NPTEL : Introduction to Aerospace Propulsion (Aerospace Engineering)

Co-ordinators : Prof. Bhaskar Roy, Prof. A M Pradeep

Lecture 1 - Course Intro & Historical development of flights

Lecture 2 - Early development of aircraft propulsive devices

Lecture 3 - Development of Jet propulsion for aircraft

Lecture 4 - Introduction to thermodynamics, Scope and method, Basic concepts: system, surroundings, property, intensive and extensive, state, equilibrium and state postulate, process, path and cycle

Lecture 5 - Quasi-static processes, zeroth law of thermodynamics and temperature, concept of energy and its various forms, internal energy, enthalpy

Lecture 6 - Specific heats at constant pressure and volume Work and heat transfers

Lecture 7 - Tutorial

Lecture 8 - First law of thermodynamics for closed systems

Lecture 9 - First law of thermodynamics for open systems/flow processes

Lecture 10 - Second law of thermodynamics, heat engines, refrigerators and heat pumps, Kelvin-Planck and Clausius statement of second law of thermodynamics

Lecture 11 - Reversible and irreversible processes, concept of entropy

Lecture 12 - Increase of entropy principle, third law of thermodynamics, absolute entropy, perpetual motion machines

Lecture 13 - Tutorial

Lecture 14 - Carnot cycle, Carnot principle, thermodynamic temperature scale

Lecture 15 - Exergy, availability and second law efficiency

Lecture 16 - Tutorial

Lecture 17 - Gas and vapour power cycles, Otto cycle, Diesel cycle, Dual cycle

Lecture 18 - Rankine cycle, Brayton cycle, Stirling and Ericsson cycles

Lecture 19 - Thermodynamic property relations, Jacobean and Legendre transformations, Maxwellâ€™s equations

Lecture 20 - Tutorial

Lecture 21 - Properties of gas and vapour mixtures

Lecture 22 - One-dimensional compressible flows, isentropic flows

Lecture 23 - Flows with friction and heat transfer, normal and oblique shocks

Lecture 24 - Piston-prop engines: Otto cycles; Ideal and Real cycles

Lecture 25 - IC Engines for aircraft application

Lecture 26 - Performance parameters of IC engines

Lecture 27 - Supercharging of aircraft IC engines

Lecture 28 - Tutorial: IC Engines

Lecture 29 - Propeller fundamentals

Lecture 30 - Propeller aerodynamic theories - I

Lecture 31 - Propeller aerodynamic theories - II

Lecture 32 - Tutorial: Propellers

Lecture 33 - Ideal cycles for Jet engines

Lecture 34 - Ideal cycles for variants of jet engines

Lecture 35 - Tutorial

Lecture 36 - Fundamentals of Ramjets and Pulsejets

Lecture 37 - Fundamentals of Rocket engines

Lecture 38 - Fundamentals of Missile engines

Lecture 39 - Various space vehicles and their engines

Lecture 40 - Closure of the lecture series : recap

NPTEL : Jet Aircraft Propulsion (Aerospace Engineering)

Co-ordinators : Prof. A M Pradeep, Prof. Bhaskar Roy

Lecture 1 - Introduction & Development of Jet Aircraft Propulsion

Lecture 2 - How the Aircraft Jet Engines make Thrust

Lecture 3 - Jet Engine Basic Performance Parameters

Lecture 4 - Turbojet, Reheat Turbojet and Multi-spool Engines

Lecture 5 - Turbofan, Turbo-prop and Turboshaft engines

Lecture 6 - Ideal and Real Brayton cycles

Lecture 7 - Jet Engine Cycles for Aircraft propulsion

Lecture 8 - Cycle components and component performances

Lecture 9 - Tute-1

Lecture 10 - Analysis of engine real cycles

Lecture 11 - Tute-2

Lecture 12 - Thermodynamics of Compressors

Lecture 13 - Thermodynamics of Turbines

Lecture 14 - Axial Compressors : two dimensional analytical model

Lecture 15 - Cascade analysis; Loss and Blade performance estimation

Lecture 16 - Free Vortex theory; Single-Multi-stage characteristics

Lecture 17 - Tutes-3

Lecture 18 - Elements of centrifugal compressor

Lecture 19 - Centrifugal Compressor characteristics: Surging, Choking

Lecture 20 - Axial flow turbines; Turbine Blade 2-D (cascade) analysis

Lecture 21 - Multi-staging: Axial Turbine; Turbine Cooling Technology

Lecture 22 - Radial Turbine Aerodynamics & Thermodynamics; Losses

Lecture 23 - Tutes-4

Lecture 24 - Types of combustion chambers: mechanism & parameters

Lecture 25 - Pr. Loss, Combustion efficiency; Combustion intensity

Lecture 26 - Practical combustion system ; Stability, Fuel injection

Lecture 27 - Intakes for Powerplant: Transport / Military Aircraft

Lecture 28 - Subsonic, Transonic, Supersonic Intake Designs

Lecture 29 - Nozzle : fixed and variable geometry nozzles

Lecture 30 - C-D nozzle and their uses

Lecture 31 - Tute-5

Lecture 32 - Engine Off Design Operations

Lecture 33 - Aircraft Engine component matching: Dimensional analysis

Lecture 34 - Engine component matching and Sizing

Lecture 35 - Installed Performance of Engine

Lecture 36 - Tute-6

Lecture 37 - Use of Ramjets and Pulsejets in Aircraft propulsion

Lecture 38 - Thermodynamic Cycle & Performance Parameters

Lecture 39 - Flow in Diffusers, Combustors and Nozzles

Lecture 40 - Performanace and Design of Ramjet & Scramjet Engines

Lecture 41 - Tute-7

Lecture 42 - Future of Aircraft Propulsion

NPTEL : Turbomachinery Aerodynamics (Aerospace Engineering)

Co-ordinators : Prof. Bhaskar Roy, Prof. A M Pradeep

Lecture 1 - Introduction to Turbo machines Syllabus, References and Schedules

Lecture 2 - Axial Flow Compressors and Fans : Introduction to Compressor Aerothermodynamics

Lecture 3 - A two dimensional analytical model :Cascade

Lecture 4 - 2D losses in Axial flow Compressor Stage : Primary losses

Lecture 5 - Tutorial 1 : Two Dimensional Axial Flow Compressors

Lecture 6 - 3D Flows in Blade Passages, Secondary Flows, Tip leakage Flow, Scrubbling

Lecture 7 - Three Dimensional Flow Analysis : Radial Equilibrium Concept

Lecture 8 - Classical Blade Design Laws : Free Vortex and other Laws

Lecture 9 - Three Dimensional Flow Analysis in Axial Flow Compressor

Lecture 10 - Tutorial 2 : Three Dimensional Axial Flow Compressors

Lecture 11 - Axial Compressor Characteristics: Single stage, Multi stage and Multi spool Characteristics

Lecture 12 - Instability in Axial Compressors

Lecture 13 - Inlet Distortion and Rotating Stall, Control of Instability

Lecture 14 - Transonic Compressors and Shock Structure Models, Transonic Compressor Characteristics

Lecture 15 - Axial Flow Compressor Design, Inter Spool Duct

Lecture 16 - Design of Compressor Blades, Aerofoil Design (Subsonic, Transonic, Supersonic Profiles)

Lecture 17 - Design of Compressor Blade: 3D Blade Shapes of Rotors and Stators

Lecture 18 - Noise Problem in Axial Compressors and Fans

Lecture 19 - Axial Flow Turbines: Introduction to Turbines Aerothermodynamics

Lecture 20 - Axial Flow Turbines: Turbine Blade 2D (Cascade) Analysis

Lecture 21 - Axial Flow Turbines: Work done, Degree of Reaction, Losses and Efficiency

Lecture 22 - Axial Flow Turbines: Blade and Axial Flow Passages, Exit Flow Matching with Nozzle

Lecture 23 - Tutorial 3 : Axial Flow Turbines

Lecture 24 - Multi staging and Multi spooling of Turbine

Lecture 25 - 3D Flow in Turbine: 3D Flow Theories, Free Vortex Theories etc.

Lecture 26 - Tutorial 4 : 3D Flows in Axial Flow Turbines

Lecture 27 - Turbine Blade Cooling â€“ Fundamentals of Heat Transfer, Blade Cooling Requirements

Lecture 28 - Turbine Blade Cooling Technologies

Lecture 29 - Turbine Blade Design: Turbine Profiles, Aerofoil Data and Profile Construction

Lecture 30 - Turbine Blade Design: 3D Blade Shapes

Lecture 31 - Centrifugal Compressors: Thermodynamics and Aerodynamics

Lecture 32 - Centrifugal Compressors: Characteristics, Stall, Surge Problems

Lecture 33 - Tutorial 5 : Centrifugal Compressors

Lecture 34 - Design of Centrifugal Compressors: Impellers, Vane/Vane less Diffusers, Volutes

Lecture 35 - Radial Turbines: Thermodynamics and Aerodynamics

Lecture 36 - Tutorial 6 : Radial Turbines

Lecture 37 - Radial Turbine Characteristics and Design of Radial Turbines

Lecture 38 - CFD for Turbomachinery: Grid Generation, Boundary Conditions for Flow Analysis

Lecture 39 - CFD for Turbomachinery: Flow Track and Inter-spool Duct Design using CFD

Lecture 40 - CFD for Turbomachinery: 2D and 3D Blade Generation and Analysis Using CFD

NPTEL : NOC:Introduction to Aerospace Engineering (Aerospace Engineering)

Co-ordinators : Prof. Rajkumar Pant

Lecture 1 - Course Layout and Brief Introduction of Course Instructor

Lecture 2 - Introduction to International Standard Atmosphere (ISA)

Lecture 3 - Pressure, Temperature, Density and Viscosity Variation with Altitude in ISA

Lecture 4 - Other Standard Atmospheres

Lecture 5 - Aircraft Component Nomenclature - Wing and its Components

Lecture 6 - Aircraft Component Nomenclature - Fuselage and its Components

Lecture 7 - Aircraft Component Nomenclature - Tail Plane and its Components

Lecture 8 - Tutorial 1 - Aircraft Component Nomenclature

Lecture 9 - Essentials of Incompressible Flow - Part I

Lecture 10 - Essentials of Incompressible Flow - Part II

Lecture 11 - Bernoulli's Equation and Coanda Effect

Lecture 12 - Mach Number

Lecture 13 - Tutorial 2 - Incompressible Flow and Flow Visualization

Lecture 14 - Viscous Flow and Reynolds Number

Lecture 15 - Introduction to Boundary Layer

Lecture 16 - Pressure Measurement

Lecture 17 - Air Speed Measurement - Pitot Static Tube

Lecture 18 - Air Speed Corrections

Lecture 19 - Altitude and ROC/ROD Measurement

Lecture 20 - Measurements in Compressible Flows

Lecture 21 - Non Pneumatic Instruments

Lecture 22 - Introduction to Aerofoils and Aerofoil Nomenclature

Lecture 23 - Aerofoils - A Visit to the Past

Lecture 24 - Thick Aerofoils

Lecture 25 - Low Reynolds Number Aerofoils

Lecture 26 - Lift Generation by Wings - Part I

Lecture 27 - Lift Generation by Wings - Part II

Lecture 28 - Coefficient of Lift and Coefficient of Pressure

Lecture 29 - Tutorial on Aerofoils

Lecture 30 - Critical Mach Number

Lecture 31 - Wave Drag

Lecture 32 - Swept Wings

Lecture 33 - Introduction to Drag and Types of Drag

Lecture 34 - Factors Affecting Induced Drag

Lecture 35 - Skin Friction Drag

Lecture 36 - Tutorial on Critical Mach Number and Wave Drag

Lecture 37 - Introduction to Propulsion

Lecture 38 - Gas Turbine Engine Types - Part I

Lecture 39 - Gas Turbine Engine Types - Part II

Lecture 40 - Introduction to Electric Propulsion and Ion Propulsion

Lecture 41 - Steady Level Flight

Lecture 42 - Power Required for the Steady Level Flight

Lecture 43 - Steady Level Flight - A Pilot's View

Lecture 44 - Tutorial on Steady Level Flight

Lecture 45 - Gliding Flight

Lecture 46 - Climbing Flight and Ceiling

Lecture 47 - Introduction to Turning Flight

Lecture 48 - Turning Flight Equations

Lecture 49 - Instantaneous and Sustained Turn

Lecture 50 - Tutorial on Climbing Flight and Turning Flight

Lecture 51 - Introduction to Static Stability: Center of Pressure, Center of Gravity and Neutral Point

Lecture 52 - Aerodynamic Center and Effect of Center of Gravity

Lecture 53 - Effect of Center of Gravity - A Practical Demonstration

Lecture 54 - Introduction to V-n Diagram

Lecture 55 - V-n Diagram as per FAR 23 Regulations

Lecture 56 - Effect of Gusts on V-n Diagram

Lecture 57 - Tutorial on Stability and Control

Lecture 58 - Range

Lecture 59 - Specific Fuel Consumption and Generalized Range Equation

Lecture 60 - Endurance

Lecture 61 - Take-off Performance of Flight - Part I

Lecture 62 - Take-off Performance of Flight - Part II

Lecture 63 - Landing Performance of Flight

Lecture 64 - Tutorial on Range Payload Diagram

Lecture 65 - Tutorial on Range and Endurance

Lecture 66 - Flapping Wing Aerodynamics - Part I

Lecture 67 - Flapping Wing Aerodynamics - Part II

NPTEL : NOC:Introduction to Aircraft Design (Aerospace Engineering)

Co-ordinators : Prof. Rajkumar Pant

Lecture 1 - What is Aircraft Design

Lecture 2 - Aircraft Design Process

Lecture 3 - Design Stages

Lecture 4 - Phases in Aircraft Design

Lecture 5 - The Design Spiral

Lecture 6 - Importance of Cost in Aircraft Design

Lecture 7 - Basic Laws of Aircraft Design

Lecture 8 - Requirements Capture

Lecture 9 - Quality Function Deployment

Lecture 10 - House of Quality Chart

Lecture 11 - Example of HoQ for HALE UAV

Lecture 12 - Illustration of HOQ-GA aircraft

Lecture 13 - Airliners

Lecture 14 - Key Issues in Design of Airliners

Lecture 15 - Design Considerations - Future Airliners

Lecture 16 - Supersonic Transport Aircraft

Lecture 17 - Airliner and Supersonic Aircraft, some additional concepts

Lecture 18 - Design Considerations - Cargo Aircraft

Lecture 19 - Design Considerations - GA Aircraft

Lecture 20 - Types of Military Aircraft

Lecture 21 - Cargo, GA and Military Aircraft, Some additional concepts

Lecture 22 - Aircraft Configuration Design

Lecture 23 - Podded Engines on Wings

Lecture 24 - Wing Sweep

Lecture 25 - Canards and Flying Wing

Lecture 26 - Three Surface Aircraft

Lecture 27 - Winglets

Lecture 28 - Thrust Vectoring

Lecture 29 - Few Novel Concepts_01

Lecture 30 - Aircraft Configuration Design - Closing Remarks

Lecture 31 - Choices in Aircraft Layout

Lecture 32 - Wing Geometry Definitions

Lecture 33 - Options for Wing layout

Lecture 34 - Propulsion System Layout

Lecture 35 - Tail Plane Layout

Lecture 36 - Landing Gear Layout - Part 1

Lecture 37 - Landing Gear Layout - Part 2

Lecture 38 - Landing Gear of some Famous Aircraft

Lecture 39 - Tutorial on OpenVSP

Lecture 40 - Initial Sizing in Aircraft Design

Lecture 41 - Estimation of Empty Weight Fraction

Lecture 42 - Estimation of Mission Segment Weights

Lecture 43 - Estimation of Fuel Weight Fractions

Lecture 44 - Estimation of maximum L/D

Lecture 45 - Estimation of engine parameters

Lecture 46 - Estimation of Design gross weight

Lecture 47 - Take-off weight build up

Lecture 48 - Tutorial on Initial Sizing of Transport Aircraft

Lecture 49 - Tutorial on Initial Sizing of Military Aircraft

Lecture 50 - Subsonic Parasite Drag Estimation

Lecture 51 - Component Buildup Method

Lecture 52 - Drag Estimation of Military Aircraft

Lecture 53 - Tutorial on Drag Polar Estimation of Military Aircraft

Lecture 54 - Estimation of Lift Coefficient

Lecture 55 - Estimation of Maximum Lift Coefficient

Lecture 56 - Flaps as High Lift Devices

Lecture 57 - Tutorial on Lift Coefficient Estimation of Transport Aircraft

Lecture 58 - Tutorial on Lift Coefficient Estimation of Military Aircraft

Lecture 59 - Constraint Analysis- Introductory Remarks

Lecture 60 - Constraint Analysis- Transport Aircraft - Part 1

Lecture 61 - Constraint Analysis- Transport Aircraft - Part 2

Lecture 62 - Tutorial on Constraint Analysis of Transport Aicraft - Part 1

Lecture 63 - Tutorial on Constraint Analysis of Transport Aicraft - Part 2

Lecture 64 - Constraint Analysis- Military Aircraft

Lecture 65 - Tutorial on Constraint Analysis of Military Aicraft - Part 1

Lecture 66 - Tutorial on Constraint Analysis of Military Aicraft - Part 2

Lecture 67 - Refined Sizing

Lecture 68 - Tutorial on Refined Sizing of Jet Fighter Aircraft

Lecture 69 - Cost Estimation in Aircraft Conceptual Design

Lecture 70 - Aircraft Life Cycle Cost Estimation

Lecture 71 - Tutorial on RDT&E and Production Cost Estimation of Transport Aircraft

Lecture 72 - Tutorial on DT&E and Production Cost Estimation of HALE UAV

Lecture 73 - Estimation of Direct Operating Cost

Lecture 74 - Fighter Aircraft Life Cycle Cost Estimation Model

Lecture 75 - Range Payload Diagram - Part 1

Lecture 76 - Range Payload Diagram - Part 2

Lecture 77 - Tutorial on Range Payload Diagram of Transport Aircraft

Lecture 78 - Environmental issues in Aircraft Design

Lecture 79 - Limit Manoeuvre Envelope

Lecture 80 - Effect of Gust

Lecture 81 - Aircraft Loads

Lecture 82 - Tutorial on V-n Diagram of Transport Aircraft

Lecture 83 - High Altitude Long Endurance (HALE) Aircraft

Lecture 84 - Morphing of Aircraft Configurations

Lecture 85 - Guest Lectuer on Air Power and Multi-role Fighter Aircraft - Part 1

Lecture 86 - Guest Lectuer on Air Power and Multi-role Fighter Aircraft - Part 2

NPTEL : NOC:Introduction to Launch Vehicle Analysis and Design (Aerospace Engineering)

Co-ordinators : Prof. Ashok Joshi

Lecture 1 - Introduction

Lecture 2 - Course Plan

Lecture 3 - Ascent Mission Basics

Lecture 4 - Force and Geometry Models - 1

Lecture 5 - Force and Geometry Models - 2

Lecture 6 - Idealized Performance

Lecture 7 - Trajectory Under Gravity

Lecture 8 - Impact of Gravity

Lecture 9 - Impact of Drag

Lecture 10 - Curvilinear Motion Concept

Lecture 11 - Constant Pitch Rate Solution

Lecture 12 - Constant Velocity Solution

Lecture 13 - Constant (T/m) Solution

Lecture 14 - Ascent Mission Design

Lecture 15 - Multi-stage Rocket Basics

Lecture 16 - Multi-stage Configuration Basics

Lecture 17 - Multi-stage Solution Basics

Lecture 18 - Multi-stage Problem Definition

Lecture 19 - Optimal Staging Strategy

Lecture 20 - Lagrange Solution

Lecture 21 - Approximate Staging Solution

Lecture 22 - Variant Concept

Lecture 23 - Variant Design Solution

Lecture 24 - Parallel Staging Concept

Lecture 25 - Parallel Staging Benefits

Lecture 26 - Jet Damping and Ballistic Missiles

Lecture 27 - Current Rocket Concepts

Lecture 28 - Launch Widow and SSTO Concepts

Lecture 29 - Reentry Concept

Lecture 30 - Ballistic Reentry Solution

Lecture 31 - Lifting and Other Reentry Modes

Lecture 32 - Concluding Remarks

Lecture 33 - Rectilinear Trajectories

Lecture 34 - Curvilinear Trajectories

Lecture 35 - Multi-stage Rocket Concept

Lecture 36 - Optimal Multi-stage Solutions

NPTEL : NOC:Lighter than Air Systems (Aerospace Engineering)

Co-ordinators : Prof. Rajkumar Pant

Lecture 1 - Introduction to the Course Content

Lecture 2 - Differences between LTA and HTA systems

Lecture 3 - The three conventional LTA systems

Lecture 4 - LTA gases, Types of Airships and their components

Lecture 5 - Introduction of Skyship 600 and USP of Airships

Lecture 6 - Applications of Airships

Lecture 7 - Tethered Aerostat systems

Lecture 8 - Why use Aerostats

Lecture 9 - Some Queries on Aerostats

Lecture 10 - Historical developments of LTA systems - Part I

Lecture 11 - Historical developments of LTA systems - Part II

Lecture 12 - Historical developments of LTA systems - Part III

Lecture 13 - Historical developments of LTA systems - Part IV

Lecture 14 - Historical developments of LTA systems - Part V

Lecture 15 - Historical developments of LTA systems - Part VI

Lecture 16 - Overview of PADD

Lecture 17 - Remote Controlled Airships

Lecture 18 - Autonomous Airships

Lecture 19 - Indoor Blimp Projects by students

Lecture 20 - Biomimetic Airships

Lecture 21 - Introduction to Buoyancy

Lecture 22 - Basic Concepts of Aerostatics

Lecture 23 - Ballasting, Weigh off and Fuel weight recovery

Lecture 24 - In flight Ballast Collection methods

Lecture 25 - Static Lift Prediction - Part I

Lecture 26 - Static Lift Prediction - Part II

Lecture 27 - Tutorial Problem 1 on Static Lift Estimation

Lecture 28 - Effect of Humidity and Vapour Pressure

Lecture 29 - Calculation of Ambient Air Density

Lecture 30 - Tutorial Problem 2 and 3 on Static Lift Estimation

Lecture 31 - Effect of Lifting Gas Purity, Superpressure and Superheat

Lecture 32 - Ballonet Air Weight Estimation

Lecture 33 - Net Static Lift of non rigid airships

Lecture 34 - Net Static Lift for other LTA systems

Lecture 35 - Tutorial Problem 4 on Net Static Lift Estimation

Lecture 36 - Parameters affecting Static Lift

Lecture 37 - Effect of change in Atmospheric Pressure

Lecture 38 - Tutorial Problem 5 on Change in Atmospheric Pressure

Lecture 39 - Effect of Superpressure

Lecture 40 - Tutorial Problem 6 on effect of Superpressure

Lecture 41 - Effect of Slow change in Atmospheric Temperature and Superheat

Lecture 42 - Effect of Rapid change in Atmospheric Temperature

Lecture 43 - Tutorial Problem 7 on Change in Atmospheric Temperature and Superheat

Lecture 44 - Revision and Tutorial Problem 08 and 09 on Affecting Parameters of Static Lift

Lecture 45 - Effect of change in Relative Humidity

Lecture 46 - Effect of change in Lifting Gas Purity

Lecture 47 - Effect of change in Lifting Gas Volume

Lecture 48 - Determination of Inflation Fraction

Lecture 49 - Flight To Lower Ground Elevation

Lecture 50 - Tutorial Problem 10 on Helium Addition

Lecture 51 - Outdoor Hot Air Balloon

Lecture 52 - Pressure Height

Lecture 53 - Tutorial Problem 11 on Pressure Height Calculation

Lecture 54 - Sea Level Inflation Fraction

Lecture 55 - Flight above Pressure Height

Lecture 56 - Effect of Change in Operating Altitude

Lecture 57 - Tutorial Problem 12 on Lifting Gas Loss

Lecture 58 - Descent Following Exceedance

Lecture 59 - Pressure Height for other LTA Vehicles

Lecture 60 - Discussion of Practice Questions

Lecture 61 - Envelope Materials - Part I

Lecture 62 - Envelope Materials - Part II

Lecture 63 - Envelope Materials - Part III

Lecture 64 - Fabric Testing Machines - Part I

Lecture 65 - Fabric Testing Machines - Part II

Lecture 66 - Need for Ground Handling

Lecture 67 - Aerium Hanger for CL 160 Airship

Lecture 68 - Ground Handling of Airships

Lecture 69 - Types of Mooring Masts and Design Requirements

Lecture 70 - Nose Battens for Envelopes

Lecture 71 - Need for Airship Design Methodology

Lecture 72 - Overview of Airship Design Methodology ADM

Lecture 73 - Details of Airship Design Methodology ADM

Lecture 74 - Inputs to Airship Design Methodology - Part 1

Lecture 75 - Inputs to Airship Design Methodology - Part 2

Lecture 76 - Design Constants in Airship Design Methodology

Lecture 77 - Outputs from Airship Design Methodology

Lecture 78 - Statistical Data Used in Airship Design Methodology

Lecture 79 - Validation of Airship Design Methodology

Lecture 80 - Envelope Shapes for LTA Systems

Lecture 81 - Example of Application of Airship Design Methodology

Lecture 82 - Conclusions and Limitations of Airship Design Methodology

Lecture 83 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 1

Lecture 84 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 2

Lecture 85 - Sizing Procedure for Indoor Remotely Controlled Airships - Part 3

Lecture 86 - Tutorial on Sizing of an Indoor Non Rigid Remotely Controlled Airship

Lecture 87 - Transportation Problems Faced by Remote Regions

Lecture 88 - Airships vs Helicopters - Part I

Lecture 89 - Airships vs Helicopters - Part II

Lecture 90 - Chaar Dham Yatra - Part I

Lecture 91 - Chaar Dham Yatra - Part II

Lecture 92 - Chaar Dham Yatra - Part III

Lecture 93 - Steam and IC engines for Airships

Lecture 94 - Electric motors for Airships

Lecture 95 - Turboprops for Airships

Lecture 96 - Solar Propulsion and Thrust Vectoring on Airships

Lecture 97 - Lectuer on Dynamics

Lecture 98 - Lectuer on Drag

Lecture 99 - Aerodynamic Stability

Lecture 100 - Added Mass Effects

Lecture 101 - Introduction to Aerostat Design Methodology

Lecture 102 - Inputs for Aerostat Design Methodology

Lecture 103 - Design Constants in Aerostat Design Methodology

Lecture 104 - Overview of Aerostat Design Methodology

Lecture 105 - Equilibrium Analysis of Aerostats - Part I

Lecture 106 - Equilibrium Analysis of Aerostats - Part II

Lecture 107 - Methodology for Tether Profile Estimation

Lecture 108 - Sizing of Reusable Indoor Hot Air Balloon

Lecture 109 - Tutorial on Sizing of RIHAB

Lecture 110 - Features of Hybrid Airships

Lecture 111 - Technological challenges in HALE Platforms development - Part I

Lecture 112 - Technological challenges in HALE Platforms development - Part II

Lecture 113 - Initial sizing of Stratospheric Airships

Lecture 114 - Introduction to Hybrid Airships

Lecture 115 - Lockheed Martin's P 791 Hybrid Airship

Lecture 116 - Aeroscraft ML 866 Hybrid Airship

Lecture 117 - SkyCat Hybrid Airship

Lecture 118 - Rotary and Winged Hybrid Airships

Lecture 119 - Hybrid Ultra Heavy Lift Cargo Vehicle Transport

Lecture 120 - Features of Hybrid Airships

Lecture 121 - Solar Powered Airships

NPTEL : NOC:Elements of Mechanical Vibration (Aerospace Engineering)

Co-ordinators : Prof. Ashish K Darpe

Lecture 1

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Lecture 4

Lecture 5

Lecture 6

Lecture 7

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Lecture 10

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Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28 - LABORATORY SESSION (Introduction)

Lecture 29 - EXPERIMENT 1

Lecture 30 - EXPERIMENT 2

Lecture 31 - EXPERIMENT No. 2

Lecture 32

Lecture 33

Lecture 34

Lecture 35 - LABORATORY SESSION #3

Lecture 36 - LABORATORY SESSION #4

Lecture 37 - LABORATORY SESSION #5

Lecture 38

Lecture 39

Lecture 40

Lecture 41 - LABORATORY SESSION #6

Lecture 42 - LABORATORY SESSION #7

Lecture 43 - LABORATORY SESSION #8

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

NPTEL : Aero elasticity (Aerospace Engineering)

Co-ordinators : Prof. C. Venkatesan

Lecture 1 - Aero elasticity

Lecture 2 - Aero elasticity

Lecture 3 - Aero elasticity

Lecture 4 - Aero elasticity

Lecture 5 - Aero elasticity

Lecture 6 - Aero elasticity

Lecture 7 - Aero elasticity

Lecture 8 - Aero elasticity

Lecture 9 - Aero elasticity

Lecture 10 - Aero elasticity

Lecture 11 - Aero elasticity

Lecture 12 - Aero elasticity

Lecture 13 - Aero elasticity

Lecture 14 - Aero elasticity

Lecture 15 - Aero elasticity

Lecture 16 - Aero elasticity

Lecture 17 - Aero elasticity

Lecture 18 - Aero elasticity

Lecture 19 - Aero elasticity

Lecture 20 - Aero elasticity

Lecture 21 - Aero elasticity

Lecture 22 - Aero elasticity

Lecture 23 - Aero elasticity

Lecture 24 - Aero elasticity

Lecture 25 - Aero elasticity

Lecture 26 - Aero elasticity

NPTEL : Foundation of Scientific Computing (Aerospace Engineering)

Co-ordinators : Prof. Tapan K. Sengupta

Lecture 1

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Lecture 5

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Lecture 9

Lecture 10

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Lecture 12

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Lecture 32

Lecture 33

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Lecture 37

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Lecture 40

NPTEL : Instability and Transition of Fluid Flows (Aerospace Engineering)

Co-ordinators : Prof. Tapan K. Sengupta

Lecture 1 - Instability and Transition of Fluid Flows

Lecture 2 - Instability and Transition of Fluid Flows

Lecture 3 - Instability and Transition of Fluid Flows

Lecture 4 - Instability and Transition of Fluid Flows

Lecture 5 - Instability and Transition of Fluid Flows

Lecture 6 - Instability and Transition of Fluid Flows

Lecture 7 - Instability and Transition of Fluid Flows

Lecture 8 - Instability and Transition of Fluid Flows

Lecture 9 - Instability and Transition of Fluid Flows

Lecture 10 - Instability and Transition of Fluid Flows

Lecture 11 - Instability and Transition of Fluid Flows

Lecture 12 - Instability and Transition of Fluid Flows

Lecture 13 - Instability and Transition of Fluid Flows

Lecture 14 - Instability and Transition of Fluid Flows

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Lecture 38 - Instability and Transition of Fluid Flows

Lecture 39 - Instability and Transition of Fluid Flows

NPTEL : Introduction to Helicopter Aerodynamics and Dynamics (Aerospace Engineering)

Co-ordinators : Prof. A.R. Manjunath, Prof. C. Venkatesan

Lecture 1 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 2 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 3 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 4 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 5 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 6 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 7 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 8 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 9 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 10 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 11 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 12 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 13 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 14 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 15 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 16 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 17 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 18 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 19 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 20 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 21 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 22 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 23 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 24 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 25 - Introduction to Helicopter Aerodynamics and Dynamics

Lecture 26 - Introduction to Helicopter Aerodynamics and Dynamics

NPTEL : Introduction to Propulsion (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Fundamentals of Aerospace Propulsion

Lecture 2 - Fundamentals of Aerospace Propulsion

Lecture 3 - Fundamentals of Aerospace Propulsion

Lecture 4 - Fundamentals of Aerospace Propulsion

Lecture 5 - Fundamentals of Aerospace Propulsion

Lecture 6 - Fundamentals of Aerospace Propulsion

Lecture 7 - Fundamentals of Aerospace Propulsion

Lecture 8 - Fundamentals of Aerospace Propulsion

Lecture 9 - Fundamentals of Aerospace Propulsion

Lecture 10 - Fundamentals of Aerospace Propulsion

Lecture 11 - Fundamentals of Aerospace Propulsion

Lecture 12 - Fundamentals of Aerospace Propulsion

Lecture 13 - Fundamentals of Aerospace Propulsion

Lecture 14 - Fundamentals of Aerospace Propulsion

Lecture 15 - Fundamentals of Aerospace Propulsion

Lecture 16 - Fundamentals of Aerospace Propulsion

Lecture 17 - Fundamentals of Aerospace Propulsion

Lecture 18 - Fundamentals of Aerospace Propulsion

Lecture 19 - Fundamentals of Aerospace Propulsion

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Lecture 21 - Fundamentals of Aerospace Propulsion

Lecture 22 - Fundamentals of Aerospace Propulsion

Lecture 23 - Fundamentals of Aerospace Propulsion

Lecture 24 - Fundamentals of Aerospace Propulsion

Lecture 25 - Fundamentals of Aerospace Propulsion

Lecture 26 - Fundamentals of Aerospace Propulsion

Lecture 27 - Fundamentals of Aerospace Propulsion

Lecture 28 - Fundamentals of Aerospace Propulsion

Lecture 29 - Fundamentals of Aerospace Propulsion

Lecture 30 - Fundamentals of Aerospace Propulsion

Lecture 31 - Fundamentals of Aerospace Propulsion

Lecture 32 - Fundamentals of Aerospace Propulsion

Lecture 33 - Fundamentals of Aerospace Propulsion

Lecture 34 - Fundamentals of Aerospace Propulsion

Lecture 35 - Fundamentals of Aerospace Propulsion

Lecture 36 - Fundamentals of Aerospace Propulsion

Lecture 37 - Fundamentals of Aerospace Propulsion

Lecture 38 - Fundamentals of Aerospace Propulsion

Lecture 39 - Fundamentals of Aerospace Propulsion

Lecture 40 - Fundamentals of Aerospace Propulsion

NPTEL : Jet and Rocket Propulsion (Aerospace Engineering)

Co-ordinators : Dr. A. Kushari

Lecture 1 - Jet and Rocket Propulsion

Lecture 2 - Jet and Rocket Propulsion

Lecture 3 - Jet and Rocket Propulsion

Lecture 4 - Jet and Rocket Propulsion

Lecture 5 - Jet and Rocket Propulsion

Lecture 6 - Jet and Rocket Propulsion

Lecture 7 - Jet and Rocket Propulsion

Lecture 8 - Jet and Rocket Propulsion

Lecture 9 - Jet and Rocket Propulsion

Lecture 10 - Jet and Rocket Propulsion

Lecture 11 - Jet and Rocket Propulsion

Lecture 12 - Jet and Rocket Propulsion

Lecture 13 - Jet and Rocket Propulsion

Lecture 14 - Jet and Rocket Propulsion

Lecture 15 - Jet and Rocket Propulsion

Lecture 16 - Jet and Rocket Propulsion

Lecture 17 - Jet and Rocket Propulsion

Lecture 18 - Jet and Rocket Propulsion

Lecture 19 - Jet and Rocket Propulsion

Lecture 20 - Jet and Rocket Propulsion

Lecture 21 - Jet and Rocket Propulsion

Lecture 22 - Jet and Rocket Propulsion

Lecture 23 - Jet and Rocket Propulsion

Lecture 24 - Jet and Rocket Propulsion

Lecture 25 - Jet and Rocket Propulsion

Lecture 26 - Jet and Rocket Propulsion

Lecture 27 - Jet and Rocket Propulsion

Lecture 28 - Jet and Rocket Propulsion

Lecture 29 - Jet and Rocket Propulsion

Lecture 30 - Jet and Rocket Propulsion

Lecture 31 - Jet and Rocket Propulsion

Lecture 32 - Jet and Rocket Propulsion

Lecture 33 - Jet and Rocket Propulsion

Lecture 34 - Jet and Rocket Propulsion

Lecture 35 - Jet and Rocket Propulsion

Lecture 36 - Jet and Rocket Propulsion

Lecture 37 - Jet and Rocket Propulsion

Lecture 38 - Jet and Rocket Propulsion

Lecture 39 - Jet and Rocket Propulsion

Lecture 40 - Jet and Rocket Propulsion

NPTEL : NOC:Introduction to Airplane Performance (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh, Dr. Deepu Philip

Lecture 1 - General Introduction: Airplane Performance Characteristics

Lecture 2 - George Cayley: Concept of Lift and Drag

Lecture 3 - Introduction to airplane and its components

Lecture 4 - Hansa 3 Aircraft and its Primary Systems

Lecture 5 - Concept of Lift Aerofoil: Wing : Complete Aircraft

Lecture 6 - Drag Polar

Lecture 7 - Revision

Lecture 8 - Standard Atmosphere: Description and Modeling

Lecture 9 - Measuring Instruments: Altimeter, Airspeed Indicator

Lecture 10 - Equations of Motion: Static Performance

Lecture 11 - Thrust Required, Power Required: Cruise

Lecture 12 - Excess Thrust and Power: Climb Angle and Rate of Climb

Lecture 13 - Review

Lecture 14 - Thrust Required: A Closer Look

Lecture 15 - Modeling of CL: Dimensional Analysis

Lecture 16 - A Closer Look: Point Mass Model, Dimensional Analysis

Lecture 17 - Estimation of Drag Polar Through Flight Test

Lecture 18 - Estimation of Rate of Climb

Lecture 19 - Revision.

Lecture 20 - Range and Endurance

Lecture 21 - Range and Endurance: (Continued...)

Lecture 22 - Gliding Flight

Lecture 23 - Accelerated Flight

Lecture 24 - V-n Diagram

Lecture 25 - Revision..

Lecture 26 - V stall: Cruise and Manoeuvre

Lecture 27 - Flaps:High Lift Devices to Reduce Take off / Landing Distance

Lecture 28 - Take off

Lecture 29 - Take off Performance

Lecture 30 - Take off Performance: (Continued...)

Lecture 31 - Revision...

Lecture 32 - Landing Performance

Lecture 33 - Landing Performance: (Continued...)

Lecture 34 - Challanges in Takeoff and Landing: Single and Twin Engines

Lecture 35 - Introduction to Static Stability

Lecture 36 - Positioning of Center of Pressure for Static Stability

Lecture 37 - Revision.....

Lecture 38 - Stability and Control: Designers Perspective

Lecture 39 - Stability and Control: Designers Perspective (Continued...)

Lecture 40 - Longitudinal Control: Elevator

Lecture 41 - Contribution of Wing and Tail: Stability

Lecture 42 - Stability: Wing and Tail Contribution

Lecture 43 - Control: Elevator

Lecture 44 - Control: Delta-e Required

Lecture 45 - Control: Delta-e Required (Continued...)

Lecture 46 - Design Basics: Wing Loading & Thrust Loading

Lecture 47 - Design Basics: Sweep & Dihedral

Lecture 48 - Revision.

NPTEL : NOC:Stability and control of aircraft (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh

Lecture 1 - Introduction

Lecture 2 - Introduction to Static Stability

Lecture 3 - Stability and Trim

Lecture 4 - Stability : Wing Contribution

Lecture 5 - Stability : Tail Contribution and Static Margin

Lecture 6 - Problems : Stability and Wing Contribution Completed

Lecture 7 - Problems : Stability Tail Contribution Completed

Lecture 8 - Neutral Point and Fuselage Contribution Completed

Lecture 9 - Longitudinal Control Completed

Lecture 10 - Longitudinal Control (Continued...)

Lecture 11 - Control: Elevator

Lecture 12 - CL_trim Vs ????e_trim

Lecture 13 - Neutral Point: A Closer Look

Lecture 14 - Contribution of Engine towards Stability

Lecture 15 - Revision

Lecture 16 - Trim:Cruse,Climb and Landing

Lecture 17 - Trim: Maneuver

Lecture 18 - Maneuvering Point: Stick Fixed

Lecture 19 - Numerical: Stick Fixed Maneuvering Point and Flight Demonstration

Lecture 20 - Revision

Lecture 21 - Directional Stability

Lecture 22 - Directional Control

Lecture 23 - Lateral Stability and Control

Lecture 24 - Numericals : Directional, Lateral Stability and Control

Lecture 25 - Revision

Lecture 26 - Stick Free Stability

Lecture 27 - Stick Free Stability (Continued...)

Lecture 28 - Hinge Moment and Hinge Moment Derivative

Lecture 29 - Aircraft Handling Qualities

Lecture 30 - Aircraft Handling Qualities (Continued...)

Lecture 31 - Reversible Control: Stick Free and Trim Tabs

Lecture 32 - Numericals: Stick Free

Lecture 33 - Numericals: Stick Free (Continued...)

Lecture 34 - Handling Qualities: Maneuvering Flight

Lecture 35 - Determination of Neutral Point and Maneuvering Point by Flight Experiment

Lecture 36 - Ponit Mass Equation of Motion

Lecture 37 - Forces and Moments

Lecture 38 - Aircraft Equations of Motion

Lecture 39 - Six Degrees of Freedom of an Aircraft

Lecture 40 - 6 DoF : Angular Momentum Components

Lecture 41 - Vector in a Rotating Frame

Lecture 42 - Euler Angles

Lecture 43 - Small Perturbation Theory

Lecture 44 - Small Perturbation Theory (Continued...)

Lecture 45 - Perturbed Equations of Motion: Longitudinal Case

Lecture 46 - Perturbed Force : fz

Lecture 47 - Perturbed Force : fz (Continued...)

Lecture 48 - Perturbed Pitching Moment

Lecture 49 - Longitudinal Dimensional Stability Derivatives

Lecture 50 - Dynamic Stability

Lecture 51 - Longitudinal Modes

Lecture 52 - Short Period and Phugoid Approximations

Lecture 53 - Pure Pitching Motion

Lecture 54 - Stability Augmentation System (SAS)

Lecture 55 - Lateral-Directional Motion

Lecture 56 - Tutorial - 1

Lecture 57 - Tutorial - 2

Lecture 58 - Tutorial - 3

Lecture 59 - Tutorial - 4

Lecture 60 - History of Aviation

NPTEL : NOC:Engineering Thermodynamics (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Thermodynamics and its Applications

Lecture 2 - System and its Surroundings

Lecture 3 - Property of System

Lecture 4 - Energy and its Various Forms

Lecture 5 - Concepts of Equilibrium and its State

Lecture 6 - Energy and its Interactions

Lecture 7 - Heat Interactions

Lecture 8 - Thermodynamic Properties of Fluids - 1

Lecture 9 - Thermodynamic Properties of Fluids - 2

Lecture 10 - Thermodynamic Properties of Fluids - 3

Lecture 11 - Thermodynamic Properties of Fluids - 4

Lecture 12 - Thermodynamic Properties of Fluids - 5

Lecture 13 - First Law of Thermodynamics for Cyclic Process

Lecture 14 - First Law of Thermodynamics for Non-cyclic Process - 1

Lecture 15 - First Law of Thermodynamics for Non-cyclic Process - 2

Lecture 16 - Control Mass and Control Volume

Lecture 17 - First Law of Thermodynamics for Steady Flow Processes

Lecture 18 - First Law of Thermodynamics for Unsteady Flow Processes

Lecture 19 - First Law of Thermodynamics to Reacting Systems

Lecture 20 - Second Law of Thermodynamics: Basic Concepts - 1

Lecture 21 - Second Law of Thermodynamics: Basic Concepts - 2

Lecture 22 - Second Law of Thermodynamics: Carnot Cycle and Efficiency

Lecture 23 - Second Law of Thermodynamics: Clausius Inequality

Lecture 24 - Applications of Second Law of Thermodynamics: Entropy - 1

Lecture 25 - Applications of Second Law of Thermodynamics: Entropy - 2

Lecture 26 - Exergy

Lecture 27 - Gas Turbine Cycle

Lecture 28 - Vapor Power Cycle - 1

Lecture 29 - Vapor Power Cycle - 2

Lecture 30 - Vapor Power Cycle - 3

Lecture 31 - Gas Power Cycles - 1

Lecture 32 - Gas Power Cycles - 2

Lecture 33 - Refrigeration Cycles

Lecture 34 - Non-Reacting Mixture and Psychrometry

Lecture 35 - Gas-Vapor Mixture and Air Conditioning - 1

Lecture 36 - Gas-Vapor Mixture and Air Conditioning - 2

Lecture 37 - Thermodynamic Property Relations - 1

Lecture 38 - Thermodynamic Property Relations - 2

NPTEL : NOC:Aircraft Dynamic Stability and Design Stability (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh

Lecture 1 - Introduction to Dynamic Stability

Lecture 2 - Spring-Mass-Damper System : Underdamped

Lecture 3 - Spring-Mass-Damper System : Over and Critically damped

Lecture 4 - Laplace Transform

Lecture 5 - Pitch Dynamics : 1 D

Lecture 6 - Numericals: Week - 1

Lecture 7 - Aircraft Rigid Body Equation of Motion

Lecture 8 - Six Degree of Freedom Equation of Motion

Lecture 9 - Vector in Rotating Frame

Lecture 10 - Forces and Moments on Aircraft

Lecture 11 - Euler Angles

Lecture 12 - Trajectory of the Aircraft

Lecture 13 - Small Perturbation Theory

Lecture 14 - Perturbed Aerodynamic Forces and Moments

Lecture 15 - U-derivatives

Lecture 16 - Alpha - derivatives

Lecture 17 - Alpha Dot Derivatives

Lecture 18 - q and delta Derivatives

Lecture 19 - Dimensional Stability Derivatives

Lecture 20 - Longitudinal Characteristic Equation

Lecture 21 - Routh's Criteria and Longitudinal Dynamic Stability

Lecture 22 - Longitudinal Modes: Short Period and Phugoid

Lecture 23 - Short period Mode Approximation

Lecture 24 - Long Period Mode (Phugoid) Approximation

Lecture 25 - Lateral Directional Stability Derivatives

Lecture 26 - Lateral Directional Stability Derivatives (Continued...)

Lecture 27 - Perturbed Equation of Motion for Lateral Dynamics

Lecture 28 - Modes of Lateral Directional Dynamics

Lecture 29 - Spiral and Dutch Roll modes Approximation

Lecture 30 - RouthÂ–Hurwitz Stability Criterion

Lecture 31 - Introduction to Stability Augmentation

Lecture 32 - Pure Yawing and Pure Rolling Motion

Lecture 33 - SAS for Longitudinal Dynamics

Lecture 34 - SAS for Lateral Dynamics

Lecture 35 - Flight Handling Qualities

Lecture 36 - Numericals

Lecture 37 - Revision

Lecture 38 - Mode Shape : Longitudinal Case

Lecture 39 - Mode Shape : Lateral Directional Case

Lecture 40 - Numericals : Transfer Funtions and Response

Lecture 41 - Stability Augmentation System

Lecture 42 - Numericals : SAS

Lecture 43 - Numericals : Mode Shapes

NPTEL : NOC:Introduction to Ancient Indian Technology (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Introduction to Ancient Indian Civilization

Lecture 2 - Ancient Indian CivilizationÂ's Gift to the World

Lecture 3 - Why do we need to look at Ancient Indian Science and Technology?

Lecture 4 - Glimpses of Ancient Indian Science and Technology

Lecture 5 - Brief Review of Ancient Indian Scriptures

Lecture 6 - Basic Principles of carrying out science and technology

Lecture 7 - Arrays of Physics, chemistry and Indoor games

Lecture 8 - Marvels of Ancient Indian Technology

Lecture 9 - Introduction to Indian Agriculture

Lecture 10 - Problems arising due to modern agricultural practices

Lecture 11 - Pesticides and soil degradation

Lecture 12 - Agriculture - A Primary Productive Activity

Lecture 13 - An Agricultural Tools - A Plough

Lecture 14 - Soil and seeds

Lecture 15 - Sowing Methods

Lecture 16 - Indigenous cattle and manuring

Lecture 17 - Ancient Indian Textile Technology

Lecture 18 - Handlooms and Charkha

Lecture 19 - Different types of Handlooms

Lecture 20 - Ancient Rural Indian Housing

Lecture 21 - Thatched Roof House

Lecture 22 - Rural Walls and Roof materials

Lecture 23 - Indus Valley and Harappan Civilization

Lecture 24 - First and Second of Indian Civilization

Lecture 25 - Town topologies and Brick and Tile making process

Lecture 26 - Availability of Water and Freshwater

Lecture 27 - Ancient Indian Wells

Lecture 28 - Temple Water tanks and Dams

Lecture 29 - Tank Irrigation system and Rainwater Harvesting

Lecture 30 - Waterbodies - Lakes and Canals

Lecture 31 - Sluices and Embankments

Lecture 32 - World of Materials

Lecture 33 - Metals - Gold Silver Lead

Lecture 34 - History of Copper

Lecture 35 - Iron during Vedic period

Lecture 36 - Iron smelting process in ancient India

Lecture 37 - Iron and Steel crafts in ancient India

Lecture 38 - Extraction and smelting of Zinc in Ancient India

Lecture 39 - Metal Casting in Ancient India

Lecture 40 - Glass Technology in Ancient India

NPTEL : NOC:Introduction to Experiments in Flight (Aerospace Engineering)

Co-ordinators : Prof. Mahendra Verma, Dr. A.K. Ghosh

Lecture 1 - Weighment and Calculation of CG (Theory)

Lecture 2 - Cruise Experiment (Theory)

Lecture 3 - Weighment Experiment and cockpit panel description

Lecture 4 - Drag Polar Experiment

Lecture 5 - CG and Climb Experiment

Lecture 6 - Calibration of Control Surface

Lecture 7 - Calibration of Control Surfaces (Experiment)

Lecture 8 - Introduction to Flight Data Recorder

Lecture 9 - Sensors - Part I

Lecture 10 - Sensors - Part II

Lecture 11 - Data Acquisition using MEMS devices

Lecture 12 - Estimation of Stick-Fixed Neutral Point

Lecture 13 - Estimation of Stick-Free Neutral Point and Stick-Free Maneuvering Point

Lecture 14 - Static: Lateral-Directional Stability Test

Lecture 15 - Static: Lateral-Directional Stability Test (Continued...)

Lecture 16 - Steady Coordinated Turn

Lecture 17 - Introduction to Parameter Estimation

Lecture 18 - Parameter Estimation using Least Squares Method

Lecture 19 - Aerodynamic Parameter Estimation using Least Squares Method

Lecture 20 - Aerodynamic Parameter Estimation using Delta Method

Lecture 21 - Aerodynamic Parameter Estimation using Delta Method (Continued...)

NPTEL : NOC:Engineering Thermodynamics (2017) (Aerospace Engineering)

Co-ordinators : Dr. Jayant K. Singh

Lecture 1 - Fundamental laws of nature, system definitions and applications

Lecture 2 - Thermodynamic property, state, equilibrium and process

Lecture 3 - Temperature scale and pressure

Lecture 4 - Macroscopic and microscopic forms of energy

Lecture 5 - Different forms of work, energy transfer and sign convention

Lecture 6 - First law of thermodynamics and energy balance

Lecture 7 - Efficiency of mechanical and electrical devices

Lecture 8 - Examples on basic concept and energy balance

Lecture 9 - Phase change of a pure substance

Lecture 10 - Property diagrams of pure substances

Lecture 11 - Thermodynamic properties of a pure substance from a property table

Lecture 12 - Thermodynamic properties of a pure substance

Lecture 13 - Equations of state and compressibility chart

Lecture 14 - Examples on properties of pure substances

Lecture 15 - Quasi equilibrium, moving boundary work

Lecture 16 - Polytropic process

Lecture 17 - Energy analysis of closed system and unrestrained expansion

Lecture 18 - Internal energy, enthalpy, and specific heats of ideal gas

Lecture 19 - Internal energy, enthalpy, and specific heats of solids and liquids

Lecture 20 - Examples on energy balance for closed systems and moving boundary work

Lecture 21 - Conservation of mass and steady flow processes

Lecture 22 - Flow work and energy of flowing fluid

Lecture 23 - Energy balance for steady flow devices

Lecture 24 - Throttling valve, mixing chamber and heat exchanger

Lecture 25 - Energy analysis of steady and unsteady flow devices

Lecture 26 - Examples on mass and energy analysis of open systems

Lecture 27 - Second law of thermodynamics, heat engine and cyclic devices

Lecture 28 - COP of refrigerator and heat pump, second law statements

Lecture 29 - Perpetual motion machines, reversible and irreversible processes, Carnot cycle

Lecture 30 - Carnot principles, thermodynamic temperature scale, Carnot HE and HP

Lecture 31 - Examples on second law of thermodynamics

Lecture 32 - Clausius inequality, application of second law

Lecture 33 - Entropy, increase in entropy principle, isentropic process

Lecture 34 - Change in entropy of solids, liquids and ideal gases

Lecture 35 - Reversible flow work, multistage compressor, efficiency of pump and compressors

Lecture 36 - Entropy balance in closed system and control volume

Lecture 37 - Examples on entropy change in a system

Lecture 38 - Exergy and second law efficiency

Lecture 39 - Exergy of a fixed mass and flowing stream

Lecture 40 - Exergy transfer due to heat, mass and work, exergy destruction

Lecture 41 - Exergy balance and second law efficiency for closed systems and steady flow devices

Lecture 42 - Examples related to exergy change and exergy destruction

Lecture 43 - Gas power cycles and air-standard assumptions

Lecture 44 - An overview of reciprocating engines and otto cycle

Lecture 45 - Analysis of Diesel cycle

Lecture 46 - Analysis of Brayton cycle

Lecture 47 - Examples on gas power cycles such as Otto, Diesel and Brayton

Lecture 48 - Rankin and Carnot vapour power cycles

Lecture 49 - Ideal regenerative Rankin cycle and combined gas-vapour cycle

Lecture 50 - Refrigeration cycles

Lecture 51 - Examples on vapour power cycles

Lecture 52 - Thermodynamic property relations: Gibbs equation, Mnemonic diagrams and reciprocity relations

Lecture 53 - hermodynamic property relations: Clapeyron equation and Maxwell relations

Lecture 54 - Thermodynamic property relations: Joule-Thomson coefficient and cyclic relations

Lecture 55 - Combustion and conservation of mass in a chemical reaction

Lecture 56 - Energy balance for reacting systems

Lecture 57 - Enthalpy of formation and combustion, adiabatic flame temperature

Lecture 58 - Examples on property relations and reaction thermodynamics

NPTEL : NOC:Aircraft Design (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh

Lecture 1 - Introduction

Lecture 2 - Wing Loading and Thrust Loading

Lecture 3 - Basic Design - Lift and Drag

Lecture 4 - Range and Endurance

Lecture 5 - Mission Requirements

Lecture 6 - Range and Endurance : Propeller-driven Aircraft

Lecture 7 - Fuel Consumption : Cruise Flight

Lecture 8 - L/D for Maximum Range and Endurance

Lecture 9 - Range and endurance for Jet-driven Aircraft

Lecture 10 - Estimation of Fuel for a Mission

Lecture 11 - Design Considerations : Power Plant, Gross Weight

Lecture 12 - Design Considerations : Aerofoil Selection

Lecture 13 - Design Considerations : Wing

Lecture 14 - Wing Design: Aerofoil

Lecture 15 - Wing Design:t/c, Camber and Leading Edge Radius

Lecture 16 - Wing Design: Aspect Ratio

Lecture 17 - Wing Design: Sweep, Twist and Taper Ratio

Lecture 18 - Wing Arrangements

Lecture 19 - Tail Arrangements

Lecture 20 - Tail Arrangements (Continued...)

Lecture 21 - Aircraft Structure

Lecture 22 - Wing Loading and Power Loading

Lecture 23 - Thrust Loading and Wing Loading

Lecture 24 - Thrust Loading

Lecture 25 - Wing Loading

Lecture 26 - Wing Loading : Maneuver,Climb and glide

Lecture 27 - Take off: Wing Loading and Thrust Loading

Lecture 28 - Take off: Vstall and High Life Devices

Lecture 29 - Wing Loading: Take off and Landing

Lecture 30 - Revision (Wing Loading and Thrust Loading)

Lecture 31 - Numerical: Wing Loading

Lecture 32 - Wing Loading: Designers Approach

Lecture 33 - Stability Considerations

Lecture 34 - Static Stability Basics

Lecture 35 - Wing and tail contribution to Longitudinal Static Stability

Lecture 36 - Conceptual Design

Lecture 37 - Conceptual design (Continued...)

Lecture 38 - Elevator Effectiveness

Lecture 39 - Elevator Effectiveness (Continued...)

Lecture 40 - Numerical - Pitching moment

Lecture 41 - Numerical - Elevator Effectiveness

Lecture 42 - Aircraft Maintenance Guidelines

Lecture 43 - Inspection for Aircraft

Lecture 44 - Numerical of Weight Fraction

Lecture 45 - Inspection of Sinus 912 Motor Glider

Lecture 46 - Numericals

NPTEL : NOC:Fundamentals Of Combustion-I (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Introduction to fundamentals of combustion

Lecture 2 - Scope and applications of combustion

Lecture 3 - Scope of combustion (Continued...) and types of fuel and oxidizers

Lecture 4 - Characterization of liquid and gaseous fuel

Lecture 5 - Properties of liquid and solid fuels, various modes of combustion

Lecture 6 - Thermodynamics of combustion

Lecture 7 - Thermodynamics of combustion (Continued...)

Lecture 8 - Laws of thermodynamics and Stoichiometry

Lecture 9 - Stoichiometric calculations for air-gas mixture

Lecture 10 - Mixture fraction calculation for diffusion flames

Lecture 11 - Thermochemistry

Lecture 12 - Heat of reaction and bond energy

Lecture 13 - Adiabatic flame temperature

Lecture 14 - Adiabatic flame temperature and its effect on various parameters

Lecture 15 - Introduction to chemical equilibrium

Lecture 16 - Chemical equilibrium and Gibbs free energy

Lecture 17 - Equilibrium constants and Le chatlier principle

Lecture 18 - Determination of chemical equilibrium composition

Lecture 19 - Chemical and reaction kinetics

Lecture 20 - Compact notation and reaction rate of chemical reaction

Lecture 21 - Collision Theory

Lecture 22 - Collision theory (Continued...)

Lecture 23 - Collision frequency of molecules

Lecture 24 - Specific reaction rate and Arrhenius law

Lecture 25 - First order, Second order and Third-order reactions

Lecture 26 - Classification of chemical reactions

Lecture 27 - Elementary chain reactions

Lecture 28 - Quasi-steady state and partial equilibrium approximation

Lecture 29 - Physics of combustion

Lecture 30 - Transport equations and molecular model for transport process

Lecture 31 - Mean free path length

Lecture 32 - Lennard-Jones potential model for diffusivity

Lecture 33 - Lennard-Jones potential model (Continued...)

Lecture 34 - Mass conservation law

Lecture 35 - Momentum conservation equation

Lecture 36 - Introduction to mass transfer

Lecture 37 - Species transport equation

Lecture 38 - Energy conservation equation

Lecture 39 - Conserved scalar approach for one dimensional flows

Lecture 40 - Introduction to turbulent combustion

NPTEL : NOC:Aircraft Maintenance (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh

Lecture 1 - Rules and Regulations for Civil Aviation in India

Lecture 2 - Rules and Regulations for Civil Aviation in India (Continued...)

Lecture 3 - Aircraft Hydraulic System

Lecture 4 - Aircraft Fuel System

Lecture 5 - Aircraft Landing Gear System

Lecture 6 - Aircraft Wheels

Lecture 7 - Aircraft Brakes System

Lecture 8 - Basic Aircraft Design

Lecture 9 - Aircraft Electrical System

Lecture 10 - Aircraft Electrical Circuit

Lecture 11 - Inspection of Aircraft

Lecture 12 - Maintenance Schedule

Lecture 13 - Maintenance Schedule (Continued...)

Lecture 14 - Inspection of Cessna 206

NPTEL : NOC:Fundamentals of Combustion - Part 2 (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Combustion Modes and Classsification of Flames

Lecture 2 - Analysis of One Dimensional Combustion Wave

Lecture 3 - Analysis of One Dimensional Combustion Wave (Continued...)

Lecture 4 - Introduction to Laminar Premixed Flame

Lecture 5 - Structure of One Dimensional Premixed Flame

Lecture 6 - Laminar Flame Theory for Premixed Flames

Lecture 7 - Laminar Flame Theory for Premixed Flames (Continued...)

Lecture 8 - Determination of Laminar Burning Velocity for Premixed Flames

Lecture 9 - Flame Thickness and Burning Velocity Measurement Methods

Lecture 10 - Stationary Flame Method for Burning Velocity Measurement

Lecture 11 - Effects of Chemical and Physical Variables on Burning Velocity

Lecture 12 - Effects of Chemical and Physical Variables on Burning Velocity (Continued...)

Lecture 13 - Effect of Inert Additives on Burning Velocity and Flame Extinction

Lecture 14 - Simplified Analysis for Quenching Diameter

Lecture 15 - Flammability Limits and Flame Stabilization

Lecture 16 - Ignition in Premixed Flames

Lecture 17 - Introduction to Turbulent Premixed Flames

Lecture 18 - Turbulent Burning Velocity and Premixed Flame Regimes

Lecture 19 - Intoduction to Gaseous Jet Diffusion Flame

Lecture 20 - Phenomenological Analysis of a Laminar Jet Diffusion Flame

Lecture 21 - Theoretical Analysis of a Two-Dimensional Diffusion Flame

Lecture 22 - Theoretical Analysis of a Two-Dimensional Diffusion Flame (Continued...)

Lecture 23 - Flame Height Estimation and Smoke point in Diffusion Flames

Lecture 24 - Mechanism of Soot Formation and Introduction to Liquid Fuel Combustion

Lecture 25 - Introduction to Droplet Combustion

Lecture 26 - Liquid Droplet Combustion

Lecture 27 - Droplet Combustion (Continued...)

Lecture 28 - Droplet Combustion in Convective Environment

Lecture 29 - Droplet Combustion in Convective Environment and Introduction to Spray Combution Mode

Lecture 30 - Spray Combustion Model

Lecture 31 - Introduction to Solid Fuel Combustion

Lecture 32 - Solid Fuel Combustion (Continued...)

Lecture 33 - Diffusional theory for Carbon Combustion

Lecture 34 - Carbon Burning Rate

Lecture 35 - Carbon Burning Rate (Continued...)

Lecture 36 - Carbon Sphere in Convective Environment

Lecture 37 - Combustion and Effects on Environment

Lecture 38 - Chemicals from Combustion

Lecture 39 - Emission Control Methods

Lecture 40 - Combustion Modification Methods

NPTEL : NOC:Design of Fixed Wing Unmanned Aerial Vehicles (Aerospace Engineering)

Co-ordinators : Prof. Saderla Subrahmanyam

Lecture 1 - Introduction, course content and classification of UAVs

Lecture 2 - Measurement of Flight Velocity and Standard Atmosphere

Lecture 3 - Anatomy of Airplane and Airfoil Nomenclature

Lecture 4 - Examples, Pitot and static tube and differential pressure sensor

Lecture 5 - Generation of Lift and Drag

Lecture 6 - Aerodynamic center and center of pressure, Various wing planform

Lecture 7 - Lifting line theory, NACA airfoil nomenclature

Lecture 8 - Airfoil and Finite wing, Various wing planform

Lecture 9 - Interpreting airfoil data, Cl vs Alpha and drag polar, selection of airfoil

Lecture 10 - Introduction to Airplane performance, Equation of motion

Lecture 11 - Thrust required and Power required

Lecture 12 - Calculation of Performance parameters and selection of power plant

Lecture 13 - Climb Performance, Engine Sizing and Power Plant selection

Lecture 14 - Weight Estimation , Common propulsion systems

Lecture 15 - Weight Estimation contd., Electric propulsion, Battery Sizing

Lecture 16 - Iterative weight estimation and Wing sizing

Lecture 17 - Wing Planform selection and sizing and Flight test of Cropped delta wing UAVs

Lecture 18 - Effect of variation of CG location and Static Stability

Lecture 19 - C.G. location and Longitudinal Static stability

Lecture 20 - Tutorial 1

Lecture 21 - Contribution of tail in static stability and Neutral point.

Lecture 22 - Tutorial 2

Lecture 23 - Tutorial 3

NPTEL : NOC:Introduction to Finite Volume Methods-I (Aerospace Engineering)

Co-ordinators : Prof. Ashoke De

Lecture 1 - Introduction to Finite Volume Method

Lecture 2 - Governing Equations and Discretization

Lecture 3 - Boundary Conditions and Classification of PDEs

Lecture 4 - Mathematical Description of fluid flow - I

Lecture 5 - Mathematical description of fluid flow - II

Lecture 6 - Discretization Process - I

Lecture 7 - Discretization Process - II

Lecture 8 - Discretization Process - III

Lecture 9 - Taylor Series - I

Lecture 10 - Taylor Series - II

Lecture 11 - Derivatives and Errors - I

Lecture 12 - Derivatives and errors - II

Lecture 13 - Grid Transformation

Lecture 14 - Finite Volume Formulation - I

Lecture 15 - Finite Volume Formulation - II

Lecture 16 - Properties of discretized equations

Lecture 17 - Introduction to Finite Volume Mesh

Lecture 18 - Structured Mesh System

Lecture 19 - Unstructured Mesh System - I

Lecture 20 - Unstructured Mesh System - II

Lecture 21 - Properties of Unstructured Mesh - I

Lecture 22 - Properties of Unstructured Mesh - II

Lecture 23 - Finite Volume discretization of Diffusion Equation - I

Lecture 24 - Finite Volume discretization of Diffusion equation - II

Lecture 25 - Finite Volume discretization of Diffusion equation - III

Lecture 26 - Discretization of Diffusion Equation for Cartesian orthogonal systems - I

Lecture 27 - Discretization of Diffusion Equation for Cartesian orthogonal systems - II

Lecture 28 - Calculation of Diffusivity

Lecture 29 - Discretization of Diffusion Equation for non-Cartesian orthogonal systems - I

Lecture 30 - Discretization of Diffusion Equation for non-orthogonal systems - I

Lecture 31 - Discretization of Diffusion Equation for non-orthogonal systems - II

Lecture 32 - Discretization of Diffusion Equation for non-orthogonal systems - III

Lecture 33 - Gradient Calculation for Diffusion Equation - I

Lecture 34 - Gradient Calculation for Diffusion Equation - II

Lecture 35 - Gradient Calculation for Diffusion Equation - III

Lecture 36 - Properties of matrices - I

Lecture 37 - Properties of matrices - II

Lecture 38 - Error Analysis - I

Lecture 39 - Error Analysis - II

Lecture 40 - Error Analysis - III

NPTEL : NOC:Advance Aircraft Maintenance (Aerospace Engineering)

Co-ordinators : Dr. A.K. Ghosh, Mr. V. Mathur

Lecture 1 - Introduction to Engines

Lecture 2 - Introduction to Engines (Continued...)

Lecture 3 - Construction of Reciprocating Engine

Lecture 4 - Construction of Reciprocating Engine (Continued...)

Lecture 5 - Construction of Reciprocating Engine (Continued...)

Lecture 6 - Lubrication System

Lecture 7 - Lubrication System Demonstration

Lecture 8 - Lubrication System (Continued...)

Lecture 9 - Induction System

Lecture 10 - Induction System (Continued...)

Lecture 11 - Cooling System

Lecture 12 - Exhaust System

Lecture 13 - Cooling and Exhaust System (Lab Session)

Lecture 14 - Engine fuel and Fuel Metering Systems

Lecture 15 - Engine Fuel and Fuel Metering Systems (Continued...)

Lecture 16 - Engine Fuel and Fuel Metering Systems (Lab Session)

Lecture 17 - Carburetor troubleshooting and Fuel Injection System

Lecture 18 - Fuel injection Systems (Continued...)

Lecture 19 - Fuel System

Lecture 20 - Ignition system

Lecture 21 - Ignition system (Continued...)

Lecture 22 - Ignition system (Lab session)

Lecture 23 - Basics of propeller and maintenance

Lecture 24 - Aircraft Reciprocating Engine Inspection - Part 1

Lecture 25 - Aircraft Reciprocating Engine Inspection - Part 2

Lecture 26 - Aircraft Reciprocating Engine Inspection - Part 3

Lecture 27 - Checklist for Aircraft Reciprocating Engine Maintenance

Lecture 28 - Aircraft Maintenance (Aircraft Performance Point of View)

NPTEL : NOC:Introduction to Finite Volume Methods-II (Aerospace Engineering)

Co-ordinators : Prof. Ashoke De

Lecture 1 - Linear solvers - I

Lecture 2 - Linear solvers - II

Lecture 3 - Linear solvers - III

Lecture 4 - Linear solvers - IV

Lecture 5 - Linear solvers - V

Lecture 6 - Linear solvers - VI

Lecture 7 - Linear solvers - VII

Lecture 8 - Linear solvers - VIII

Lecture 9 - Convection term discretisation - I

Lecture 10 - Convection term discretisation - II

Lecture 11 - Convection term discretisation - III (Private)

Lecture 12 - Convection term discretisation - IV (Private)

Lecture 13 - Convection term discretisation - V (Private)

Lecture 14 - Convection term discretisation - VI (Private)

Lecture 15 - Convection term discretisation - VII (Private)

Lecture 16 - Convection term discretisation - VIII

Lecture 17 - Convection term discretisation - IX

Lecture 18 - High Resolution Schemes - I

Lecture 19 - High Resolution Schemes - II

Lecture 20 - High Resolution Schemes - III

Lecture 21 - High Resolution Schemes - IV

Lecture 22 - High Resolution Schemes - V

Lecture 23 - High Resolution Schemes - VI

Lecture 24 - High Resolution Schemes - VII

Lecture 25 - Temporal discretisation - I

Lecture 26 - Temporal discretisation - II

Lecture 27 - Temporal discretisation - III

Lecture 28 - Temporal discretisation - IV

Lecture 29 - Discretisation of the Source Term, Relaxation and Other Details - I

Lecture 30 - Discretisation of the Source Term, Relaxation and Other Details - II

Lecture 31 - Fluid Flow Computation: Incompressible Flows - I

Lecture 32 - Fluid Flow Computation: Incompressible Flows - II

Lecture 33 - Fluid Flow Computation: Incompressible Flows - III

Lecture 34 - Fluid Flow Computation: Incompressible Flows - IV

Lecture 35 - Fluid Flow Computation: Incompressible Flows - V

Lecture 36 - Fluid Flow Computation: Incompressible Flows - VI

Lecture 37 - Fluid Flow Computation: Incompressible Flows - VII

Lecture 38 - Fluid Flow Computation: Incompressible Flows - VIII

Lecture 39 - Fluid Flow Computation: Compressible Flows - I

Lecture 40 - Some Advanced Topics - I

NPTEL : NOC:Introduction to Rocket Propulsion (Aerospace Engineering)

Co-ordinators : Dr. D.P. Mishra

Lecture 1 - Introduction

Lecture 2 - A Brief History of Rocket Propulsion and ISRO

Lecture 3 - Types of Rocket Engine

Lecture 4 - Fundamentals of Aero-thermodynamics

Lecture 5 - Control Volume Analysis and Governing Equations

Lecture 6 - Adiabatic Steady 1-D flow and Speed of Sound

Lecture 7 - Basics of Thermochemistry

Lecture 8 - Adiabatic Flame Temperature and Chemical Equilibrium

Lecture 9 - Ideal Rocket Engine, Thrust Equation and Performance Parameters

Lecture 10 - Performance Parameters of Rocket Engine

Lecture 11 - Performance Parameters of Rocket Engine (Continued...)

Lecture 12 - Ideal Nozzle

Lecture 13 - Rocket Nozzle

Lecture 14 - Convergent Nozzle

Lecture 15 - Convergent-Divergent Nozzle and Shock Reflection

Lecture 16 - Effect of Back Pressure and Thrust Coefficient

Lecture 17 - Thrust Coefficient

Lecture 18 - Characteristics Velocity, Combustion Efficiency and Thrust Effectiveness

Lecture 19 - Actual Rocket Nozzle Characteristics

Lecture 20 - Flight Performance of a Rocket Vehicle

Lecture 21 - Flight Performance of a Rocket Vehicle

Lecture 22 - Flight Trajectory of Single Stage Rocket Vehicle

Lecture 23 - Orbital Mechanics

Lecture 24 - Types of Orbits

Lecture 25 - Orbital and Escape Velocity

Lecture 26 - Interplanetary Transfer Path

Lecture 27 - Multi-staging Rocket

Lecture 28 - Chemical Propellants-Characteristics and Classification

Lecture 29 - Solid and Composite Propellants

Lecture 30 - Composite Propellants and it's Manufacturing

Lecture 31 - Classification of Liquid Propellants

Lecture 32 - Solid Propellant Rocket Engine

Lecture 33 - Propellant Burning Mechanism and Flame Structure

Lecture 34 - Composite Propellant Combustion

Lecture 35 - Regression Rate of Solid Propellant and Effect of Operating Parameters

Lecture 36 - Characteristics of Solid Propellants

Lecture 37 - Effect of Acceleration and Particle Size on Burning Rate

Lecture 38 - Erosive Burning, Effect of Propellant Temperature and Thermal Model

Lecture 39 - Chamber Pressure in Solid Propellant Rocket Engine

Lecture 40 - Types of Propellant Grains

Lecture 41 - Types of Solid Propellant Grains and Evolution of Burning Surface

Lecture 42 - Burning Stability and Ignition System in SPRE

Lecture 43 - Liquid Propellant Rocket Engine: Basic Configuration and Types

Lecture 44 - Injection System in LPRE

Lecture 45 - Atomization of Liquid Propellants

Lecture 46 - Types of Injection System in LPRE

Lecture 47 - Analysis of Impinging Atomizer

Lecture 48 - Injection Distributor and Combustion Process in LPRE

Lecture 49 - Variation of Gas Specific Volume and Combustion Chamber Geometry

Lecture 50 - Liquid Propellant Feed System in LPRE

Lecture 51 - Turbo-Pump Feed Configuration

Lecture 52 - Ignition System in LPRE

Lecture 53 - Cooling of Thrust Chamber and Nozzle of a Rocket Engine

Lecture 54 - Cooling System of Rocket Engine (Continued...)

Lecture 55 - Modes of Heat Transfer through combustion Chamber Wall and Nozzle Wall

Lecture 56 - Heat Transfer Analysis of Cooling System

Lecture 57 - Hybrid Propellant Rocket Engine

Lecture 58 - Regression Rate of Solid Fuel Grain in HPRE and Types of Port Configurations

Lecture 59 - Non-Chemical Rocket Engine

Lecture 60 - Electromagnetic Thruster, Nuclear and Solar Rocket Engine

NPTEL : NOC:UAV Design - Part II (Aerospace Engineering)

Co-ordinators : Prof. Saderla Subrahmanyam

Lecture 1 - Introduction to Design Algorithms: Flight Dynamics Point of View

Lecture 2 - Thrust Generation and Power Required

Lecture 3 - Lift and Drag for Infinite Wing

Lecture 4 - Lift and Drag for an Infinite Wing (Continued...)

Lecture 5 - Relation between Aerodynamic center and Center of Pressure

Lecture 6 - Aerodynamic Characteristics of Wing

Lecture 7 - Stability and Criteria for Longitudinal Static Stability

Lecture 8 - Numericals

Lecture 9 - Longitudinal Static Stability - Wing Contribution

Lecture 10 - Flight Demonstration of Flat Plate

Lecture 11 - Numericals (Continued...)

Lecture 12 - Example Problems for Wing alone Configuration

Lecture 13 - Wing-Tail Contribution and Neutral Point

Lecture 14 - Example problems of wing and tail combination

Lecture 15 - Example problems of wing and tail combination (Continued...)

Lecture 16 - Flight demonstration of same wing and tail combination

Lecture 17 - Matlab Tutorial

Lecture 18 - Trim Requirements of UAV

Lecture 19 - Example on performance analysis of UAV

Lecture 20 - Weight Estimation and wing Sizing with Example

Lecture 21 - Power Plant Selection with Example

Lecture 22 - Subroutine for takeoff performance (Powerplant selection)

Lecture 23 - Subroutine for Climb Performance (Powerplant Selection)

Lecture 24 - Subroutine for Weight Estimation

Lecture 25 - Subroutine for Planform Geometry Selection

Lecture 26 - Subroutine for Airfoil Selection

NPTEL : NOC:Introduction to Airbreathing Propulsion (Aerospace Engineering)

Co-ordinators : Prof. Ashoke De

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Review of Fluid Mechanics

Lecture 5 - Review of Fluid Mechanics, Thermodynamics

Lecture 6 - Review of Compressible Flows

Lecture 7 - Review of Compressible Flows (Continued...)

Lecture 8 - Review of Compressible Flows (Continued...)

Lecture 9 - Review of Compressible Flows (Continued...)

Lecture 10 - Review of Compressible Flows (Continued...)

Lecture 11 - Introduction to gas turbine engines

Lecture 12 - Introduction to gas turbine engines (Continued...)

Lecture 13 - Introduction to gas turbine engines (Continued...)

Lecture 14 - Introduction to gas turbine engines (Continued...)

Lecture 15 - Introduction to gas turbine engines (Continued...)

Lecture 16 - Introduction to gas turbine engines (Continued...)

Lecture 17 - Introduction to gas turbine engines (Continued...)

Lecture 18 - Piston Engines and Propellers

Lecture 19 - Piston Engines and Propellers (Continued...)

Lecture 20 - Piston Engines and Propellers (Continued...)

Lecture 21 - Piston Engines and Propellers (Continued...)

Lecture 22 - Piston Engines and Propellers (Continued...)

Lecture 23 - Piston Engines and Propellers (Continued...)

Lecture 24 - Performance/cycle analysis: Pulsejet

Lecture 25 - Performance/cycle analysis: Pulsejet (Continued...), Ramjet

Lecture 26 - Performance/cycle analysis: Ramjet (Continued...)

Lecture 27 - Performance/cycle analysis: Ramjet (Continued...), and Scramjet Engines

Lecture 28 - Performance/cycle analysis: Turbojet

Lecture 29 - Performance/cycle analysis: Turbojet (Continued...)

Lecture 30 - Performance/cycle analysis: Turbojet (Continued...), Turbofan

Lecture 31 - Performance/cycle analysis: Turbofan (Continued...)

Lecture 32 - Performance/cycle analysis: Turbofan (Continued...), Turboramjet

Lecture 33 - Performance/cycle analysis: Turboramjet (Continued...)

Lecture 34 - Performance/cycle analysis: Turboprop

Lecture 35 - Performance/cycle analysis: Turboshaft, and Propfan

Lecture 36 - Stationary components: intakes

Lecture 37 - Stationary components: combustors

Lecture 38 - Stationary components: nozzles, Industrial Gas Turbines

Lecture 39 - Introduction to turbomachinery: basic principles and equations

Lecture 40 - Centrifugal compressor

Lecture 41 - Centrifugal compressor (Continued...)

Lecture 42 - Centrifugal compressor (Continued...)

Lecture 43 - Centrifugal compressor (Continued...)

Lecture 44 - Centrifugal compressor (Continued...)

Lecture 45 - Centrifugal compressor (Continued...)

Lecture 46 - Centrifugal compressor (Continued...)

Lecture 47 - Axial compressor

Lecture 48 - Axial compressor (Continued...)

Lecture 49 - Axial compressor (Continued...)

Lecture 50 - Axial compressor (Continued...)

Lecture 51 - Axial compressor (Continued...)

Lecture 52 - Axial compressor (Continued...)

Lecture 53 - Axial compressor (Continued...)

Lecture 54 - Axial compressor (Continued...)

Lecture 55 - Axial turbine

Lecture 56 - Axial turbine (Continued...)

Lecture 57 - Axial turbine (Continued...)

Lecture 58 - Axial turbine (Continued...)

Lecture 59 - Axial turbine (Continued...)

Lecture 60 - Radial Flow Turbine, Module Matching

NPTEL : NOC:Computational Science in Engineering (Aerospace Engineering)

Co-ordinators : Prof. Ashoke De

Lecture 1 - Linear Algebra: Introduction

Lecture 2 - Linear Algebra: Introduction (Continued...)

Lecture 3 - Linear Algebra: Permutation Matrix, Existence of Solution

Lecture 4 - Linear Algebra: Permutation Matrix, Existence of Solution (Continued...)

Lecture 5 - Linear Algebra: Linear Independence, Basis Vector and Dimensions

Lecture 6 - Linear Algebra: Null Space, Column Space, Row Space, Introduction to Orthogonal System

Lecture 7 - Linear Algebra: Orthogonal System, Projection, Determinant

Lecture 8 - Linear Algebra: Orthogonal System, Projection, Determinant (Continued...)

Lecture 9 - Linear Algebra: Properties of Determinant, Cramer's Rule, Introduction to Eigen Values

Lecture 10 - Linear Algebra: Eigen Values, Eigen Vectors, SVD

Lecture 11 - Linear Algebra: Eigen Values, Eigen Vectors, SVD (Continued...)

Lecture 12 - ODE: Introduction to ODEs, Initial Value Problem, Separation of Variables

Lecture 13 - ODE: Solution of Exact ODEs, First Order Linear Systems

Lecture 14 - ODE: Solution of Second Order Linear ODEs

Lecture 15 - ODE: Existence and Uniqueness of Solution, Non-Homogeneous System

Lecture 16 - ODE: Higher Order Linear ODEs, Variation of Parameters, System of ODEs

Lecture 17 - ODE: Linear Systems, Superposition for Homogeneous Systems

Lecture 18 - Fourier Analysis, Orthogonality of Trigonometric Systems, Euler's Formula

Lecture 19 - Parseval's Theorem, Fourier Integrals, Laplace Transforms

Lecture 20 - PDE: Introduction to PDEs, Solution of PDEs using Characteristics Curve

Lecture 21 - PDE: First Order PDEs, Dilation Invariant Solution of Differential Equations

Lecture 22 - PDE: Solution of Linear PDEs

Lecture 23 - PDE: Separation of Variables, Eigenvalue Problem, Poisson Integral Representation

Lecture 24 - PDE: Boundary Conditions, Solution of 2D systems

Lecture 25 - Introduction to Numerical Methods, Mathematical Models, Errors

Lecture 26 - Errors, Numerical Differentiation, Stability

Lecture 27 - Roots of Equations: Graphical Method, Bi-Section Mehtod, False-Position Method

Lecture 28 - Secant Method, Brent's Method, Multipoint Iteration Method, Derative Free Method

Lecture 29 - Complex Roots, Birge-Vieta Method, Bairstow's method

Lecture 30 - Solution of Linear Algebric Equations, Gauss Elimination Method

Lecture 31 - Direct Methods: Gauss Elimination, Gauss-Jordan, Crout's Method, Cholesky Method, Iterative Methods: Jacobi Iteration

Method, Gauss-Seidel

Lecture 32 - Extrapolation Method, Eigenvalue Problem, Jacobi Method, Householder's Method for Symmetric Matrices, Power Method, Inverse Power Method

Lecture 33 - Interpolation: Taylor's Series, Lagrange and Newton Interpolation, Iterated Interpolation, Hermite Interpolation, Finite Difference Operations

Lecture 34 - Piecewise and Spline Interpolation, Bivariate Interpolation, Least Square Approximation, Uniform Polynomial Approximation

Lecture 35 - Numerical Differentiation and Intergration, Methods Based on Finite Differences, Methods based on Undetermined Coefficients, Extrapolation Methods, Partial Differentiation

Lecture 36 - Numerical Integration: Newton-Cotes Method, Gaussian Integration Methods, Lobatto Integration Method, Radau Integration Method, Composite Integration Methods

Lecture 37 - Double Integration: Trapezoidal Rule, Simpson's Rule, Solution of ODEs: Difference Equation, Single Step Methods, Explicit Methods

Lecture 38 - Runge-Kutta Methods, Euler-Cauchy Method, Multi-step Methods, Predictor-Corrector Methods

Lecture 39 - System of Differential Equations, Stability Analysis, Solution of Boundary Value Problem: Shooting Method

Lecture 40 - Numerical Approach to Solution of PDEs: Heat Conduction Equation, Convergence and Stability

NPTEL : NOC:Introduction to Aircraft Control System (Aerospace Engineering)

Co-ordinators : Prof. Dipak Kumar Gir

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56

Lecture 57

Lecture 58

Lecture 59

Lecture 60

NPTEL : NOC:Applied Computational Fluid Dynamics (Aerospace Engineering)

Co-ordinators : Prof. Rajesh Ranjan

Lecture 1 - CFD Introduction - I

Lecture 2 - CFD Introduction - II

Lecture 3 - CFD Introduction - III

Lecture 4 - CFD Approaches, Compressible Flows - I

Lecture 5 - CFD Approaches, Compressible Flows - II

Lecture 6 - Thermodynamics - I

Lecture 7 - Thermodynamics - II

Lecture 8 - Governing Equations - I

Lecture 9 - Governing Equations - II

Lecture 10 - Governing Equations - III

Lecture 11 - Governing Equations - IV

Lecture 12 - Governing Equations (Energy) - I

Lecture 13 - Governing Equations (Energy) - II

Lecture 14 - Non-dimensionalization - I

Lecture 15 - Non-dimensionalization - II

Lecture 16 - Classification of PDEs - I

Lecture 17 - Classification of PDEs - II

Lecture 18 - Numerical Discretization - I

Lecture 19 - Numerical Discretization - II

Lecture 20 - Compact Schemes - I

Lecture 21 - Compact Schemes - II

Lecture 22 - Model Equations - I

Lecture 23 - Model Equations - II

Lecture 24 - Numerical Schemes: MPDE - I

Lecture 25 - Numerical Schemes: MPDE - II

Lecture 26 - MPDE, Lax Theorem - I

Lecture 27 - MPDE, Lax Theorem - II

Lecture 28 - Stability

Lecture 29 - Dissipation/Dispersion Error - I

Lecture 30 - Dissipation/Dispersion Error - II

Lecture 31 - Advanced Schemes - I

Lecture 32 - Advanced Schemes - II

Lecture 33 - Multistep Schemes, MATLAB Linear - I

Lecture 34 - Multistep Schemes, MATLAB Linear - II

Lecture 35 - Solution Nonlinear/Eulers equations, Shock Tube - I

Lecture 36 - Solution Nonlinear/Eulers equations, Shock Tube - II

Lecture 37 - Introduction to FV - I

Lecture 38 - Introduction to FV - II

Lecture 39 - Introduction to FV - III

Lecture 40 - Introduction to FV - IV

Lecture 41 - Introduction to FV - I

Lecture 42 - Introduction to FV - II

Lecture 43 - Turbulent Flows - I

Lecture 44 - Turbulent Flows - II

Lecture 45 - Incompressible RANS Equations

Lecture 46 - RANS Equations, Eddy Viscosity Model - I

Lecture 47 - RANS Equations, Eddy Viscosity Model - II

Lecture 48 - Turbulence Models

Lecture 49 - Advanced Turbulence Models - I

Lecture 50 - Advanced Turbulence Models - II

Lecture 51 - Boundary Conditions - I

Lecture 52 - Boundary Conditions - II

Lecture 53 - Boundary Conditions - III

Lecture 54 - Boundary Conditions - IV

Lecture 55 - LES/DNS

Lecture 56 - LES

Lecture 57

Lecture 58

Lecture 59

Lecture 60

Lecture 61

Lecture 62

NPTEL : High Speed Aero Dynamics (Aerospace Engineering)

Co-ordinators : Dr. K.P. Sinhamahapatra

Lecture 1 - Introduction and Review of Thermodynamics

Lecture 2 - Review of Thermodynamics (Continued...)

Lecture 3 - Review of Thermodynamics (Continued...)

Lecture 4 - Review of Thermodynamics (Continued...)

Lecture 5 - One-dimensional gas dynamics

Lecture 6 - One-dimensional gas dynamics (Continued...)

Lecture 7 - One-dimensional gas dynamics (Continued...)

Lecture 8 - One-dimensional waves

Lecture 9 - One-dimensional waves (Continued...)

Lecture 10 - One-dimensional waves (Continued...)

Lecture 11 - Waves and Supersonic Flow

Lecture 12 - Waves and Supersonic Flow (Continued...)

Lecture 13 - Waves and Supersonic Flow (Continued...)

Lecture 14 - Waves and Supersonic Flow (Continued...)

Lecture 15 - Shock Expansion Theory

Lecture 16 - Flow through ducts and channels

Lecture 17 - Flow in ducts

Lecture 18 - Flow in ducts (Continued...)

Lecture 19 - Adiabatic Flow in ducts with friction

Lecture 20 - Adiabatic flow in ducts with friction (Continued...)

Lecture 21 - Isothermal flow in ducts with friction

Lecture 22 - Flow in uniform duct with heating

Lecture 23 - Multi - dimensional flow problems

Lecture 24 - Multi - dimensional flow problems (Continued...)

Lecture 25 - Linearized flow problems

Lecture 26 - Linearized flow problems (Continued...)

Lecture 27 - Linearized flow problems (Continued...)

Lecture 28 - Linearized flow problems (Continued...)

Lecture 29 - Linearized flow problems (Continued...)

Lecture 30 - Linearized flow problems (Continued...)

Lecture 31 - Linearized flow problems (Continued...)

Lecture 32 - Linearized Problems - Forces on Slender Bodies

Lecture 33 - Linearized Problems - Forces on Slender Bodies (Continued...)

Lecture 34 - Similarity Rules for High Speed Flows

Lecture 35 - Similarity Rules for High Speed Flows (Continued...)

Lecture 36 - Similarity Rules for High Speed Flows (Continued...)

Lecture 37 - Similarity Rules in Hypersonic Flow

Lecture 38 - Transonic Flow

Lecture 39 - Transonic Flow (Continued...)

Lecture 40 - Transonic Flow (Continued...)

NPTEL : Space Flight Mechanics (Aerospace Engineering)

Co-ordinators : Dr. Manoranjan Sinha

Lecture 1 - Introduction to Space Flight Mechanics

Lecture 2 - Particle Kinematics

Lecture 3 - Particle Kinematics (Continued...)

Lecture 4 - Conic Section

Lecture 5 - Two Body Problem

Lecture 6 - Two Body Problem (Continued...1)

Lecture 7 - Two Body Problem (Continued...2)

Lecture 8 - Two Body Problem (Continued...3)

Lecture 9 - Two Body Problem (Continued...4)

Lecture 10 - Two Body Problem (Continued...5)

Lecture 11 - Two Body Problem (Continued...6)

Lecture 12 - Two Body Problem (Continued...7) & Three Body Problem

Lecture 13 - Three Body Problem (Continued...1)

Lecture 14 - Three Body Problem (Continued...2)

Lecture 15 - Three Body Problem (Continued...3)

Lecture 16 - Three Body Problem (Continued...4)

Lecture 17 - Three Body Problem (Continued...5)

Lecture 18 - Three Body Problem (Continued...6)

Lecture 19 - Three Body Problem (Continued...7)

Lecture 20 - Three Body Problem (Continued...8)

Lecture 21 - Trajectory Transfer

Lecture 22 - Trajectory Transfer (Continued...1)

Lecture 23 - Trajectory Transfer (Continued...2)

Lecture 24 - Trajectory Transfer (Continued...3)

Lecture 25 - Trajectory Transfer (Continued...4)

Lecture 26 - Trajectory Transfer (Continued...5)

Lecture 27 - Trajectory Transfer (Continued...6)

Lecture 28 - Trajectory Transfer (Continued...7)

Lecture 29 - Trajectory Transfer (Continued...8)

Lecture 30 - Trajectory Transfer (Continued...9)

Lecture 31 - Trajectory Transfer (Continued...10)

Lecture 32 - Trajectory Transfer (Continued...11) and Attitude Dynamics

Lecture 33 - Attitude Dynamics (Continued...1)

Lecture 34 - Attitude Dynamics (Continued...2)

Lecture 35 - Attitude Dynamics (Continued...3)

Lecture 36 - Attitude Dynamics (Continued...4)

Lecture 37 - Attitude Dynamics (Continued...5)

Lecture 38 - Attitude Dynamics (Continued...6)

Lecture 39 - Attitude Dynamics (Continued...7)

Lecture 40 - Attitude Dynamics (Continued...8)

Lecture 41 - Attitude Dynamics (Continued...9)

Lecture 42 - Propulsion

Lecture 43 - Propulsion (Continued...1)

Lecture 44 - Propulsion (Continued...2)

Lecture 45 - Propulsion (Continued...3)

NPTEL : Introduction to Aerodynamics (Aerospace Engineering)

Co-ordinators : Dr. K.P. Sinhamahapatra

Lecture 1 - Aircraft and Aerodynamic Forces and Moments

Lecture 2 - Aircraft and Aerodynamic Forces and Moments (Continued...)

Lecture 3 - Fluids and Forces in Fluids

Lecture 4 - Fluids and Forces in Fluids (Continued...)

Lecture 5 - Forces in Fluids

Lecture 6 - Forces in Fluids (Continued...)

Lecture 7 - Kinematics of fluid motion

Lecture 8 - Kinematics of fluid motion (Continued...)

Lecture 9 - Kinematics of fluid motion (Continued...)

Lecture 10 - Kinematics of fluid motion (Continued...)

Lecture 11 - Kinematics of fluid motion - Velocity with specified extension and vorticity

Lecture 12 - Kinematics of fluid motion - Velocity with specified extension and vorticity (Continued...)

Lecture 13 - Kinematics of fluid motion - Vorticity Distribution

Lecture 14 - Kinematics of fluid motion - Velocity without expansion and vorticity

Lecture 15 - Irrotational Solenoidal Flow in Multiply Connected region

Lecture 16 - Irrotational Solenoidal Flow in Multiply Connected region (Continued...)

Lecture 17 - Equations of Fluid Motion - Navier - Stokes Equation

Lecture 18 - Equations of Fluid Motion - Navier - Stokes Equation (Continued...)

Lecture 19 - Equations of Fluid Motion - Navier - Stokes Equation (Continued...)

Lecture 20 - Conservation of Energy and Energy Equation

Lecture 21 - Equations of Motions

Lecture 22 - Equations of Motion (Continued...)

Lecture 23 - Exact Solution for Simple Problems

Lecture 24 - Exact Solution for Simple Problems (Continued...)

Lecture 25 - Non-dimensional Form of the Equations and Possible Simplifications

Lecture 26 - High Reynolds Number Approximation

Lecture 27 - Conditions fior Incompressibility

Lecture 28 - Potential Flow

Lecture 29 - Potential Flow - Combination of Basic Solutions

Lecture 30 - Potential Flow - Combination of Basic Solutions (Continued...)

Lecture 31 - Potential Flow - Combination of Basic Solutions (Continued...)

Lecture 32 - Potential Flow - Combination of Basic Solutions (Continued...) - Lifting Cylinder

Lecture 33 - Conformal Transformation

Lecture 34 - Conformal Transformation (Continued...)

Lecture 35 - Zhukovsky Transformation

Lecture 36 - Zhukovsky Transformation (Continued...)

Lecture 37 - Zhukovsky Transformation - Applications

Lecture 38 - Zhukovsky Transformation - Applications (Continued...)

Lecture 39 - Zhukovsky Transformation - Applications (Continued...)

Lecture 40 - Transformation

Lecture 41 - Transformation (Continued...)

Lecture 42 - Boundary - Layer Theory

Lecture 43 - Boundary - Layer Theory (Continued...)

Lecture 44 - Boundary - Layer Theory (Continued...)

Lecture 45 - Boundary - Layer Theory (Continued...)

Lecture 46 - Boundary - Layer Theory (Continued...)

NPTEL : NOC:Satellite Attitude Dynamics and Control (Aerospace Engineering)

Co-ordinators : Dr. Manoranjan Sinha

Lecture 1 - Kinematics of Rotation

Lecture 2 - Kinematics of Rotation (Continued...)

Lecture 3 - Kinematics of Rotation (Continued...)

Lecture 4 - Kinematics of Rotation (Continued...)

Lecture 5 - Kinematics of Rotation (Continued...)

Lecture 6 - Kinematics of Rotation (Continued...)

Lecture 7 - Rotation

Lecture 8 - Rotation (Continued...)

Lecture 9 - Rotation (Continued...)

Lecture 10 - Rotation (Continued...)

Lecture 11 - Rotational Kinematics

Lecture 12 - Rotational Kinematics (Continued...)

Lecture 13 - Rotational Kinematics (Continued...)

Lecture 14 - Rotational Kinematics (Continued...)

Lecture 15 - Rotational Dynamics (Rigid Body Dynamics)

Lecture 16 - Rotational Dynamics (Rigid Body Dynamics) (Continued...)

Lecture 17 - Rotational Dynamics (Rigid Body Dynamics) (Continued...)

Lecture 18 - Rigid Body Dynamics

Lecture 19 - Rigid Body Dynamics (Continued...)

Lecture 20 - Rigid Body Dynamics (Continued...)

Lecture 21 - Rigid Body Dynamics (Continued...)

Lecture 22 - Rigid Body Dynamics (Continued...)

Lecture 23 - Rigid Body Dynamics (Continued...)

Lecture 24 - Rigid Body Dynamics (Continued...)

Lecture 25 - Rigid Body Dynamics (Continued...)

Lecture 26 - Stability of Torque Free Rotation

Lecture 27 - Stability of Torque Free Rotation (Continued...)

Lecture 28 - Gravity-gradient Satellite

Lecture 29 - Gravity-gradient Satellite (Continued...)

Lecture 30 - Gravity-gradient Satellite (Continued...)

Lecture 31 - Gravity-gradient Satellite (Continued...)

Lecture 32 - Gravity-gradient Satellite (Continued...)

Lecture 33 - Gravity-gradient Satellite (Continued...)

Lecture 34 - Gravity-gradient Satellite (Continued...)

Lecture 35 - Gravity-gradient Satellite (Continued...)

Lecture 36 - Gravity-gradient Satellite (Continued...)

Lecture 37 - Gravity-gradient Satellite (Continued...)

Lecture 38 - Spin Stabilization

Lecture 39 - Spin Stabilization (Continued...)

Lecture 40 - Spin Stabilization (Continued...)

Lecture 41 - Spin Stabilization (Continued...)

Lecture 42 - Spin Stabilization (Continued...)

Lecture 43 - Control Moment Gyroscope

Lecture 44 - Control Moment Gyroscope (Continued...)

Lecture 45 - Gyroscope/Top Motion

Lecture 46 - Gyroscope/Top Motion (Continued...)

Lecture 47 - Gyroscopic Motion

Lecture 48 - Gyroscopic Motion (Continued...)

Lecture 49 - Reaction Wheel/Gyrostat

Lecture 50 - Reaction Wheel/Gyrostat (Continued...)

Lecture 51 - Gyrostat

Lecture 52 - Gyrostat (Continued...)

Lecture 53 - Gyrostat (Continued...)

Lecture 54 - Gyrostat (Continued...)

Lecture 55 - Control Moment Gyro

Lecture 56 - Control Moment Gyro (Continued...)

Lecture 57 - Control Moment Gyro (Continued...)

Lecture 58 - Control Moment Gyro (Continued...)

Lecture 59 - Satellite Dynamics with Control Moment Gyro

Lecture 60 - Satellite Dynamics with Control Moment Gyro (Continued...)

Lecture 61 - Satellite Dynamics with Control Moment Gyro (Continued...)

Lecture 62 - Simplified Control Gyro for Satellite Attitude Control

Lecture 63 - Satellite Attitude Control using Magnetic Torquer

Lecture 64 - Satellite Attitude Control using Magnetic Torquer (Continued...)

Lecture 65 - Satellite Attitude Control using Magnetic Torquer (Continued...)

Lecture 66 - Satellite Attitude Control using Magnetic Torquer (Continued...)

Lecture 67 - Satellite Attitude Control using Magnetic Torquer (Continued...)

Lecture 68 - Satellite Attitude Control using Lorentz Force

Lecture 69 - Satellite Attitude Control using Thruster

Lecture 70 - Atmospheric Drag on the Satellite

Lecture 71 - Atmospheric Force and Moment on the Satellite

Lecture 72 - Atmospheric Force and Moment on the Satellite (Continued...)

Lecture 73 - Solar Radiation Force and Moment on the Satellite

NPTEL : NOC:Vibration and Structural Dynamics (Aerospace Engineering)

Co-ordinators : Prof. Mira Mitra

Lecture 1 - Introduction

Lecture 2 - Undamped Free Vibration

Lecture 3 - Damped Free Vibration

Lecture 4 - Damped Free Vibration (Continued...)

Lecture 5 - Damped Free Vibration (Continued...)

Lecture 6 - Force Vibration

Lecture 7 - Harmonic Loading

Lecture 8 - Harmonic Loading (Continued...)

Lecture 9 - Harmonic Loading (Continued...)

Lecture 10 - Harmonic Loading (Continued...)

Lecture 11 - Impulse Load and Arbitrary Load

Lecture 12 - Impulse Load and Arbitrary Load (Continued...)

Lecture 13 - MDOF, 2-Dof System

Lecture 14 - Normal Mode of Vib

Lecture 15 - Natural Frequency and Mode Shapes

Lecture 16 - Mode Shapes of MDOF

Lecture 17 - Mode Shapes and Free Vibration Response of MODF

Lecture 18 - Example on MODF

Lecture 19 - Example on MODF (Continued...)

Lecture 20 - Modal Expansion Theorem, Generalized Coordinate

Lecture 21 - Examples on Modal Analysis

Lecture 22 - Damping

Lecture 23 - Rigid Body Modes

Lecture 24 - Numerical Time Integration

Lecture 25 - Continuous System

Lecture 26 - Axial Vibration of Bar

Lecture 27 - Axial Vibration of Bar (Continued...)

Lecture 28 - Bending Vibration in Beam

Lecture 29 - Bending Vibration in Beam (Continued...)

Lecture 30 - Bending Vibration in Beam (Continued...)

Lecture 31 - Modal Analysis

Lecture 32 - Modal Analysis (Continued...)

Lecture 33 - Modal Analysis of Continuous System

Lecture 34 - Modal Analysis of Continuous System (Continued...)

Lecture 35 - Approximate Method

Lecture 36 - Approximate Methods (Continued...)

Lecture 37 - Collocation Method

Lecture 38 - Analytical Methods

Lecture 39 - Analytical Methods (Continued...)

Lecture 40 - Analytical Methods (Continued...)

NPTEL : NOC:Space Flight Mechanics (Aerospace Engineering)

Co-ordinators : Dr. Manoranjan Sinha

Lecture 1 - Conic Section

Lecture 2 - Conic Section (Continued...)

Lecture 3 - Conic Section (Continued...)

Lecture 4 - Central Force Motion

Lecture 5 - Gravitational Central Force Motion

Lecture 6 - Gravitational Central Force Motion (Continued...)

Lecture 7 - Gravitational Central Force Motion (Continued...)

Lecture 8 - 2-Body Problem

Lecture 9 - 2-Particle System Motion Under Mutual Gravitational Attraction

Lecture 10 - 2-Particle Body Problem

Lecture 11 - 2-Particle Body System

Lecture 12 - Classical Orbital Elements / Parameters

Lecture 13 - Classical Orbital Elements / Parameters (Continued...)

Lecture 14 - Classical Orbital Elements / Parameters (Continued...)

Lecture 15 - Classical Orbital Elements and Its Inverse Problems

Lecture 16 - Inverse Problem of Orbit Determination (Classical Orbital Elements)

Lecture 17 - Problem Solving on 2-Body Problem Related to Orbit and Orbital Elements

Lecture 18 - Problem Related to Orbital Elements

Lecture 19 - Kepler's Equation / Kepler's Problem

Lecture 20 - Kepler's Problem (Continued...)

Lecture 21 - Kepler's Problem (Continued...)

Lecture 22 - Kepler's Equation

Lecture 23 - Kepler's Equation (Continued...)

Lecture 24 - Kepler's Equation (Continued...)

Lecture 25 - Kepler's Equation (Continued...)

Lecture 26 - Kepler's Equation (Continued...)

Lecture 27 - Kepler's Equation (Continued...)

Lecture 28 - Kepler's Equation (Continued...)

Lecture 29 - 3-Body Problem

Lecture 30 - 3-Body Problem (Continued...)

Lecture 31 - 3-Body Problem (Continued...)

Lecture 32 - 3-Body Problem (Continued...)

Lecture 33 - 3-Body Problem (Continued...)

Lecture 34 - Restricted 3-Body Problem

Lecture 35 - Restricted 3-Body Problem (Continued...)

Lecture 36 - Restricted 3-Body Problem (Continued...)

Lecture 37 - Restricted 3-Body Problem (Continued...)

Lecture 38 - Restricted 3-Body Problem (Continued...)

Lecture 39 - Restricted 3-Body Problem (Continued...)

Lecture 40 - Restricted 3-Body Problem (Continued...)

Lecture 41 - Restricted 3-Body Problem (Continued...)

Lecture 42 - Restricted 3-Body Problem (Continued...)

Lecture 43 - Restricted 3-Body Problem (Continued...)

Lecture 44 - Restricted 3-Body Problem (Continued...)

Lecture 45 - Restricted 3-Body Problem (Continued...)

Lecture 46 - Restricted 3-Body Problem (Continued...)

Lecture 47 - General Perturbation Theory

Lecture 48 - General Perturbation Theory (Continued...)

Lecture 49 - General Perturbation Theory (Continued...)

Lecture 50 - General Perturbation Theory (Continued...)

Lecture 51 - General Perturbation Theory (Continued...)

Lecture 52 - General Orbit Perturbation Theory

Lecture 53 - General Orbit Perturbation Theory (Continued...)

Lecture 54 - General Orbit Perturbation Theory (Continued...)

Lecture 55 - General Orbit Perturbation Theory (Continued...)

Lecture 56 - General Orbit Perturbation Theory (Continued...)

Lecture 57 - General Orbit Perturbation Theory (Continued...)

Lecture 58 - General Orbit Perturbation Theory (Continued...)

Lecture 59 - General Orbit Perturbation Theory (Continued...)

Lecture 60 - General Orbit Perturbation Theory (Continued...)

Lecture 61 - General Orbit Perturbation Theory (Continued...)

Lecture 62 - General Orbit Perturbation Theory (Continued...)

Lecture 63 - General Orbit Perturbation Theory (Continued...)

Lecture 64 - General Orbit Perturbation Theory (Continued...)

Lecture 65 - General Orbit Perturbation Theory (Continued...)

Lecture 66 - General Orbit Perturbation Theory (Continued...)

Lecture 67 - General Orbit Perturbation Theory (Continued...)

Lecture 68 - Orbit Determination

Lecture 69 - Orbit Determination (Continued...)

Lecture 70 - Orbit Determination (Continued...)

Lecture 71 - Orbit Determination (Continued...)

Lecture 72 - Transformation from Celestial to Earth Fixed Reference Frame

Lecture 73 - Time

Lecture 74 - Time (Continued...)

Lecture 75 - Orbit Determination

Lecture 76 - Orbit Determination (Continued...)

Lecture 77 - Orbit Determination (Continued...)

Lecture 78 - Orbit Determination (Continued...)

Lecture 79 - Trajectory Transfer

Lecture 80 - Trajectory Transfer (Continued...)

Lecture 81 - Trajectory Transfer (Continued...)

Lecture 82 - Trajectory Transfer (Continued...)

Lecture 83 - Trajectory Transfer (Continued...)

Lecture 84 - Trajectory Transfer (Continued...)

Lecture 85 - Trajectory Transfer (Continued...)

Lecture 86 - Trajectory Transfer (Continued...)

Lecture 87 - Interplanetary Transfer

Lecture 88 - Interplanetary Transfer (Continued...)

Lecture 89 - Interplanetary Transfer (Continued...)

Lecture 90 - Patched Conic Section Method for Interplanetary Transfer

Lecture 91 - Interplanetary Mission

Lecture 92 - Interplanetary Mission (Continued...)

Lecture 93 - Interception in Coplanar Orbit

Lecture 94 - Interception in Coplanar Orbit (Continued...)

Lecture 95 - Interception in non-coplanar Orbit

Lecture 96 - Interception in non-coplanar Orbit (Continued...)

Lecture 97 - Interception in non-coplanar Orbit (Continued...)

Lecture 98 - Non Coplanar Transfer

Lecture 99 - Sphere of Influence

NPTEL : NOC:Aircraft Structures - I (Aerospace Engineering)

Co-ordinators : Dr. Anup Ghosh

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Load Encountered by a Typical Aircraft

Lecture 5 - Conceptual Structural Details of a Typical Aircraft

Lecture 6 - Airworthiness of An Aircraft

Lecture 7 - Aerodynamic Loads and Load Factors

Lecture 8 - Loads From A Symmetric Manoeuvre Of An Aircraft

Lecture 9 - Shear and Moment on Wing An Aircraft

Lecture 10 - Distribution Of Load On The Fuselage

Lecture 11 - Unit Load Analysis Of Fuselage

Lecture 12 - Truss System

Lecture 13 - Truss System (Continued...)

Lecture 14 - Space Structures

Lecture 15 - Space Structures (Continued...)

Lecture 16 - Wing Truss System

Lecture 17 - Introduction to Energy Methods

Lecture 18 - Dummy and Unit Load Method

Lecture 19 - Dummy and Unit Load Method - Examples

Lecture 20 - Castigliano's Theorems

Lecture 21 - Rayleigh - Ritz Method

Lecture 22 - Statically Indeterminate Structures

Lecture 23 - Theory of Elasticity - Stress

Lecture 24 - Theory of Elasticity - Equilibrium

Lecture 25 - Stress Transformation and Principal Stress

Lecture 26 - Theory of Elasticity - Principal Stress Boundary Condition

Lecture 27 - Shear Stresses

Lecture 28 - Introduction of Strain

Lecture 29 - Introduction of strain - Equations of compatibility

Lecture 30 - Formulation of Elasticity Problems

Lecture 31 - Inverse Method of Solution

Lecture 32 - Semi-Inverse Method of Solution

Lecture 33 - Equilibrium Equation in Polar Coordinate System

Lecture 34 - Compatibility Condition in Polar Cordinate System

Lecture 35 - Effects of Circular Hole on Stress Distributions in a Plate

Lecture 36 - Effects of Circular Hole on Stress Distributions in a Plate

Lecture 37 - Effects of Circular Hole on Stress Distributions in a Plate

Lecture 38 - Theory of Elasticity - Torsion Problems

Lecture 39 - Theory of Elasticity - Torsion Problems (Continued...)

Lecture 40 - Torsion of an Elliptical Bar

Lecture 41 - Membrane Analogy for Torsion Problem

Lecture 42 - Membrane Analogy for Torsion Problem (Continued...)

NPTEL : NOC:Introduction to CFD (Aerospace Engineering)

Co-ordinators : Prof. Arnab Roy

Lecture 1 - Brief Overview of CFD

Lecture 2 - Governing Equations of Fluid Flow

Lecture 3 - Governing Equations of Fluid Flow (Continued...)

Lecture 4 - Classification of PDEs

Lecture 5 - Classification of PDEs (Continued...)

Lecture 6 - Methods for Approximate Solution of PDEs

Lecture 7 - Finite Difference Method

Lecture 8 - Methods for Approximate Solution of PDEs (Continued...)

Lecture 9 - Methods for Approximate Solution of PDEs (Continued...)

Lecture 10 - Methods for Approximate Solution of PDEs (Continued...)

Lecture 11 - Methods for Approximate Solution of PDEs (Continued...)

Lecture 12 - Taylor Table Approach for Constructing Finite Difference Schemes

Lecture 13 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)

Lecture 14 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)

Lecture 15 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)

Lecture 16 - Taylor Table Approach for Constructing Finite Difference Schemes (Continued...)

Lecture 17 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE)

Lecture 18 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)

Lecture 19 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)

Lecture 20 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)

Lecture 21 - Numerical Solution of Steady State Heat Conduction (Elliptic PDE) (Continued...)

Lecture 22 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE)

Lecture 23 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)

Lecture 24 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)

Lecture 25 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)

Lecture 26 - Numerical Solution of Unsteady Heat Conduction (Parabolic PDE) (Continued...)

Lecture 27 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE)

Lecture 28 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

Lecture 29 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

Lecture 30 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

Lecture 31 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

Lecture 32 - Numerical Solution of Linear Wave Equation (Hyperbolic PDE) (Continued...)

Lecture 33 - Numerical Solution of One Dimensional Convection - Diffusion Equation

Lecture 34 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)

Lecture 35 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)

Lecture 36 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)

Lecture 37 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)

Lecture 38 - Numerical Solution of One Dimensional Convection - Diffusion Equation (Continued...)

Lecture 39 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations

Lecture 40 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)

Lecture 41 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)

Lecture 42 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)

Lecture 43 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)

Lecture 44 - Numerical Solution of Two Dimensional Incompressible Navier Stokes Equations (Continued...)

Lecture 45 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem

Lecture 46 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)

Lecture 47 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)

Lecture 48 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)

Lecture 49 - Numerical Solution of One Dimensional Euler Equation for Shock Tube Problem (Continued...)

Lecture 50 - Basics of Interface Capturing Methods for Applications in Multiphase Flow

Lecture 51 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)

Lecture 52 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)

Lecture 53 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)

Lecture 54 - Basics of Interface Capturing Methods for Application in Multiphase Flow (Continued...)

Lecture 55 - Basics of Turbulence Modeling

Lecture 56 - Basics of Turbulence Modeling (Continued...)

Lecture 57 - Basics of Turbulence Modeling (Continued...)

Lecture 58 - Basics of Turbulence Modeling (Continued...)

Lecture 59 - Basics of Turbulence Modeling (Continued...)

Lecture 60 - Basics of Turbulence Modeling (Continued...)

Lecture 61 - Structured and Unstructured Grid Generation

Lecture 62 - Structured and Unstructured Grid Generation (Continued...)

Lecture 63 - Structured and Unstructured Grid Generation (Continued...)

Lecture 64 - Structured and Unstructured Grid Generation (Continued...)

Lecture 65 - Structured and Unstructured Grid Generation (Continued...)

NPTEL : NOC:Fundamentals of Theoretical and Experimental Aerodynamics (Aerospace Engineering)

Co-ordinators : Prof. Arnab Roy

Lecture 1 - Introduction on Aerodynamics-its relevance and applications

Lecture 2 - Atmosphere

Lecture 3 - Flow velocity, pressure, skin friction

Lecture 4 - Generation of aerodynamic forces and moments on an aircraft

Lecture 5 - Generation of aerodynamic forces and moments on an aircraft (Continued...)

Lecture 6 - Generation of aerodynamic forces and moments on an aircraft (Continued...)

Lecture 7 - Eulerian and Lagrangian perspectives of flow: Fluid element trajectories

Lecture 8 - Fluid element trajectories, Angular velocity, and vorticity

Lecture 9 - Irrotational and Rotational flow, Strain of a fluid element, Gradient

Lecture 10 - Line Surface and Volume Integrals, Circulation, Velocity

Lecture 11 - Conservation equations of mass, momentum and energy

Lecture 12 - Conservation equations of momentum and energy

Lecture 13 - Inviscid and viscous flows

Lecture 14 - Inviscid and viscous flows (Continued...)

Lecture 15 - Bernoulliâ€™s equation and its applications

Lecture 16 - Bernoulliâ€™s equation applications; Potential flow; Boundary layer flow

Lecture 17 - Boundary layer flow

Lecture 18 - Boundary Layer (Continued...) and Laminar and turbulent flow

Lecture 19 - Airfoil Geometry, forces and moments acting on an airfoil

Lecture 20 - Pressure distribution on an airfoil, Airfoil nomenclature and characteristics

Lecture 21 - Airfoil characteristics; Aerodynamic center; Some more elementary flows

Lecture 22 - Elementary flows- Doublet and Point Vortex; Vortex sheet

Lecture 23 - Kutta condition; Kelvinâ€™s circulation theorem; Introduction to thin airfoil theory

Lecture 24 - Results of thin airfoil theory for symmetric

Lecture 25 - Multi element airfoils, Laminar and turbulent

Lecture 26 - Finite wing geometry and flow features

Lecture 27 - Biot Savart Law; Prandtlâ€™s lifting line theory

Lecture 28 - Prandtl lifting theory for finite wings

Lecture 29 - Finite wing aerodynamics; Delta wing aerodynamics

Lecture 30 - Delta wing aerodynamics; Unsteady aerodynamics

Lecture 31 - Fundamentals of high speed flows

Lecture 32 - Velocity potential equation and its application; Finite Waves

Lecture 33 - Normal shocks

Lecture 34 - Normal shocks, Mach waves and oblique shocks

Lecture 35 - Oblique shock; Prandtl Meyer expansion

Lecture 36 - Shock expansion theory; Flow through converging diverging nozzle

Lecture 37 - Flow through converging diverging nozzle under different back pressure

Lecture 38 - Priliminary concepts of hypersonic flow; Shock tube

Lecture 39 - Computing aerodynamic flows - trying to connect with the theory

Lecture 40 - Computing aerodynamic flows - trying to connect with the theory (Continued...)

Lecture 41 - Some more on flow physics; The different steps involved in flow computations

Lecture 42 - An introduction to Panel Method

Lecture 43 - Panel method and Vortex Lattice Method

Lecture 44 - Mathematical classification of PDEs and their physical behavior

Lecture 45 - Basics of grid and discretization of governing PDEs

Lecture 46 - Different aspects of numerical schemes

Lecture 47 - Basics of Euler Equation

Lecture 48 - Basics of Compressible Navier Stokes Equations

Lecture 49 - Wind tunnel-an experimental tool in aerodynamics; Types of wind tunnels

Lecture 50 - Wind Tunnel design basics - Subsonic Wind Tunnels

Lecture 51 - Wind Tunnel design basics - Subsonic wind tunnels (Continued...)

Lecture 52 - Wind Tunnel design basics - Supersonic wind tunnels

Lecture 53 - Continuous closed circuit supersonic wind tunnel

Lecture 54 - Scalling of wind tunnel models; Safety issues in wind tunnel handling

Lecture 55 - Flow visualization techniques

Lecture 56 - Schlieren and Shadowgraph techniques

Lecture 57 - Measurement of Pressure using mechanical instruments

Lecture 58 - Rayleigh Pitot tube; Drag measurement using wake survey and direct weighing method

Lecture 59 - Mechanical balance

Lecture 60 - Electronic transducers

Lecture 61 - Wheatstone bridge circuits for force and moment measurement

Lecture 62 - Strain gauge based balances; Electronic pressure gauges

Lecture 63 - Absolute-Gauge-Differential pressure sensors; Data Acquisition System

Lecture 64 - Measurement error and uncertainty

Lecture 65 - Velocity measurement using Particle Image Velocimetry

Lecture 66 - Velocity measurement using Particle Image Velocimetry (Continued...)

Lecture 67 - Particle image velocimetry (Continued...)

Lecture 68 - How wind tunnel and associated instrumentation are used

Lecture 69 - Quick recapitulation of course content and closure

NPTEL : NOC:Aerodynamic Design of Axial Flow Compressors and Fans (Aerospace Engineering)

Co-ordinators : Prof. Chetankumar Sureshbhai Mistry

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Stage Configurations and Parameters

Lecture 8 - Stage Configurations and Parameters (Continued...)

Lecture 9 - Stage Configurations and Parameters (Continued...)

Lecture 10 - Stage Configurations and Parameters (Continued...)

Lecture 11 - Stage Configurations and Parameters (Continued...)

Lecture 12 - Stage Configurations and Parameters (Continued...)

Lecture 13 - Stage Configurations and Parameters (Continued...)

Lecture 14 - Stage Configurations and Parameters (Continued...)

Lecture 15 - Stage Configurations and Parameters (Continued...)

Lecture 16 - Design Concepts

Lecture 17 - Design Concepts (Continued...)

Lecture 18 - Design Concepts (Continued...)

Lecture 19 - Design Concepts (Continued...)

Lecture 20 - Design Concepts (Continued...)

Lecture 21 - Design Concepts (Continued...)

Lecture 22 - Design Concepts (Continued...)

Lecture 23 - Cascade Aerodynamics

Lecture 24 - Cascade Aerodynamics (Continued...)

Lecture 25 - Cascade Aerodynamics (Continued...)

Lecture 26 - Cascade Aerodynamics (Continued...)

Lecture 27 - Cascade Aerodynamics (Continued...)

Lecture 28 - Selection of Design Parameters

Lecture 29 - Selection of Design Parameters (Continued...)

Lecture 30 - Selection of Design Parameters (Continued...)

Lecture 31 - Selection of Design Parameters (Continued...)

Lecture 32 - Selection of Design Parameters (Continued...)

Lecture 33 - Design Strategies

Lecture 34 - Design Strategies (Continued...)

Lecture 35 - Design Strategies (Continued...)

Lecture 36 - Design Strategies (Continued...)

Lecture 37 - Design of Low Speed Compressor

Lecture 38 - Design of Low Speed Compressor (Continued...)

Lecture 39 - Design of Low Speed Compressor (Continued...)

Lecture 40 - Design of Low Speed Compressor (Continued...)

Lecture 41 - Design of Low Speed Compressor (Continued...)

Lecture 42 - Design of Low Speed Compressor (Continued...)

Lecture 43 - Design of Low Speed Contra rotating Fan

Lecture 44 - Design of Low Speed Contra rotating Fan (Continued...)

Lecture 45 - Design of Low Speed Contra rotating Fan (Continued...)

Lecture 46 - Design of Low Speed Contra rotating Fan (Continued...)

Lecture 47 - Design of Low Speed Contra rotating Fan (Continued...)

Lecture 48 - Design of Low Speed Contra rotating Fan (Continued...)

Lecture 49 - Transonic Compressors

Lecture 50 - Transonic Compressors (Continued...)

Lecture 51 - Transonic Compressors (Continued...)

Lecture 52 - Transonic Compressors (Continued...)

Lecture 53 - Transonic Compressors (Continued...)

Lecture 54 - Design of Transonic Compressor

Lecture 55 - Design of Transonic Compressor (Continued...)

Lecture 56 - Design of Transonic Compressor (Continued...)

Lecture 57 - Design of Transonic Compressor (Continued...)

Lecture 58 - Design of Transonic Compressor (Continued...)

Lecture 59 - Design of Transonic Compressor (Continued...)

Lecture 60 - Design of Industrial fan

Lecture 61 - Design of Industrial fan (Continued...)

Lecture 62 - Design of Industrial fan (Continued...)

Lecture 63 - Design of Industrial fan (Continued...)

Lecture 64 - Design of Industrial fan (Continued...)

Lecture 65 - CFD application to Design and Performance assessment

Lecture 66 - CFD application to Design and Performance assessment (Continued...)

Lecture 67 - CFD application to Design and Performance assessment (Continued...)

Lecture 68 - CFD application to Design and Performance assessment (Continued...)

Lecture 69 - CFD application to Design and Performance assessment (Continued...)

NPTEL : NOC:Smart Structures (Aerospace Engineering)

Co-ordinators : Prof. Mohammed Rabius Sunny

Lecture 1 - Introduction to Smart Structures (Continued...)

Lecture 2 - Introduction to Smart Structures (Continued...)

Lecture 3 - Introduction to Smart Structures (Continued...)

Lecture 4 - Introduction to Piezoelectric Materials

Lecture 5 - Introduction to Piezoelectric Materials (Continued...)

Lecture 6 - Mathematical Preliminaries

Lecture 7 - 3D Constitutive Modeling of Piezoelectric Materials - 1

Lecture 8 - 3D Constitutive Modeling of Piezoelectric Materials - 2

Lecture 9 - 3D Constitutive Modeling of Piezoelectric Materials - 3

Lecture 10 - 3D Constitutive Modeling of Piezoelectric Materials - 4

Lecture 11 - Piezoelectric Sensors and Actuators

Lecture 12 - Numercial Problems and Solutions

Lecture 13 - Induced Strain Actuation - Static Analysis

Lecture 14 - Induced Strain Actuation - Static Analysis (Continued...)

Lecture 15 - Induced Strain Actuation - Static Analysis

Lecture 16 - Induced Strain Actuation - Static Analysis (Continued...)

Lecture 17 - Induced Strain Actuation - Static Analysis (Continued...)

Lecture 18 - Induced Strain Actuation - Static Analysis - Numerical Examples

Lecture 19 - Introduction to Energy Principles for Structural Analysis

Lecture 20 - Introduction to Energy Principles for Structural Analysis (Continued...)

Lecture 21 - Statis Analysis of beam for Induced Strain Actuation using Energy Principles

Lecture 22 - Static Analysis of beam for Induced Strain Actuation using Energy Principles (Continued...)

Lecture 23 - Static Analysis of beam for Induced Strain Actuation using Energy Principles (Continued...)

Lecture 24 - Static Analysis of beam for Induced strain Actuation using Energy Principles Numerical

Lecture 25 - Dynamic Analysis of Beam for Induced Strain Actuation Using Energy Principle

Lecture 26 - Dynamic Analysis of Beam for Induced Strain Actuation Using (Continued...)

Lecture 27 - Energy Harvesting and Vibration Control

Lecture 28 - Energy Harvesting and Vibration Control (Continued...)

Lecture 29 - Solution of Coupled Linear Ordinary Differential Equations

Lecture 30 - Introduction to Fibre Reinforced Plastic Composites

Lecture 31 - Constitutive Relation of Unidirectional FRP Composite Ply

Lecture 32 - Constitutive Relation of Unidirectional FRP Composite Ply (Continued...)

Lecture 33 - Constitutive Relation of Unidirectional FRP Composite Ply (Continued...)

Lecture 34 - Mechanics of FRP Composite Laminate Numerical Examples

Lecture 35 - Mechanics of FRP Composite Laminate Numerical Examples (Continued...)

Lecture 36 - Analysis of composite laminate with piezoelectric patches (Continued...)

Lecture 37 - Analysis of composite laminate with piezoelectric patches (Continued...)

Lecture 38 - Analysis of composite laminate with piezoelectric patches (Continued...)

Lecture 39 - Analysis of composite laminate with piezoelectric patches (Continued...)

Lecture 40 - Analysis of composite laminate with piezoelectric patches - computer programming

Lecture 41 - Introduction to Shape Memory Alloys

Lecture 42 - Temperature and Stress Dependent Phase Transformation Modeling

Lecture 43 - Temperature and Stress Dependent Phase Transformation Modeling (Continued...)

Lecture 44 - Stress-strain Curve at Low Temperature, Pseudo elasticity Two Way Shape Memory Effect

Lecture 45 - Constitutive Relations of Shape Memory Alloys

Lecture 46 - Constitutive Relations of Shape Memory Alloys (Continued...)

Lecture 47 - Constitutive Relations of Shape Memory Alloys (Continued...)

Lecture 48 - Constitutive Relations of Shape Memory Alloys (Continued...)

Lecture 49 - Constitutive Relations of Shape Memory Alloys (Continued...)

Lecture 50 - Finite Element Formulation of Euler - Bernoulli Beam

Lecture 51 - Finite Element Formulation of Euler - Bernoulli Beam (Continued...)

Lecture 52 - Anlsysis of a Beam with Shape Memory Alloy Wire

Lecture 53 - Analysis of a Beam with Shape Memory Alloy Wire (Continued...)

Lecture 54 - Introduction to Electro and Magneto Rheological Fluids

Lecture 55 - Analaysis of Electro and Magneto Rheological Fluid Flow

Lecture 56 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)

Lecture 57 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)

Lecture 58 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)

Lecture 59 - Analaysis of Electro and Magneto Rheological Fluid Flow

Lecture 60 - 60 Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)

Lecture 61 - Analaysis of Electro and Magneto Rheological Fluid Flow (Continued...)

Lecture 62 - Analysis of a Beam with ER/MR Fluid Layer

NPTEL : NOC:Aeroengine Gas Turbine Cycles (Aerospace Engineering)

Co-ordinators : Prof. Chetankumar Sureshbhai Mistry

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Component Performance

Lecture 8 - Component Performance (Continued...)

Lecture 9 - Component Performance (Continued...)

Lecture 10 - Component Performance (Continued...)

Lecture 11 - Component Performance (Continued...)

Lecture 12 - Turbojet Engine - I

Lecture 13 - Turbojet Engine - I (Continued...)

Lecture 14 - Turbojet Engine - I (Continued...)

Lecture 15 - Turbojet Engine - I (Continued...)

Lecture 16 - Turbojet Engine - I (Continued...)

Lecture 17 - Turbojet Engine - I (Continued...)

Lecture 18 - Turbojet Engine - II

Lecture 19 - Turbojet Engine - II (Continued...)

Lecture 20 - Turbojet Engine - II (Continued...)

Lecture 21 - Turbojet Engine - II (Continued...)

Lecture 22 - Turbojet Engine - II (Continued...)

Lecture 23 - Turbofan Engine - I

Lecture 24 - Turbofan Engine - I (Continued...)

Lecture 25 - Turbofan Engine - I (Continued...)

Lecture 26 - Turbofan Engine - I (Continued...)

Lecture 27 - Turbofan Engine - I (Continued...)

Lecture 28 - Turbofan Engine - II

Lecture 29 - Turbofan Engine - II (Continued...)

Lecture 30 - Turbofan Engine - II (Continued...)

Lecture 31 - Turbofan Engine - II (Continued...)

Lecture 32 - Turbofan Engine - II (Continued...)

Lecture 33 - Turbofan Engine - III

Lecture 34 - Turbofan Engine - III (Continued...)

Lecture 35 - Turbofan Engine - III (Continued...)

Lecture 36 - Turbofan Engine - III (Continued...)

Lecture 37 - Turbofan Engine - III (Continued...)

Lecture 38 - Turbofan Engine - IV

Lecture 39 - Turbofan Engine - IV (Continued...)

Lecture 40 - Turbofan Engine - IV (Continued...)

Lecture 41 - Turbofan Engine - IV (Continued...)

Lecture 42 - Turbofan Engine - IV (Continued...)

Lecture 43 - Turbofan Engine - IV (Continued...)

Lecture 44 - Recent Advances in Turbofan Engines

Lecture 45 - Recent Advances in Turbofan Engines (Continued...)

Lecture 46 - Recent Advances in Turbofan Engines (Continued...)

Lecture 47 - Recent Advances in Turbofan Engines (Continued...)

Lecture 48 - Recent Advances in Turbofan Engines (Continued...)

Lecture 49 - Recent Advances in Turbofan Engines (Continued...)

Lecture 50 - Turboprop Engine

Lecture 51 - Turboprop Engine (Continued...)

Lecture 52 - Turboprop Engine (Continued...)

Lecture 53 - Turboprop Engine (Continued...)

Lecture 54 - Turboprop Engine (Continued...)

Lecture 55 - Turboshaft Engine

Lecture 56 - Turboshaft Engine (Continued...)

Lecture 57 - Turboshaft Engine (Continued...)

Lecture 58 - Turboshaft Engine (Continued...)

Lecture 59 - Turboshaft Engine (Continued...)

Lecture 60 - Component Matching and Testing

Lecture 61 - Component Matching and Testing (Continued...)

Lecture 62 - Component Matching and Testing (Continued...)

Lecture 63 - Component Matching and Testing (Continued...)

Lecture 64 - Aircraft Engine Testing

NPTEL : NOC:Combustion of Solid Fuels and Propellants (Aerospace Engineering)

Co-ordinators : Prof. Srinibas Karmakar

Lecture 1 - Basic Principle of Rocket

Lecture 2 - Basic Principle of Rocket (Continued...)

Lecture 3 - Performance Parameters

Lecture 4 - Performance Parameters (Continued...)

Lecture 5 - Performance Parameters (Example problems)

Lecture 6 - Solid Propellant Rocket - Brief Description

Lecture 7 - Solid Propellants - Introduction

Lecture 8 - Solid Propellants - Selection Criteria

Lecture 9 - Solid Propellants - Selection Criteria (Continued...)

Lecture 10 - Solid Propellants - Selection Criteria (Continued...)

Lecture 11 - Propellants Ingredients (Continued...) and Classification of Solid Propellants

Lecture 12 - Tutorial Problems

Lecture 13 - Combustion of Solid Propellants - Introduction

Lecture 14 - Combustion of Double-Base Propellants

Lecture 15 - Combustion of Double-Base Propellants (Continued...)

Lecture 16 - Combustion of Double-Base Propellants (Continued...)

Lecture 17 - Evaluation of Burn Rate of DB Propellants

Lecture 18 - Evaluation of Burn Rate of DB Propellants (Continued...)

Lecture 19 - Combustion of Composite Propellants - Introduction

Lecture 20 - Combustion of Composite Propellants (Continued...)

Lecture 21 - Evaluation of Burn Rate of Composite Propellants

Lecture 22 - Effect of Various Parameters on Burn Rate of Composite Propellants

Lecture 23 - Effect of Transients, Vehicle Acceleration, Binder, Catalysts on Burning Rate of CP

Lecture 24 - Effect of Catalysts on Burning Rate of CP (Continued...)

Lecture 25 - Combustion of Nitra mine Composite Propellants

Lecture 26 - Combustion of CMDB Propellants

Lecture 27 - Choice of Pressure Index (n); Tutorial Problems

Lecture 28 - Metal Combustion Classification-Introduction

Lecture 29 - Metal Combustion Classification (Continued...)

Lecture 30 - Metal Combustion Classification (Continued...)

Lecture 31 - Metal Particle Combustion Regimes

Lecture 32 - Metal Particle Combustion Regimes (Continued...)

Lecture 33 - Combustion Times for Diffusion and Kinetic Controlled Regimes

Lecture 34 - Ignition and Combustion of Boron Particle

Lecture 35 - Ignition and Combustion of Boron Particle (Continued...)

Lecture 36 - Ignition and Combustion of Aluminum Particle,Recent Future Developments on Metal Fuels

Lecture 37 - Erosive Burning in Solid Propellant Rockets - Introduction

Lecture 38 - Methods for Determination of Erosive Function

Lecture 39 - Methods for Determination of Erosive Function (Continued...)

Lecture 40 - Erosive Burning Theories

NPTEL : NOC:Aerospace Structural Analysis (Aerospace Engineering)

Co-ordinators : Prof. Mira Mitra

Lecture 1 - Introduction to Aerospace Structures

Lecture 2 - Introduction to Aerospace Structures

Lecture 3 - Recap of Theory of Elasticity

Lecture 4 - Torsion of Circular Cross-Section Shaft

Lecture 5 - Torsion of Non-Circular Cross-Section Shaft

Lecture 6 - Torsion of Non-Circular Cross-Section Shaft

Lecture 7 - Torsion of Non-Circular Cross-Section Shaft

Lecture 8 - Torsion of Non-Circular Cross-Section Shaft

Lecture 9 - Membrane Analogy

Lecture 10 - Membrane Analogy

Lecture 11 - Torsion of Thin-Walled Cross-Section

Lecture 12 - Torsion of Thin-Walled Cross-Section

Lecture 13 - Torsion of Thin-Walled Closed Cross-Section

Lecture 14 - Torsion of Thin-Walled Closed Cross-Section

Lecture 15 - Torsion of Thin-Walled Closed Cross-Section

Lecture 16 - Bi-directional Bending

Lecture 17 - Bi-directional Bending

Lecture 18 - Bi-directional Bending

Lecture 19 - Deflection in Bi-directional Bending

Lecture 20 - Deflection in Bi-directional Bending

Lecture 21 - Shear Stresses due to Shear Forces

Lecture 22 - Shear Stresses due to Shear Forces

Lecture 23 - Shear Stresses due to Shear Forces

Lecture 24 - Shear Center

Lecture 25 - Shear Center

Lecture 26 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force

Lecture 27 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force

Lecture 28 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force

Lecture 29 - Shear Flow in Thin-walled Closed Cross-Section due to Shear Force

Lecture 30 - Skin-Stringer Idealization

Lecture 31 - Skin-Stringer Idealization

Lecture 32 - Skin-Stringer Idealization

Lecture 33 - Skin-Stringer Idealization

Lecture 34 - Skin-Stringer Idealization

Lecture 35 - Skin-Stringer Idealization

Lecture 36 - Buckling of Column

Lecture 37 - Buckling of Column

Lecture 38 - Buckling of Column with Initial Imperfection

Lecture 39 - Buckling of Column with Different Boundary Conditions

Lecture 40 - Buckling of Column with Different Boundary Conditions

NPTEL : NOC:Fundamentals of Supersonic and Hypersonic Flow (Aerospace Engineering)

Co-ordinators : Prof. Arnab Roy

Lecture 1 - Introduction to supersonic and hypersonic flows

Lecture 2 - Introduction to supersonic and hypersonic flows (Continued...)

Lecture 3 - Characteristics of these two flow regimes

Lecture 4 - Characteristics of these two flow regimes (Continued...)

Lecture 5 - Where do these flows occur

Lecture 6 - Basic Concepts and Governing Equations of Compressible Flow

Lecture 7 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)

Lecture 8 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)

Lecture 9 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)

Lecture 10 - Basic Concepts and Governing Equations of Compressible Flow (Continued...)

Lecture 11 - Brief introduction to waves

Lecture 12 - Shocks and Expansion waves

Lecture 13 - Shock and expansion wave relations in the high Mach number limit

Lecture 14 - Revisiting Waves, Conservation Equations and Shocks

Lecture 15 - More on shock and expansion wave relations

Lecture 16 - Introduction to viscous compressible flow

Lecture 17 - Introduction to viscous compressible flow - boundary layer equations

Lecture 18 - Compressible Boundary Layer Equations (Continued...)

Lecture 19 - Compressible Boundary Layer Equations (Continued...)

Lecture 20 - Compressible Boundary Layer Equations - aerodynamic heating and drag

Lecture 21 - Introduction to High Temperature Gas Dynamics

Lecture 22 - Introduction to High Temperature Gas Dynamics (Continued...)

Lecture 23 - Introduction to High Temperature Gas Dynamics (Continued...)

Lecture 24 - Thermodynamics and chemistry of high temperature gases

Lecture 25 - Equilibrium chemically reacting gas mixture

Lecture 26 - Introduction to Statistical Thermodynamics

Lecture 27 - Macrostates and Microstates and counting of microstates

Lecture 28 - Most probable macrostate - Boltzmann Distribution

Lecture 29 - Partition function and its role in finding thermodynamic properties of a single

Lecture 30 - Equilibrium composition of high temperature air

Lecture 31 - Introduction to Hypersonic Non Equilibrium Flows

Lecture 32 - Basics of Kinetic Theory of Gases

Lecture 33 - Kinetic Theory of Gases (Continued...)

Lecture 34 - Vibrational Nonequilibrum

Lecture 35 - Chemical Nonequilibrum

Lecture 36 - Inviscid High Temperature Equilibrium Flow

Lecture 37 - Inviscid High Temperature Equilibrium Flow (Continued...)

Lecture 38 - Governing equations of Inviscid High Temperature Equilibrium Flow

Lecture 39 - Inviscid High Temperature Equilibrium Flow-normal and oblique shock

Lecture 40 - Inviscid High Temperature Equilibrium Flow-flow through CD nozzle

Lecture 41 - Inviscid High Temperature Non Equilibrium Flow - Introduction

Lecture 42 - Inviscid High Temperature Non Equilibrium Flow - Introduction (Continued...)

Lecture 43 - Inviscid High Temperature Non Equilibrium Flow - Governing Equations

Lecture 44 - Inviscid High Temperature Non Equilibrium Flow - frozen, equilibrium

Lecture 45 - Inviscid High Temperature Non Equilibrium Flow - shocks, nozzle flow

Lecture 46 - Viscous High Temperature Flows - Introduction

Lecture 47 - Viscous High Temperature Flows - Introduction (Continued...)

Lecture 48 - Transport properties and Governing Equations of Viscous High Temperature Flows

Lecture 49 - Governing Equations of Viscous High Temperature Flows, Boundary layer Equations

Lecture 50 - Introduction to radiative heat transfer, computational results on viscous

Lecture 51 - Recapitulating the basics of high speed aerodynamics from an application perspective

Lecture 52 - Recapitulating the basics of high speed aerodynamics from an application perspective

Lecture 53 - Supersonic and Hypersonic Shock Interactions

Lecture 54 - Supersonic and hypersonic shock interactions (Continued...); Hypersonic Flight

Lecture 55 - Hypersonic Flight Trajectories (Continued...), Basics of wave rider, Recapitulation

Lecture 56 - Reference Temperature Method; Brief discussion on boundary layer transition

Lecture 57 - Recapitulation of the Reference Temperature Method; Governing equations

Lecture 58 - Some numerical simulations on shock diffraction, shock wave boundary

Lecture 59 - High speed intakes; scramjet engines; other applications of shock waves

Lecture 60 - Other applications of shock waves - astrophysical flows, a quick

NPTEL : Acoustic Instabilities in Aerospace Propulsion (Aerospace Engineering)

Co-ordinators : Prof. R.I. Sujith

Lecture 1 - Introduction to Thermoacoustic Instabilities

Lecture 2 - Part I : Introduction to Acoustics Part II : Conservation Equations

Lecture 3 - Wave Equation and its Solution in Time Domain

Lecture 4 - Part I : Harmonic Waves Part II : Acoustic Energy Corollory

Lecture 5 - Standing Waves - 1

Lecture 6 - Standing Waves - 2

Lecture 7 - Power Flow and Acoustic Admittance

Lecture 8 - Impedance Tube Technique

Lecture 9 - Admittance and Standing Waves

Lecture 10 - Admittance, Stability and Attenuation

Lecture 11 - Attenuation : Continued Sound Propagation Through Inhomogeneous Media - 1

Lecture 12 - Sound Propagation Through Inhomogeneous Media - 2

Lecture 13 - Sound Propagation Through Inhomogeneous Media - 3

Lecture 14 - Multidimensional Acoustic Fields - 1

Lecture 15 - Multidimensional Acoustic Fields - 2

Lecture 16 - Interaction between Sound and Combustion

Lecture 17 - Reference Books Derivation of Rayleigh Criteria

Lecture 18 - Effect of Heat release on the Acoustic Field

Lecture 19 - Modal Analysis of Thermoacoustic Instability - 1

Lecture 20 - Modal Analysis of Thermoacoustic Instability - 2

Lecture 21 - Active Control of Thermoacoustic Instability

Lecture 22 - Toy model for a Rijke tube in Time Domain

Lecture 23 - Galerkin Technique for Thermoacoustics

Lecture 24 - Evolution Equation for Thermoacoustics

Lecture 25 - Non linear analysis of Thermoacoustic Instability

Lecture 26 - Non-normality, Transient Growth and Triggering Instability - 1

Lecture 27 - Non-normality, Transient Growth and Triggering Instability - 2

Lecture 28 - Non-normality, Transient Growth and Triggering Instability - 3

Lecture 29 - Bifurcations

Lecture 30 - Premixed Flame Acoustic Interaction - 1

Lecture 31 - Premixed Flame Acoustic Interaction - 2

Lecture 32 - Combustion instability due to Equivalence Ratio Fluctuation

Lecture 33 - Role of Hydrodynamic Instabilities - 1

Lecture 34 - Role of Hydrodynamic Instabilities - 2

Lecture 35 - Role of Hydrodynamic Instabilities - 3

Lecture 36 - Active Control of Thermoacoustic Instability Revisited

Lecture 37 - Solid Propellant Combustion Instability - 1

Lecture 38 - Solid Propellant Combustion Instability - 2

Lecture 39 - Response of a Diffusion Flame to Acoustic Oscillations - 1

Lecture 40 - Response of a Diffusion Flame to Acoustic Oscillations - 2

Lecture 41 - Response of a Diffusion Flame to Acoustic Oscillations - 3

NPTEL : Aerospace Propulsion (Aerospace Engineering)

Co-ordinators : Dr. P.A. Ramakrishna

Lecture 1 - Introduction

Lecture 2 - Air breathing Engines - Turbojet I

Lecture 3 - Air breathing Engines - Turbojet II

Lecture 4 - Air breathing Engines - Turboprop & Turbofan

Lecture 5 - Air breathing Engines - Ramjet & Scramjet

Lecture 6 - Non-air breathing Engines I

Lecture 7 - Non-air breathing Engines II

Lecture 8 - General Performance Parameters I

Lecture 9 - General Performance Parameters II

Lecture 10 - Cycle Analysis - Ramjet

Lecture 11 - Cycle Analysis - Turbojet I

Lecture 12 - Cycle Analysis - Turbojet II

Lecture 13 - Cycle Analysis - Turbojet III

Lecture 14 - Cycle Analysis - Turbojet IV

Lecture 15 - Cycle Analysis - Turbojet V

Lecture 16 - Cycle Analysis - Turbojet VI

Lecture 17 - Cycle Analysis - Turbofan

Lecture 18 - Rocket Nozzles - 1D Analysis I

Lecture 19 - Rocket Nozzles - 1D Analysis II

Lecture 20 - Rocket Nozzles - 1D Analysis III

Lecture 21 - Rocket Nozzles - Real Effects I

Lecture 22 - Rocket Nozzles - Real Effects II

Lecture 23 - Rocket Nozzles - Thrust Vectoring

Lecture 24 - Solid Rockets - Propellants

Lecture 25 - Solid Rockets - Burn rate

Lecture 26 - Solid Rockets - Performance

Lecture 27 - Solid Rockets - Grain

Lecture 28 - Solid Rockets - Ignition, Quenching

Lecture 29 - Solid Rockets - Igniter, Depressurization

Lecture 30 - Propellant Combustion - Combustion Modelling

Lecture 31 - Liquid Rocket - Propellants

Lecture 32 - Liquid Rocket - Nozzle Cooling I

Lecture 33 - Liquid Rocket - Nozzle Cooling II

Lecture 34 - Liquid Rocket - Nozzle Cooling III

Lecture 35 - Liquid Rocket - Pressure fed system

Lecture 36 - Liquid Rocket - Pump fed system

Lecture 37 - Liquid Rocket - Pumps

Lecture 38 - Liquid Rocket - Fuel Injection

Lecture 39 - Hybrid Rocket - Basics

Lecture 40 - Hybrid Rocket Performance

Lecture 41 - Hybrid Rocket Combustion

Lecture 42 - Chemical Equilibrium Analyser - SP 273

NPTEL : Combustion (Aerospace Engineering)

Co-ordinators : Prof. S.R. Chakravarthy

Lecture 1 - Introduction

Lecture 2 - Chemical Reactions, Heats of Reaction and Formation

Lecture 3 - Sensible Enthalpy and Adiabatic Flame Temperature

Lecture 4 - Dissociation of Products, Role of Pressure

Lecture 5 - Numerical Calculation of Adiabatic Flame Temperature, Chemical Kinetics 1

Lecture 6 - Chemical Kinetics 2

Lecture 7 - Equilibrium Reactions, Global Kinetics, Order of Reaction

Lecture 8 - Reduced Chemistry, Steady State Approximation

Lecture 9 - Steady State Approximation, Partial Equilibrium Approximation

Lecture 10 - Partial Equilibrium Approximation, Chemical Explosions

Lecture 11 - Combining Chemical and Thermal Processes 1

Lecture 12 - Combining Chemical and Thermal Processes 2

Lecture 13 - Combining Chemical and Thermal Processes 3

Lecture 14 - Combining Chemical and Thermal Processes 4

Lecture 15 - Mass and Molar Diffusion, Fick's Law

Lecture 16 - Conservation Equations for Multi-Component Mixtures

Lecture 17 - Multi-Component Diffusion Equation

Lecture 18 - Multi-Component Momentum Equation

Lecture 19 - Energy Equation

Lecture 20 - One Dimensional Steady Flow

Lecture 21 - Schvab-Zeldovich Formulation 1

Lecture 22 - Schvab-Zeldovich Formulation 2

Lecture 23 - Rankine-Hugoniot Relations 1

Lecture 24 - Rankine-Hugoniot Relations 2

Lecture 25 - Rankine-Hugoniot Relations 3

Lecture 26 - Velocity, Temperature and Entropy Variation along Hugoniot Curve

Lecture 27 - Laminar Premixed Flames

Lecture 28 - Laminar Premixed Flames - Corrections

Lecture 29 - Laminar Premixed Flames - Rigorous Analysis 1

Lecture 30 - Laminar Premixed Flames - Rigorous Analysis 2

Lecture 31 - Flame Speed Dependencies, G-Equation

Lecture 32 - Bunsen Burner 1

Lecture 33 - Bunsen Burner 2

Lecture 34 - Flame Stabilisation 1

Lecture 35 - Flame Stabilisation 2

Lecture 36 - Ignition

Lecture 37 - Burke-Schumann Problem 1

Lecture 38 - Burke-Schumann Problem 2

Lecture 39 - Burke-Schumann Problem 3

Lecture 40 - Flame Structure

Lecture 41 - Mixture Fraction Formulation 1

Lecture 42 - Mixture Fraction Formulation 2

Lecture 43 - Droplet Burning 1

Lecture 44 - Droplet Burning 2

Lecture 45 - Spray Combustion 1

Lecture 46 - Spray Combustion 2

Lecture 47 - Turbulent Combustion 1

Lecture 48 - Turbulent Combustion 2

Lecture 49 - Combustion Instabilities

Lecture 50 - Detonations

Lecture 51 - Detonation Wave - ZND Structure

NPTEL : Flight Dynamics II (Stability) (Aerospace Engineering)

Co-ordinators : Dr. Nandan Kumar Sinha

Lecture 1 - Earth Atmosphere, Aircraft components, Aircraft nomenclature

Lecture 2 - Basic aerodynamics

Lecture 3 - Equilibrium and stability

Lecture 4 - Static vs dynamic stability

Lecture 5 - Criterion for stability, Wing contribution

Lecture 6 - Horizontal tail contribution

Lecture 7 - Wing plus tail contribution

Lecture 8 - Static margin and CG limits

Lecture 9 - Fuselage contribution

Lecture 10 - Powerplant contribution

Lecture 11 - Power effects on neutral point

Lecture 12 - Elevator

Lecture 13 - Stick free stability, Most fwd CG location

Lecture 14 - Longitudinal stick force per 'g', Ground effect

Lecture 15 - Control requirement, Pull-up maneuver, Maneuver point

Lecture 16 - Elevator per 'g', Maneuver point

Lecture 17 - Example problems

Lecture 18 - Lateral-Directional Stability Derivatives, Fuselage/Vertical fin contribution

Lecture 19 - Roll stability, Wing sweep effect, Rudder

Lecture 20 - Dihedral effect, Various contributions

Lecture 21 - Power effects, Roll control, Aileron

Lecture 22 - Example problems

Lecture 23 - Derivation of Translational Motion Equations

Lecture 24 - Derivation of Angular Motion Equations

Lecture 25 - Description of various forces and moments

Lecture 26 - Nonlinearities and Associated Aircraft Behavior

Lecture 27 - Small perturbation method, Linearization of equations

Lecture 28 - Aerodynamic force and Moment Derivatives

Lecture 29 - Contribution of Aircraft components to Aerodynamic Derivatives

Lecture 30 - Linear Model and Aircraft Dynamics Modes

Lecture 31 - Short Period, Phugoid (Lanchester's formulation)

Lecture 32 - Short period mode approximation

Lecture 33 - Flying and Handling Qualities, Cooper Harper Scale

Lecture 34 - Pure rolling motion, Pure yawing motion,Spiral approximation

Lecture 35 - Spiral, Roll, Dutch roll Mode approximations

Lecture 36 - Lateral directional Flying Qualities, Routh's Stability criterion

Lecture 37 - Stability in Steady Roll Maneuver

Lecture 38 - Wind Effect on Aircraft Pure Plunging Motion

Lecture 39 - Wind Profiles, Longitudinal Mode Response to Wind Shear

Lecture 40 - Stability control/Augmentation

Lecture 41 - Autopilots, Automatic Landing System

NPTEL : Gas Dynamics (Aerospace Engineering)

Co-ordinators : Dr. T.M. Muruganandam

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

NPTEL : Introduction to CFD (Aerospace Engineering)

Co-ordinators : Prof. M. Ramakrishna

Lecture 1 - Introduction, Why and how we need computers

Lecture 2 - Representing Arrays and functions on computers

Lecture 3 - Representing functions - Box functions

Lecture 4 - Representing functions - Polynomials and Hat functions

Lecture 5 - Hat functions, Quadratic and Cubic representations

Lecture 6 - Demo - Hat functions, Aliasing

Lecture 7 - Representing Derivatives - finite differences

Lecture 8 - Finite differences, Laplace equation

Lecture 9 - Laplace equation - Jacobi iterations

Lecture 10 - Laplace equation - Iteration matrices

Lecture 11 - Laplace equation - convergence rate

Lecture 12 - Laplace equation - convergence rate Continued

Lecture 13 - Demo - representation error, Laplace equation

Lecture 14 - Demo - Laplace equation, SOR

Lecture 15 - Laplace equation - final, Linear Wave equation

Lecture 16 - Linear wave equation - Closed form and numerical solution, stability analysis

Lecture 17 - Generating a stable scheme and Boundary conditions

Lecture 18 - Modified equation

Lecture 19 - Effect of higher derivative terms on Wave equation

Lecture 20 - Artificial dissipation, upwinding, generating schemes

Lecture 21 - Demo - Modified equation, Wave equation

Lecture 22 - Demo - Wave equation / Heat Equation

Lecture 23 - Quasi-linear One-Dimensional. wave equation

Lecture 24 - Shock speed, stability analysis, Derive Governing equations

Lecture 25 - One-Dimensional Euler equations - Attempts to decouple

Lecture 26 - Derive Eigenvectors, Writing Programs

Lecture 27 - Applying Boundary conditions

Lecture 28 - Implicit Boundary conditions

Lecture 29 - Flux Vector Splitting, setup froms averaging

Lecture 30 - Roes averaging

Lecture 31 - Demo - One Dimensional flow

Lecture 32 - Accelerating convergence - Preconditioning, dual time stepping

Lecture 33 - Accelerating convergence - Intro to Multigrid method

Lecture 34 - Multigrid method

Lecture 35 - Multigrid method - final, Parallel Computing

Lecture 36 - Calculus of Variations - Three Lemmas and a Theorem

Lecture 37 - Calculus of Variations - Application to Laplace Equation

Lecture 38 - Calculus of Variations - Final and Random Walk

Lecture 39 - Overview and Recap of the course

NPTEL : NOC:Rocket Propulsion (Aerospace Engineering)

Co-ordinators : Prof. K. Ramamurthi, Prof. S. Varunkumar

Lecture 1 - Introduction

Lecture 2 - Motion in Space

Lecture 3 - Rotational Frame of Reference and Orbital Velocities

Lecture 4 - Velocity Requirements

Lecture 5 - Theory of rocket propulsion

Lecture 6 - Rocket Equation and Staging of Rockets

Lecture 7 - Review of Rocket Principles: Propulsion Efficiency

Lecture 8 - Examples Illustrating Theory of Rocket Propulsion and Introduction to Nozzles

Lecture 9 - Theory of Nozzles

Lecture 10 - Nozzle Shape

Lecture 11 - Area Ratio of Nozzles: Under Expansion and Over Expansion

Lecture 12 - Characteristic Velocity and Thrust Coefficient

Lecture 13 - Divergence Loss in Conical Nozzles and the Bell Nozzles

Lecture 14 - Unconventional Nozzles and Problems in Nozzles

Lecture 15 - Criterion for Choice of Chemical Propellants

Lecture 16 - Choice of Fuel-Rich Propellants

Lecture 17 - Performance Prediction Analysis

Lecture 18 - Factors Influencing Choice of Chemical Propellants

Lecture 19 - Low energy liquid propellants and Hybrid propellants Chapter 5: Solid Propellant Rockets

Lecture 20 - Introduction to Solid Propellant Rockets

Lecture 21 - Burn Rate of Solid Propellants and Equilibrium Pressure in Solid Propellant Rockets

Lecture 22 - Design Aspects of Solid Propellant Rockets

Lecture 23 - Burning Surface Area of Solid Propellant Grains

Lecture 24 - Ignition of Solid Propellant Rockets

Lecture 25 - Review of Solid Propellant Rockets

Lecture 26 - Feed Systems for Liquid Propellant Rockets

Lecture 27 - Feed System Cycles for Pump Fed Liquid Propellant Rockets

Lecture 28 - Analysis of Gas Generator and Staged combustion cycles and introduction to injectors

Lecture 29 - Injectors, Cooling of Chambers and Mixture Ratio Distribution

Lecture 30 - Efficiencies due to mixture ratio distribution and incomplete vaporization

Lecture 31 - Pumps and Turbines: Propellant Feed System at Zero -g- Conditions

Lecture 32 - Review of Liquid Bi-propellant Rockets and Introduction to Mono-propellant Rockets

Lecture 33 - Introduction to Hybrid Rockets and a Simple Illustration of Combustion instability in Liquid Propellant Rockets

Lecture 34 - Principles of Electrostatic and Electromagnetic Rockets

Lecture 35 - Electrical Thrusters

Lecture 36 - Electrical and Nuclear Rockets; Advanced Propulsion

NPTEL : Advanced Control System Design for Aerospace Vehicles (Aerospace Engineering)

Co-ordinators : Dr. Radhakant Padhi

Lecture 1 - Introduction and Motivation for Advanced Control Design

Lecture 2 - Classical Control Overview - I

Lecture 3 - Classical Control Overview - II

Lecture 4 - Classical Control Overview - III

Lecture 5 - Classical Control Overview - IV

Lecture 6 - Basic Principles of Atmospheric Flight Mechanics

Lecture 7 - Overview of Flight Dynamics - I

Lecture 8 - Overview of Flight Dynamics - II

Lecture 9 - Representation of Dynamical Systems - I

Lecture 10 - Representation of Dynamical Systems - II

Lecture 11 - Representation of Dynamical Systems - III

Lecture 12 - Review of Matrix Theory - I

Lecture 13 - Review of Matrix Theory - II

Lecture 14 - Review of Matrix Theory - III

Lecture 15 - Review of Numerical Methods

Lecture 16 - Linearization of Nonlinear Systems

Lecture 17 - First and Second Order Linear Differential Equations

Lecture 18 - Time Response of Linear Dynamical Systems

Lecture 19 - Stability of Linear Time Invariant Systems

Lecture 20 - Controllability and Observability of linear Time Invariant Systems

Lecture 21 - Pole Placement Control Design

Lecture 22 - Pole Placement Observer Design

Lecture 23 - Static Optimization: An Overview

Lecture 24 - Calculus of Variations: An Overview

Lecture 25 - Optimal Control Formulation using Calculus of Variations

Lecture 26 - Classical Numerical Methods for Optimal Control

Lecture 27 - Linear Quadratic Regulator (LQR) Design - 1

Lecture 28 - Linear Quadratic Regulator (LQR) Design - 2

Lecture 29 - Linear Control Design Techniques in Aircraft Control - I

Lecture 30 - Linear Control Design Techniques in Aircraft Control - II

Lecture 31 - Lyapunov Theory - I

Lecture 32 - Lyapunov Theory - II

Lecture 33 - Constructions of Lyapunov Functions

Lecture 34 - Dynamic Inversion - I

Lecture 35 - Dynamic Inversion - II

Lecture 36 - Neuro-Adaptive Design - I

Lecture 37 - Neuro-Adaptive Design - II

Lecture 38 - Neuro-Adaptive Design for Flight Control

Lecture 39 - Integrator Back-Stepping; Linear Quadratic (lQ) Observer

Lecture 40 - An Overview of Kalman Filter Theory

NPTEL : Optimal Control, Guidance and Estimation (Aerospace Engineering)

Co-ordinators : Dr. Radhakant Padhi

Lecture 1 - Introduction, Motivation and Overview

Lecture 2 - Overview of SS Approach and Matrix Theory

Lecture 3 - Review of Numerical Methods

Lecture 4 - An Overview of Static Optimization - I

Lecture 5 - An Overview of Static Optimization - II

Lecture 6 - Review of Calculus of Variations - I

Lecture 7 - Review of Calculus of Variations - II

Lecture 8 - Optimal Control Formulation Using Calculus of Variations

Lecture 9 - Classical Numerical Methods to Solve Optimal Control Problems

Lecture 10 - Linear Quadratic Regulator (LQR) - I

Lecture 11 - Linear Quadratic Regulator (LQR) - II

Lecture 12 - Linear Quadratic Regulator (LQR) - III

Lecture 13 - Linear Quadratic Regulator (LQR) - III

Lecture 14 - Discrete-time Optimal Control

Lecture 15 - Overview of Flight Dynamics - I

Lecture 16 - Overview of Flight Dynamics - II

Lecture 17 - Overview of Flight Dynamics - III

Lecture 18 - Linear Optimal Missile Guidance using LQR

Lecture 19 - SDRE and Î¸ - D Designs

Lecture 20 - Dynamic Programming

Lecture 21 - Approximate Dynamic Programming (ADP), Adaptive Critic (AC) and Single Network Adaptive Critic (SNAC) Design

Lecture 22 - Transcription Method to Solve Optimal Control Problems

Lecture 23 - Model Predictive Static Programming (MPSP) and Optimal Guidance of Aerospace Vehicles

Lecture 24 - MPSP for Optimal Missile Guidance

Lecture 25 - Model Predictive Spread Control (MPSC) and Generalized MPSP (G-MPSP) Designs

Lecture 26 - Linear Quadratic Observer & An Overview of State Estimation

Lecture 27 - Review of Probability Theory and Random Variables

Lecture 28 - Kalman Filter Design - I

Lecture 29 - Kalman Filter Design - II

Lecture 30 - Kalman Filter Design - III

Lecture 31 - Integrated Estimation, Guidance & Control - I

Lecture 32 - Integrated Estimation, Guidance & Control - II

Lecture 33 - LQG Design; Neighboring Optimal Control & Sufficiency Condition

Lecture 34 - Constrained Optimal Control - I

Lecture 35 - Constrained Optimal Control - II

Lecture 36 - Constrained Optimal Control - III

Lecture 37 - Optimal Control of Distributed Parameter Systems - I

Lecture 38 - Optimal Control of Distributed Parameter Systems - II

Lecture 39 - Take Home Material: Summary - I

Lecture 40 - Take Home Material: Summary - II

NPTEL : NOC:Combustion in Air Breathing Aero Engines (Aerospace Engineering)

Co-ordinators : Prof. Swetaprovo Chaudhuri

Lecture 1 - Introduction

Lecture 2 - Chemical Equilibrium - I

Lecture 3 - Chemical Equilibrium - II

Lecture 4 - Chemical Kinetics - I

Lecture 5 - Chemical Kinetics - II

Lecture 6 - Chemical Kinetics - III

Lecture 7 - Chemical Kinetics - IV

Lecture 8 - Oxidation Mechanism of Fuels - I

Lecture 9 - Oxidation Mechanism of Fuels - II

Lecture 10 - Oxidation Mechanism of Fuels - III

Lecture 11 - Oxidation Mechanism of Fuels - IV

Lecture 12 - Transport Phenomena

Lecture 13 - Governing Equations - I

Lecture 14 - Governing Equations - II

Lecture 15 - Governing Equations - III

Lecture 16 - Governing Equations - IV

Lecture 17 - Governing Equations - V

Lecture 18 - Laminar Non-Premixed Flames - I

Lecture 19 - Laminar Non-Premixed Flames - II

Lecture 20 - Laminar Non-Premixed Flames - III

Lecture 21 - Laminar Non-Premixed Flames - IV

Lecture 22 - Laminar Premixed Flames - I

Lecture 23 - Laminar Premixed Flames - II

Lecture 24 - Laminar Premixed Flames - III

Lecture 25 - Laminar Premixed Flames - IV

Lecture 26 - Laminar Premixed Flames - V

Lecture 27 - Laminar Premixed Flames - VI

Lecture 28 - Laminar Premixed Flames - VII

Lecture 29 - Limit Phenomena - I

Lecture 30 - Limit Phenomena - II

Lecture 31 - Introduction to turbulent flows

Lecture 32 - Non-reacting turbulent flows - I

Lecture 33 - Non-reacting turbulent flows - II

Lecture 34 - Reacting turbulent flows - III

Lecture 35 - Reacting turbulent flows - IV

Lecture 36 - Reacting turbulent flows - V

Lecture 37 - Reacting turbulent flows - VI

Lecture 38 - Reacting turbulent flows - VII

Lecture 39 - Turbulent Non-Premixed Flames - I

Lecture 40 - Turbulent Non-Premixed Flames - II

Lecture 41 - Turbulent Non-Premixed Flames - III

Lecture 42 - Turbulent Premixed Flames - I

Lecture 43 - Turbulent Premixed Flames - II

Lecture 44 - Turbulent Premixed Flames - III

Lecture 45 - Turbulent Premixed Flames - IV

Lecture 46 - Turbulent Premixed Flames - V

Lecture 47 - Turbulent Premixed Flames - VI

Lecture 48 - Aero Gas Turbine Combustors - I

Lecture 49 - Aero Gas Turbine Combustors - II

Lecture 50 - Aero Gas Turbine Combustors - III

Lecture 51 - Aero Gas Turbine Combustors - IV

Lecture 52 - Aero Gas Turbine Combustors - V

Lecture 53 - Flame Stabilization and Blow off - I

Lecture 54 - Flame Stabilization and Blow off - II

Lecture 55 - Flame Stabilization and Blow off - III

Lecture 56 - Flame Stabilization and Blow off - IV

Lecture 57 - Flame Stabilization and Blow off - V

Lecture 58 - Combustion in Scramjets - I

Lecture 59 - Combustion in Scramjets - II

Lecture 60 - Combustion in Scramjets - III

Lecture 61 - Combustion in Scramjets - IV

Lecture 62 - Review

NPTEL : NOC:Gasdynamics: Fundamentals and Applications (Aerospace Engineering)

Co-ordinators : Prof. Srisha Rao M V

Lecture 1 - Introduction

Lecture 2 - Flow Regimes

Lecture 3 - Thermodynamics - 1

Lecture 4 - Thermodynamics - 2

Lecture 5 - Thermodynamics - Numerical

Lecture 6 - Flow equations - Integral Form

Lecture 7 - Flow equations - Differential Form

Lecture 8 - Quasi-1D Assumption

Lecture 9 - Speed of Sound

Lecture 10 - Speed of Sound - Numerical

Lecture 11 - Stagnation properties

Lecture 12 - Pitot tube

Lecture 13 - Sonic/Star properties

Lecture 14 - Numerical

Lecture 15 - Normal Shock - I

Lecture 16 - Normal Shock - II-a

Lecture 17 - Normal Shock - II-b

Lecture 18 - Normal Shock - III

Lecture 19 - Normal Shock - IV

Lecture 20 - Normal Shock - Numerical

Lecture 21 - The Shock Tube

Lecture 22 - Waves of infinitesimal Amplitude

Lecture 23 - Waves of finite amplitude

Lecture 24 - Shock Tube Relations

Lecture 25 - Unsteady Flows - Numerical

Lecture 26 - Oblique Shock Waves

Lecture 27 - Expansion waves

Lecture 28 - Shock Expansion Method

Lecture 29 - Shock Reflection

Lecture 30 - Oblique Shock and Expansion waves - Numerical

Lecture 31 - Varying Area Duct Flows - I

Lecture 32 - Varying Area Duct Flows - II

Lecture 33 - Converging Nozzle and Chocking

Lecture 34 - Converging and Diverging Nozzle Operation

Lecture 35 - Varying area flow- Numericals - I

Lecture 36 - Diffusers Intakes/Inlets

Lecture 37 - Experimental facilities

Lecture 38 - Varying area flow - Numericals - II

Lecture 39 - Varying area flow - Numericals - III

Lecture 40 - Varying area flow - Numericals - IV

Lecture 41 - 1D flow with friction - Fanno flow - I

Lecture 42 - 1D flow with friction - Fanno flow - II

Lecture 43 - 1D flow with friction - Fanno flow - III

Lecture 44 - 1D flow with friction - Fanno flow - Numericals

Lecture 45 - 1D Flows with Heat Addition: Rayleigh Flows - I

Lecture 46 - 1D Flows with Heat Addition: Rayleigh Flows - II

Lecture 47 - 1D Flows with Heat Addition: Rayleigh Flows - Numericals

Lecture 48 - Generalized 1D Flows

Lecture 49 - Small perturbation theory - I

Lecture 50 - Small perturbation theory - II

Lecture 51 - Small perturbation theory - III

Lecture 52 - Method of Characteristics: 2D Supersonic Flow - I

Lecture 53 - Method of Characteristics: 2D Supersonic Flow - II

Lecture 54 - Method of Characteristics: Applications

Lecture 55 - Hypersonic Flows - I

Lecture 56 - Hypersonic Flows - II

Lecture 57 - Edney Shock Interaction

Lecture 58 - Shock Boundary Layer Interaction - I

Lecture 59 - Shock Boundary Layer Interaction - II

Lecture 60 - Concluding Remarks

NPTEL : NOC:Thermal Processing of Foods (Agriculture)

Co-ordinators : Prof. R. Anandalakshmi

Lecture 1 - Food Microbiology: Microbial Growth and Concerns in Various Foods

Lecture 2 - Blanching, Pasteurization, Ultra-pasteurization, Hot fill and UHT

Lecture 3 - Thermal processing equipment

Lecture 4 - Milk pasteurization

Lecture 5 - Canning operations

Lecture 6 - Temperature distribution and heat penetration

Lecture 7 - Kinetics of reactions

Lecture 8 - F value and process requirements

Lecture 9 - Quality considerations and process optimization

Lecture 10 - Shelf life studies

Lecture 11 - Validation of heat processes

Lecture 12 - Fundamentals of aseptic processing

Lecture 13 - Aseptic equipment design

Lecture 14 - Aseptic process design

Lecture 15 - Microwave and radio frequency heating

Lecture 16 - Ohmic heating

Lecture 17 - Overview of non-thermal processing technologies

Lecture 18 - Advanced separation processes

Lecture 19 - High pressure dialysis, ultrafiltration and reverse osmosis

Lecture 20 - Nanofiltration, electrodialysis and membrane separation

Lecture 21 - Various types of heat exchangers for food process engineering

Lecture 22 - Various types of driers for food process engineering

Lecture 23 - Importance and applications of extrusion technology in food processing

Lecture 24 - Changes of properties and functional components of extruded foods

Lecture 25 - Food biosensors

Lecture 26 - Types of functional foods: Probiotics and nutraceuticals

Lecture 27 - Packaging considerations: Barrier and mechanical properties of food packaging materials

Lecture 28 - Biocomposite/bionanocomposite materials for food packaging applications

Lecture 29 - Sanitary components and requirements

Lecture 30 - Regulatory considerations

Lecture 31 - Special Lecture: Membrane Seperation

NPTEL : NOC:Natural Resources Management (Agriculture)

Co-ordinators : Prof. Sudip Mitra

Lecture 1 - Introduction to Natural Resource bases - Part 1

Lecture 2 - Introduction to Natural Resource bases - Part 2A

Lecture 3 - Introduction to Natural Resource bases - Part 2B

Lecture 4 - Introduction to Natural Resource bases - Part 2C

Lecture 5 - Resource management Paradigms - Part 1

Lecture 6 - Resource management Paradigms - Part 2

Lecture 7 - Approaches to NRM

Lecture 8 - Biodiversity and conservation - Part 1

Lecture 9 - Biodiversity and conservation - Part 2

Lecture 10 - Biodiversity and conservation - Part 3

Lecture 11 - Participatory Rural Appraisal and Rapid Rural Appraisal - Part 1

Lecture 12 - Participatory Rural Appraisal and Rapid Rural Appraisal - Part 2

Lecture 13 - Participatory Rural Appraisal and Rapid Rural Appraisal - Part 3

Lecture 14 - Participatory Rural Appraisal and Rapid Rural Appraisal - Part 4

Lecture 15 - Introduction to INRM

Lecture 16 - Learning cycle in Integrated Natural Resources Management

Lecture 17 - Technologies for Integrated Natural Resources Management

Lecture 18 - PRA techniques within INRM

Lecture 19 - Ranking technique

Lecture 20 - Community Based Natural Resources Management - Part 1

Lecture 21 - Community Based Natural Resources Management - Benefits from CBNRM

Lecture 22 - Community Based Natural Resources Management - Part 2

Lecture 23 - Watershed management

Lecture 24 - Watershed management: Flood control

Lecture 25 - National Water Policy

Lecture 26 - Soil erosion management

Lecture 27 - Landuse management for flood risk reduction

Lecture 28 - Drought Management

Lecture 29 - Common Property Right (CPR)

Lecture 30 - A Tutorial on Tragedy of the Commons

Lecture 31 - Environmental Management Systems (EMS)

Lecture 32 - National Environment Policy (NEP)

Lecture 33 - Modeling And Simulations Applications in Agriculture for NRM - Part 1

Lecture 34 - Modeling And Simulations Applications in Agriculture for NRM - Part 2

Lecture 35 - Modeling And Simulations Applications in Agriculture for NRM - Part 3

Lecture 36 - Modeling And Simulations Applications in Agriculture for NRM - Part 4

Lecture 37 - Modeling And Simulations Applications in Agriculture for NRM - Part 5

Lecture 38 - Precision Farming and Protected Cultivation - Part 1

Lecture 39 - Precision Farming and Protected Cultivation - Part 2

Lecture 40 - Precision Farming and Protected Cultivation - Part 3

Lecture 41 - Environmental Impact Assessment (EIA) - Part 1

Lecture 42 - Environmental Impact Assessment (EIA) - Part 2

Lecture 43 - Environmental Impact Assessment (EIA) - Part 3

Lecture 44 - Environmental Impact Assessment (EIA) - Part 4

Lecture 45 - Environmental Impact Assessment (EIA) - Part 5

Lecture 46 - Environmental Impact Assessment (EIA) - Part 6

Lecture 47 - Environmental Impact Assessment (EIA) - Part 7

Lecture 48 - CBNRM in Kenya

Lecture 49 - Model sensitivity and Uncertainty

Lecture 50 - MCDA in Agriculture

Lecture 51 - MCDM for NRM - Part 1

Lecture 52 - MCDM for NRM - Part 2

Lecture 53 - MCDM for NRM - Part 3

Lecture 54 - Remote Sensing and GIS Application in Agriculture and NRM (Introduction)

Lecture 55 - Remote Sensing and GIS Application in Agriculture and NRM - Part 1

Lecture 56 - Remote Sensing and GIS Application in Agriculture and NRM - Part 2

Lecture 57 - Remote Sensing and GIS Application in Agriculture and NRM - Part 3

Lecture 58 - Climate change; vulnerability; adaptation - Part 1

Lecture 59 - Climate change; vulnerability; adaptation - Part 2

Lecture 60 - Climate change; vulnerability; adaptation - Part 3

Lecture 61 - ICT: Introduction

Lecture 62 - ICT for Soil management

Lecture 63 - ICT for Water management

Lecture 64 - Collective Management of resources

Lecture 65 - Revision

NPTEL : NOC:Basic Crop Production Practices (BCPP) (Agriculture)

Co-ordinators : Prof. J. R. Yadav, Dr. Vinod Kumar, Dr. Sharwan Kumar Shukla

Lecture 1 - Introduction

Lecture 2 - Irrigation and irrigation needs

Lecture 3 - Source of Irrigation

Lecture 4 - Importance of crops and classification

Lecture 5 - Crop rotation principle

Lecture 6 - Importance of vegetable and classification

Lecture 7 - Paddy crop production

Lecture 8 - Sorghum crop production

Lecture 9 - Pearl millet crop production

Lecture 10 - Maize crop production

Lecture 11 - Pigeon pea crop production

Lecture 12 - Green gram crop production

Lecture 13 - Black gram crop production

Lecture 14 - Cowpea crop production

Lecture 15 - Groundnut crop production

Lecture 16 - Sesame crop production

Lecture 17 - Soybean crop production

Lecture 18 - Sunflower crop production

Lecture 19 - Mango crop production

Lecture 20 - Guava crop production

Lecture 21 - Banana crop production

Lecture 22 - Papaya crop production

Lecture 23 - Tomato crop production

Lecture 24 - Brinjal crop production

Lecture 25 - Chili crop production

Lecture 26 - Okra crop production

NPTEL : NOC:GIS in Ag-Essentials and Applications (GIS) (Agriculture)

Co-ordinators : Dr. Venkataraman Balaji, Dr. R. Nagarajan

Lecture 1 - Introduction

Lecture 2 - Our Agriculture Practices and Lessons

Lecture 3 - Climate and Scale of Change

Lecture 4 - Course Corrections

Lecture 5 - Modified Agriculture - Precision Agriculture

Lecture 6 - Modififed Agriculture Practice - Climate Smart Agriculture

Lecture 7 - Maps and Information in Practice

Lecture 8 - Geographical Information System (GIS)

Lecture 9 - Types of input

Lecture 10 - Analysis - Map overlay

Lecture 11 - Buffering and Perspective View

Lecture 12 - GIS Type and Available GIS Softwares

Lecture 13 - Village Cadastral Map and Property Card

Lecture 14 - Cadastral Maps and Contents

Lecture 15 - Creation of Cadastral Information Base

Lecture 16 - Land Information System

Lecture 17 - Creation of Village Boundary Based Basin Analysis

Lecture 18 - Village Information System

Lecture 19 - Needs and Weather Forecast

Lecture 20 - Cloud Types and Rain Bearing Clouds

Lecture 21 - Weather Satellites and Cloud Pattern Reading

Lecture 22 - Rainfall and Supplementary Irrigation

Lecture 23 - Synergistic Use

Lecture 24 - Surface Rainfall - Run off Assessment and Model

Lecture 25 - Soil and Water Assessment Tools (SWAT) Model

Lecture 26 - Groundwater Availability

Lecture 27 - Groundwater Potential Mapping

Lecture 28 - Water Storage and Water Availability and Release

Lecture 29 - Growth of Crop Area in Command Area and Impact Climate Change

Lecture 30 - Impact of Climate on Agriculture

Lecture 31 - Crop Water Requirement and Distribution Loss

Lecture 32 - Village Agriculture and Other Water Demand and Supply Source

Lecture 33 - Water Security Assessment

Lecture 34 - Land Degradation: Soil Salinity

Lecture 35 - Water Logging

Lecture 36 - Water Balance Under Different Rainfall

Lecture 37 - Drought and Characteristics

Lecture 38 - Drought Vulnerability and Risk Assessment

Lecture 39 - Monitoring and Warning

Lecture 40 - Drought Monitoring: a global perspective

Lecture 41 - Drought Risk and Vulnerability Assessment: a global perspective

Lecture 42 - GIS in Sustainable Agriculture

Lecture 43 - Assessment of Existing Water Storage Structures and Rehabilitation

Lecture 44 - Sustainable Development and Agriculture: a confluence of pressures

Lecture 45 - Climate Change and Drought: a global perspective

Lecture 46 - GIS and Drought Management: a global perspective

NPTEL : NOC:Integrated Pest Management (IPM) (Agriculture)

Co-ordinators : Prof. M. Bheemanna, Prof. B.V. Patil, Prof. Prabhuraj A

Lecture 1 - Introduction

Lecture 2 - Insect, abundance and diversity

Lecture 3 - Insect classification based on economic importance

Lecture 4 - Pest, causes for outbreaks and categories

Lecture 5 - Pest, causes for outbreaks and categories (Continued...)

Lecture 6 - Pest surveillance and methods of sampling

Lecture 7 - Principles of Pest Management and History

Lecture 8 - IPM, Definition and Concepts

Lecture 9 - Ecological Methods of Pest Management - Legal and Cultural

Lecture 10 - Ecological Methods of Pest Management - Cultural (Continued...)

Lecture 11 - Ecological Methods of Pest Management - Cultural (Continued...)

Lecture 12 - Ecological Methods of Pest Management - Physical

Lecture 13 - Ecological Methods of Pest Management - Mechanical

Lecture 14 - Host Plant Resistance

Lecture 15 - Host Plant Resistance (Continued...)

Lecture 16 - Biological Control - Predators

Lecture 17 - Biological Control - Parasitoids

Lecture 18 - Biological Control - Microbes: Fungi, Bacteria and Viruses

Lecture 19 - Biological Control - Microbes: Entomopathogenic Nematodes

Lecture 20 - Pest management by modifying insect behaviour

Lecture 21 - Use of sex pheromones in pest management

Lecture 22 - Use of attractants and repellants in pest management

Lecture 23 - Pest management through radiation technology - Principles

Lecture 24 - Sterile Insect Technique - case studies

Lecture 25 - Pest management through botanicals

Lecture 26 - Pest management through botanicals (Continued...)

Lecture 27 - Chemical Control - History and classification

Lecture 28 - Mode of Action of different insecticide groups

Lecture 29 - Chemical Control - Considerations for Chemicals Integration

Lecture 30 - Insecticide Resistance and Management

Lecture 31 - Insecticide as component of IPM

Lecture 32 - Biotechnological Approaches in IPM

Lecture 33 - Agro-ecosystem Analysis

Lecture 34 - IPM in Paddy

Lecture 35 - IPM in Paddy (Continued...)

Lecture 36 - IPM in Pigeon pea

Lecture 37 - IPM in Pigeon pea (Continued...)

Lecture 38 - IPM in Groundnut

Lecture 39 - IPM in Mustard and Soyabean

Lecture 40 - IPM in Cotton

Lecture 41 - IPM in Cotton (Continued...)

Lecture 42 - IPM in Sugarcane

Lecture 43 - IPM in Sugarcane (Continued...)

Lecture 44 - IPM in Tomato

Lecture 45 - IPM in Cabbage

Lecture 46 - IPM in Mango

Lecture 47 - IPM in Grapes

NPTEL : NOC:Nutrition, Therapeutics and Health (NM) (Agriculture)

Co-ordinators : Dr. V. Vijaya Lakshmi (Instructor Incharge)

Lecture 1 - Introduction

Lecture 2 - Relationship between Food, Nutrition and Health 1

Lecture 3 - Relationship between Food, Nutrition and Health 2

Lecture 4 - Digestion, absorption and utilization of Nutrients 1

Lecture 5 - Digestion, absorption and utilization of Nutrients 2

Lecture 6 - Recommended dietary allowances

Lecture 7 - Carbohydrate

Lecture 8 - Fiber

Lecture 9 - Protein

Lecture 10 - Protein - health significance

Lecture 11 - Fat

Lecture 12 - Energy 1

Lecture 13 - Energy 2

Lecture 14 - Energy 3

Lecture 15 - Fat Soluble Vitamins 1

Lecture 16 - Fat Soluble Vitamins 2

Lecture 17 - Fat Soluble Vitamins 3

Lecture 18 - Water Soluble Vitamins 1

Lecture 19 - Water Soluble Vitamins 2

Lecture 20 - Water soluble Vitamins 3

Lecture 21 - Water soluble Vitamins 4

Lecture 22 - Major minerals 1

Lecture 23 - Major minerals 2

Lecture 24 - Trace minerals 1

Lecture 25 - Trace minerals 2

Lecture 26 - Water

Lecture 27 - Nutritional Disorders

Lecture 28 - Balanced diet and food groups

Lecture 29 - Food guide for selecting adequate diet, practical aspects of food selection

Lecture 30 - Meal planning

Lecture 31 - Other aspects affecting food selection

Lecture 32 - Food sanitation and hygiene

Lecture 33 - Water Purification

Lecture 34 - Therapeutic adaptation of normal diet

Lecture 35 - Principles of therapeutic diet

Lecture 36 - Diet during fevers

Lecture 37 - Diet in lung disease

Lecture 38 - Diet in GI disorders Â– constipation

Lecture 39 - Diet during diarrhoea

Lecture 40 - Diet in disorders of liver

Lecture 41 - Diseases of gall bladder

Lecture 42 - Diet in Diabetes

Lecture 43 - Diseases of Heart and blood vessels

Lecture 44 - Diet for myocardial infarction

Lecture 45 - Diet in kidney disorders

Lecture 46 - Diet in renal failure

Lecture 47 - Diet in cancer

Lecture 48 - Diet in metabolic disorders

Lecture 49 - Diet in stress, burns and surgery

NPTEL : NOC:Weather Forecast in Agriculture and Agro-advisory (WF) (Agriculture)

Co-ordinators : Dr. R. Nagarajan, Co Faculty, Dr.T.N.Balasubramanian (Rtd.), Instructor Incharge

Lecture 1 - Introduction

Lecture 2 - Basic aspects of Atmosphere, Climate, Weather

Lecture 3 - Basic aspects of Rainfall and their application in crop production

Lecture 4 - Basic aspects of Temperature and their application in crop production

Lecture 5 - Basic aspects of Relative humidity, Cloud cover and their application in crop production

Lecture 6 - Basic aspects of wind, wind direction and their application in crop production

Lecture 7 - Three weather codes and crop production

Lecture 8 - Crop production risks and their management

Lecture 9 - Weather sensitive crops, stages and farm operations

Lecture 10 - Crop-weather interactions and definition

Lecture 11 - Crop-Weather Interactions: Wheat, Rice and Maize

Lecture 12 - Crop-Weather Interactions: Sorghum, Groundnut and Pigeon pea

Lecture 13 - Crop-Weather Interactions: Cotton and Sugarcane

Lecture 14 - Crop-Weather Interactions: Sugarbeet and Chickpea

Lecture 15 - Crop-Weather Interactions: Sunflower and Mustard

Lecture 16 - Genesis of weather forecast in India and Abroad

Lecture 17 - Types of weather forecast and details

Lecture 18 - Types of weather forecast and details (Continued...)

Lecture 19 - Simple methods of verification of weather forecast with real event

Lecture 20 - Traditional knowledges on weather forecast and their validity

Lecture 21 - Weather thumb rules and their validity

Lecture 22 - Development and component of agro advisory for weather forecast

Lecture 23 - Development and component of agro advisory for weather forecast (Continued...)

Lecture 24 - Model agro advisories for selected five days weather forecast

Lecture 25 - Mass communication mode of agro advisories and their effectiveness

Lecture 26 - Discussion on weather forecast and agro advisory from different website

Lecture 27 - Role of climate manager on farm management decision based on weather forecast at village level and assignment

Lecture 28 - Development of selected weather window for issuing agro advisory - case study from Tamil Nadu

Lecture 29 - Model of agro advisory for 54 selected weather window of Tamil Nadu for rice

Lecture 30 - Response farming- a type of farm planning being practiced in Australia considering seasonal climate forecast

Lecture 31 - Case study in India on the adoption of weather based crop production - Crop management

Lecture 32 - Case study in India on the adoption of weather based crop production - Pest and disease management

Lecture 33 - Case study in India on the adoption of weather based animal production

Lecture 34 - Cost benefit analysis for the case study done on crop management

Lecture 35 - Cost benefit analysis for the case study done on animal management

Lecture 36 - Summary

NPTEL : NOC:ICT Basics (Agriculture)

Co-ordinators : Prof. T.V. Prabhakar

Lecture 1 - Introduction

Lecture 2 - Highlights Week 0 and 1

Lecture 3 - What is ICT?

Lecture 4 - Architecture of a Computer

Lecture 5 - Architecture of a Phone

Lecture 6 - What is the Internet?

Lecture 7 - What is WWW?

Lecture 8 - Highlights Week 2

Lecture 9 - Phones, Smart Phones, Phablets, Tablets

Lecture 10 - Introduction to Android

Lecture 11 - Network Architectures - Part-1 (Introduction to Computer Networks)

Lecture 12 - Network Architectures - Part-2 (Overview of Network Architecture)

Lecture 13 - Network Architectures - Part-3 (Architecture of Internet)

Lecture 14 - Mobile Wireless Communications - Introduction (Module-1)

Lecture 15 - Mobile Wireless Communication (Module-2)

Lecture 16 - Highlights Week 3

Lecture 17 - Adaptive and Responsive Websites

Lecture 18 - Data management

Lecture 19 - Knowledge Representation

Lecture 20 - Knowledge Representation Techniques

Lecture 21 - Expert Systems

Lecture 22 - Highlights Week - 4

Lecture 23 - Speech Recognition

Lecture 24 - Speech Synthesis

Lecture 25 - Identity Management - Part 1

Lecture 26 - Identity Management - Part 2

Lecture 27 - Location Recognition - Part 1

Lecture 28 - Location Recognition - Part 2

Lecture 29 - Parameter Sensing

Lecture 30 - Highlights Week-5

Lecture 31 - Social Networking - Part 1

Lecture 32 - Social Networking - Part 2

Lecture 33 - Blogs

Lecture 34 - Facebook

Lecture 35 - Twitter

Lecture 36 - 3G WCDMA (Module- 3)

Lecture 37 - 4G Mobile Wireless WiMAX (Module-4)

Lecture 38 - Advanced Wireless Technologies (Module-5)

Lecture 39 - LTE, WLAN, Bluetooth and Future

Lecture 40 - Highlights Week-6

Lecture 41 - Introduction to Cloud Computing

Lecture 42 - Introduction to Cloud Services

Lecture 43 - Cloud Service Providers

Lecture 44 - GIS Application in Agriculture - Part 1

Lecture 45 - GIS Application in Agriculture - Part 2

NPTEL : NOC:Momentum Transfer in Process Engineering (Agriculture)

Co-ordinators : Prof. Tridib Kumar Goswami

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11 - Application of Navier Stokeâ€™s equation for finding out viscosity - Part 2

Lecture 12 - Application of Navier Stokeâ€™s equation for finding out viscosity - Part 3

Lecture 13 - Flow through pipes

Lecture 14 - Hagen-poiseuille equation from Navier stokes equation

Lecture 15 - Fanning friction factor

Lecture 16 - Moodyâ€™s chart

Lecture 17 - Laminar and turbulent flow in a pipe

Lecture 18 - Flow through flat and parallel plates

Lecture 19 - Flow of film or film flow

Lecture 20 - Problems and solution of falling film

Lecture 21 - Flow through annulus - Part 1

Lecture 22 - Flow through annulus - Part 2

Lecture 23 - Stokeâ€™s law

Lecture 24 - Flow through flat plates or slits

Lecture 25 - Problems and solution for flow through flat plates or slits

Lecture 26 - Compressible fluid flow

Lecture 27 - Flow through nozzle - I

Lecture 28 - Flow through nozzle - II

Lecture 29 - Flow through nozzle - problems and solutions

Lecture 30 - Nozzle flow- problems and solutions

Lecture 31 - Sonic velocity

Lecture 32 - Sonic velocity - Mach number

Lecture 33 - Variable fluid flow

Lecture 34 - Variable fluid flow - problems and solutions

Lecture 35 - Variable fluid flow - problems and solutions (Continued...)

Lecture 36 - Pneumatic conveying

Lecture 37 - Problem on Pneumatic conveying - Part 1

Lecture 38 - Problem on Pneumatic conveying - Part 2

Lecture 39 - Non Newtonian fluid flow - Part 1

Lecture 40 - Non Newtonian fluid flow - Part 2

Lecture 41 - Velocity profile for Non Newtonian fluid

Lecture 42 - Average velocity for Non Newtonian fluid

Lecture 43 - Problems and solution of Non Newtonian fluid - Part 1

Lecture 44 - Problems and solution of Non Newtonian fluid - Part 2

Lecture 45 - Flow of Non Newtonian fluid through slit

Lecture 46 - Generalized coefficient of Reynolds number

Lecture 47 - Flow through packed beds

Lecture 48 - Ergunâ€™s equation- derivation - Part 1

Lecture 49 - Ergunâ€™s equation- derivation - Part 2

Lecture 50 - Solving problems on Ergunâ€™s equation

Lecture 51 - Solving problems on Ergunâ€™s equation

Lecture 52 - Fluidization

Lecture 53 - Fluidized bed flow

Lecture 54 - Problem of Fluidized bed condition - Part 1

Lecture 55 - Problem of Fluidized bed condition - Part 2

Lecture 56 - Problem and solution

Lecture 57 - Problem and solution

Lecture 58 - Problem and solution

Lecture 59 - Problem and solution

Lecture 60 - Problem and solution with comprehension of course

NPTEL : NOC:Farm Machinery (Agriculture)

Co-ordinators : Prof. VK Tewari

Lecture 1 - Importance of Farm Machines in the Contest of Enhance Production, Multiple Cropping, Labour Scarcity etc.

Lecture 2 - Ploughing and first opening of the soil, the design and component details

Lecture 3 - Tractor, implement and soil force consideration for tillage implement design

Lecture 4 - Tractor, implement and soil force consideration for tillage implement design

Lecture 5 - Mechanics of rotavoator or rotary tillers

Lecture 6 - Design of a tractor PTO operated rotavator

Lecture 7 - Tractor implement hitching systems

Lecture 8 - Mechanics of tractor implement hitch system and traction prediction models

Lecture 9 - Laboratory class on traction and tire testing

Lecture 10 - Combination tillage implements for efficient land preparation

Lecture 11 - LASER guided land laveller

Lecture 12 - Introduction of seeding operation

Lecture 13 - Types of seed metering devices and their operation

Lecture 14 - Types of fertilizer metering, furrow opening and soil covering devices

Lecture 15 - Equipment for seeding and planting

Lecture 16 - Equipment for precision planting

Lecture 17 - Equipment for Paddy Transplanting

Lecture 18 - Microcontroller based uniform seed rate application system

Lecture 19 - GPS based automatic Variable rate fertilizer applicator

Lecture 20 - Embedded GPS integrated Variable Rate Fertilizer Applicator

Lecture 21 - Design of a seeding equipment - PART 1

Lecture 22 - Design of a seeding equipment - PART 2

Lecture 23 - Design of a seeding equipment - PART 3

Lecture 24 - Design a tractor drawn seed drill for a 40 hp tractor - I

Lecture 25 - Design a tractor drawn seed drill for a 40 hp tractor - II

Lecture 26 - Testing of tractor operated seeding equipment

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32 - Farm machines for interculture operation

Lecture 33 - Performance of weeding blades of a push-pull weeder

Lecture 34 - Advanced level machinery for inter and intra row weeding

Lecture 35 - Tractor mounted contact type microcontroller based improved variable rate herbicide applicator

Lecture 36 - Design of manually operated weeding equipment

Lecture 37 - Plant protection equipment/machinery

Lecture 38 - Selection and design of plant protection equipment/machinery

Lecture 39 - Manually operated knapsack-cum-boom sprayer

Lecture 40 - Performance evaluation of sprayer

Lecture 41 - Testing and certification of spraying equipment

Lecture 42 - Problems based on the design and selection of spraying equipment - I

Lecture 43 - Problems based on the design and selection of spraying equipment - II

Lecture 44 - Advanced level spraying equipment: Ultrasonic sensor based sprayer

Lecture 45 - Advanced level spraying equipment: Drone assisted variable rate chemical application system and electrostatic sprayer

Lecture 46 - Harvesting equipment

Lecture 47 - Machines for harvesting cereal crops, root and fruit crops

Lecture 48 - Combine Harvester

Lecture 49 - Advanced technology approach for cotton harvesting

Lecture 50 - hreshing operation and equipment

Lecture 51 - Design of threshing equipment

Lecture 52 - Performance evaluation and testing of thresher

Lecture 53 - Conservation Agriculture

Lecture 54 - Materials for construction of farm machinery

Lecture 55 - Machinery for Land Drainage, Land Reclamation and Estate Maintenance Part - I

Lecture 56 - Machinery for Land Drainage, Land Reclamation and Estate Maintenance Part - II

Lecture 57 - Machinery for Land Drainage, Land Reclamation and Estate Maintenance Part - III

Lecture 58 - Machinery Selection and Management - Part 1

Lecture 59 - Machinery Selection and Management - Part 2

Lecture 60 - Epilogue

NPTEL : NOC:Irrigation and Drainage (Agriculture)

Co-ordinators : Prof. Damodhara Rao Mailapallli

Lecture 1 - Introduction

Lecture 2 - Soil Properties - I

Lecture 3 - Soil Properties - II

Lecture 4 - Soil Water

Lecture 5 - Tutorial - I

Lecture 6 - Field water balance

Lecture 7 - Evapotranspiration

Lecture 8 - Crop water requirement

Lecture 9 - Irrigation Scheduling

Lecture 10 - Tutorial

Lecture 11 - Irrigation Water Conveyance System

Lecture 12 - Irrigation Water Conveyance

Lecture 13 - Channel Design Structures

Lecture 14 - Measurement of Irrigation Water: Pipe

Lecture 15 - Tutorial

Lecture 16 - Water Application Methods

Lecture 17 - Surface Irrigation Hydraulics

Lecture 18 - Furrow Irrigation Hydraulics

Lecture 19 - Border Irrigation Design

Lecture 20 - Tutorial

Lecture 21 - Sprinkler Irrigation Design

Lecture 22 - Sprinkler Irrigation : Hydraulic Design

Lecture 23 - Drip Irrigation - I

Lecture 24 - Drip Irrigation Design

Lecture 25 - Tutorial (Week 5)

Lecture 26 - Irrigation Wells

Lecture 27 - Aquifer Properties

Lecture 28 - Well Hydraulics - 1

Lecture 29 - Well Hydraulics - 2

Lecture 30 - Tutorial

Lecture 31 - Introduction

Lecture 32 - Centrifugal Pump: Basics

Lecture 33 - Centrifugal Pumps: Power Requirement

Lecture 34 - Pump Characteristic Curves

Lecture 35 - Tutorial

Lecture 36 - Management of salt affected soils: Saline and alkali soils - 1

Lecture 37 - Management of salt affected soils: Saline and alkali soils - 1

Lecture 38 - Agricultural Drainage: Related Concepts

Lecture 39 - Agricultural Drainage: Introduction

Lecture 40 - Tutorial

Lecture 41 - Drainage System Components

Lecture 42 - Drainage System : Drain Pipe

Lecture 43 - Drainage System : Structures

Lecture 44 - Drainage System Design

Lecture 45 - Tutorial

Lecture 46 - Subsurface Drainage Design - 1

Lecture 47 - Subsurface Drainage Design - 2

Lecture 48 - Subsurface Drainage Design - 3

Lecture 49 - Subsurface Drainage Design - 4

Lecture 50 - Tutorial

Lecture 51 - Surface drainage system design - 1

Lecture 52 - Surface drainage system design - 2

Lecture 53 - Non-conventional drainage

Lecture 54 - Economics of drainage project

Lecture 55 - Tutorial

Lecture 56 - Case study of drainage system

Lecture 57 - Drainage Model

Lecture 58 - Irrigation Efficiency

Lecture 59 - Irrigation Economics

Lecture 60 - Irrigation model

NPTEL : NOC:Fundamentals of Food Process Engineering (Agriculture)

Co-ordinators : Prof. Jayeeta Mitra

Lecture 1 - Importance Of Rheology In Food

Lecture 2 - Food Rheology

Lecture 3 - Food Rheology

Lecture 4 - Food Rheology

Lecture 5 - Food Rheology

Lecture 6 - Measurements of Rheological Properties

Lecture 7 - Measurements of Rheological Properties

Lecture 8 - Rheological Properties of Viscoelastic Food

Lecture 9 - Rheological Properties of Viscoelastic Food

Lecture 10 - Rheological Properties of Viscoelastic Food

Lecture 11 - Thermal Processing And Microbial Death Kinetics

Lecture 12 - Thermal processing and microbial death kinetics

Lecture 13 - Thermal processing and microbial death kinetics (Continued...)

Lecture 14 - Thermal processing and microbial death kinetics (Continued...)

Lecture 15 - Thermal processing and microbial death kinetics (Continued...)

Lecture 16 - Evaporation and concentration

Lecture 17 - Evaporation and concentration

Lecture 18 - Evaporation and concentration

Lecture 19 - Evaporation and concentration

Lecture 20 - Evaporation and concentration

Lecture 21 - Heat Exchangers

Lecture 22 - Heat Exchangers

Lecture 23 - Heat Exchangers

Lecture 24 - Heat Exchangers

Lecture 25 - Heat Exchangers

Lecture 26 - Drying Technology

Lecture 27 - Drying Technology

Lecture 28 - Drying Technology

Lecture 29 - Drying Technology

Lecture 30 - Drying Technology

Lecture 31 - Freezing and Freeze Drying

Lecture 32 - Freezing and Freeze Drying

Lecture 33 - Freezing and Freeze Drying

Lecture 34 - Freezing and Freeze Drying

Lecture 35 - Freezing and Freeze Drying

Lecture 36 - Size Reduction

Lecture 37 - Size Reduction (Continued...)

Lecture 38 - Size Reduction (Continued...)

Lecture 39 - Size Reduction (Continued...)

Lecture 40 - Size Reduction (Continued...)

Lecture 41 - Mechanical Separation Techniques

Lecture 42 - Mechanical Separation Techniques

Lecture 43 - Mechanical Separation Techniques

Lecture 44 - Mechanical Separation Techniques

Lecture 45 - Mechanical Separation Techniques

Lecture 46 - Mixing and agitation

Lecture 47 - Mixing and agitation (Continued...)

Lecture 48 - Mixing and agitation (Continued...)

Lecture 49 - Mixing and agitation (Continued...)

Lecture 50 - Mixing and agitation (Continued...)

Lecture 51 - Leaching and Extraction

Lecture 52 - Leaching and Extraction (Continued...)

Lecture 53 - Leaching and Extraction (Continued...)

Lecture 54 - Leaching and Extraction (Continued...)

Lecture 55 - Leaching and Extraction (Continued...)

Lecture 56 - Non Thermal Processing

Lecture 57 - Non Thermal Processing (Continued...)

Lecture 58 - Non Thermal Processing (Continued...)

Lecture 59 - Non Thermal Processing (Continued...)

Lecture 60 - Non Thermal Processing (Continued...)

NPTEL : NOC:Soil and Water Conservation Engineering (Agriculture)

Co-ordinators : Prof. Rajendra Singh

Lecture 1 - Introduction

Lecture 2 - Soilerosion causes and types

Lecture 3 - Factors affecting soil erosion and effects of soil erosion

Lecture 4 - Soil erosion - Mechanics

Lecture 5 - Water erosion control measures

Lecture 6 - Soil loss estimation

Lecture 7 - Erosivity and Erodibility

Lecture 8 - Modification in Universal soil loss equcation - Part I

Lecture 9 - Modification in Universal soil loss equcation - Part II

Lecture 10 - Soil loss measurement

Lecture 11 - Bunds - Introduction

Lecture 12 - Contour Bunds

Lecture 13 - Problems on Contour Bunds

Lecture 14 - Graded Bunds

Lecture 15 - Problems on Graded Bunds

Lecture 16 - Terrace - Introduction

Lecture 17 - Bench Terraces

Lecture 18 - Problems on Bench Terraces

Lecture 19 - Broad-base Terraces

Lecture 20 - Problems on Broad-base Terraces

Lecture 21 - Grassed Waterways

Lecture 22 - Problems on Grassed Waterways

Lecture 23 - Parabolic Grassed Waterways

Lecture 24 - GATE Questions on Various Topics Covered

Lecture 25 - Introduction-Gully Control Measures

Lecture 26 - Gully Control Measures (Permanent Structures)

Lecture 27 - Design Considerations- Permanent Gully Control Structures

Lecture 28 - Basics of Open Channel Hydraulics - 1

Lecture 29 - Basics of Open Channel Hydraulics - 2

Lecture 30 - Hydraulic Design of Drop Spillway

Lecture 31 - Hydraulic Design of drop Spillway in different Flow Conditions

Lecture 32 - Hydraulic Design Components

Lecture 33 - Structural Design of Drop Spillway - 1

Lecture 34 - Structural Design of Drop Spillway - 2

Lecture 35 - Structural Design of Drop Spillway - 3

Lecture 36 - Structural Design of Drop Spillway - 4

Lecture 37 - GATE Question

Lecture 38 - Drop Inlet Spillway

Lecture 39 - Drop Inlet Spillway (Continued...)

Lecture 40 - Introduction-Drop Inlet Spillway

Lecture 41 - Drop Inlet Spillway Design - I

Lecture 42 - Numerical Problems

Lecture 43 - Ogee Spillway

Lecture 44 - Chute Spillway

Lecture 45 - Chute Spillway Design - I

Lecture 46 - Chute Spillway Design - II

Lecture 47 - Energy Dissipation

Lecture 48 - Wind Erosion and Control Basics

Lecture 49 - Design of Wind Breaks

Lecture 50 - Design of Shelterbelts

Lecture 51 - Formation of Sand Dunes

Lecture 52 - Stabilization of Sand Dunes

Lecture 53 - Land Capability Classes

Lecture 54 - Improving Land Capability

Lecture 55 - Sediment and Its Transportation

Lecture 56 - Sediment Sampling

NPTEL : NOC:Dairy and Food Process and Products Technology (Agriculture)

Co-ordinators : Prof. Tridib Kumar Goswami

Lecture 1 - Preamble of the Subject

Lecture 2 - What is Food and Nutrients

Lecture 3 - Nutritional Value of the Nutrients

Lecture 4 - Best Way of Storage of Food Materials

Lecture 5 - Preservation Techniques

Lecture 6 - Temperature Quotient and Its Impact

Lecture 7 - Food Additives

Lecture 8 - Quality of Food

Lecture 9 - Quality of Food (Continued...)

Lecture 10 - Emerging Technology

Lecture 11 - Emerging Technology (Continued...)

Lecture 12 - Food Laws - Why?

Lecture 13 - Food Laws of India

Lecture 14 - Standards in India

Lecture 15 - Hygiene and Other Controls in India

Lecture 16 - Physico-Chemical Properties of Milk

Lecture 17 - Milk - What is it

Lecture 18 - Milk - How it looks?

Lecture 19 - Milk - Constituents

Lecture 20 - Constituents of Milk

Lecture 21 - Milk Fat

Lecture 22 - Milk Fat (Continued...)

Lecture 23 - Milk Fat (Continued...)

Lecture 24 - Milk Fat (Continued...)

Lecture 25 - Protein

Lecture 26 - Protein (Continued...)

Lecture 27 - Amino Acids

Lecture 28 - Amino Acids (Continued...)

Lecture 29 - Milk Protein

Lecture 30 - Casein Micelle

Lecture 31 - Whey Protein

Lecture 32 - Whey Protein (Continued...)

Lecture 33 - Lactoferrin

Lecture 34 - Carbohydrates in Milk

Lecture 35 - Small Constituents of Milk

Lecture 36 - Enzymes in Milk

Lecture 37 - Chemical and Microbial Spoilage of Milk and Milk Products

Lecture 38 - Extrinsic Factors for Microbial Growth

Lecture 39 - Natural or Other Type of Spoilage

Lecture 40 - Packaging

Lecture 41 - Milk Pasteurization

Lecture 42 - Thermal Death Time

Lecture 43 - Pasteurization Effectiveness

Lecture 44 - Milk Pasteurization and Homogenization

Lecture 45 - Milk Pasteurization and Homogenization (Continued...)

Lecture 46 - Milk Homogenization

Lecture 47 - Milk Centrifugation

Lecture 48 - Types of Available Milk

Lecture 49 - Types of Available Milk in the Market

Lecture 50 - New Technologies in Dairy Industries

Lecture 51 - Cheese

Lecture 52 - Chedder Cheese

Lecture 53 - Ice Cream

Lecture 54 - Process of Ice Cream Preparation

Lecture 55 - Ice Cream Lolies

Lecture 56 - Over Run and Calculation for Preparing Ice Cream Mix

Lecture 57 - Transportation of Ice Cream vis a vis Frozen Foods

Lecture 58 - Packaging of Food Materials

Lecture 59 - Modified Atmosphere Packaging

Lecture 60 - Flow Chart for Manufacturing Some Dairy and Food Products

NPTEL : NOC:Organic Farming for Sustainable Agricultural Production (Agriculture)

Co-ordinators : Prof. Dilip Kumar Swain

Lecture 1 - Organic Farming: Introduction and Status

Lecture 2 - Organic Farming: Introduction and Status (Continued...)

Lecture 3 - Organic Farming and its Components

Lecture 4 - Organic Farming Concepts and Principles

Lecture 5 - Organic Farming Concepts and Principles (Continued...)

Lecture 6 - SWOT Analysis of Organic Farming

Lecture 7 - Sustainable Agriculture

Lecture 8 - Key Indicators of Sustainable Agriculture

Lecture 9 - Organic Farming and Climate Change

Lecture 10 - Organic Farming and Climate Change (Continued...)

Lecture 11 - Principles of Compost Production

Lecture 12 - Vermicompost Production Technology

Lecture 13 - Vermicompost Production Technology (Continued...)

Lecture 14 - Vermicompost Production Technology (Continued...)

Lecture 15 - Enriched Vermicompost Production Technology

Lecture 16 - Vermicompost Quality and Marketing

Lecture 17 - Introduction to Pest and Disease Management

Lecture 18 - Pest and Disease Management in Organic Farming

Lecture 19 - Level C Pest and Disease Management

Lecture 20 - Level C Pest and Disease Management (Continued...)

Lecture 21 - Introduction to Organic Crop Management

Lecture 22 - Introduction to Organic Crop Management (Continued...)

Lecture 23 - Organic Vegetable Crop Management

Lecture 24 - Organic Vegetable Crop Management (Cereals)

Lecture 25 - Organic Vegetable Crop Management (Cereals) (Continued...)

Lecture 26 - Organic Field Crop Management (Pulse and Oilseed Crop)

Lecture 27 - Organic Plantation Crop Management

Lecture 28 - Organic Meat Production

Lecture 29 - Introduction on transition to organic crop production

Lecture 30 - Crop planning and rotation design in organic system

Lecture 31 - Crop planning and rotation design in organic system (Continued...)

Lecture 32 - Integrated Farming System and Urban Agriculture

Lecture 33 - Quality of Organic Food

Lecture 34 - Natural Sources of Antioxidants for Health Defense

Lecture 35 - Antioxidant Capacity of fruits and vegetables

Lecture 36 - Organic Food and Human Health

Lecture 37 - Organic Standard

Lecture 38 - Organic Certification Process

Lecture 39 - Operational Structure of Organic Certification

Lecture 40 - Marketing of Organic Products

NPTEL : NOC:Novel Technologies for Food Processing and Shelf Life Extension (Agriculture)

Co-ordinators : Prof. Hari Niwas Mishra

Lecture 1 - Course Introduction; Food Constituents and Functions

Lecture 2 - Quality and Safety Aspects of Food

Lecture 3 - Factors Affecting Quality During Processing and Storage

Lecture 4 - Role of Water in Food and its Shelf Life

Lecture 5 - Gelatinization and Retrogradation of Starch

Lecture 6 - Browning Reactions

Lecture 7 - Food Proteins

Lecture 8 - Principles of Food Preservation

Lecture 9 - Traditional Food Preservation Technologies - Part 1

Lecture 10 - Traditional Food Preservation Technologies - Part 2

Lecture 11 - High Pressure Processing of Food - Part 1

Lecture 12 - High Pressure Processing of Food - Part 2

Lecture 13 - Membrane Technology - Part 1

Lecture 14 - Membrane Technology - Part 2

Lecture 15 - Food Irradiation - Part 1

Lecture 16 - Food Irradiation - Part 2

Lecture 17 - Microwave Heating

Lecture 18 - Radio Frequency Drying

Lecture 19 - Super Critical Fluid Extraction - Part 1

Lecture 20 - Super Critical Fluid Extraction - Part 2

Lecture 21 - Freeze Drying - Part 1

Lecture 22 - Freeze Drying - Part 2

Lecture 23 - Food Extrusion Technology - Part 1

Lecture 24 - Food Extrusion Technology - Part 2

Lecture 25 - Textured Vegetable Protein (TVP)

Lecture 26 - Aseptic Processing and Packaging

Lecture 27 - Hurdle Technology

Lecture 28 - Natural Antimicrobials

Lecture 29 - Food Lipids: Nature and Occurrence

Lecture 30 - Extraction of Oil - Part 1

Lecture 31 - Extraction of Oil - Part 2

Lecture 32 - Refining of Oil - Part 1

Lecture 33 - Refining of Oil - Part 2

Lecture 34 - Modified Fats

Lecture 35 - Rancidity

Lecture 36 - Natural Antioxidants

Lecture 37 - Microencapsulation - Part 1

Lecture 38 - Microencapsulation - Part 2

Lecture 39 - Food nanotechnology

Lecture 40 - Respiration and Ripening

Lecture 41 - Modified Atmospheric Storage (MAP)

Lecture 42 - Active Packaging Technology

Lecture 43 - Edible coating technology

Lecture 44 - Multiproduct CA/MA Storage Unit

Lecture 45 - Grain Storage

Lecture 46 - Ozonation of Food Grains

Lecture 47 - Hyper Spectral Imaging for Quality Analysis of Food Grains

Lecture 48 - Non-Destructive Methods for Analysis of Grain Quality

Lecture 49 - Detection of Spoilage in Grains using Biosensors

Lecture 50 - Food Fortification

Lecture 51 - Iron Fortified Rice (IFR)

Lecture 52 - Nutri Dal and Fortified Noodles

Lecture 53 - High Energy RTE Food Paste - Part 1

Lecture 54 - High Energy RTE Food Paste - Part 2

Lecture 55 - Functional Foods and Nutraceuticals

Lecture 56 - Algae Based Health Foods

Lecture 57 - Gluten Free Bread and Pasta

Lecture 58 - Food Powder and Premixes

Lecture 59 - GMP/GHP in Food Industry

Lecture 60 - FCTL R&D and Course Summary

NPTEL : NOC:Soil Science and Technology (Agriculture)

Co-ordinators : Prof. Somsubhra Chakraborty

Lecture 1 - Basic Overview of Soil

Lecture 2 - Weathering and Soil Formation

Lecture 3 - Weathering and Soil Formation (Continued...)

Lecture 4 - Weathering and Soil Formation (Continued...)

Lecture 5 - Weathering and Soil Formation (Continued...)

Lecture 6 - Soil Taxonomy and Classification

Lecture 7 - Soil Taxonomy and Classification (Continued...)

Lecture 8 - Soil Taxonomy and Classification (Continued...)

Lecture 9 - Soil Orders, Soil Colour and Texture

Lecture 10 - Soil Texture and Structure

Lecture 11 - Soil Tillage and Soil Density

Lecture 12 - Soil Porosity and Consistency

Lecture 13 - Soil Consistency and Soil Water

Lecture 14 - Soil Water

Lecture 15 - Tutorial

Lecture 16 - Soil Water Movement

Lecture 17 - Qualitative Description of Soil Wetness

Lecture 18 - Soil Air

Lecture 19 - Soil Temperature

Lecture 20 - Tutorial

Lecture 21 - Silicate Clays

Lecture 22 - Silicate Clays (Continued...)

Lecture 23 - Sources of Charges in Soil

Lecture 24 - Cation Exchange Capacity (CEC)

Lecture 25 - Sorption of Pesticides

Lecture 26 - Diffuse Double Layer

Lecture 27 - Adsorption Isotherms

Lecture 28 - Soil Acidity

Lecture 29 - Soil Salinity and Alkalining

Lecture 30 - Submerged Soils

Lecture 31 - Essential Plant Nutrients

Lecture 32 - Soil N

Lecture 33 - Biological N Fixation

Lecture 34 - Soil P and K

Lecture 35 - Fertilizers

Lecture 36 - Soil Testing - I

Lecture 37 - Soil Testing - II

Lecture 38 - Soil Organic Matter

Lecture 39 - Soil Organisms

Lecture 40 - Compost

Lecture 41 - Land Degradation and Soil Erosion

Lecture 42 - Universal Soil Loss Equation

Lecture 43 - Conservation Tillage

Lecture 44 - Wind Erosion and Tillage Erosion

Lecture 45 - Organic Pollutants in Soil

Lecture 46 - Remediation of Organic Pollutant

Lecture 47 - Toxic Inorganic Substances in Soil

Lecture 48 - Removal of Toxic Inorganic Substances

Lecture 49 - Soil Survey

Lecture 50 - Remote Sensing in Soil Survey

Lecture 51 - GIS and GPS

Lecture 52 - Geostatistics

Lecture 53 - Basics of VisNIR - DRS

Lecture 54 - VisNIR-DRS Applications for Soil

Lecture 55 - PXRF Soil Applications

Lecture 56 - Basic Overview of DSM

Lecture 57 - Modeling Continuous Variables

Lecture 58 - Modeling Continuous Variables (Continued...)

Lecture 59 - Modeling Categorical Variables

Lecture 60 - Pedotransfer Functions and Uncertainty of DSM

NPTEL : NOC:Thermal Operations in Food Process Engineering: Theory and Applications (Agriculture)

Co-ordinators : Prof. Tridib Kumar Goswami

Lecture 1 - Fundamentals of Food Processing and Preservation

Lecture 2 - Fundamentals of Food Processing and Preservation (Continued...)

Lecture 3 - Preservation Techniques

Lecture 4 - Fundamentals of Food Processing and Preservation (Continued...)

Lecture 5 - Fundamentals of Food Processing and Preservation (Continued...)

Lecture 6 - Fundamentals of Food Processing and Preservation why and how do food spoil

Lecture 7 - One Dimentional Conduction Heat Transfer in Cortesian Coordinate

Lecture 8 - One Dimentional Conduction Heat Transfer in Cortesian Coordinate (Continued...)

Lecture 9 - One Dimentional Steady State Heat Conduction

Lecture 10 - One Dimentional Steady State Heat Conduction (Continued...)

Lecture 11 - One Dimensional Heat Transfer Through Cylinders

Lecture 12 - One Dimensional Heat Transfer Through Cylinders (Continued...)

Lecture 13 - One Dimensional Heat Transfer Through Cylinders (Continued...)

Lecture 14 - One Dimensinal Heat Transfer

Lecture 15 - Thermal Resistance

Lecture 16 - Thermal contact Resistance and Finned Surface

Lecture 17 - Finned Surface

Lecture 18 - Finned Surface (Continued...)

Lecture 19 - Finned Surface (Continued...)

Lecture 20 - Heat Transfer in Finned Surfaces

Lecture 21 - Transient Heat Transfer

Lecture 22 - Transient Heat Transfer (Continued...)

Lecture 23 - Transient Heat Transfer (Continued...)

Lecture 24 - Transient Heat Transfer (Continued...)

Lecture 25 - Heister Chart

Lecture 26 - Heister Chart (Continued...)

Lecture 27 - Heat Transfer by Convection

Lecture 28 - Heat Transfer by Convection(Continued...)

Lecture 29 - Heat Transfer by Convection(Continued...)

Lecture 30 - Heat Transfer by Convection(Continued...)

Lecture 31 - Heat Transfer by Convection(Continued...)

Lecture 32 - Heat Transfer by Convection(Continued...)

Lecture 33 - Heat Transfer by Convection(Continued...)

Lecture 34 - Heat Transfer by Radiation

Lecture 35 - Heat Transfer by Radiation (Continued...)

Lecture 36 - Heat Transfer by Convection (Continued...)

Lecture 37 - Heat Transfer by Radiation (Continued...)

Lecture 38 - Heat Transfer by Radiation (Continued...)

Lecture 39 - Boiling and Condensation

Lecture 40 - Boiling (Continued...)

Lecture 41 - Condensation

Lecture 42 - Condensation (Continued...)

Lecture 43 - Heat Exchangers

Lecture 44 - Heat Exchangers (Continued...)

Lecture 45 - Heat Exchangers (Continued...)

Lecture 46 - Heat Exchangers (Continued...)

Lecture 47 - Log mean Temperature Difference

Lecture 48 - Heat Exchangers (Continued...)

Lecture 49 - Heat Exchangers (Continued...)

Lecture 50 - Heat Exchangers (Continued...)

Lecture 51 - Heat Exchangers (Continued...)

Lecture 52 - Heat Exchangers (Continued...)

Lecture 53 - Heat Exchangers (Continued...)

Lecture 54 - Thermal Death Reaction Kinecties

Lecture 55 - Preservation by High Temparature Processing

Lecture 56 - Preservation by High Temparature Processing (Continued...)

Lecture 57 - Distillation

Lecture 58 - Distillation (Continued...)

Lecture 59 - Distillation (Continued...)

Lecture 60 - Drying and Multiple Effect Evaporator

NPTEL : NOC:Micro Irrigation Engineering (Agriculture)

Co-ordinators : Prof. Kamlesh Narayan Tiwari

Lecture 1 - Micro-Irrigation: Introduction and Scope

Lecture 2 - Fundamentals of Fluid Mechanics and its Application in MI

Lecture 3 - Soil Water Concept

Lecture 4 - Soil Water Constants and Infiltration

Lecture 5 - Tutorial 1 - Numerical Examples on Fluid Mechanics and Soil water

Lecture 6 - Evapotranspiration

Lecture 7 - Determination of Evapotranspiration

Lecture 8 - Crop Coefficients and Crop Water Requirement

Lecture 9 - Demonstration of Agro Metrological Instruments

Lecture 10 - Demonstration of Lysimeter

Lecture 11 - Tutorial 2 - Numerical Examples on Crop Water Requirement

Lecture 12 - Irrigation Scheduling

Lecture 13 - Soil and Plant Water Monitoring Instruments

Lecture 14 - Measurement of Irrigation Water

Lecture 15 - Irrigation Efficiency

Lecture 16 - Tutorial 3 - Numerical Examples on Irrigation water Management

Lecture 17 - Introduction of Water Lifts and Pumps

Lecture 18 - Variable Displacement Pumps

Lecture 19 - Irrigation Water Quality

Lecture 20 - Tutorial 4 - Numerical Examples on Water Measurements and Pumps

Lecture 21 - Irrigation methods

Lecture 22 - Micro Irrigation System: Concept and Types

Lecture 23 - Drip Irrigation: Introduction and Types

Lecture 24 - Drip Irrigation: Design Considerations and System Layout

Lecture 25 - Types and Selection of Emission Devices

Lecture 26 - Hydraulics Drip Irrigation System Pipe Network

Lecture 27 - Tutorial 5 - Numerical Example on Design of Drip Irrigation System

Lecture 28 - Fertigation

Lecture 29 - Fertigation Application Methods

Lecture 30 - Drip Irrigation: Filtration System

Lecture 31 - Tutorial 6 - Numerical Examples on Emission Devices and Fertigation

Lecture 32 - Installation and Operation of Drip Irrigation System

Lecture 33 - Maintenance of Drip Irrigation System

Lecture 34 - Demonstration of Drip Irrigation Components and Evaluation of Drip Emitter

Lecture 35 - Soil Water Movement under Drip Emitter

Lecture 36 - Design and Development of Drip Emitter

Lecture 37 - Tutorial 7- Numerical Examples on Drip Irrigation System

Lecture 38 - Micro Sprinkler Irrigation System

Lecture 39 - Bubbler Irrigation System

Lecture 40 - Sprinkler Irrigation System

Lecture 41 - Sprinkler Irrigation System Design

Lecture 42 - Performance Evaluation of Sprinkler Irrigation System

Lecture 43 - Tutorial 8 - Numerical Examples on Sprinkler Irrigation System

Lecture 44 - Tutorial 9 - Numerical Examples on Design of Sprinkler Irrigation System

Lecture 45 - Sprinkler Irrigation System: Layout, Installation, Operation and Maintenance

Lecture 46 - Standards and Quality Assurance of MIS Components

Lecture 47 - Standards and Quality Assurance of Sprinkler Irrigation System Components

Lecture 48 - Solar Photovoltaic System for Irrigation - Part 1

Lecture 49 - Solar Photovoltaic System for Irrigation - Part 2

Lecture 50 - Tutorial 10 - Numerical Examples on Solar PV Irrigation System

Lecture 51 - Automation of Micro Irrigation System - Part 1

Lecture 52 - Automation of Micro Irrigation System - Part 2

Lecture 53 - Automation of Micro Irrigation System - Part 3

Lecture 54 - Automation of Micro Irrigation System - Part 4

Lecture 55 - Economic Analysis of Micro Irrigation System - Part 1

Lecture 56 - Economic Analysis of MIS - Part 2

Lecture 57 - Economic Analysis of MIS - Part 3

Lecture 58 - Tutorial 11- Numerical Examples on Economics of Micro Irrigation System

Lecture 59 - Precision Agriculture

Lecture 60 - Micro Irrigation Engineering: Epilogue

NPTEL : NOC:Instrumentation and Process Control in Food Industry (Agriculture)

Co-ordinators : Prof. Ashis Kumar Datta

Lecture 1 - Introduction to Process Control

Lecture 2 - Laplace Transform Review - I

Lecture 3 - Laplace Transform Review - II

Lecture 4 - Zero and First Order Instruments

Lecture 5 - First Order Instruments

Lecture 6 - Second Order Instruments - I

Lecture 7 - Second Order Instruments - II

Lecture 8 - Food Instrumentation

Lecture 9 - Chromatography

Lecture 10 - Mass Spectrometry - I

Lecture 11 - Mass Spectrometry - II

Lecture 12 - Model Development

Lecture 13 - PID Controller Response Analysis

Lecture 14 - Block Diagram Representation of CSTR Systems

Lecture 15 - Transient Response of Controlled Systems/Solved Examples

Lecture 16 - Solved Examples on Controlled System

Lecture 17 - Complex Variables as Roots of Characteristic Equation

Lecture 18 - Routh Tests for Stability of Systems

Lecture 19 - Poles and Zeros of the OLTF

Lecture 20 - Plotting of Root Loci

Lecture 21 - Root Loci of PI Controlled Systems

Lecture 22 - Root Loci of PID Controlled Systems

Lecture 23 - First and Second Order Systems Responses

Lecture 24 - A Control Problem

Lecture 25 - PI/PD/PID Controllers and Worked Out Example 1

Lecture 26 - Linear Lag/Transportation Systems/First Order/Second Order Systems- Sinusoidal Input

Lecture 27 - PI/PD/PID Controllers

Lecture 28 - Linear Lag/Transportation system/ Firts order/ Second order system

Lecture 29 - Worked Out Example 2

Lecture 30 - Concepts of Gain Margin and Phase Margins

Lecture 31 - Worked Out Examples

Lecture 32 - Z-Transforms of Sampled Functions

Lecture 33 - Functions Reconstruction and Manipulation

Lecture 34 - Open Loop Z-Transfer Functions

Lecture 35 - Neuro - Fuzzy Logic Controller

Lecture 36 - Auto - Pilot Control Algorithm

Lecture 37 - Fuzzy logic controller algorithm for Soan Papri Manufacture

Lecture 38 - Appendices - Set Theory

Lecture 39 - Fuzzy Sets Theory

Lecture 40 - Worked Out Examples

Lecture 41 - Temperature Standards, Calibration and senssor

Lecture 42 - Vacuum Measurement

Lecture 43 - Viscometer and Cream Separator

Lecture 44 - Spray Dryer and Plate Freezer

NPTEL : NOC:Machine Learning for Soil and Crop Management (Agriculture)

Co-ordinators : Prof. Somsubhra Chakraborty

Lecture 1 - General Overview of ML and DL Applications in Agriculture

Lecture 2 - General Overview of ML and DL Applications in Agriculture (Continued...)

Lecture 3 - General Overview of ML and DL Applications in Agriculture (Continued...)

Lecture 4 - General Overview of ML and DL Applications in Agriculture (Continued...)

Lecture 5 - General Overview of ML and DL Applications in Agriculture (Continued...)

Lecture 6 - Basics of Multivariate Data Analytics

Lecture 7 - Basics of Multivariate Data Analytics (Continued...)

Lecture 8 - Basics of Multivariate Data Analytics (Continued...)

Lecture 9 - Basics of Multivariate Data Analytics (Continued...)

Lecture 10 - Basics of Multivariate Data Analytics (Continued...)

Lecture 11 - Principal Component Analysis and Regression Applications in Agriculture

Lecture 12 - Principal Component Analysis and Regression Applications in Agriculture (Continued...)

Lecture 13 - Principal Component Analysis and Regression Applications in Agriculture (Continued...)

Lecture 14 - Principal Component Analysis and Regression Applications in Agriculture (Continued...)

Lecture 15 - Principal Component Analysis and Regression Applications in Agriculture (Continued...)

Lecture 16 - Applications of Classification and Clustering Methods in Agriculture

Lecture 17 - Applications of Classification and Clustering Methods in Agriculture (Continued...)

Lecture 18 - Applications of Classification and Clustering Methods in Agriculture (Continued...)

Lecture 19 - Applications of Classification and Clustering Methods in Agriculture (Continued...)

Lecture 20 - Applications of Classification and Clustering Methods in Agriculture (Continued...)

Lecture 21 - Diffuse Reflectance Spectroscopy: Basics and Applications for Crop and Soil

Lecture 22 - Diffuse Reflectance Spectroscopy: Basics and Applications for Crop and Soil (Continued...)

Lecture 23 - Diffuse Reflectance Spectroscopy: Basics and Applications for Crop and Soil (Continued...)

Lecture 24 - Diffuse Reflectance Spectroscopy: Basics and Applications for Crop and Soil (Continued...)

Lecture 25 - Diffuse Reflectance Spectroscopy: Basics and Applications for Crop and Soil (Continued...)

Lecture 26 - Use of ML for Portable Proximal Soil and Crop Sensors

Lecture 27 - Use of ML for Portable Proximal Soil and Crop Sensors (Continued...)

Lecture 28 - Use of ML for Portable Proximal Soil and Crop Sensors (Continued...)

Lecture 29 - Use of ML for Portable Proximal Soil and Crop Sensors (Continued...)

Lecture 30 - Use of ML for Portable Proximal Soil and Crop Sensors (Continued...)

Lecture 31 - ML and DL for Soil and Crop Image Processing

Lecture 32 - ML and DL for Soil and Crop Image Processing (Continued...)

Lecture 33 - ML and DL for Soil and Crop Image Processing (Continued...)

Lecture 34 - ML and DL for Soil and Crop Image Processing (Continued...)

Lecture 35 - ML and DL for Soil and Crop Image Processing (Continued...)

Lecture 36 - UAV and ML Applications in Agriculture

Lecture 37 - UAV and ML Applications in Agriculture (Continued...)

Lecture 38 - UAV and ML Applications in Agriculture (Continued...)

Lecture 39 - UAV and ML Applications in Agriculture (Continued...)

Lecture 40 - UAV and ML Applications in Agriculture (Continued...)

Lecture 41 - Hyperspectral Remote Sensing and ML Applications in Agriculture

Lecture 42 - Hyperspectral Remote Sensing and ML Applications in Agriculture (Continued...)

Lecture 43 - Hyperspectral Remote Sensing and ML Applications in Agriculture (Continued...)

Lecture 44 - Hyperspectral Remote Sensing and ML Applications in Agriculture (Continued...)

Lecture 45 - Hyperspectral Remote Sensing and ML Applications in Agriculture (Continued...)

Lecture 46 - Digital Soil Mapping - General Overview

Lecture 47 - Digital Soil Mapping - General Overview (Continued...)

Lecture 48 - Digital Soil Mapping - General Overview (Continued...)

Lecture 49 - Digital Soil Mapping - General Overview (Continued...)

Lecture 50 - Digital Soil Mapping - General Overview (Continued...)

Lecture 51 - Digital Soil Mapping With Continuous Variables

Lecture 52 - Digital Soil Mapping With Continuous Variables (Continued...)

Lecture 53 - Digital Soil Mapping With Continuous Variables (Continued...)

Lecture 54 - Digital Soil Mapping With Continuous Variables (Continued...)

Lecture 55 - Digital Soil Mapping With Continuous Variables (Continued...)

Lecture 56 - Digital Soil Mapping With Categorical Variables

Lecture 57 - Digital Soil Mapping With Categorical Variables (Continued...)

Lecture 58 - Digital Soil Mapping With Categorical Variables (Continued...)

Lecture 59 - Digital Soil Mapping With Categorical Variables (Continued...)

Lecture 60 - Digital Soil Mapping With Categorical Variables (Continued...)

NPTEL : NOC:Advanced Aquaculture Technology (Agriculture)

Co-ordinators : Prof. Gourav Dhar Bhowmick

Lecture 1 - Introduction

Lecture 2 - Aquaculture systems and input factors

Lecture 3 - Important species in aquaculture

Lecture 4 - Propagation; Water budget

Lecture 5 - Conservation strategies

Lecture 6 - Transformation of open culture to closed high-tech technologies

Lecture 7 - Intensive farming in high-tech tanks

Lecture 8 - Re-circulatory system

Lecture 9 - Flow-through system

Lecture 10 - Raceway culture

Lecture 11 - Polyculture, IMTA

Lecture 12 - Coastal aquaculture

Lecture 13 - Mariculture

Lecture 14 - Algal Culture

Lecture 15 - Seaweed Culture; Pearl Culture

Lecture 16 - Introduction to freshwater prawn culture

Lecture 17 - Introduction to shrimp culture

Lecture 18 - Introduction to shrimp culture (Continued...)

Lecture 19 - Introduction to crab culture

Lecture 20 - Introduction to crab culture (Continued...)

Lecture 21 - Larval rearing and hatcheries

Lecture 22 - Design of hatchery for Carps

Lecture 23 - Design of prawn hatchery

Lecture 24 - Design of Shrimp hatchery

Lecture 25 - Maintenance of optimum conditions

Lecture 26 - Balanced diet

Lecture 27 - Balanced diet and Feed formulation

Lecture 28 - Feed formulation: Linear Programming

Lecture 29 - Feed additives

Lecture 30 - Feed additives, Food conversion ratio (FCR)

Lecture 31 - Important water quality parameters and criteria

Lecture 32 - Aeration

Lecture 33 - Aerator performance

Lecture 34 - Important calculations on aerators

Lecture 35 - Chemical treatment

Lecture 36 - Overview of Wastewater Treatment Methods

Lecture 37 - Overview of Wastewater Treatment Methods (Continued...)

Lecture 38 - Bio-electrochemical system based wastewater treatment

Lecture 39 - Bio-electrochemical system-based wastewater treatment (Continued...)

Lecture 40 - Bio-electrochemical system-based wastewater treatment (Continued...)

Lecture 41 - Organic Aquaculture Standards

Lecture 42 - Wastewater-fed aquaculture

Lecture 43 - Integrated farming

Lecture 44 - Integrated farming (Continued...)

Lecture 45 - Bio-floc Technology

Lecture 46 - Green aquaculture

Lecture 47 - Smart Aquaponic system

Lecture 48 - Bioremediation

Lecture 49 - Biofiltration

Lecture 50 - Eco-labelling

Lecture 51 - Fish and fish products preservation

Lecture 52 - Fish and fish products preservation (Continued...)

Lecture 53 - Fish by-products

Lecture 54 - Fish by-products (Continued...)

Lecture 55 - Zero waste recycling

Lecture 56 - Impact of Climate Change on aquaculture

Lecture 57 - Impact of Climate Change on aquaculture (Continued...)

Lecture 58 - Mitigation and adaptive strategies

Lecture 59 - Mitigation and adaptive strategies (Continued...)

Lecture 60 - Mitigation and adaptive strategies (Continued...)

Lecture 61 - Opportunities in Aquaculture sectors for the entrepreneurs from the coastal regions

NPTEL : NOC:Post Harvest Operations and Processing of Fruits, Vegetables, Spices and Plantation Crop Products (Agriculture)

Co-ordinators : Prof. Hari Niwas Mishra

Lecture 1 - Course Introduction

Lecture 2 - Fruits and Vegetables

Lecture 3 - Fruits and Vegetable (Part II : Respiration, Ripening and Senescence)

Lecture 4 - Indian Spices

Lecture 5 - Plantation Crops

Lecture 6 - Post Harvest Losses: Causes and Preventive Measures

Lecture 7 - Post Harvest Operations

Lecture 8 - Handling and Transportation

Lecture 9 - Supply Chain Management and Storage

Lecture 10 - Quality Assurance and Control (QA/QC)

Lecture 11 - Basics of Processing and Preservation

Lecture 12 - Processing by Removal of Water

Lecture 13 - Processing by Addition of Heat

Lecture 14 - Processing by Removal of Heat

Lecture 15 - Irradiation of Fruits, Vegetables and Spices

Lecture 16 - Cleaning and Washing

Lecture 17 - Sorting and Grading

Lecture 18 - Peeling, Coring, Slicing

Lecture 19 - Containers and Packaging Materials for Fresh Produce

Lecture 20 - Packaging Methods and Equipment

Lecture 21 - Minimal Processing

Lecture 22 - Hurdle Technology Concepts

Lecture 23 - Intermediate and High Moisture Fruit Products

Lecture 24 - Cut Fruits and Vegetables - Part I

Lecture 25 - Cut Fruits and Vegetables - Part II

Lecture 26 - Juice Extraction and Clarification

Lecture 27 - Concentrates and Pastes

Lecture 28 - Aseptic processing and packaging

Lecture 29 - RTS and RTD beverages

Lecture 30 - Quality and Safety Aspects

Lecture 31 - Techniques and Equipment

Lecture 32 - Powders and Premixes - Part I

Lecture 33 - Powders and Premixes - Part II

Lecture 34 - RTE Fruit Products

Lecture 35 - Dehydrated and Instant Cooking Vegetables

Lecture 36 - Tea and Tea Products

Lecture 37 - Coffee Processing

Lecture 38 - Cocoa and Chocolate Technology

Lecture 39 - Processing of Vanilla Beans and Production of Vanilla Flavour

Lecture 40 - Coconut and Cashew Processing

Lecture 41 - Processing of spices

Lecture 42 - Spice powders

Lecture 43 - Spice Pastes, Sauces and Gravies

Lecture 44 - Essential Oil and Oleoresin

Lecture 45 - Condiments Technology

Lecture 46 - Fermentation Technology

Lecture 47 - Fruit Wines and Ciders

Lecture 48 - Probiotic / Fermented Vegetable Products

Lecture 49 - Carbonated Fruit Juices and Premixes

Lecture 50 - Quality Characteristics

Lecture 51 - Packaging Technology

Lecture 52 - Smart Packaging

Lecture 53 - Edible Coatings and Films

Lecture 54 - Modified Atmosphere Packaging

Lecture 55 - Controlled Atmosphere Storage

Lecture 56 - Green Technologies and Near Zero Waste Processing

Lecture 57 - Extraction of Bioactive and Pigments from Processing Waste

Lecture 58 - Valorisation of Waste into Value-added Products

Lecture 59 - FSSAI Regulations and FSMS Guidelines for Fruits, Vegetables, Spices and Plantation Crops

Lecture 60 - Course Summary and Summing-up

NPTEL : NOC:Soil Fertility and Fertilizers (Agriculture)

Co-ordinators : Prof. Somsubhra Chakraborty

Lecture 1 - Importance of Soil Nutrient Management and Basic Soil-Plant Relationship

Lecture 2 - Importance of Soil Nutrient Management and Basic Soil-Plant Relationship (Continued...)

Lecture 3 - Importance of Soil Nutrient Management and Basic Soil-Plant Relationship (Continued...)

Lecture 4 - Importance of Soil Nutrient Management and Basic Soil-Plant Relationship (Continued...)

Lecture 5 - Importance of Soil Nutrient Management and Basic Soil-Plant Relationship (Continued...)

Lecture 6 - Soil Nitrogen for Plant Nutrition

Lecture 7 - Soil Nitrogen for Plant Nutrition (Continued...)

Lecture 8 - Soil Nitrogen for Plant Nutrition (Continued...)

Lecture 9 - Soil Nitrogen for Plant Nutrition (Continued...)

Lecture 10 - Soil Nitrogen For Plant Nutrition (Continued...)

Lecture 11 - Soil P and K for Plant Nutrition

Lecture 12 - Soil P and K for Plant Nutrition (Continued...)

Lecture 13 - Soil P and K for Plant Nutrition (Continued...)

Lecture 14 - Soil P and K for Plant Nutrition (Continued...)

Lecture 15 - Soil P and K for Plant Nutrition (Continued...)

Lecture 16 - Soil Secondary Nutrients and their role in Plant Nutrition

Lecture 17 - Soil Secondary Nutrients and their role in Plant Nutrition (Continued...)

Lecture 18 - Soil Secondary Nutrients and their role in Plant Nutrition (Continued...)

Lecture 19 - Soil Secondary Nutrients and their role in Plant Nutrition (Continued...)

Lecture 20 - Soil Secondary Nutrients and their role in Plant Nutrition (Continued...)

Lecture 21 - Soil Micronutrients and their role in Plant Nutrition

Lecture 22 - Soil Micronutrients and their role in Plant Nutrition (Continued...)

Lecture 23 - Soil Micronutrients and their role in Plant Nutrition (Continued...)

Lecture 24 - Soil Micronutrients and their role in Plant Nutrition (Continued...)

Lecture 25 - Soil Micronutrients and their role in Plant Nutrition (Continued...)

Lecture 26 - Soil Testing and Soil Fertility Evaluation Methods

Lecture 27 - Soil Testing and Soil Fertility Evaluation Methods (Continued...)

Lecture 28 - Soil Testing and Soil Fertility Evaluation Methods (Continued...)

Lecture 29 - Soil Testing and Soil Fertility Evaluation Methods (Continued...)

Lecture 30 - Soil Testing and Soil Fertility Evaluation Methods (Continued...)

Lecture 31 - Soil Health and Quality, Problem Soil, Land Capability Classification

Lecture 32 - Soil Health and Quality, Problem Soil, Land Capability Classification (Continued...)

Lecture 33 - Soil Health and Quality, Problem Soil, Land Capability Classification (Continued...)

Lecture 34 - Soil Health and Quality, Problem Soil, Land Capability Classification (Continued...)

Lecture 35 - Soil Health and Quality, Problem Soil, Land Capability Classification (Continued...)

Lecture 36 - Organic Manures, Manufacturing, Properties, and fate af N, P, K and Micronutrient .....

Lecture 37 - Organic Manures, Manufacturing, Properties, and fate af N, P, K and Micronutrient (Continued...)

Lecture 38 - Organic Manures, Manufacturing, Properties, and fate af N, P, K and Micronutrient (Continued...)

Lecture 39 - Organic Manures, Manufacturing, Properties, and fate af N, P, K and Micronutrient (Continued...)

Lecture 40 - Organic Manures, Manufacturing, Properties, and fate af N, P, K and Micronutrient (Continued...)

Lecture 41 - Fertilizer Quality Control, Fertilizer Adulteration and Fertilizer Testing

Lecture 42 - Fertilizer Quality Control, Fertilizer Adulteration and Fertilizer Testing (Continued...)

Lecture 43 - Fertilizer Quality Control, Fertilizer Adulteration and Fertilizer Testing (Continued...)

Lecture 44 - Fertilizer Quality Control, Fertilizer Adulteration and Fertilizer Testing (Continued...)

Lecture 45 - Fertilizer Quality Control, Fertilizer Adulteration and Fertilizer Testing (Continued...)

Lecture 46 - Biofertilizers and Management of fertilizers and manures in Soil

Lecture 47 - Biofertilizers and Management of fertilizers and manures in Soil (Continued...)

Lecture 48 - Biofertilizers and Management of fertilizers and manures in Soil (Continued...)

Lecture 49 - Biofertilizers and Management of fertilizers and manures in Soil (Continued...)

Lecture 50 - Biofertilizers and Management of fertilizers and manures in Soil (Continued...)

Lecture 51 - Fertilizer Recommendation Approaches and Integrated Plant Nutrient Management

Lecture 52 - Fertilizer Recommendation Approaches and Integrated Plant Nutrient Management (Continued...)

Lecture 53 - Fertilizer Recommendation Approaches and Integrated Plant Nutrient Management (Continued...)

Lecture 54 - Fertilizer Recommendation Approaches and Integrated Plant Nutrient Management (Continued...)

Lecture 55 - Fertilizer Recommendation Approaches and Integrated Plant Nutrient Management (Continued...)

Lecture 56 - Agricultural Productivity and Environmental Quality

Lecture 57 - Agricultural Productivity and Environmental Quality (Continued...)

Lecture 58 - Agricultural Productivity and Environmental Quality (Continued...)

Lecture 59 - Agricultural Productivity and Environmental Quality (Continued...)

Lecture 60 - Agricultural Productivity and Environmental Quality (Continued...)

NPTEL : NOC:Cooling Technology: Why and How utilized in Food Processing and Allied Industries (Agriculture)

Co-ordinators : Prof. Tridib Kumar Goswami

Lecture 1 - Introduction to Cooling

Lecture 2 - Why Cooling is required ?

Lecture 3 - Definitions

Lecture 4 - How to produce Safe Foods

Lecture 5 - How to produce Safe Foods ? (Continued...)

Lecture 6 - Cooling Load Calculation

Lecture 7 - Cooling Load Calculation (Continued...)

Lecture 8 - Cooling Load Calculation (Continued...)

Lecture 9 - Cooling Load Calculation (Continued...)

Lecture 10 - Basics of Thermodynamics

Lecture 11 - Basics of Thermodynamics (Continued...)

Lecture 12 - Basics of Thermodynamics (Continued...)

Lecture 13 - Basics of Thermodynamics (Continued...)

Lecture 14 - Basics of Thermodynamics (Continued...)

Lecture 15 - Basics of Thermodynamics (Continued...)

Lecture 16 - Basics of Thermodynamics (Continued...)

Lecture 17 - Basics of Thermodynamics (Continued...)

Lecture 18 - Psychrometrics

Lecture 19 - Psychrometrics (Continued...)

Lecture 20 - Psychrometrics (Continued...)

Lecture 21 - Psychrometrics (Continued...)

Lecture 22 - Psychrometrics (Continued...)

Lecture 23 - Psychrometrics (Continued...)

Lecture 24 - Psychrometrics (Continued...)

Lecture 25 - The Carnot Cycle

Lecture 26 - Carnot Cycle (Continued...)

Lecture 27 - Carnot Cycle (Continued...)

Lecture 28 - Carnot Cycle (Continued...)

Lecture 29 - Carnot Refrigeration Cycles

Lecture 30 - Carnot Refrigeration Cycles (Continued...)

Lecture 31 - Practical Difficulties with Carnot Cycle

Lecture 32 - Dry Compression

Lecture 33 - Problem Solving with Carnot System

Lecture 34 - Pure Substance as Refrigerant

Lecture 35 - Pure Substance as Refrigerant (Continued...)

Lecture 36 - Gas as Refrigerant

Lecture 37 - Gas as Refrigerant (Continued...)

Lecture 38 - Gas as Refrigerant (Continued...)

Lecture 39 - Basics of Refrigeration and Air Conditioning

Lecture 40 - Basics of Refrigeration and Air Conditioning (Continued...)

Lecture 41 - Selection of Condenser

Lecture 42 - Compressor

Lecture 43 - Reciprocating Compressor

Lecture 44 - Reciprocating Compressor (Continued...)

Lecture 45 - Reciprocating Compressor (Continued...)

Lecture 46 - Centrifugal Compressor

Lecture 47 - Rotary, Positive Displacement Type Compressors

Lecture 48 - Condenser

Lecture 49 - Condenser (Continued...)

Lecture 50 - Evaporator and Expansion Device

Lecture 51 - Freezing

Lecture 52 - Crystallization in Freezing

Lecture 53 - Freezing Curve

Lecture 54 - Freezers

Lecture 55 - Control Atmosphere Storage

Lecture 56 - Use of Phase Change Materials (PCM)

Lecture 57 - Cold Chain and Cold Storage

Lecture 58 - Cold Storage

Lecture 59 - Ice Cream

Lecture 60 - Ice Cream (Continued...)

NPTEL : NOC:Traction Engineering (Agriculture)

Co-ordinators : Prof. Hifjur Raheman

Lecture 1 - Concept of Traction and Traction Devices

Lecture 2 - Classification of wheels, Forces and moments acting on wheel

Lecture 3 - Tyre constructions and its specification

Lecture 4 - Tractive performance parameters

Lecture 5 - Tutorial 1

Lecture 6 - Mechanics of wheel and its tractive performance

Lecture 7 - Measurement of soil strength, cohesion and angle of internal friction

Lecture 8 - Measurement and characterization of terrain response

Lecture 9 - Characterization of shear stress and shear strength in different soil conditions

Lecture 10 - Tutorial 2 - Measurement of shear strength, modulus of sinkage and cone index

Lecture 11 - Rolling resistance of a rigid towed wheel

Lecture 12 - Rolling resistance of a pneumatic wheel

Lecture 13 - Motion resistance of a track

Lecture 14 - Tractive effort and slip of a powered rigid wheel

Lecture 15 - Tutorial 3 - Computation of rolling resistance of rigid wheel and pneumatic wheel

Lecture 16 - Tractive effort and slip of a track

Lecture 17 - Tractive effort and slip of a pneumatic wheel

Lecture 18 - Tractive performance prediction models - Wismer and Luth

Lecture 19 - Tractive performance prediction models - Brixius

Lecture 20 - Tutorial 4 - Tractive Performance Estimation Using Brixius Model

Lecture 21 - Effect of tyre parameters on tractive performance of tyre

Lecture 22 - Selection of tyre

Lecture 23 - Comparison of single tyre with dual tyres

Lecture 24 - Performance evaluation of a walking tractor fitted with track

Lecture 25 - Tutorial 5

Lecture 26 - Measurement of Cone Index

Lecture 27 - Pressure Sinkage Relationship in a Sandy Clay Loam Soil

Lecture 28 - Measurement of Theoretical Velocity, Actual Velocity and Slip for a Pneumatic Wheel

Lecture 29 - Measurement of Contact Area of a Pneumatic Tyre on a Hard Surface

Lecture 30 - Measurement of Tractice Efficiency

Lecture 31 - Performance comparison of track with wheel

Lecture 32 - Traction Aids for Tractors

Lecture 33 - Ballasting of Wheeled Tractors to achieve Maximum Power Output in Frictional-Cohesive soils

Lecture 34 - Optimum ballasting of a front wheel assisted tractor

Lecture 35 - Tutorial 7

Lecture 36 - Cornering Properties of tyres

Lecture 37 - Lateral force developed by an unpowered tractor wheel

Lecture 38 - Steering of wheeled vechiles and steady state handling of front wheel steered vechiles

Lecture 39 - Classification of steady state handling characteristics and handling diagram

Lecture 40 - Tutorial 8

NPTEL : NOC:Food Oils and Fats : Chemistry and Technology (Agriculture)

Co-ordinators : Prof. Hari. Niwas Mishra

Lecture 1 - Oil and Fats Processing Industry - Current Status, Issues and Challenges

Lecture 2 - Plant Sources of Edible Oils and Fats

Lecture 3 - Composition, Nutrition and Health Values of Plant Oils

Lecture 4 - Animal Sources of Edible Oils and Fats

Lecture 5 - Composition, Nutrition and Health Values of Animal Fats and Oils

Lecture 6 - Lipids and Their Classification

Lecture 7 - Fatty acids and their types

Lecture 8 - Glycerides - Type, Structure and Function

Lecture 9 - Triglycerides - Function in Nutrition and Food Processing

Lecture 10 - Phospholipids and Sterols

Lecture 11 - Engineering Properties of Edible Oils

Lecture 12 - Chemical Properties of Edible Oils

Lecture 13 - Rancidity and Reversion

Lecture 14 - Oxidative Rancidity

Lecture 15 - Antioxidants in Edible Oil

Lecture 16 - Pre-Treatment Techniques

Lecture 17 - Physical Methods for Oil Extraction - Concept and Mechanism

Lecture 18 - Expression - Pressing

Lecture 19 - Screw Expelling

Lecture 20 - Recent Developments in Oil Expression Technology

Lecture 21 - Extraction principles and mechanisms

Lecture 22 - Factors affecting extraction process

Lecture 23 - Solvent Extraction Technology and Equipment

Lecture 24 - Miscella Distillation and Meal Desolventization

Lecture 25 - Novel techniques of oil extraction

Lecture 26 - Crude Oil Characteristics and Processing

Lecture 27 - Clarification and Degumming

Lecture 28 - Chemical Refining and Neutralization

Lecture 29 - Bleaching

Lecture 30 - Physical Refining and Deodorization

Lecture 31 - Hydrogenation

Lecture 32 - Interesterification and Winterization

Lecture 33 - Fractionation and Plasticization

Lecture 34 - Margarine and Shortenings

Lecture 35 - Trans-free modifications

Lecture 36 - Animal fats

Lecture 37 - Fish oil and Algal oil

Lecture 38 - Dairy Cream

Lecture 39 - Butter

Lecture 40 - Ghee (Butter Oil)

Lecture 41 - Characteristics and specifications

Lecture 42 - Frying Technology

Lecture 43 - Seed Oils

Lecture 44 - Fruit and Nut Oils

Lecture 45 - Rice Bran Oil

Lecture 46 - Tree Nut Oils

Lecture 47 - Tropical Exotic Oils and Butter

Lecture 48 - Essential Oil

Lecture 49 - Cocoa/Shea Butter and Structured Triacylglycerols

Lecture 50 - Oil powder and liposomes

Lecture 51 - Major by-Products, Their Composition and Uses

Lecture 52 - By-Products Utilization - I

Lecture 53 - By-Products Utilization - II

Lecture 54 - Lecithin Production

Lecture 55 - Biodiesel Production from Waste Cooking Oil

Lecture 56 - Edible Oil Blending and Fortification

Lecture 57 - Packaging materials and methods

Lecture 58 - Handling and Storage

Lecture 59 - Quality Analysis and Control

Lecture 60 - Regulatory Requirements and Course summary

NPTEL : NOC:Watershed Hydrology (Agriculture)

Co-ordinators : Prof. Rajendra Singh

Lecture 1 - Introduction

Lecture 2 - Precipitation

Lecture 3 - Rainfall data analysis - I

Lecture 4 - Rainfall data analysis - II

Lecture 5 - Rainfall Frequency Analysis

Lecture 6 - Hydrological Abstractions

Lecture 7 - Evaporation

Lecture 8 - Evapotranspiration

Lecture 9 - Infiltration - I

Lecture 10 - Infiltration - II

Lecture 11 - Streamflow Processes

Lecture 12 - Streamflow Measurement - 1

Lecture 13 - Streamflow Measurement - 2

Lecture 14 - Streamflow Measurement - 3

Lecture 15 - Flow Duration Curve and Flow Mass Curve

Lecture 16 - Runoff

Lecture 17 - Estimation of Runoff

Lecture 18 - Estimation of Runoff - Rational Method

Lecture 19 - Estimation of Runoff - SCS-Curve Number Method

Lecture 20 - Numerical on Estimation of Runoff

Lecture 21 - Hydrograph - I

Lecture 22 - Hydrograph - II

Lecture 23 - Derivation of Unit Hydrograph - I

Lecture 24 - Derivation of Unit Hydrograph - II

Lecture 25 - Numerical on Hydrograph

Lecture 26 - Synthetic Unit Hydrograph - I

Lecture 27 - Synthetic Unit Hydrograph - II

Lecture 28 - IUH and Distribution Graph

Lecture 29 - Numerical on Synthetic UH, IUH and Distribution Graph - I

Lecture 30 - Numerical on Synthetic UH, IUH and Distribution Graph - II

Lecture 31 - Drainage Basin Characteristics

Lecture 32 - Drainage Basin Geomorphology

Lecture 33 - Morphometric analysis using RS and GIS

Lecture 34 - Watershed Management - I

Lecture 35 - Watershed Management - II

Lecture 36 - Hydrological Modelling: Introduction and Protocol

Lecture 37 - Hydrological Models: Classification

Lecture 38 - Hydrological Model: Calibration, Validation and Evaluation

Lecture 39 - Sensitivity Analysis and Machine Learning in Hydrology

Lecture 40 - Machine Learning in Hydrology - II

Lecture 41 - Floods

Lecture 42 - Design Flood

Lecture 43 - Flood Frequency Analysis

Lecture 44 - Flood Control and Management

Lecture 45 - Floodplain Zoning and Numerical on Floods

Lecture 46 - Flood Routing: Introduction

Lecture 47 - Hydrologic Reservoir Routing

Lecture 48 - Hydrologic Channel Routing

Lecture 49 - Hydraulic Channel Routing - Hydraulic routing

Lecture 50 - Numerical on Flood Routing

Lecture 51 - Drought: Introduction

Lecture 52 - Classification of Drought

Lecture 53 - Agricultural Drought - I

Lecture 54 - Agricultural Drought - II

Lecture 55 - Drought Management

Lecture 56 - Hydrological Model Demonstration

Lecture 57 - Miscellaneous Topics

Lecture 58 - Objectives on Watershed Hydrology

Lecture 59 - Objectives on Watershed Hydrology

Lecture 60 - Solution of Numerical Problems in Assignments

NPTEL : NOC:Water Quality Management Practices (Agriculture)

Co-ordinators : Prof. Gourav Dhar Bhowmick

Lecture 1 - Introduction to Water Quality

Lecture 2 - Classification of Major Water Pollutants

Lecture 3 - Emerging Concerns in Wastewater Treatment in Global Scenario

Lecture 4 - Environmental Legislation and Regulatory Standards

Lecture 5 - Commonly used terminologies and definitions

Lecture 6 - Collection and Preservation of Samples and the Measurement of pH, Acidity, Alkalinity

Lecture 7 - Measurement of DO and Solids in wastewater (TSS/VSS/TDS), Turbidity

Lecture 8 - Determination of BOD, COD and TOC

Lecture 9 - Modelling of BOD and its relation with COD and TOC

Lecture 10 - Determination of Nitrogen, Phosphorus and Microbial Counts

Lecture 11 - Wastewater Treatment Classification and Plant Analysis

Lecture 12 - Order of Reaction and Types of Reactors Used in Wastewater Treatment

Lecture 13 - Concept of Mass Balance

Lecture 14 - Overview of Sewage Treatment Plant

Lecture 15 - Self-Purification and its Factors

Lecture 16 - Screens

Lecture 17 - Grit Chamber and its Classification - I

Lecture 18 - Grit Chamber and its Classification - II and Skimming Tank

Lecture 19 - Theory of Sedimentation and Introduction to Primary Sedimentation Tank and its Types

Lecture 20 - PST: Performance factors affecting efficiency and design recommendations

Lecture 21 - Equalization

Lecture 22 - Neutralization, Dissolved Air Floatation

Lecture 23 - Coagulation

Lecture 24 - Flocculation

Lecture 25 - Pre-aeration and other advanced primary treatment units

Lecture 26 - Bacterial Metabolism and Their Use in Wastewater

Lecture 27 - Factors Affecting Bacterial Growth and Wastewater Treatment Using Bacteria

Lecture 28 - Role of enzymes and algae in biological wastewater treatment

Lecture 29 - Important nomenclature on aerobic treatment units

Lecture 30 - Types of aeration used in aerobic treatment units and Analysis of Gas Transfer

Lecture 31 - Activated Sludge Process: Description and Types

Lecture 32 - Bacterial growth kinetics in ASP: Biomass mass balance and substrate mass balance

Lecture 33 - Equalization Estimation of values of other operating parameters in ASP

Lecture 34 - Numericals on ASP

Lecture 35 - Sequencing Batch Reactor

Lecture 36 - Trickling Filter- Physical Overview, Types and Process Description

Lecture 37 - Aerated Lagoon, Fluidised Bed Bioreactor, Biological Active Filter

Lecture 38 - Aerated Lagoons, Fluidized Bed Bioreactors, Biological Active Filters

Lecture 39 - Rotating Biological Contactor and Hanging Sponge Reactor

Lecture 40 - Membrane Bioreactor (MBR)

Lecture 41 - Principles of Anaerobic process for wastewater treatment and Methane Production

Lecture 42 - Types of Anaerobic Treatment Systems

Lecture 43 - Factors Affecting Anaerobic Treatment Systems

Lecture 44 - Designs of Anaerobic Reactors: UASB reactor - I

Lecture 45 - Designs of Anaerobic Reactors: UASB reactor - II

Lecture 46 - Pond System, Components, Factors and Terminologies

Lecture 47 - Constructed Wetlands

Lecture 48 - Bio-electrochemical Systems: Types and Definition

Lecture 49 - Hybrid Bio-electrochemical Systems

Lecture 50 - Modular Designs for Smart Cities

Lecture 51 - Nitrification and Denitrification: Major factors

Lecture 52 - Systems used for Nitrification and Denitrification, Anammox Process

Lecture 53 - Biological Phosphorus Removal and Factors affecting it

Lecture 54 - Advanced Oxidation Processes

Lecture 55 - Other Tertiaty treatment systems

Lecture 56 - Disinfection of Wastewater

Lecture 57 - Sludge Management

Lecture 58 - Life-Cycle Costing

Lecture 59 - Case studies

Lecture 60 - Future of Sustainable Wastewater Treatment Technologies

NPTEL : NOC:Modern Food Packaging Technologies: Regulatory Aspects and Global Trends (Agriculture)

Co-ordinators : Prof. Prem Prakash Srivastav

Lecture 1 - Introduction to Food Packaging

Lecture 2 - Introduction to Food Packaging (Continued...)

Lecture 3 - Introduction to Food Packaging (Continued...)

Lecture 4 - Introduction to Food Packaging (Continued...)

Lecture 5 - Introduction to Food Packaging (Continued...)

Lecture 6 - Introduction to Food Packaging (Continued...)

Lecture 7 - Type of Packaging Materials (Paper)

Lecture 8 - Type of Packaging Materials (Paper) (Continued...)

Lecture 9 - Type of Packaging Materials (Paper) (Continued...)

Lecture 10 - Testing of Paper and Paperboard

Lecture 11 - Types of Packaging Materials (Glass)

Lecture 12 - Types of Packaging Materials (Glass) (Continued...)

Lecture 13 - Types of Packaging Materials (Glass) (Continued...)

Lecture 14 - Types of Packaging Materials (Glass) (Continued...)

Lecture 15 - Types of Packaging Materials (Plastic 1)

Lecture 16 - Types of Packaging Materials (Plastic 1) (Continued...)

Lecture 17 - Types of Packaging Materials (Plastic 1) (Continued...)

Lecture 18 - Types of Packaging Materials (Plastic 1) (Continued...)

Lecture 19 - Types of Packaging Materials (Plastic 2)

Lecture 20 - Types of Packaging Materials (Plastic 2) (Continued...)

Lecture 21 - Properties of Plastic Polymers

Lecture 22 - Properties of Plastic Polymers (Continued...)

Lecture 23 - Coating, Printing and Labeling of Plastic Films

Lecture 24 - Retort Pouches

Lecture 25 - Metals as a Packaging Material

Lecture 26 - Metals as a Packaging Material (Continued...)

Lecture 27 - Metals as a Packaging Material (Can Making Process)

Lecture 28 - Metals as a Packaging Material (can end making process)

Lecture 29 - Metals as a Packaging Material (Aluminium Container)

Lecture 30 - Metals as a Packaging Material (Corrosion of Metal Packaging)

Lecture 31 - Testing and Regulatory Aspects of Food Packging

Lecture 32 - Testing and Regulatory Aspects of Food Packging (Continued...)

Lecture 33 - Testing and Regulatory Aspects of Food Packging (Continued...)

Lecture 34 - Special Packging Methods (form-fill-seal machine)

Lecture 35 - Special Packging Methods (controlled atmospheric packaging)

Lecture 36 - Special Packaging Methods (modified atmospheric packaging)

Lecture 37 - Special Packaging Methods (aseptic packaging)

Lecture 38 - Special Packaging Methods (active and intelligent packaging)

Lecture 39 - Packaging of Food Products (meat and poultry products)

Lecture 40 - Packaging of Food Products (meat and poultry products) (Continued...)

Lecture 41 - Packaging of Food Products (meat and poultry products) (Continued...)

Lecture 42 - Packaging of Food Products (dairy and dairy based products)

Lecture 43 - Packaging of Food Products (dairy and dairy based products) (Continued...)

Lecture 44 - Packaging of Food Products (dairy and dairy based products) (Continued...)

Lecture 45 - Packaging of Food Products (fruits and vegetables)

Lecture 46 - Packaging of Food Products (fruits and vegetables) (Continued...)

Lecture 47 - Packaging of Food Products (cereals and flours)

Lecture 48 - Packaging of Food Products (bakery and rte products)

Lecture 49 - Packaging of Food Products (confectionery products)

Lecture 50 - Packaging of Food Products (beverages)

Lecture 51 - Overview to Modern Food Packaging

Lecture 52 - Challenges and Variations in Packaging Industries

Lecture 53 - Recent Trends in Packaging Materials - Biodegradable

Lecture 54 - Recent Trends in Packaging Materials - Edible

Lecture 55 - Recycling and Disposal of Plastic Waste and Environmental Concern

Lecture 56 - Packaging Processes and Machinery

Lecture 57 - Packaging Processes and Machinery (Continued...)

Lecture 58 - Packaging Processes and Machinery (Continued...)

Lecture 59 - Packaging Laws and Regulation

Lecture 60 - FSSAI Regulations on Packaging and Labelling Requirements

NPTEL : NOC:Basics of Crop Breeding and Plant Biotechnology (Agriculture)

Co-ordinators : Prof. Joydeep Banerjee

Lecture 1 - Mendelian Genetics

Lecture 2 - Mendelian Genetics

Lecture 3 - Mendelian Genetics

Lecture 4 - Concept of Gene and Experiments on Plant Hybridization

Lecture 5 - Concept of Gene and Experiments on Plant Hybridization

Lecture 6 - Pureline Selection

Lecture 7 - Pedigree Method

Lecture 8 - Backcross Breeding

Lecture 9 - Back Cross Method (Recessive Gene Transfer)

Lecture 10 - Merits and Demerits of Backcross Breeding and Cytoplasm Transfer Through BB

Lecture 11 - Mass Selection

Lecture 12 - Modifications of Mass Selection

Lecture 13 - Recurrent Selection

Lecture 14 - Reciprocal Recurrent Selection

Lecture 15 - Heterosis and Inbreeding Depression

Lecture 16 - Degree of Inbreeding and Genetic Basis of Heterosis and Inbreeding Depression

Lecture 17 - Genetic Basis of Heterosis and Inbreeding Depression

Lecture 18 - Population Genetics - Part I

Lecture 19 - Population Genetics - Part II

Lecture 20 - Population Genetics - Part III

Lecture 21 - Polyploidy - Introduction

Lecture 22 - Autopolyploidy

Lecture 23 - Features and Limitations of Autopolyploids

Lecture 24 - Allopolyploidy

Lecture 25 - Introduction to Reverse Breeding

Lecture 26 - Applications of Reverse Breeding

Lecture 27 - Introduction to Markers

Lecture 28 - RFLP

Lecture 29 - RAPD

Lecture 30 - AFLP

Lecture 31 - ISSR, SSR, CAPS

Lecture 32 - Backcross breeding through molecular marker - Part I

Lecture 33 - Backcross breeding through molecular marker - Part II

Lecture 34 - Enzymatic tools used in Molecular Biology

Lecture 35 - Vectors and Plasmids used in Molecular Biology

Lecture 36 - Types of Vectors used in Plant Transformation and Selectable Marker Gene

Lecture 37 - Scorable Marker Gene and Plant Tissue Culture

Lecture 38 - Gene Cloning

Lecture 39 - Promoters and Preparation of Over expression Construct

Lecture 40 - Preparation of Gene Silencing Construct

Lecture 41 - Unidirectional and Bidirectional Promoter, NumericalQuestion on Promoter Analysis

Lecture 42 - Application of Plant Tissue Culture - Part I

Lecture 43 - Application of Plant Tissue Culture - Part II

Lecture 44 - Haploids and Artificial Seeds

Lecture 45 - Gene Transfer Methods

Lecture 46 - Agrobacterium Mediated Transformation in Tobacco and Rice

Lecture 47 - PCR Screening

Lecture 48 - Southern and Northern Blot

Lecture 49 - Western Blot

Lecture 50 - Microarray and Other Screening Methods

Lecture 51 - Molecular Analysis of Transgenic Plants - I

Lecture 52 - Molecular Analysis of Transgenic Plants - II

Lecture 53 - Double Integration - Part I

Lecture 54 - Double Integration - Part II

Lecture 55 - Golden Rice, Bt Cotton, FLAVR SAVR

Lecture 56 - Characterisation of OsGLP1 Gene from Rice - Part I

Lecture 57 - Characterization of OsGLP1 Gene from Rice - Part II

Lecture 58 - Seed Sterilisation and Transformation (Rice and Tobacco)

NPTEL : NOC:Landscape Architecture and Site Planning - Basic Fundamentals (Architecture)

Co-ordinators : Prof. Uttam Kumar Bannerjee

Lecture 1 - Overview

Lecture 2 - Introduction to Landscape

Lecture 3 - Categories and Materials in Landscape

Lecture 4 - Objective and Professional Scope of Landscape Design

Lecture 5 - Objective and Professional Scope of Landscape Design (Continued...)

Lecture 6 - Introduction to History of Landscape Design

Lecture 7 - Introduction to History of Landscape Design (Continued...)

Lecture 8 - Introduction to History of Landscape Design (Continued...)

Lecture 9 - Introduction to History of Landscape Design (Continued...)

Lecture 10 - Introduction to History of Landscape Design (Continued...)

Lecture 11 - Introduction to History of Landscape Design (Continued...)

Lecture 12 - Introduction to History of Landscape Design (Continued...)

Lecture 13

Lecture 14

Lecture 15

Lecture 16 - Behavioral Principle

Lecture 17 - Behavioral Principle (Continued...)

Lecture 18 - Behavioral Principle (Continued...)

Lecture 19 - Behavioral Principle (Continued...)

Lecture 20 - Behavioral Principle (Continued...)

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31 - Landform Design

Lecture 32 - Landform Design (Continued...)

Lecture 33 - Landform Design (Continued...)

Lecture 34 - Landform Design (Continued...)

Lecture 35 - Landform Design (Continued...)

Lecture 36 - Planting Design

Lecture 37 - Planting Design (Continued...)

Lecture 38 - Planting Design (Continued...)

Lecture 39 - Planting Design (Continued...)

Lecture 40 - Planting Design (Continued...)

NPTEL : NOC:Architectural Conservation and Historic Preservation (Architecture)

Co-ordinators : Prof. Sanghamitra Basu

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Need, Debate and Purpose

Lecture 4 - Heritage Significance and Values

Lecture 5 - Heritage Significance and Values (Continued...)

Lecture 6 - Assessing Heritage Values and Significance

Lecture 7 - Heritage Values and Significance (Continued...)

Lecture 8 - Assessing Heritage Significance Concept and Process

Lecture 9 - Assessing Heritage Significance Concept and Process (Continued...)

Lecture 10 - Divergent Approaches for Managing and Rehabilitating Heritage Properties : Degrees of Intervention

Lecture 11 - Divergent Approaches for Managing and Rehabilitating Heritage Properties : Degrees of Intervention (Continued...)

Lecture 12 - Divergent Approaches for Managing and Rehabilitating Heritage Properties : Degrees of Intervention (Continued...)

Lecture 13 - Ethics of Conservation

Lecture 14 - Evolution of Heritage Conservation

Lecture 15 - Evolution of Heritage Conservation (Continued...)

Lecture 16 - World Heritage Sites - Part 1

Lecture 17 - World heritage Sites - Part 2

Lecture 18 - World Heritage Sites - Part 3

Lecture 19 - World Heritage Sites - Part 4

Lecture 20 - World Heritage Sites - Part 5

Lecture 21 - Causes of decay in cultural property - Part 1

Lecture 22 - Causes of decay - Part 2

Lecture 23 - Causes of decay - Part 3

Lecture 24 - Causes of decay - Part 4

Lecture 25 - Documenting heritage properties

Lecture 26 - Documenting Heritage Properties : A Demonstration Example

Lecture 27 - Investigation and Conservation of Historic Structures : Case Study 1

Lecture 28 - Investigation and Conservation of Historic Structures : Case Study 2 (Part a)

Lecture 29 - Investigation and Conservation of Historic Structures : Case Study 2 (Part b)

Lecture 30 - Conservation of Historic Structures : Maintenance and Repair

Lecture 31 - Conservation of Historic Structures : Maintenance and Repair (Continued...)

Lecture 32 - Historic Cities and Heritage Areas

Lecture 33 - Historic Cities and Heritage Areas (Continued...)

Lecture 34 - Historic Cities and Heritage Areas (Continued...)

Lecture 35 - Historic Cities and Heritage Areas (Continued...)

Lecture 36 - Historic Cities and Heritage Zones - India

Lecture 37 - Historic Areas and Heritage Zones - India (Continued...)

Lecture 38 - New Buildings in Historic Settings

Lecture 39 - Heritage Impact Assessment in Historic Settings

Lecture 40 - Adaptive Reuse

Lecture 41 - Legislative and Organizational Policies for India

Lecture 42 - Heritage Regulations and Role of Voluntary Organisations

Lecture 43 - Heritage Conservation - Issues and Potentials: Heritage tourism, sustainability and way forward

NPTEL : NOC:Architectural Acoustics (Architecture)

Co-ordinators : Prof. Sumana Gupta, Prof. Sankha Pratim Bhattacharya

Lecture 1 - Introduction and Historical Overview

Lecture 2 - Introduction to Acoustical Physics

Lecture 3 - Frequency and Octave

Lecture 4 - Sound Pressure and Intensity Levels

Lecture 5 - Near and Far Field Propagation and Loudness

Lecture 6 - Room Acoustics - I

Lecture 7 - Room Acoustics - II

Lecture 8 - Indoor Acoustics, Reflection and Absorption

Lecture 9 - Concept of Reverberation

Lecture 10 - Application of Reverberation Time

Lecture 11 - Introduction to Acoustical Absorbers

Lecture 12 - Panel Absorbers and Resonators

Lecture 13 - Absorption in spaces of different volumes

Lecture 14 - Acoustical Absorbers

Lecture 15 - Reverberation time and Intelligibility

Lecture 16 - Acoustical Criteria and Space Design

Lecture 17 - Acoustical Criteria and Space Design (Continued...)

Lecture 18 - Acoustical Criteria and Space Design (Continued...)

Lecture 19 - Acoustical Criteria and Space Design (Continued...)

Lecture 20 - Acoustical Criteria and Space Design (Continued...)

Lecture 21 - Introduction to Auditorium Design

Lecture 22 - Introduction to Auditorium Design (Continued...)

Lecture 23 - Introduction to Auditorium Design (Continued...)

Lecture 24 - Introduction to Auditorium Design Balcony and ceiling design

Lecture 25 - Introduction to Auditorium Design: Some Examples

Lecture 26 - Electro Acoustics - I

Lecture 27 - Electro Acoustics - II

Lecture 28 - Meteorological conditions and propagation of sound

Lecture 29 - Topography and sound propagation Historical contexts

Lecture 30 - Open air Theatre considerations

Lecture 31 - Air Borne Sound Transmission

Lecture 32 - Air Borne Sound Transmission (Continued...)

Lecture 33 - Air Borne Sound Transmission (Continued...)

Lecture 34 - Structure Borne Sound Transmission

Lecture 35 - Structure Borne Sound Transmission (Continued...)

Lecture 36 - Environmental Acoustics - I

Lecture 37 - Environmental Acoustics - II

Lecture 38 - Urban Noise Control: Planning Consideration - I

Lecture 39 - Urban Noise Control: Planning Consideration - II

Lecture 40 - Urban Noise Control: Architectural Consideration

NPTEL : NOC:Building Materials and Composites (Architecture)

Co-ordinators : Prof. Sumana Gupta

Lecture 1 - Introduction to the course

Lecture 2 - Clay products - 1

Lecture 3 - Clay products - 2

Lecture 4 - Stone

Lecture 5 - Stone (Continued...)

Lecture 6 - Introduction to wood

Lecture 7 - Wood: procurement details, properties, classification

Lecture 8 - Defects of wood and Wood joinery

Lecture 9 - Engineered wood

Lecture 10 - Bamboo

Lecture 11 - Glass

Lecture 12 - Glass (Continued...)

Lecture 13 - Glass (Continued...)

Lecture 14 - Glass wall and glass insulation

Lecture 15 - Ceramic tiles and vitrified tiles

Lecture 16 - Introduction to concrete

Lecture 17 - Fine Aggregates

Lecture 18 - Coarse Aggregates

Lecture 19 - Cement

Lecture 20 - Water, Plasticizer admixture and tests

Lecture 21 - Introduction to prefabricated items

Lecture 22 - CMU, AAC and Pavement Blocks

Lecture 23 - Precast Wall Panels

Lecture 24 - Floor panels

Lecture 25 - Columns, foundation, ferro-cement

Lecture 26 - Introduction to metals

Lecture 27 - Ferrous Metals 1 - Cast and Wrought Iron

Lecture 28 - Ferrous metals 2 - Steel

Lecture 29 - Ferrous metals 2 - Reinforcement bars, Corrosion, Light Gauge Steel

Lecture 30 - Non-ferrous metals

Lecture 31 - Damp proofing

Lecture 32 - Damp proofing methods and materials

Lecture 33 - Thermal insulation and sound insulation

Lecture 34 - Insulation, Bitumen and Gypsum

Lecture 35 - Composites

Lecture 36 - Paints

Lecture 37 - Paints (Continued...)

Lecture 38 - Paints (Continued...)

Lecture 39 - Plastics

Lecture 40 - Plastics (Continued...)

NPTEL : NOC:Environmental Soil Chemistry (Architecture)

Co-ordinators : Prof. Somsubhra Chakraborty

Lecture 1 - Evolution of Soil Chemistry

Lecture 2 - Evolution of Soil Chemistry (Continued...)

Lecture 3 - Evolution of Soil Chemistry (Continued...)

Lecture 4 - Evolution of Soil Chemistry (Continued...)

Lecture 5 - Evolution of Soil Chemistry (Continued...)

Lecture 6 - Inorganic Soil Components

Lecture 7 - Inorganic Soil Components (Continued...)

Lecture 8 - Inorganic Soil Components (Continued...)

Lecture 9 - Inorganic Soil Components (Continued...)

Lecture 10 - Inorganic Soil Components (Continued...)

Lecture 11 - Chemistry of Soil Organic Matter

Lecture 12 - Chemistry of Soil Organic Matter (Continued...)

Lecture 13 - Chemistry of Soil Organic Matter (Continued...)

Lecture 14 - Chemistry of Soil Organic Matter (Continued...)

Lecture 15 - Chemistry of Soil Organic Matter (Continued...)

Lecture 16 - Soil Solution-Solid Phase Equilibria and Sorption in Solids

Lecture 17 - Soil Solution-Solid Phase Equilibria and Sorption in Solids (Continued...)

Lecture 18 - Soil Solution-Solid Phase Equilibria and Sorption in Solids (Continued...)

Lecture 19 - Soil Solution-Solid Phase Equilibria and Sorption in Solids (Continued...)

Lecture 20 - Soil Solution-Solid Phase Equilibria and Sorption in Solids (Continued...)

Lecture 21 - Ion Exchange Processes

Lecture 22 - Ion Exchange Processes (Continued...)

Lecture 23 - Ion Exchange Processes (Continued...)

Lecture 24 - Ion Exchange Processes (Continued...)

Lecture 25 - Ion Exchange Processes (Continued...)

Lecture 26 - Kinetics of Soil Chemical Processes

Lecture 27 - Kinetics of Soil Chemical Processes (Continued...)

Lecture 28 - Kinetics of Soil Chemical Processes (Continued...)

Lecture 29 - Kinetics of Soil Chemical Processes (Continued...)

Lecture 30 - Kinetics of Soil Chemical Processes (Continued...)

Lecture 31 - Redox Chemistry of Soils

Lecture 32 - Redox Chemistry of Soils (Continued...)

Lecture 33 - Redox Chemistry of Soils (Continued...)

Lecture 34 - Redox Chemistry of Soils (Continued...)

Lecture 35 - Redox Chemistry of Soils (Continued...)

Lecture 36 - Soil Pollutants

Lecture 37 - Soil Pollutants (Continued...)

Lecture 38 - Soil Pollutants (Continued...)

Lecture 39 - Soil Pollutants (Continued...)

Lecture 40 - Soil Pollutants (Continued...)

Lecture 41 - Pollutant-Soil Solution Interaction

Lecture 42 - Pollutant-Soil Solution Interaction (Continued...)

Lecture 43 - Pollutant-Soil Solution Interaction (Continued...)

Lecture 44 - Pollutant-Soil Solution Interaction (Continued...)

Lecture 45 - Pollutant-Soil Solution Interaction (Continued...)

Lecture 46 - Retention of Pollutants on and within Soil Solid Phases

Lecture 47 - Retention of Pollutants on and within Soil Solid Phases (Continued...)

Lecture 48 - Retention of Pollutants on and within Soil Solid Phases (Continued...)

Lecture 49 - Retention of Pollutants on and within Soil Solid Phases (Continued...)

Lecture 50 - Retention of Pollutants on and within Soil Solid Phases (Continued...)

Lecture 51 - Modeling the Fate of Pollutants in Soil, Risk and Remedies

Lecture 52 - Modeling the Fate of Pollutants in Soil, Risk and Remedies (Continued...)

Lecture 53 - Modeling the Fate of Pollutants in Soil, Risk and Remedies (Continued...)

Lecture 54 - Modeling the Fate of Pollutants in Soil, Risk and Remedies (Continued...)

Lecture 55 - Modeling the Fate of Pollutants in Soil, Risk and Remedies (Continued...)

Lecture 56 - Analytical Techniques for Assessing Soil Pollution

Lecture 57 - Analytical Techniques for Assessing Soil Pollution (Continued...)

Lecture 58 - Analytical Techniques for Assessing Soil Pollution (Continued...)

Lecture 59 - Analytical Techniques for Assessing Soil Pollution (Continued...)

Lecture 60 - Analytical Techniques for Assessing Soil Pollution (Continued...)

NPTEL : NOC:Structural System in Architecture (Architecture)

Co-ordinators : Prof. Sankha Pratim Bhattacharya

Lecture 1 - Introduction to Structural System

Lecture 2 - Force System

Lecture 3 - Moment, Couple and Static Equilibrium

Lecture 4 - Supports and Reactions

Lecture 5 - Structural Loading and Support Reactions

Lecture 6 - Theory of Elasticity - 1

Lecture 7 - Theory of Elasticity - 2

Lecture 8 - Shear Force Diagram

Lecture 9 - Bending Moment Diagram

Lecture 10 - SFD and BMD: Special Cases

Lecture 11 - Bending Stress in Beam - I

Lecture 12 - Bending Stress in Beam - II

Lecture 13 - Bending Stress in Beam - III

Lecture 14 - Shear Stress in Beam

Lecture 15 - Theory of Column

Lecture 16 - Deflection of Beams

Lecture 17 - Indeterminate Beams

Lecture 18 - AIndeterminate Beams and Frames

Lecture 19 - Structural Grid and Framing

Lecture 20 - Structural Design

Lecture 21 - Introduction to Truss

Lecture 22 - Analysis of Truss - 1

Lecture 23 - Analysis of Truss - 2

Lecture 24 - Application of Truss in Architecture

Lecture 25 - Space Frame Structures

Lecture 26 - Introduction to Arch

Lecture 27 - Structural Principle and Application of Arch

Lecture 28 - Shell Structures

Lecture 29 - Application of Arch and Shell in Architecture

Lecture 30 - Structural Concept and Application of Dome in Architecture

Lecture 31 - Cable Supported Structures

Lecture 32 - Membrane Structures

Lecture 33 - Application of Tensile Structures in Architecture

Lecture 34 - Flat Plate and Flate Slab Structures

Lecture 35 - Waffle Slab and Folded Plate Structures

Lecture 36 - Temporary Structures

Lecture 37 - Building Foundation

Lecture 38 - Structural System for High-rise Buildings - I

Lecture 39 - Structural System for High-rise Buildings - II

Lecture 40 - Structural Detailing

NPTEL : NOC:Urban Landuse and Transportation Planning (Architecture)

Co-ordinators : Prof. Debapratim Pandit

Lecture 1 - Introduction to Landuse transportation planning

Lecture 2 - Plans and planning process

Lecture 3 - Urban landuse planning

Lecture 4 - Comprehensive mobility plan

Lecture 5 - Landuse transport interaction

Lecture 6 - Theoretical foundations - Part 1

Lecture 7 - Theoretical foundations - Part 2

Lecture 8 - Modeling approaches

Lecture 9 - Existing integrated land use transportation models

Lecture 10 - Land use transportation model components and future challenges

Lecture 11 - Sampling Theory - 1

Lecture 12 - Sampling Theory - 2

Lecture 13 - Data and Surveys

Lecture 14 - Transport Planning surveys - Part 1

Lecture 15 - Transport Planning surveys - Part 2

Lecture 16 - Demographic Transition

Lecture 17 - Demographic Models - 1

Lecture 18 - Demographic Models - 2

Lecture 19 - Microsimulation and Population Synthesis - 1

Lecture 20 - Microsimulation and Population Synthesis - 2

Lecture 21 - Urban Growth Assessment

Lecture 22 - Urban land suitability assessment

Lecture 23 - Accessibility - 1

Lecture 24 - Accessibility - 2

Lecture 25 - Land Price Model

Lecture 26 - Discrete choice theory

Lecture 27 - Residential mobility and location choice - 1

Lecture 28 - Residential mobility model using binary logistic regression

Lecture 29 - Residential mobility and location choice - 2

Lecture 30 - Residential location choice model using multinomial logistic regression

Lecture 31 - Travel demand forecasting and Trip generation

Lecture 32 - Multiple linear regression

Lecture 33 - Trip Production and Attraction - 1

Lecture 34 - Trip Production and Attraction - 2

Lecture 35 - Trip distribution

Lecture 36 - Mode choice theory

Lecture 37 - Mode choice model

Lecture 38 - Hybrid mode choice model - 1 (Factor Analysis)

Lecture 39 - Hybrid mode choice model - 2 (Joint RP SP model)

Lecture 40 - Nested logit model

Lecture 41 - Introduction to Trip Assignment

Lecture 42 - Route Choice

Lecture 43 - Link assignment - 1

Lecture 44 - Link assignment - 2

Lecture 45 - Dynamic traffic assignment

Lecture 46 - Transportation Software

Lecture 47 - CUBE Overview

Lecture 48 - Travel demand modelling using CUBE and VISUM

Lecture 49 - Activity based modelling in CUBE

Lecture 50 - Vehicular emission and pollution modelling

Lecture 51 - Urban Freight Planning: Theory

Lecture 52 - Urban Freight Planning: Demand Modelling

Lecture 53 - Urban Freight Planning: Logistics

Lecture 54 - Last Mile Logistics - 1

Lecture 55 - Last Mile Logistics - 2

Lecture 56 - Employment location choice and Real estate Development location choice

Lecture 57 - Activity based model - 1

Lecture 58 - Activity based model - 2

Lecture 59 - Mode choice using Machine Learning

Lecture 60 - Shared Mobility

NPTEL : NOC:Urban utilities Planning : Water Supply, Sanitation and Drainage (Architecture)

Co-ordinators : Prof. Debapratim Pandit

Lecture 1 - Urban Utilities Planning Issues

Lecture 2 - Planning Strategies

Lecture 3 - Planning Strategies (Continued...)

Lecture 4 - Urban Utilities

Lecture 5 - Water Sensitive Urban Planning

Lecture 6 - Water Demand Prediction and Management

Lecture 7 - Types of Urban Water Demand

Lecture 8 - Fluctuations in Urban Water Demand

Lecture 9 - Role of Government

Lecture 10 - Cost of water supply

Lecture 11 - Rainfall, Runoff and Ground Water

Lecture 12 - Groundwater Properties and Flow Characteristics

Lecture 13 - Groundwater Intakes and Issues

Lecture 14 - Groundwater Yield

Lecture 15 - Surface Water Intakes

Lecture 16 - Pumping Stations

Lecture 17 - Pumps

Lecture 18 - Sizing of Pumps

Lecture 19 - Service Reservoir - Part I

Lecture 20 - Service Reservoir - Part II

Lecture 21 - Distribution System Layout

Lecture 22 - Conveyance of water - Part I

Lecture 23 - Conveyance of water - Part II

Lecture 24 - Pipes, Joints, Meters and SCADA Systems

Lecture 25 - Distribution Network Design

Lecture 26 - Water quality and testing - Part I

Lecture 27 - Water quality and testing - Part II

Lecture 28 - Water treatment - Part I

Lecture 29 - Water treatment - Part II

Lecture 30 - Water treatment - Part III

Lecture 31 - Sanitation basics - Part I

Lecture 32 - Sanitation Basics - Part II

Lecture 33 - Sewage Systems - Part I

Lecture 34 - Sewage Systems - Part II

Lecture 35 - Sewage Systems - Part III

Lecture 36 - Water Carriage System and Sewerage Layout

Lecture 37 - Quantity of Sanitary Sewage

Lecture 38 - Storm Water Drainage Planning - Part I

Lecture 39 - Storm Water Drainage Planning - Part II

Lecture 40 - Storm Water Drainage Planning - Part III

Lecture 41 - Sewer Design

Lecture 42 - Runoff estimation - Part 1

Lecture 43 - Runoff estimation - Part 2

Lecture 44 - Sewerage Network Design - Part 1

Lecture 45 - Sewerage Network Design - Part 2

Lecture 46 - Sewer appurtenances - Part 1

Lecture 47 - Sewer appurtenances - Part 2

Lecture 48 - Storm water drains

Lecture 49 - Sewer maintenance and cleaning

Lecture 50 - Laying of sewer and utility corridors

Lecture 51 - Sewage disposal and treatment in India: Introduction

Lecture 52 - Natural methods of sewage treatment

Lecture 53 - Artificial sewage treatment - Part 1: Primary treatment

Lecture 54 - Artificial sewage treatment - Part 2: Secondary treatment

Lecture 55 - Artificial sewage treatment - Part 3: Advanced methods

Lecture 56 - Ground water Recharge - Part 1

Lecture 57 - Ground water Recharge - Part 2

Lecture 58 - Urban flood management and drainage plans - Part 1

Lecture 59 - Urban flood management and drainage plans - Part 2

Lecture 60 - Urban flood management and drainage plans - Part 3

NPTEL : NOC:Urban Services Planning (Architecture)

Co-ordinators : Prof. Debapratim Pandit

Lecture 1 - Introduction

Lecture 2 - Strategic Aspects

Lecture 3 - Regulatory Framework

Lecture 4 - Municipal Management and Finance - Part I

Lecture 5 - Municipal Management and Finance - Part II

Lecture 6 - Service Planning Basics - Part I

Lecture 7 - Service Planning Basics - Part II

Lecture 8 - Service Planning Basics - Part III

Lecture 9 - Service Planning Basics - Part IV

Lecture 10 - Service Planning Basics - Part V

Lecture 11 - Solid Waste Management Rules and Guidelines

Lecture 12 - Solid Waste Management Rules 2016

Lecture 13 - MSWM Plan Preparation - Part I

Lecture 14 - MSWM Plan Preparation - Part II

Lecture 15 - MSWM Plan Preparation - Part III

Lecture 16 - Waste Generation - Part I

Lecture 17 - Waste generation - Part II

Lecture 18 - Waste quantification and characteristics

Lecture 19 - Waste composition

Lecture 20 - Waste storage

Lecture 21 - Primary and Secondary waste collection - Part I

Lecture 22 - Primary and Secondary waste collection - Part II

Lecture 23 - Primary and Secondary waste collection - Part III

Lecture 24 - Routing and scheduling for solid waste vehicles - Part I

Lecture 25 - Routing and scheduling for solid waste vehicles - Part II

Lecture 26 - Waste processing, recycling and recovery - Part 1

Lecture 27 - Waste processing, recycling and recovery - Part 2

Lecture 28 - Composting - Part 1

Lecture 29 - Composting - Part 2

Lecture 30 - Composting - Part 3

Lecture 31 - SWM 2016 Specifications for Sanitary Landfills

Lecture 32 - Site selection for Sanitary Landfills

Lecture 33 - Sanitary Landfill Design - Part I

Lecture 34 - Sanitary Landfill Design - Part II

Lecture 35 - Sanitary Landfill design - Part III

Lecture 36 - Waste to Energy - Part I: Biomethanation

Lecture 37 - Waste to Energy - Part II: Refuse Derived Fuel

Lecture 38 - Waste to Energy - Part III: Incineration

Lecture 39 - Waste to Energy - Part IV

Lecture 40 - Life Cycle Assessment

Lecture 41 - Street sweeping and Cleaning of surface drains

Lecture 42 - Construction and demolition waste management - Part I

Lecture 43 - Construction and demolition waste management - Part II

Lecture 44 - Special waste management - Part I

Lecture 45 - Special waste management - Part II

Lecture 46 - Healthcare facility standards - Part I

Lecture 47 - Healthcare facility standards - Part II

Lecture 48 - Urban Health Services - Part I

Lecture 49 - Urban Health Services - Part II

Lecture 50 - Health in Urban Planning

Lecture 51 - Municipal Social Services: Introduction

Lecture 52 - Economic and Social development

Lecture 53 - Urban Poverty Alleviation

Lecture 54 - Education

Lecture 55 - Vulnerable population groups

Lecture 56 - Vector Borne Disease Control

Lecture 57 - Street Lighting

Lecture 58 - Urban Forestry, Parks and Open Spaces

Lecture 59 - Fire Stations

Lecture 60 - Crematoriums and Burial Grounds

NPTEL : NOC:Introduction to History of Architecture in India (Architecture)

Co-ordinators : Prof. Pushkar Sohoni

Lecture 1 - Early Architecture

Lecture 2 - Buddhist and Early Temple Architecture

Lecture 3 - Sacrificial Altars and Divine Shelters

Lecture 4 - The Great Temple

Lecture 5 - Week-1 Review

Lecture 6 - Delhi Sultanate

Lecture 7 - Regional Sultanas

Lecture 8 - Temple and Mosque

Lecture 9 - Daulatabad Fort

Lecture 10 - Week-2 Review

Lecture 11 - Mughal Architecture - Part 1

Lecture 12 - Mughal Architecture - Part 2

Lecture 13 - Imbrication of Sultanate and Maratha Architecture

Lecture 14 - Maratha Temple

Lecture 15 - Week-3 Review

Lecture 16 - Princely States of India

Lecture 17 - Colonial Architecture In India

Lecture 18 - International, Art Deco, Modern

Lecture 19 - Architecture Today Commerce and Creativity

Lecture 20 - Week-4 Review

NPTEL : NOC:Strategies for Sustainable Design (Architecture)

Co-ordinators : Prof. Shiva Ji

Lecture 1 - Strategies for Sustainable Design - Welcome Lectuer

Lecture 2 - Various Perspectives around Sustainability

Lecture 3 - Spheres of Energy Efficient/Green/Environmental/Sustainable Designs

Lecture 4 - Environmental Sustainability

Lecture 5 - Social Sustainability

Lecture 6 - Economic Sustainabilty

Lecture 7 - Climate Change Mitigation and the Way Forward

Lecture 8 - Future of Human Habitation Design

Lecture 9 - Relevance of Sustainable Design in Contemporary Context

Lecture 10 - Built Environment and Energy Consumption

Lecture 11 - Reliance and Dependence of Building Design on Energy

Lecture 12 - Current Scenario of Sustainable Design: Indian

Lecture 13 - Current Scenario of Sustainable Design: International

Lecture 14 - Designing Strategically for Preventing pollution: Air, Water, Soil, Noise, Light Radiation, etc

Lecture 15 - Low Environmental Impact

Lecture 16 - Thinking for Alternatives through Systemic Design

Lecture 17 - Consumption and Consumerist Lifestyle

Lecture 18 - Environmental impact Assessment

Lecture 19 - Lifecycle Analysis - Part A

Lecture 20 - Lifecycle Analysis - Part B

Lecture 21 - Growth and Development in Construction and Allied Sectors

Lecture 22 - Policy Push in Real Estate and Manufacturing Sectors

Lecture 23 - Policy Push for Development of the Low Economic Regions

Lecture 24 - Sustainable Building Materials

Lecture 25 - Reduce/Reuse/Recycle

Lecture 26 - National Building Code 2016 - Part 11 and Energy Conservation Building Code

Lecture 27 - Guidelines for Building Design by SA Methods: GRIHA

Lecture 28 - UN SDG for Sustainable Development

Lecture 29 - LeNS Design Method and Tools such as SPSS, MSDS, DE

Lecture 30 - Vernacular Design Case Example

Lecture 31 - Climate Responsiveness

Lecture 32 - Thinking the Unthinkable: Need for Innovation in Design Process

Lecture 33 - Design for Net-Zero Energy, Lighting, Ventilation, Views and Human Comfort

Lecture 34 - D4S with Inspiration from Nature

Lecture 35 - D4S for Optimization of Manufacturing

Lecture 36 - International Conventions, Laws and Emerging Technologies for SD

Lecture 37 - Environmental Laws

Lecture 38 - Emerging Technologies and their Possible Intervention in Design

Lecture 39 - Case 1 - Campus Planning and Design of IIT Gandhinagar

Lecture 40 - Case 2 - A Comparative Analysis of Product Designs

Lecture 41 - Case 3 - Design of First Net-Zero Building of India

Lecture 42 - Case 4 - A Comparative Analysis of Internatonal Design Projects

Lecture 43 - Summary

NPTEL : NOC:Architectural Approaches to Decarbonization of Buildings (Architecture)

Co-ordinators : Prof. Iyer Vijayalaxmi Kasinath

Lecture 1 - Introduction to GHG and the role of buildings in its reduction

Lecture 2 - Strategies to reduce GHG in Building Industry

Lecture 3 - Policies, initiatives and future trends to reduce GHG in the Building Industry

Lecture 4 - India's stand on Carbon Neutrality

Lecture 5 - India's approach to long term low Low Carbon Development - Part 1

Lecture 6 - India's approach to long term low Low Carbon Development - Part 2

Lecture 7 - Embodied energy and Embodied Carbon

Lecture 8 - Basics of Embodied and Operational Carbon - Part 1

Lecture 9 - Basics of Embodied and Operational Carbon - Part 2

Lecture 10 - Factors of Embodied energy calculation

Lecture 11 - Operational Energy and Operational Carbon - Part 1

Lecture 12 - Operational Energy and Operational Carbon - Part 2

Lecture 13 - Strategies to reduce Operational Energy

Lecture 14 - Strategies to reduce Operational Energy and Case study

Lecture 15 - Impact of reducing Operational Energy and Operational Carbon

Lecture 16 - Passive Design Strategies in Carbon neutral Architecture

Lecture 17 - Orientation and Form for Passive cooling

Lecture 18 - Appropriate Planning for Passive Architecture

Lecture 19 - Appropriate fenestration for Passive Architecture

Lecture 20 - Appropriate Planning and openings for Passive Architecture

Lecture 21 - Settlement planning principles for carbon neutrality

Lecture 22 - Settlement planning principles for carbon neutrality - case studies

Lecture 23 - Appropriate Openings for reduced Operational Energy - Part 1

Lecture 24 - Appropriate Openings for reduced Operational Energy - Part 2

Lecture 25 - Methods of bringing in natural daylight

Lecture 26 - Role of Landscape and water in Passive Design - Part 1

Lecture 27 - Role of Landscape and water in Passive Design - Part 2

Lecture 28 - Carbon neutrality through strategising building materials

Lecture 29 - Choice of building materials for carbon neutrality - Part 1

Lecture 30 - Choice of building materials for carbon neutrality - Part 2

Lecture 31 - Strategies to reduce Embodied Carbon through Design and Development

Lecture 32 - Renewable building materials

Lecture 33 - Renewable building materials and technologies

Lecture 34 - Renewable building materials based Case studies

Lecture 35 - High embodied carbon building materials

Lecture 36 - Comparison between conventional and alternate building materials

Lecture 37 - Environmental impacts of building materials and components

Lecture 38 - Building Envelope types

Lecture 39 - Dynamic Envelope - Case Studies Part 1

Lecture 40 - Dynamic Envelope - Case Studies Part 2

Lecture 41 - Low Energy Envelope - Part 1

Lecture 42 - Low Energy Envelope - Part 2

Lecture 43 - Natural Daylighting Strategies

Lecture 44 - Daylighting optimized skylights

Lecture 45 - Daylighting optimized fenestration

Lecture 46 - Daylighting - Case studies 1

Lecture 47 - Daylighting - Case studies 2

Lecture 48 - Recap and Conclusion

NPTEL : NOC:Building Materials as a Cornerstone to Sustainability (Architecture)

Co-ordinators : Prof. Iyer Vijayalaxmi Kasinath

Lecture 1 - Introduction to Building materials, their classification, environmental issues

Lecture 2 - Vernacular Materials

Lecture 3 - Mud - Traditional Material

Lecture 4 - Mud as a Building material

Lecture 5 - Stone

Lecture 6 - Thatch

Lecture 7 - Bamboo

Lecture 8 - Binders

Lecture 9 - Strawbale

Lecture 10 - Laterite Quarry Waste

Lecture 11 - Alternate building materials

Lecture 12 - Flyash

Lecture 13 - Furnace Slag

Lecture 14 - Cross Laminated Timber

Lecture 15 - Construction and Demolition waste

Lecture 16 - Hempcrete

Lecture 17 - Phosphogypsum

Lecture 18 - Aerated Concrete

Lecture 19 - Alternate aggregate

Lecture 20 - Innovative Building materials

Lecture 21 - Bioluminiscent paints

Lecture 22 - Milk Paints and Recycled Plastics

Lecture 23 - Agro bricks

Lecture 24 - Light emitting materials - concrete

Lecture 25 - Co2 absorbing concrete

Lecture 26 - Mycelium

Lecture 27 - Fibre Reinforced Concrete

Lecture 28 - Geopolymer concrete

Lecture 29 - Introduction to Advanced Building Materials

Lecture 30 - Carbon Sequestration

Lecture 31 - Ecobind Tiles

Lecture 32 - Permeable Concrete

Lecture 33 - Introduction to smart materials

Lecture 34 - Types of Smart Materials

Lecture 35 - Facade systems - Smart Windows

Lecture 36 - LCD

Lecture 37 - Photochromics

Lecture 38 - Thermochromic

Lecture 39 - Thermotropic materials

Lecture 40 - Types of Thermotropic materials

Lecture 41 - Phase Change Materials - Part 1

Lecture 42 - Phase Change Materials - Part 2

Lecture 43 - Adhesion changing smart materials

Lecture 44 - Titanium di oxide products

Lecture 45 - Mechanochromic, Chemochromic

Lecture 46 - Electrochromics

Lecture 47 - Nanocellulose and Electroluminiscent

Lecture 48 - Concluding Lectuer

NPTEL : NOC:Housing Policy and Planning (Architecture)

Co-ordinators : Prof. Uttam Kumar Roy

Lecture 1 - Introduction to Housing

Lecture 2 - Housing Classifications

Lecture 3 - Housing Situation

Lecture 4 - Policy and Public intervention - 1

Lecture 5 - Policy and Public intervention - 2

Lecture 6 - Urban Reform

Lecture 7 - Housing Policy

Lecture 8 - Legal and Institutional Framework for Housing

Lecture 9 - Land for Housing - 1

Lecture 10 - Land for Housing - 2

Lecture 11 - Affordability and Housing Finance

Lecture 12 - Technology Systems in Housing Delivery - 1

Lecture 13 - Technology Systems in Housing Delivery - 2

Lecture 14 - Housing for All Mission (PMAY) and Technology Sub-mission

Lecture 15 - Summing up of Part-1 (Policy) and Introduction to Housing Planning

Lecture 16 - Urban and Regional Planning - 1

Lecture 17 - Urban and Regional Planning - 2

Lecture 18 - Development Controls

Lecture 19 - Housing Infrastructure and Services-1: Transport and Roads

Lecture 20 - Housing Infrastructure and Services-2: Drainage, Sanitation, Electricity and SWM

Lecture 21 - Housing Infrastructure and Services-3: Social Infrastructure and Facilities

Lecture 22 - Housing Strategy for City-1: An overview

Lecture 23 - Housing Strategy for City-2: Dealing with Core City Housing

Lecture 24 - Housing Strategy for City-3: Dealing with New Housing Areas

Lecture 25 - Planning for Plotted Housing

Lecture 26 - Planning for Group Housing

Lecture 27 - Community Development in Housing

Lecture 28 - Cooperative Housing

Lecture 29 - Institutional and rental housing

Lecture 30 - Working PersonÂ's hostel and Serviced Apartments

Lecture 31 - Informal Housing Typologies

Lecture 32 - Approaches in Improving Slums and Squatters

Lecture 33 - Urban Village and Unauthorized Construction

Lecture 34 - Pavement Dwellers and Night Shelters

Lecture 35 - Old Age Home

Lecture 36 - Disaster Resistant Housing

Lecture 37 - Housing and Real Estate Development

Lecture 38 - Housing Management

Lecture 39 - Housing: Action Plan

Lecture 40 - Course Summary and Conclusion

NPTEL : NOC:Visual Communication Design for Digital Media (Architecture)

Co-ordinators : Prof. Saptarshi Kolay

Lecture 1 - Introduction to Visual Communication Design for Digital Media

Lecture 2 - Elements of Design - Part 1

Lecture 3 - Elements of Design - Part 2

Lecture 4 - Principles of Design - Part 1

Lecture 5 - Principles of Design - Part 2

Lecture 6 - Types of digital media technology Â— an overview of the field

Lecture 7 - Typography - 1

Lecture 8 - Typography - 2

Lecture 9 - Semiotics - 1

Lecture 10 - Semiotics - 2

Lecture 11 - Visual perception

Lecture 12 - Contemporary Visual Language - 1

Lecture 13 - Contemporary Visual Language - 2

Lecture 14 - Technology Advancements in Digital Media

Lecture 15 - Visual Design Methodology - 1_Generic Design

Lecture 16 - Visual Design Methodology - 2_Generic Design

Lecture 17 - Visual Design Methodology - 3_Animation

Lecture 18 - Visual Design Methodology - 4_web design

Lecture 19 - Visual Design Methodology - 5_graphic-design

Lecture 20 - Case Studies of Visual Design on Digital Paradigm

NPTEL : NOC:Culturally Responsive Built Environments (Architecture)

Co-ordinators : Prof. Ram Sateesh Pasupuleti

Lecture 1 - A Place

Lecture 2 - Place and Identity

Lecture 3 - Habitus - A Sense of Place

Lecture 4 - A Home - Introduction to Vernacular Architecture

Lecture 5 - The New Vernacular

Lecture 6 - Understanding Vernacular - Towards Anthropology

Lecture 7 - Understanding Rock Shelters

Lecture 8 - The Ecological and Sacred Dimension

Lecture 9 - Winter Landscape and Urbanism

Lecture 10 - Winter Cities: Design for 'ALL' Perspective

Lecture 11 - Power in Built Form

Lecture 12 - Spatial Analysis: Know-how power mediates in Built Form

Lecture 13 - The Forbidden Space

Lecture 14 - Religious Architecture: A Continuum of Meaning

Lecture 15 - Understanding Construction Workers' Housing

Lecture 16 - Culture and Disasters - Towards Method and Framework

Lecture 17 - Understanding Post Tsunami Response (Tamilnadu)

Lecture 18 - Cultural Heritage: Reassembled

Lecture 19 - Understanding the Cultural Context in Disasters and Development

Lecture 20 - Culture, Climate Change Adaptation And Disaster Risk Reduction

Lecture 21 - Conservation: Introduction

Lecture 22 - Conservation: Principles

Lecture 23 - Learning from Vernacular: Conservation Practices and Challenges

Lecture 24 - Protection of the World Cultural and Natural Heritage

Lecture 25 - Intangible Cultural Heritage

Lecture 26 - City HRIDAY Plan of Badami

Lecture 27 - Cultural planning Approaches

Lecture 28 - Urban Transformations in Doha

Lecture 29 - How The Other Half Builds?

Lecture 30 - How To/Not To Relocate Slums?

Lecture 31 - Stone- as a Vernacular Building material

Lecture 32 - Timber as Vernacular Building material

Lecture 33 - Timber Construction (A journey from Advanced to Vernacular)

Lecture 34 - How To Study Vernacular Architecture?

Lecture 35 - Architecture with out Architects

Lecture 36 - Social Change in India (Sanskritisation)

Lecture 37 - Social Change in India (Westernization)

Lecture 38 - Social Change in India (Modernization- Globalization)

Lecture 39 - Pluralism in Built Environment Education

Lecture 40 - Summary and Conclusion

NPTEL : NOC:Contemporary Architecture and Design (Architecture)

Co-ordinators : Prof. Saptarshi Kolay

Lecture 1 - Introduction

Lecture 2 - World Architecture and Design History

Lecture 3 - Industrial Revolution and Beginning of Modern Era

Lecture 4 - Post Industrial Revolution: For the Machine Movement

Lecture 5 - Post Industrial Revolution: Against the Machine Movement - Art and Craft Movement and Art Nouveau - Part 1

Lecture 6 - Post Industrial Revolution: Against the Machine Movement - Art and Craft Movement and Art Nouveau - Part 2

Lecture 7 - Post Industrial Revolution: Against the Machine Movement - Art and Craft Movement and Art Nouveau - Part 3

Lecture 8 - Evolution and Timeline of Modern Architecture and Design

Lecture 9 - Phases of Modern Architecture - Bauhaus

Lecture 10 - Phases of Modern Architecture - De Stijl

Lecture 11 - Phases of Modern Architecture - Chicago School

Lecture 12 - Phases of Modern Architecture - Chicago and Prairie School

Lecture 13 - Phases of Modern Architecture - Prairie School

Lecture 14 - Phases of Modern Architecture - Organic - Part 1

Lecture 15 - Phases of Modern Architecture - Organic - Part 2

Lecture 16 - Phases of Modern Architecture - Art Deco - Part 1

Lecture 17 - Phases of Modern Architecture - Art Deco - Part 2

Lecture 18 - Phases of Modern Architecture - Internationalism - Part 1

Lecture 19 - Phases of Modern Architecture - Internationalism - Part 2

Lecture 20 - Phases of Modern Architecture - Expressionism

Lecture 21 - Phases of Modern Architecture - Monolithic Style

Lecture 22 - Phases of Modern Architecture - Tensile and Steel Structures - Part 1

Lecture 23 - Phases of Modern Architecture - Tensile and Steel Structures - Part 2

Lecture 24 - Phases of Modern Architecture - Brutalism

Lecture 25 - Phases of Modern Architecture - Metabolism

Lecture 26 - Phases of Modern Architecture - Brutalism and Metabolism in India

Lecture 27 - Phases of Modern Art - Part 1

Lecture 28 - Phases of Modern Art - Part 2

Lecture 29 - Phases of Post Modern Architecture - Part I

Lecture 30 - Phases of Post Modern Architecture - Part II

Lecture 31 - Phases of Post Modern Architecture - Historicism

Lecture 32 - Phases of Post Modern Architecture - High Tech

Lecture 33 - Phases of Post Modern Architecture - Neo Modern

Lecture 34 - Phases of Post Modern Architecture - Critical Regionalism

Lecture 35 - Phases of Post Modern Architecture - Memphis Milano

Lecture 36 - Phases of Post Modern Architecture - Deconstructivism - Part I

Lecture 37 - Phases of Post Modern Architecture - Deconstructivism - Part II

Lecture 38 - Phases of Post Modern Architecture - Pop Art

Lecture 39 - Evolution of Typography in Contemporary Era

Lecture 40 - Phases of Post Modern Architecture - Industrial Design

NPTEL : NOC:Role of Craft and Technology in Interior-Architecture (Architecture)

Co-ordinators : Prof. Smriti Saraswat

Lecture 1 - Interior-Architecture: Definition and Understanding

Lecture 2 - Craft: Definition and Understanding (Varied Perspectives on Art and Craft)

Lecture 3 - Interior-Architecture and Craft and Technology: Establishing Inter-Relationships

Lecture 4 - Interior-Architecture and Craft and Technology: Exploring Applications

Lecture 5 - Summary and Discourse - I

Lecture 6 - Interior-Architecture: Documenting Knowledge and Skills

Lecture 7 - Traditional Knowledge Systems and the Ingenious skills of the communities

Lecture 8 - Interior-Architecture: Documenting Materials; Tools and Techniques

Lecture 9 - Traditional Knowledge Systems and the Indigenous materials; tools and techniques

Lecture 10 - Summary and Discourse - II

Lecture 11 - Creative and Cultural Industries: Understanding Definition; Significance and Scope

Lecture 12 - Building Crafts: Definitions; Perspectives and Frameworks

Lecture 13 - Building Crafts: Craft and Technology and its Role in Creating/Enhancing Interior-Architecture

Lecture 14 - Building Crafts; Craft and Technology and its Role in Creating/Enhancing Interior-Architecture

Lecture 15 - Summary and Discourse - III

Lecture 16 - Best Studies related to the Craft Sector

Lecture 17 - Case Studies from Gujarat

Lecture 18 - Case Studies from Rajasthan

Lecture 19 - Case Studies from Uttarakhand

Lecture 20 - Summary and Discourse - IV

Lecture 21 - Craft and Technology in Interior Architecture: Decoding Systems

Lecture 22 - Craft and Technology in Interior Architecture; Decoding Systems

Lecture 23 - Craft and Technology in Interior Architecture: Transformation through Time

Lecture 24 - Craft and Technology in Interior Architecture; Transformation through Time

Lecture 25 - Summary and Discourse - V

Lecture 26 - Overview of the Craft Sector Today

Lecture 27 - Craft Sector: Issues and Challenges

Lecture 28 - Craft Sector: Policies and Reforms

Lecture 29 - Craft Sector: Gaps

Lecture 30 - Summary and Discourse - VI

Lecture 31 - Continuity and Revival: Research and Documentation Perspective

Lecture 32 - Continuity and Revival: Education and Training Perspective

Lecture 33 - Continuity and Revival: Innovation and Development Perspective

Lecture 34 - Continuity and Revival: Resource Building and Dissemination Perspective

Lecture 35 - Summary and Discourse - VII

Lecture 36 - Interventions: Process Based

Lecture 37 - Interventions: Product / Design Based

Lecture 38 - Interventions: Technology Based

Lecture 39 - Interventions: Marketing / Management Based

Lecture 40 - Summary and Discourse - VIII

NPTEL : NOC:Urban Governance and Development Management (Architecture)

Co-ordinators : Prof. Uttam Kumar Roy

Lecture 1 - Introduction to Urbanisation

Lecture 2 - Introduction to Urban Governance

Lecture 3 - Constitutional Provision for Urban Local Governance

Lecture 4 - Legislative Provisions

Lecture 5 - Interfaces

Lecture 6 - People & Community - 1

Lecture 7 - People & Community - 2

Lecture 8 - Land as Basic Resource

Lecture 9 - Urban Environment and Ecology

Lecture 10 - Distinctive Features of Non-Municipal Urban (NMU) and Nagar Panchayats

Lecture 11 - Organisation Development

Lecture 12 - Transparency and Accountability

Lecture 13 - Capacity Building - 1

Lecture 14 - Capacity Building - 2

Lecture 15 - Improving Systems and Processes for Urban Governance

Lecture 16 - Urban Reform and Managing Change - 1

Lecture 17 - Urban Reform and Managing Change - 2

Lecture 18 - Visioning for Cities

Lecture 19 - Resolving Conflicts for Managing Change

Lecture 20 - Leadership and Team Building

Lecture 21 - Basic Concepts of Planning and Development

Lecture 22 - Regional and Metropolitan Planning

Lecture 23 - Urban Planning

Lecture 24 - Urban Infrastructure and Services - 1

Lecture 25 - Urban Infrastructure and Services - 2

Lecture 26 - Overview of Municipal Finance

Lecture 27 - Alternate Sources of Municipal Finance

Lecture 28 - Municipal Accounts

Lecture 29 - Value Capture Financing

Lecture 30 - Public Private Partnership (PPP) in Urban Governance

Lecture 31 - Housing Strategy for Cities

Lecture 32 - Housing & Urban Poverty

Lecture 33 - Real Estate Regulation and Development

Lecture 34 - Urban Land Management

Lecture 35 - Urban Risk and Disaster Management

Lecture 36 - Managing Urban Environment - 1

Lecture 37 - Managing Urban Environment - 2 (Mandates for Blue and Green Infrastructures)

Lecture 38 - Traffic and Transportation Management - 1

Lecture 39 - Traffic and Transportation Management - 2

Lecture 40 - Designing Urban Public Spaces

Lecture 41 - Centrally Sponsored Programmes and Schemes

Lecture 42 - AMRUT

Lecture 43 - Smart City: Concept and Mission

Lecture 44 - Swachh Bharat Mission and HRIDAY

Lecture 45 - PMAY and NULM

Lecture 46 - Fundamentals of Project Planning

Lecture 47 - Formulation of Projects

Lecture 48 - Project Monitoring and Management

Lecture 49 - Essentials of Infrastructure and Engineering Design

Lecture 50 - Managing Trans-municipal and Large Projects

Lecture 51 - Enhancing City Image

Lecture 52 - Essential Competencies of City Managers

Lecture 53 - Problem Solving and Decision Making

Lecture 54 - Effective Negotiation

Lecture 55 - Communication Skills

Lecture 56 - Time Management

Lecture 57 - Stress Management

Lecture 58 - Best Practices in Urban Management

Lecture 59 - Reflective Learning and Excellence

Lecture 60 - Course Summary, Doubt Clearing and Further Reading

NPTEL : NOC:User Interface Design (Architecture)

Co-ordinators : Prof. Saptarshi Kolay

Lecture 1 - Introduction

Lecture 2 - User Interface Designer

Lecture 3 - Design methods - I

Lecture 4 - Design Methods - II

Lecture 5 - Human Factor in Interaction Design

Lecture 6 - User Research - I

Lecture 7 - User Research - II

Lecture 8 - Low Fidelity Design - I

Lecture 9 - Low Fidelity Design - II

Lecture 10 - High Fidelity Design

Lecture 11 - Visual Cognition

Lecture 12 - Contemporary Visual Language in Design - I

Lecture 13 - Contemporary Visual Language in Design - II

Lecture 14 - Usage of Typography in User Interface Design - I

Lecture 15 - Usage of Typography in User Interface Design - II

Lecture 16 - Design Semiotics and Visual Perception

Lecture 17 - Visual Communication Design

Lecture 18 - User Testing - I

Lecture 19 - User Testing - II

Lecture 20 - Contemporary Interface Design Technology

NPTEL : NOC:Disaster Recovery and Build Back Better (Architecture)

Co-ordinators : Prof. Subhojyothi Samaddar

Lecture 1 - Disaster risk: Hazards X Exposure X Vulnerability

Lecture 2 - Disaster Recovery and Build Back Better: Risk Perception and Disaster Risk Preparedness - Part 1

Lecture 3 - Risk Perception and Disaster Risk Preparedness - Part 2

Lecture 4 - Build Back Better - People's Perspectives

Lecture 5 - Architecture at Risk

Lecture 6 - Culture, climate change adaptation and disaster risk reduction

Lecture 7 - Ayutthaya at Risk

Lecture 8 - Disaster vulnerability

Lecture 9 - Cultural Heritage: Reassembled

Lecture 10 - Rock shelters at risk

Lecture 11 - The Built Environment Professions in Disaster Risk Reduction and Response

Lecture 12 - Gadri discussions: social dimension of risk, health and DRM

Lecture 13 - Community Participation in Disaster Risk Governance : Voices from Mumbai and Ghana

Lecture 14 - Community Participation in Disaster Risk Governance : Insights From Mumbai

Lecture 15 - Frameworks

Lecture 16 - Disaster Preparedness from Cognitive and Heuristic Perspectives

Lecture 17 - Information for Disaster Preparedness

Lecture 18 - The Role of Social Networks in Disaster Preparedness

Lecture 19 - Diffusion of Disaster Preparedness Technology : What Pioneers Contribute ?

Lecture 20 - Cities and Climate Change: Adaptation and Mitigation

Lecture 21 - Temporary Shelter Construction in India

Lecture 22 - Temporary shelter construction in Kenya

Lecture 23 - Build back better in Nepal recovery

Lecture 24 - Lessons from Peru

Lecture 25 - Progressive Housing in El Salvador

Lecture 26 - Decentralizing (re)construction in Colombia

Lecture 27 - Tsunami reconstruction in Tamilnadu - Part 1 (Approach)

Lecture 28 - Tsunami reconstruction in Tamilnadu - Part 2 (Findings)

Lecture 29 - Culture and (disaster)risk

Lecture 30 - Cultural theory of risk

Lecture 31 - Guidance to DRR

Lecture 32 - Self-help housing in Turkey

Lecture 33 - The Production of refugee place in time: Case of Tibetan refugees

Lecture 34 - Assessments

Lecture 35 - Designing culturally responsive built environment in disaster context

Lecture 36 - Disaster Risk Communication

Lecture 37 - CAM and CBDRM

Lecture 38 - How to teach disaster recovery and built back better in-built environment education

Lecture 39 - Source, Message and Receiver in Disaster Risk Communication

Lecture 40 - Summary and Conclusion

NPTEL : NOC:Sustainable Architecture (Architecture)

Co-ordinators : Prof. Avlokita Agrawal

Lecture 1 - Introduction to Sustainability

Lecture 2 - Buildings, Needs and 'Sustainability'

Lecture 3 - Sustainability and Sustainable Development

Lecture 4 - Historic Origins of Sustainability

Lecture 5 - Pioneers of Sustainable Development

Lecture 6 - Environmental Impacts of Development: Impacts on Water

Lecture 7 - Environmental Impacts of Development: Impacts on Land and Air

Lecture 8 - Social and Economic Impacts of Development

Lecture 9 - Agenda 21 and UN Goals

Lecture 10 - Established needs for Sustainability in Building Sector

Lecture 11 - Definition and Characteristics of Sustainability

Lecture 12 - Flavors of Sustainable Architecture

Lecture 13 - Indicators and Terminologies in Sustainable Architecture

Lecture 14 - Process of Designing Green Buildings

Lecture 15 - Green Building Ratings and Components

Lecture 16 - Fundamentals of Thermal Comfort

Lecture 17 - Climatic Considerations, Physiological Objectives of Design

Lecture 18 - Fundamentals of Climate Responsive Buildings - I

Lecture 19 - Fundamentals of Climate Responsive Buildings - II

Lecture 20 - Visual and Acoustic Comfort

Lecture 21 - Sustainable Sites - I

Lecture 22 - Sustainable Sites - II

Lecture 23 - Sustainable Sites - III

Lecture 24 - Sustainable Sites - IV

Lecture 25 - Sustainable Sites - V

Lecture 26 - Water Conservation - I

Lecture 27 - Water Conservation - II

Lecture 28 - Water Conservation - III

Lecture 29 - Water Conservation - IV

Lecture 30 - Water Conservation - V

Lecture 31 - Materials and Resources - I

Lecture 32 - Materials and Resources - II

Lecture 33 - Materials and Resources - III

Lecture 34 - Materials and Resources - IV

Lecture 35 - Materials and Resources - V

Lecture 36 - Energy Efficiency - I

Lecture 37 - Energy Efficiency - II

Lecture 38 - Energy Efficiency - III

Lecture 39 - Energy Efficiency - IV

Lecture 40 - Energy Efficiency - V

Lecture 41 - Indoor Environmental Quality - I

Lecture 42 - Indoor Environmental Quality - II

Lecture 43 - Indoor Environmental Quality - III

Lecture 44 - Indoor Environmental Quality - IV

Lecture 45 - Indoor Environmental Quality - V

Lecture 46 - Vernacular Architecture - I

Lecture 47 - Vernacular Architecture - II

Lecture 48 - Codes and Standards

Lecture 49 - Introduction to Whole Building Simulation - I

Lecture 50 - Introduction to Whole Building Simulation - II

Lecture 51 - Whole Building Performance - I

Lecture 52 - Whole Building Performance - II

Lecture 53 - Whole Building Performance - III

Lecture 54 - Whole Building Performance - IV

Lecture 55 - Whole Building Performance - V

Lecture 56 - Whole Building Performance - VI

Lecture 57 - Whole Building Performance - VII

Lecture 58 - Whole Building Performance - VIII

Lecture 59 - Whole Building Performance - IX

Lecture 60 - Whole Building Performance - X

NPTEL : NOC:Structure, Form and Architecture: The Synergy (Architecture)

Co-ordinators : Prof. Shubhajit Sadhukhan

Lecture 1 - Introduction to Structure, Form and Architecture

Lecture 2 - Relationship of Structure to Architectural Buildings - Part I

Lecture 3 - Relationship of Structure to Architectural Buildings - Part II

Lecture 4 - Loads on Structures

Lecture 5 - Synthesis of Architectural and Structural Form

Lecture 6 - Connecting Structure and Architecture - Part I

Lecture 7 - Connecting Structure and Architecture - Part II

Lecture 8 - Structural Transformation in Architectural History

Lecture 9 - Factors affecting the Structural Forms

Lecture 10 - Learning from Animal's Architecture

Lecture 11 - Basic Structural Properties

Lecture 12 - Structural Requirements

Lecture 13 - Structural Arrangement

Lecture 14 - Structural Forms and Shapes

Lecture 15 - Structural Materials

Lecture 16 - Structural Typology

Lecture 17 - Compressive Structures

Lecture 18 - Tensile Structures

Lecture 19 - Load Bearing Structures

Lecture 20 - Temporary Structures

Lecture 21 - Framed Structure

Lecture 22 - Arch Structures

Lecture 23 - Vault Structures

Lecture 24 - Dome Structures

Lecture 25 - Grid Structures

Lecture 26 - Shell Structures

Lecture 27 - Trusses and Space Frames

Lecture 28 - Folded Plate Structures

Lecture 29 - Membrane Structures

Lecture 30 - Pneumatic Structures

Lecture 31 - Structure and Architectural Forms in Windy Areas

Lecture 32 - Structure and Architectural Forms in Seismic Prone Areas

Lecture 33 - Structure and Architectural Forms in Flood Prone Areas

Lecture 34 - Cost Effective Structure and Architecture

Lecture 35 - Structure and Light in Architecture

Lecture 36 - Evolution of Highrise Structural System

Lecture 37 - Highrise Structural Components - Part I

Lecture 38 - Highrise Structural Components - Part II

Lecture 39 - Mega Structure and Architecture-Case Studies

Lecture 40 - Architecture and Structure - Past, Present and Future

NPTEL : NOC:Engineering-Architectural Graphics - Part I: Orthographic projection (Architecture)

Co-ordinators : Prof. Avlokita Agrawal

Lecture 1 - Introduction to Engineering Graphics

Lecture 2 - Drawing Instruments

Lecture 3 - Sheet Layout and Fixing Sheet

Lecture 4 - Types of Lines and Graphic Symbols

Lecture 5 - Lettering

Lecture 6 - Dimensioning

Lecture 7 - Basic Geometrical Construction

Lecture 8 - Scales

Lecture 9 - Curves used in Engineering Practice: Conic Sections

Lecture 10 - Curves used in Engineering Practice: Cycloids, Trochoids and Involutes

Lecture 11 - Introduction to Orthographic Projection

Lecture 12 - Orthographic Projections - 1st Quadrant Vs 3rd Quadrant

Lecture 13 - Orthographic Projections - Projection of Points

Lecture 14 - Orthographic Projections - Introduction to Projection of Lines

Lecture 15 - Locus of Points

Lecture 16 - Projection of lines parallel to both the reference planes

Lecture 17 - Projection of line parallel to one and perpendicular to another plane

Lecture 18 - Projection of lines inclined to one plane

Lecture 19 - Projection of lines inclined to both the planes

Lecture 20 - Projection of a point and line on auxiliary plane

Lecture 21 - Projection of a plane perpendicular to both the reference planes

Lecture 22 - Projection of a plane perpendicular to one and parallel to another plane

Lecture 23 - Projection of a plane inclined to one and perpendicular to the other plane

Lecture 24 - Projection of a plane inclined to both the reference planes - I

Lecture 25 - Projection of a plane inclined to both the reference planes - II

Lecture 26 - Introduction to types of solids

Lecture 27 - Projection of solids in simple positions

Lecture 28 - Projection of solids with axis inclined to one of the reference planes and parallel to another

Lecture 29 - Projection of solids with axis inclined to both the reference planes

Lecture 30 - Projection of spheres

Lecture 31 - Orthographic Projections Introduction to Sections of Solids

Lecture 32 - Orthographic Projections Sections of Prisms

Lecture 33 - Orthographic Projections Sections of Pyramids

Lecture 34 - Orthographic Projections Sections of Cylinders

Lecture 35 - Orthographic Projections Sections of Cones

Lecture 36 - Orthographic Projections Sections of Spheres

Lecture 37 - Development of Surfaces - I

Lecture 38 - Development of Surfaces - II

Lecture 39 - Intersection of Surfaces - I

Lecture 40 - Intersection of Surfaces - II

NPTEL : NOC:Introduction to Urban Planning (Architecture)

Co-ordinators : Prof. Harshit Sosan Lakra

Lecture 1 - Conceptual Understanding of the Urban Areas

Lecture 2 - Urbanization and Sustainable Development

Lecture 3 - Urban Planning and 73-74 Constitution Amendment Acts

Lecture 4 - Types and Level of Plans

Lecture 5 - Regional Plan - I

Lecture 6 - Regional Plan - II

Lecture 7 - Development Plan - I

Lecture 8 - Development Plan - II (Case Study- Draft Bhopal Development Plan 2031)

Lecture 9 - Zonal Plan

Lecture 10 - Town Planning Scheme

Lecture 11 - Local Area Plan (Urban Redevelopment Plan)

Lecture 12 - Special Purpose Plan (AMRUT)

Lecture 13 - Special Purpose Plan (HRIDAY)

Lecture 14 - Special Purpose Plan (Smart City)

Lecture 15 - Perspective Plan (Agenda 2030 SDGs)

Lecture 16 - Contextualizing Cities (Egyptian, Mesopotamian, and Indus Valley Civilization)

Lecture 17 - Contextualizing Cities (Vedic Period)

Lecture 18 - Contextualizing Cities (Greek and Roman)

Lecture 19 - Contextualizing Cities (Industrial Revolution)

Lecture 20 - Contextualizing Cities (1900-1939)

Lecture 21 - Contextualizing Cities (1940-1979)

Lecture 22 - Contextualizing Cities (1980-2021)

Lecture 23 - Public Health and Urban Planning - I

Lecture 24 - Public Health and Urban Planning - II

Lecture 25 - Public Health and Urban Planning - III

Lecture 26 - Public Health and Urban Planning - IV

Lecture 27 - Housing Issues in India

Lecture 28 - Culture and Planning of Cities

Lecture 29 - Urbanization and Environmental Problems

Lecture 30 - Urbanization and Slums

Lecture 31 - Introduction to Planning Legislation

Lecture 32 - Evolution and Growth of Planning Legislation - I

Lecture 33 - Evolution and Growth of Planning Legislation - II (USA)

Lecture 34 - Evolution and Growth of Planning Legislation - III (India)

Lecture 35 - Land Acquisition Act

Lecture 36 - Legal Requirements for Industrial Development

Lecture 37 - National Environmental Legal Requirements

Lecture 38 - Section I - Cantonment Act and Section II - Legal Requirement for Heritage Conservation

Lecture 39 - Zoning Regulation

Lecture 40 - Contemplating Learning Outcomes and Future Direction in Urban Planning

NPTEL : NOC:Engineering, Architectural Graphics - Part II (Isometric and Axonometric Drawings) (Architecture)

Co-ordinators : Prof. Avlokita Agrawal

Lecture 1 - Introduction to isometric projection and isometric Scale

Lecture 2 - Isometric projection of planar figures - quadrilaterals

Lecture 3 - Isometric projection of planar figures - circles, semi circles and curves

Lecture 4 - Isometric projection of straight prisms

Lecture 5 - Isometric projection of straight pyramids

Lecture 6 - Isometric projection of Straight Cylinders

Lecture 7 - Isometric projection of Cones

Lecture 8 - Isometric projection of Frustums of cones and pyramids

Lecture 9 - Isometric projection of section of solids

Lecture 10 - Isometric projection of spheres

Lecture 11 - Isometric projection of combination of solids

Lecture 12 - Isometric Projection of intersecting solids

Lecture 13 - Converting orthographic views to isometric drawing - 1

Lecture 14 - Converting orthographic views to isometric drawing - 2

Lecture 15 - Converting Isometric drawing to orthographic views

Lecture 16 - Introduction to axonometric projection

Lecture 17 - Axonometric projection of planar figures- quadrilaterals, circles and curves

Lecture 18 - Axonometric projection of prisms and pyramids

Lecture 19 - Axonometric projection of Cylinders, cones and spheres

Lecture 20 - Axonometric projection of intersecting solids and combination of solids

NPTEL : NOC:Environmental Impact Assessment (Architecture)

Co-ordinators : Prof. Harshit Sosan Lakra

Lecture 1 - State of Global Environment (Air)

Lecture 2 - State of Global Environment (Biodiversity)

Lecture 3 - State of Global Environment (Oceans and Coasts)

Lecture 4 - State of Global Environment (Land and Soil)

Lecture 5 - State of Global Environment (Freshwater)

Lecture 6 - Definition, Process and Purpose of EIA

Lecture 7 - EIA Impact Areas, Current and Emerging - Part 1

Lecture 8 - EIA Impact Areas, Current and Emerging - Part II

Lecture 9 - EIA Origin in USA and World-Wide Development

Lecture 10 - EIA in India

Lecture 11 - World Sustainable Development Timeline (1970-1999)

Lecture 12 - World Sustainable Development Timeline (2000-2021)

Lecture 13 - EIA Law, Policy and Institutional arrangements for EIA systems - Part I

Lecture 14 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part II - Air

Lecture 15 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part III - Air

Lecture 16 - EIA Law, Policy and Institutional arrangements for EIA Systems - Part IV - Water and Geology

Lecture 17 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part V - Ecology

Lecture 18 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part VI - Coastal Ecology and Geomorphology

Lecture 19 - EIA Law, Policy and Institutional arrangements for EIA Systems - Part VII - Noise

Lecture 20 - EIA Law, Policy and Institutional arrangements for EIA Systems - Part VIII - Ecosystem Services

Lecture 21 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part IX - Cultural Heritage and Health

Lecture 22 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part X

Lecture 23 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part XI

Lecture 24 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part XII

Lecture 25 - EIA Law, Policy and Institutional Arrangements for EIA Systems - Part XIII

Lecture 26 - EIA Process - Starting and Initial Stage

Lecture 27 - EIA Process - Impact Prediction

Lecture 28 - EIA Process - Impact Evaluation, Mitigation and Enhancement

Lecture 29 - EIA Process - Participation, Presentation and Review

Lecture 30 - EIA Process - Follow-Up (Monitoring and Auditing)

Lecture 31 - EIA Methods - Air Assessment - Part I

Lecture 32 - EIA Methods - Air Assessment - Part II

Lecture 33 - EIA Methods - Water Assessment

Lecture 34 - EIA Methods - Soil, Land and Geology

Lecture 35 - EIA Methods - Climate and Climate Change - Part I

Lecture 36 - EIA Methods - Climate and Climate Change - Part II

Lecture 37 - EIA Methods for Ecology (Definitions and Concepts)

Lecture 38 - EIA Methods for Ecology (Baseline Study)

Lecture 39 - EIA Methods for Ecology (Impact Prediction and Evaluation)

Lecture 40 - EIA Methods - Ecosystem Services - Part I

Lecture 41 - EIA Methods - Ecosystem Services - Part II

Lecture 42 - EIA Methods - Coastal Ecology and Geomorphology - Part I

Lecture 43 - EIA Methods - Coastal Ecology and Geomorphology - Part II

Lecture 44 - EIA Methods - Noise

Lecture 45 - EIA Methods - Transport

Lecture 46 - EIA Methods - Landscape and Visuals

Lecture 47 - EIA Methods - Cultural Heritage

Lecture 48 - EIA Methods - Health

Lecture 49 - EIA Methods - Socio-Economic Impacts (SIA) - Part I

Lecture 50 - EIA Methods - Socio-Economic Impacts (SIA) - Part II

Lecture 51 - EIA Methods - Land Acquisition, Resettlement and Livelihoods

Lecture 52 - EIA Methods - Resource Efficiency

Lecture 53 - EIA Methods - Risk and Risk Assessment

Lecture 54 - EIA Methods - Cumulative Effects

Lecture 55 - EIA - Environmental Management Plans

Lecture 56 - EIA - Widening the scope: Strategic Environmental Assessment

Lecture 57 - EIA - Reporting and Review of EIA Quality

Lecture 58 - EIA Case Study - Mumbai Metro Line 3, Colaba - Bandra - SEEPZ

Lecture 59 - EIA Case Study - Development of Water Aerodrome, Andaman and Nicobar - Part - I

Lecture 60 - EIA Case Study - Development of Water Aerodrome, Andaman and Nicobar - Part - II

NPTEL : NOC:Modern Indian Architecture (Architecture)

Co-ordinators : Prof. P.S. Chani

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Pre-Independence - Part 1: Indo-Saracenic Architecture

Lecture 4 - Pre-Independence - Part 2: Colonial Architecture and Art Deco

Lecture 5 - Pre-Independence to Independence - Part 1

Lecture 6 - Pre-Independence to Independence - Part 2

Lecture 7 - Revivalism

Lecture 8 - The First Generation (1945-1970) - Part 1

Lecture 9 - The First Generation (1945-1970) - Part 2

Lecture 10 - The First Generation (1945-1970) - Part 3

Lecture 11 - The First Generation (1945-1970) - Part 4

Lecture 12 - The First Generation (1945-1970) - Part 5

Lecture 13 - The First Generation (1945-1970) - Part 6

Lecture 14 - Impact of Western Architects: Le Corbusier - Part 1

Lecture 15 - Impact of Western Architects: Le Corbusier - Part 2

Lecture 16 - Impact of Western Architects: Le Corbusier - Part 3

Lecture 17 - Impact of Western Architects: Le Corbusier - Part 4

Lecture 18 - Impact of Western Architects: Le Corbusier - Part 5

Lecture 19 - Impact of Western Architects: Le Corbusier - Part 6

Lecture 20 - Impact of Western Architects: Walter Gropius - Part 1

Lecture 21 - Impact of Western Architects: Walter Gropius - Part 2

Lecture 22 - Impact of Western Architects: Louis I Kahn - Part 1

Lecture 23 - Impact of Western Architects: Louis I Kahn - Part 2

Lecture 24 - Impact of Western Architects: Louis I Kahn - Part 3

Lecture 25 - Impact of Western Architects: Louis I Kahn - Part 4

Lecture 26 - Introduction to Critical Regionalism - Part 1

Lecture 27 - Introduction to Critical Regionalism - Part 2

Lecture 28 - Critical Regionalism in Indian Architecture - Part 1

Lecture 29 - Critical Regionalism in Indian Architecture - Part 2

Lecture 30 - Critical Regionalism in Indian Architecture - Part 3

Lecture 31 - Critical Regionalism in Indian Architecture - Part 4

Lecture 32 - Critical Regionalism in Indian Architecture - Part 5

Lecture 33 - Structure: The Works of Mahendra Raj

Lecture 34 - Point-Blocks and High Rises - Part 1

Lecture 35 - Point-Blocks and High Rises - Part 2

Lecture 36 - Search for a new Architecture - Part 1

Lecture 37 - Search for a new Architecture - Part 2

Lecture 38 - Search for a new Architecture - Part 3

Lecture 39 - Search for a new Architecture - Part 4

Lecture 40 - Search for a new Architecture - Part 5

NPTEL : NOC:International Studies in Vernacular Architecture (Architecture)

Co-ordinators : Prof. Ram Sateesh Pasupuleti

Lecture 1 - Culture, Identity and Built Environment

Lecture 2 - Space and Meaning in Balinese Vernacular Architecture

Lecture 3 - Adobe Construction and Religious Structures

Lecture 4 - Social System, Beliefs and its Architecture

Lecture 5 - Anthropology of Shelter-Conclusion

Lecture 6 - Stone as a Vernacular Resource Material

Lecture 7 - Earth as Vernacular Resource Material

Lecture 8 - Bamboo as Vernacular Resource Material

Lecture 9 - Timber as Vernacular Resource Material

Lecture 10 - Advanced Material Adaptations: The conclusion

Lecture 11 - Cultural Geography and Vernacular Architecture

Lecture 12 - Cultural Geography and Small-scale Features in the Landscape

Lecture 13 - Acculturation in Architecture

Lecture 14 - Tradition and Transmission

Lecture 15 - Transformation in Vernacular Context

Lecture 16 - Disasters Vulnerability and Traditions

Lecture 17 - Learning Disaster Mitigation from the Vernacular

Lecture 18 - The Second Birth: Lessons from Disaster Recovery

Lecture 19 - Climate Change and Traditions

Lecture 20 - Yonmenkaigi (Four square table system) Method for Collaborative Knowledge Development

NPTEL : NOC:Introduction to Interaction Design (Architecture)

Co-ordinators : Dr. Sonal Atreya

Lecture 1 - Introduction to Interaction Design

Lecture 2 - Components of Interaction Design

Lecture 3 - Interaction Design Process

Lecture 4 - Understanding User

Lecture 5 - Conceptual Design - Part 1

Lecture 6 - Conceptual Design - Part 2

Lecture 7 - Role of Cognition

Lecture 8 - Role of Social Interaction

Lecture 9 - Designing for Emotional Interaction

Lecture 10 - Interactive Interfaces

Lecture 11 - Data Gathering

Lecture 12 - Data Analysis

Lecture 13 - Discovering Requirements

Lecture 14 - User Personas and Scenarios

Lecture 15 - Design and Prototyping - Part 1

Lecture 16 - Design and Prototyping - Part 2

Lecture 17 - Visual Interface Design

Lecture 18 - Elements of User Interface

Lecture 19 - Affordances and UI Transformations

Lecture 20 - Component-Based Design Systems

NPTEL : NOC:Understanding and Reducing Ghg Emissions - Focus on Scope 1 and 2 Emission Reduction through Building Design and Construction (Architecture)

Co-ordinators : Prof. Avlokita Agrawal

Lecture 1 - Introduction, Sustainability, And Sustainable Development

Lecture 2 - Sustainable Development And Sustainable Goals

Lecture 3 - Sustainable Development Goals and Climate Change

Lecture 4 - Climate Risk

Lecture 5 - Impact of Development on Climate Natural Components

Lecture 6 - UNFCCC

Lecture 7 - Kyoto Protocol

Lecture 8 - The Paris Agreement

Lecture 9 - Green House Gases

Lecture 10 - Carbon Footprint and Calculation

Lecture 11 - The GHG Protocol

Lecture 12 - ISO International Standards

Lecture 13 - Identification and Determination of Scope 1,2 and 3 GHG Emissions

Lecture 14 - Identification and Determination of Scope 1,2 and 3 GHG Emissions - Part II

Lecture 15 - Identification and Determination of Scope 1,2 and 3 GHG Emissions - Part III

Lecture 16 - India Specific GHG Programs - I

Lecture 17 - India Specific GHG Programs - II

Lecture 18 - Accounting Methods and Data Collection

Lecture 19 - Tools for Calculation of GHG

Lecture 20 - Understanding the Role of Buildings and Related Emissions

Lecture 21 - Understanding Emissions of Airports

Lecture 22 - Understanding Emissions of University Campuses

Lecture 23 - Understanding Emissions of Fuel Supply Companies

Lecture 24 - Understanding Emissions of IT Companies

Lecture 25 - Understanding Emissions of Real Estate Companies

Lecture 26 - Thermal Comfort in Building

Lecture 27 - Passive Design Measures

Lecture 28 - Advanced Passive Design Measures

Lecture 29 - Natural and Mechanical Ventilation

Lecture 30 - Daylighting and Lighting Design

Lecture 31 - Factors Affecting Material Selection in Building?

Lecture 32 - Material Selection for Emission Reduction

Lecture 33 - Reducing Emission from purchased Electricity

Lecture 34 - Strategies of Renovation and Retrofitting for Emission Reduction

Lecture 35 - Case studies of Various Efficient Building Design

Lecture 36 - Calculation of Emissions Reduction from HVAC System

Lecture 37 - Calculation of Emission Reduction from Fenestration

Lecture 38 - Calculation of Emission Reduction from Building Envelope

Lecture 39 - Calculation of Emission Reduction from Source of Energy

Lecture 40 - Course Summary

NPTEL : NOC:Research Methodology for Planning and Architectural Studies (Architecture)

Co-ordinators : Prof. Shubhajit Sadhukhan

Lecture 1 - Introduction

Lecture 2 - Types of Research

Lecture 3 - Qualitative vs. Quantitative Research

Lecture 4 - Research Methods vs Research Methodology

Lecture 5 - Issues and Challenges in Planning and Architectural Research

Lecture 6 - Research Process - I

Lecture 7 - Research Process - II

Lecture 8 - Research Process - III

Lecture 9 - Research Writing - I

Lecture 10 - Research Writing - II

Lecture 11 - Basics of Literature Review

Lecture 12 - Bibliometric Analysis

Lecture 13 - Systematic Literature Review

Lecture 14 - Meta Analysis

Lecture 15 - Referencing

Lecture 16 - Types of Data in Research

Lecture 17 - Measurement and Scaling Techniques - I

Lecture 18 - Measurement and Scaling Techniques - II

Lecture 19 - Types of Surveys - I

Lecture 20 - Types of Surveys - II

Lecture 21 - Determining the Sample Size

Lecture 22 - Sampling Techniques - I

Lecture 23 - Sampling Techniques - II

Lecture 24 - Sources of Data

Lecture 25 - Preparation of Survey Questionnaire

Lecture 26 - Methods of Data Collection - I

Lecture 27 - Methods of Data Collection - II

Lecture 28 - Methods of Data Collection - III

Lecture 29 - Ethics in Data Management and Use

Lecture 30 - Similarity vs. Plagiarism

Lecture 31 - Processing of Data and Database Management

Lecture 32 - Interpreting Data

Lecture 33 - Descriptive Statistics

Lecture 34 - Representation of Data and Inferences - I

Lecture 35 - Representation of Data and Inferences - II

Lecture 36 - Hypothesis Testing

Lecture 37 - Parametric Tests

Lecture 38 - Non-parametric Tests

Lecture 39 - Quantitative Research Approach

Lecture 40 - Quantitative Research - Case Study - I

Lecture 41 - Quantitative Research - Case Study - II

Lecture 42 - Quantitative Research - Case Study - III

Lecture 43 - Quantitative Research - Case Study - IV

Lecture 44 - Quantitative Research - Case Study - V

Lecture 45 - Qualitative Research Approach

Lecture 46 - Qualitative Research - Case Study - I

Lecture 47 - Qualitative Research - Case Study - II

Lecture 48 - Qualitative Research - Case Study - III

Lecture 49 - Qualitative Research - Case Study - IV

Lecture 50 - Qualitative Research - Case Study - V

Lecture 51 - Mixed Method Research Approach

Lecture 52 - Mixed Method Research Approach - Case Study

Lecture 53 - Spatial Methods in Planning Research

Lecture 54 - Spatial Methods in Planning Research - Case Study

Lecture 55 - Research Methods for Behavioral Studies - The Basics

Lecture 56 - Simulation Based Studies in Planning and Architecture

Lecture 57 - Handling Big Data Research - The Basics

Lecture 58 - Role of AI in Architecture and Planning Studies - The Basics

Lecture 59 - Programming Language and Software for Research in Planning and Architecture

Lecture 60 - Emerging Research Potential in Planning and Architecture

NPTEL : Introduction to Atmospheric Science (Atmospheric Science)

Co-ordinators : Prof. C. Balaji

Lecture 1 - Introduction

Lecture 2 - Atmosphere-A brief survey (Pressure, Temperature and Chemical composition)

Lecture 3 - Atmosphere-A brief survey (Continued...) (Vertical structure of the atmosphere)

Lecture 4 - Vertical structure of atmosphere (Continued...) and The Earth system - Oceans

Lecture 5 - The Earth system - Oceans (Continued...) and Marine biosphere

Lecture 6 - The Earth system - Hydrological cycle

Lecture 7 - The Earth system - Hydrological cycle (Continued...) and Carbon cycle

Lecture 8 - The Earth system - Carbon cycle (Continued...), and Carbon in the oceans Earth's crust

Lecture 9 - The Earth system - Carbon in the oceans Earth's crust

Lecture 10 - Atmospheric Thermodynamics- Introduction

Lecture 11 - The hydrostatic equation

Lecture 12 - Hypsometric equation and pressure at sea level

Lecture 13 - Basic Thermodynamics

Lecture 14 - Concept of air parcel and dry adiabatic lapse rate

Lecture 15 - Potential temperature

Lecture 16 - Skew-T ln-P chart

Lecture 17 - Problems using Skew-T ln-P chart

Lecture 18 - Problems using Skew-T ln-P chart (Continued...)

Lecture 19 - Problems using Skew-T ln-P chart (Continued...)

Lecture 20 - Lifting Condensation Level (LCL)

Lecture 21 - Lifting Condensation Level (LCL) (Continued...)

Lecture 22 - Saturated Adiabatic and Psuedo-adiabatic processes

Lecture 23 - Equivalent potential temperature and wet bulb potential temperature

Lecture 24 - Normand's rule - Chinook winds

Lecture 25 - Problems on Chinook wind and static stability

Lecture 26 - Static stability-Brunt-Visala frequency

Lecture 27 - Conditional and convective instability

Lecture 28 - Static stability - Problems using radiosonde data and skew T ln P chart

Lecture 29 - The second law of thermodynamics â€“ Clausius Clapeyron relation

Lecture 30 - Clausius Clapeyron relation (Continued...)

Lecture 31 - Atmospheric radiation â€“ Radiation laws

Lecture 32 - Planck's distribution and Inverse square law

Lecture 33 - Physics of scattering, emmision and absorption

Lecture 34 - Physics of scattering, emmision and absorption (Continued...)

Lecture 35 - Radiative Transfer Equation â€“ Derivation

Lecture 36 - Radiative Transfer Equation (Continued...)

Lecture 37 - Radiative heating profiles of the atmosphere

Lecture 38 - Climate Dynamics â€“ Introduction

Lecture 39 - Climate sensitivity and feedback

Lecture 40 - Climate change

Lecture 41 - Atmospheric dynamics

NPTEL : Radiation Heat Transfer (Atmospheric Science)

Co-ordinators : Prof. J. Srinivasan

Lecture 1 - Introduction

Lecture 2 - Blackbody radiation

Lecture 3 - Properties of real surfaces

Lecture 4 - Spectral and directional variations

Lecture 5 - Shape factor

Lecture 6 - Triangular enclosure

Lecture 7 - Evaluation of shape factors

Lecture 8 - Radiation in enclosures

Lecture 9 - Electrical analogy

Lecture 10 - Applications

Lecture 11 - Non-gray enclosures

Lecture 12 - Enclosure with Specular surfaces

Lecture 13 - Integral method for enclosures

Lecture 14 - Introduction to gas radiation

Lecture 15 - Plane parallel model

Lecture 16 - Diffusion approximation

Lecture 17 - Radiative equilibrium

Lecture 18 - Optically thick limit

Lecture 19 - Radiation spectroscopy

Lecture 20 - Isothermal gas emissivity

Lecture 21 - Band models

Lecture 22 - Total Emissivity method

Lecture 23 - Isothermal gas enclosures

Lecture 24 - Well-stirred furnace model

Lecture 25 - Gas radiation in complex enclosures

Lecture 26 - Interaction between radiation and other modes of heat transfer

Lecture 27 - Radiation heat transfer during flow over flat plate

Lecture 28 - Radiation and Climate

Lecture 29 - Radiative-convective equilibrium

Lecture 30 - Radiative equilibrium with scattering

Lecture 31 - Radiation measurement

Lecture 32 - Radiation with internal heat source

Lecture 33 - Particle scattering

Lecture 34 - Scattering in the atmosphere

Lecture 35 - Non-isotropic scattering

Lecture 36 - Approximate methods in scattering : 1

Lecture 37 - Approximate methods in scattering : 2

Lecture 38 - Monte Carlo method

NPTEL : The monsoon and its variability (Atmospheric Science)

Co-ordinators : Prof. Sulochana Gadgil

Lecture 1 - Preamble and Introduction to the Indian Monsoon

Lecture 2 - Nature of the variability of the Indian Monsoon

Lecture 3 - Monsoon variability through the eye in the sky, seasonal variation of the surface wind and pressure

Lecture 4 - Background about the atmosphere and rotating systems

Lecture 5 - Rainfall and clouds over the tropics

Lecture 6 - Organization of clouds over mesoscale, synoptic scale and planetary scales

Lecture 7 - The Indian monsoon: is it a gigantic land-sea breeze?

Lecture 8 - Monsoons and the seasonal variation of tropical circulation and rainfall

Lecture 9 - Evolution of the ideas about the basic system responsible for the Indian monsoon - Part 1

Lecture 10 - Evolution of the ideas about the basic system responsible for the Indian monsoon - Part 2

Lecture 11 - Tropical Convergence Zones and the Indian monsoon - Part 1

Lecture 12 - Tropical Convergence Zones and the Indian monsoon - Part 2

Lecture 13 - Variability of organized convection over the tropical oceans

Lecture 14 - Heat lows and the TCZ

Lecture 15 - Monsoonal regions of the world

Lecture 16 - Seasonal transitions - Part 1 : spring to summer transition

Lecture 17 - Seasonal transitions - Part 2 : spring to summer transition

Lecture 18 - Seasonal transitions - Part 3 : Advance and retreat of the summer monsoon

Lecture 19 - Climatic clusters of the Indian region

Lecture 20 - Active-weak spells and breaks in the monsoon - Part 1

Lecture 21 - Active-weak spells and breaks in the monsoon - Part 2

Lecture 22 - Intraseasonal variation and intraseasonal oscillations

Lecture 23 - The tropical oceans

Lecture 24 - El Nino Southern Oscillation (ENSO) - Part 1

Lecture 25 - El Nino Southern Oscillation (ENSO) - Part 2

Lecture 26 - El Nino Southern Oscillation (ENSO) - Part 3

Lecture 27 - El Nino Southern Oscillation (ENSO) - Part 4

Lecture 28 - El Nino Southern Oscillation (ENSO) - Part 5

Lecture 29 - El Nino Southern Oscillation (ENSO) - Part 6

Lecture 30 - Indian Ocean and the monsoon - Part 1

Lecture 31 - Indian Ocean and the monsoon - Part 2

Lecture 32 - Indian Ocean Dipole - Part 1

Lecture 33 - Indian Ocean Dipole - Part 2

Lecture 34 - Interannual variation of the Indian summer Monsoon rainfall: Links to events over the Pacific and Equatorial Indian Ocean

Lecture 35 - Monsoon Variability and Agriculture - Part 1

Lecture 36 - Monsoon Variability and Agriculture - Part 2

Lecture 37 - Monsoon Variability and Agriculture - Part 3

Lecture 38 - Monsoon Variability and Agriculture - Part 4

Lecture 39 - Indian Summer Monsoon, GDP and Agriculture

Lecture 40 - Monsoon Prediction - Part 1

Lecture 41 - Monsoon Prediction - Part 2

Lecture 42 - Concluding Remarks

NPTEL : Applied Mechanics (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Sanjeev Sanghi, Prof. R.K. Mittal

Lecture 1 - Preliminary Concepts

Lecture 2 - Vector Analysis

Lecture 3 - Analysis of Forces

Lecture 4 - Analysis of Equilibrium

Lecture 5 - Structural Mechanics - Part-1

Lecture 6 - Structural Mechanics - Part-2

Lecture 7 - Friction and its Applications - Part-1

Lecture 8 - Friction and its Applications - Part-2

Lecture 9 - Friction and its Applications - Part-3

Lecture 10 - Properties of Surfaces - Part-1

Lecture 11 - Properties of Surfaces - Part-2

Lecture 12 - Properties of Surfaces - Part-3

Lecture 13 - Moments and Products of Inertia

Lecture 14 - Methods of Virtual Work and Potential Energy - Part-1

Lecture 15 - Methods of Virtual Work and Potential Energy - Part-2

Lecture 16 - Stability of Equilibrium

NPTEL : Management Science I (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Anuradha Sharma

Lecture 1 - Introduction

Lecture 2 - Motivation

Lecture 3 - Management

Lecture 4 - Work Ethics

Lecture 5 - Comparison Between Theories

Lecture 6 - Job Enrichment

Lecture 7 - Team Building and Participation

Lecture 8 - Other Leadership Styles

Lecture 9 - Empowerment

Lecture 10 - Barriers to Communication

Lecture 11 - Issues in Leadership

Lecture 12 - Participation Management and Team Working Part - 1

Lecture 13 - Participation Management and Team Working Part - 2

Lecture 14 - Participation Management and Team Working Part - 3

Lecture 15 - Participative Management and Team Working Part - 5

Lecture 16 - Organizations

Lecture 17 - Some Management Concepts - Part - 1

Lecture 18 - Some Management Concepts - Part - 2

Lecture 19 - Some Management Concepts - Part - 3

Lecture 20 - Diversity at Work Place and Management Issues

Lecture 21 - Industrial Relations and Conflict Management - Part - 1

Lecture 22 - Industrial Relations and Conflict Management - Part - 2

Lecture 23 - Selection and Training of Employees

Lecture 24 - Performance Management - Part - 1

Lecture 25 - Performance Management - Part - 2

Lecture 26 - Performance Management - Part - 3

Lecture 27 - Management Research: Some Methodological Issues-Part-2

Lecture 28 - Corporate Social Responsibilities

Lecture 29 - Women, Work and Organizations: Management Perspective - Part - 1

Lecture 30 - Women, Work and Organizations: Management Perspective - Part - 2

Lecture 31 - Selection, Recruitment and Training

Lecture 32 - Management of Change in Organization

Lecture 33 - Organizational Development

Lecture 34 - Values, Ethics and Corporate Social Responsibilities - Part - 1

Lecture 35 - Values, Ethics and Corporate Social Responsibilities - Part - 2

Lecture 36 - Management: Now and Beyond - Part - 1

Lecture 37 - Management: Now and Beyond - Part - 2

Lecture 38 - Management: Now and Beyond - Part - 3

Lecture 39 - Conclusions

NPTEL : Materials Science (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. S.K. Gupta

Lecture 1 - Introduction

Lecture 2 - Internal Energy Enthalpy

Lecture 3 - Crystal Geometry

Lecture 4 - Crystal Geometry

Lecture 5 - Crystal Geometry

Lecture 6 - Crystal Structure

Lecture 7 - Close Packing of Spheres of Equal Size

Lecture 8 - Structure of Solid Materials

Lecture 9 - Non Crystalline Solids

Lecture 10 - Polymers (Continued)

Lecture 11 - Crystal Imperfections

Lecture 12 - Crystal Imperfections

Lecture 13 - Crystal Imperfections

Lecture 14 - Crystal Imperfections

Lecture 15 - Crystal Imperfections

Lecture 16 - Phase Diagrams

Lecture 17 - Phase Diagrams

Lecture 18 - Phase Diagrams

Lecture 19 - Diffusion in Solids

Lecture 20 - Diffusion in Solids

Lecture 21 - Phase Transformations

Lecture 22 - Phase Transformations

Lecture 23 - Phase Transformations

Lecture 24 - Transformations in Steels: Eutectoid Steel

Lecture 25 - Phase Transformations; Precipitation Hardening

Lecture 26 - Mechanical Behaviour of Materials

Lecture 27 - Plastic Deformation

Lecture 28 - Plastic Deformation

Lecture 29 - Plastic Deformation

Lecture 30 - Strengthening Mechanisms Creep

Lecture 31 - Fracture

Lecture 32 - Conductors and Resistors

Lecture 33 - Conductors and Resistors

Lecture 34 - Superconductors

Lecture 35 - Superconductors

Lecture 36 - Semiconductors

NPTEL : Numerical Methods and Computation (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. S.R.K. Iyengar

Lecture 1 - Errors in Computation and Numerical Instability

Lecture 2 - Solution of Nonlinear Algebraic Equations - Part 1

Lecture 3 - Solution of Nonlinear Algebraic Equations - Part 2

Lecture 4 - Solution of Nonlinear Algebraic Equations - Part 3

Lecture 5 - Solution of Nonlinear Algebraic Equations - Part 4

Lecture 6 - Solution of Nonlinear Algebraic Equations - Part 5

Lecture 7 - Solution of Nonlinear Algebraic Equations - Part 6

Lecture 8 - Solution of Nonlinear Algebraic Equations - Part 7

Lecture 9 - Solution of Nonlinear Algebraic Equations - Part 8

Lecture 10 - Solution of Nonlinear Algebraic Equations - Part 9

Lecture 11 - Solution of a System of Linear Algebraic Equations - Part 1

Lecture 12 - Solution of a System of Linear Algebraic Equations - Part 2

Lecture 13 - Solution of a System of Linear Algebraic Equations - Part 3

Lecture 14 - Solution of a System of Linear Algebraic Equations - Part 4

Lecture 15 - Solution of a System of Linear Algebraic Equations - Part 5

Lecture 16 - Solution of a System of Linear Algebraic Equations - Part 6

Lecture 17 - Solution of a System of Linear Algebraic Equations - Part 7

Lecture 18 - Solution of a System of Linear Algebraic Equations - Part 8

Lecture 19 - Solution of a System of Linear Algebraic Equations - Part 9

Lecture 20 - Solution of a System of Linear Algebraic Equations - Part 10

Lecture 21 - Solution of a System of Linear Algebraic Equations - Part 11

Lecture 22 - Solution of a System of Linear Algebraic Equations - Part 12

Lecture 23 - Solution of a System of Linear Algebraic Equations - Part 13

Lecture 24 - Solution of a System of Linear Algebraic Equations - Part 14

Lecture 25 - Interpolation and Approximation - Part 1

Lecture 26 - Interpolation and Approximation - Part 2

Lecture 27 - Interpolation and Approximation - Part 3

Lecture 28 - Interpolation and Approximation - Part 4

Lecture 29 - Interpolation and Approximation - Part 5

Lecture 30 - Interpolation and Approximation - Part 6

Lecture 31 - Interpolation and Approximation - Part 7

Lecture 32 - Interpolation and Approximation - Part 8

Lecture 33 - Interpolation and Approximation - Part 9

Lecture 34 - Numerical Differentiation and Integration - Part 1

Lecture 35 - Numerical Differentiation and Integration - Part 2

Lecture 36 - Numerical Differentiation and Integration - Part 3

Lecture 37 - Numerical Differentiation and Integration - Part 4

Lecture 38 - Numerical Differentiation and Integration - Part 5

Lecture 39 - Numerical Differentiation and Integration - Part 6

Lecture 40 - Numerical Differentiation and Integration - Part 7

Lecture 41 - Numerical Differentiation and Integration - Part 8

NPTEL : Engineering Mechanics (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Manoj K Harbola

Lecture 1 - Engineering Mechanics

Lecture 2 - Equilibrium - I

Lecture 3 - Equilibrium - II

Lecture 4 - Equilibrium - III

Lecture 5 - Plan Trusses - I

Lecture 6 - Plan Trusses - II

Lecture 7 - Friction

Lecture 8 - Properties of Surfaces - I

Lecture 9 - Properties of Surfaces - II

Lecture 10 - Properties of Surfaces - III

Lecture 11 - Method of Virtual Work

Lecture 12 - Motion of Particles Planar Polar Coordinates

Lecture 13 - Motion With Constraints

Lecture 14 - Motion of Particle With Friction

Lecture 15 - Motion of Particles With Drag

Lecture 16 - Momentum

Lecture 17 - Work and Energy - I

Lecture 18 - Work and Energy - II

Lecture 19 - Work and Energy - III

Lecture 20 - Work and Energy - IV

Lecture 21 - Rotational Motion - I

Lecture 22 - Rotational Motion - II

Lecture 23 - Rotational Motion - III

Lecture 24 - Rotational Motion - IV

Lecture 25 - Rotational Motion - V

Lecture 26 - Rotational Motion - VI

Lecture 27 - Simple Harmonic Motion - I

Lecture 28 - Simple Harmonic Motion - II

Lecture 29 - Simple Harmonic Motion - III

Lecture 30 - Motion in Uniformly Accelerating Frames

Lecture 31 - Motion In Rotating Frame

NPTEL : Engineering Physics II (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. V. Ravishankar, Prof. S. Raychaudhuri

Module - 1 lecture - 1

Module - 1 lecture - 2

Module - 1 lecture - 3

Module - 1 lecture - 4

Module - 2 lecture - 1

Module - 2 lecture - 2

Module - 2 lecture - 3

Module - 2 lecture - 4

Module - 2 lecture - 5

Module - 3 lecture - 1

Module - 3 lecture - 2

Module - 3 lecture - 3

Module - 3 lecture - 4

Module - 3 lecture - 5 (Lecture Missing)

Module - 3 lecture - 6

Module - 3 lecture - 7

Module - 3 lecture - 8

Module - 4 lecture - 1

Module - 4 lecture - 2

Module - 4 lecture - 3

Module - 4 lecture - 4

Module - 4 lecture - 5

Module - 4 lecture - 6

Module - 4 lecture - 7

Module - 4 lecture - 8

Module - 4 lecture - 9

Module - 4 lecture - 10

Module - 4 lecture - 11

Module - 4 lecture - 12

NPTEL : Mathematics I (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Swagato K. Ray, Prof. Shobha Madan, Dr. P. Shunmugaraj

Lecture 1 - Real Number

Lecture 2 - Sequences I

Lecture 3 - Sequences II

Lecture 4 - Sequences III

Lecture 5 - Continuous Function

Lecture 6 - Properties of Continuous Function

Lecture 7 - Uniform Continuity

Lecture 8 - Differentiable Functions

Lecture 9 - Mean Value Theorem

Lecture 10 - Maxima - Minima

Lecture 11 - Taylor's Theorem

Lecture 12 - Curve Sketching

Lecture 13 - Infinite Series I

Lecture 14 - Infinite Series II

Lecture 15 - Tests of Convergence

Lecture 16 - Power Series

Lecture 17 - Riemann Integral

Lecture 18 - Riemann Integrable Functions

Lecture 19 - Applications of Riemann Integral

Lecture 20 - Length of a curve

Lecture 21 - Line Integrals

Lecture 22 - Functions of Several Variables

Lecture 23 - Differentiation

Lecture 24 - Derivatives

Lecture 25 - Mean Value Theorem

Lecture 26 - Maxima Minima

Lecture 27 - Method of Lagrange Multipliers

Lecture 28 - Multiple Integrals

Lecture 29 - Surface Integrals

Lecture 30 - Green's Theorem

Lecture 31 - Stokes Theorem

Lecture 32 - Gauss Divergence Theorem

NPTEL : Human Resource Management-I (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Kalyan Chakravarti

Lecture 1 - Nature and Scope of HRM

Lecture 2 - Analysing and Designing Job - I

Lecture 3 - Analysing and Designing Job - II

Lecture 4 - Human Resource Planning - I

Lecture 5 - Human Resource Planning - II

Lecture 6 - Recruitment and Selection

Lecture 7 - Performance Evaluation and Appraisal - I

Lecture 8 - Performance Evaluation and Appraisal (Continued...)

Lecture 9 - Training and Development

Lecture 10 - Employee Welfare

Lecture 11 - Safety, Health, Environment

Lecture 12 - Industrial Relations

Lecture 13 - Total Quality Management

Lecture 14 - Organization Culture

Lecture 15 - Change Management - Part - I

Lecture 16 - Change Management - Part - II

Lecture 17 - Wage and Salary Administration

Lecture 18 - Career Planning - Part - I

Lecture 19 - Career Planning - Part - II

Lecture 20 - Contemporary Issues in HRM - I

Lecture 21 - Contemporary Issues in HRM - II

Lecture 22 - Contemporary Issues in HRM - III

NPTEL : Leadership (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Kalyan Chakravarti

Lecture 1 - Introduction to Leadership: Functions

Lecture 2 - Leadership Roles: Leaders Vs Managers: Theories

Lecture 3 - Leadership Styles: Effective Vs Successful Managers

Lecture 4 - Leadership Behaviour: Emergence: Leadership and Trust

Lecture 5 - Leadership Styles: Adaptation-Studies/Case: From Sindhi to Siddhi (Part-I)

Lecture 6 - Case: From Sindhi to Siddhi (Part-II) Transformation Leadership

Lecture 7 - Leadership Skills: Leadership and Management

Lecture 8 - Competencies and Skills of Leaders: Issues in Organizational Leadership

Lecture 9 - Case: The DVC Story-A First Person Account - Leadership in Action (Part-I)

Lecture 10 - Case: The DVC Story-A First Person Account- Leadership in Action (Part-II)

Lecture 11 - Case: Rai Bahadur Mohan Singh Oberoi (Part-I) Issues in Institution Building

Lecture 12 - Case: Rai Bahadur Mohan Singh Oberoi (Part-II)

Lecture 13 - Case: Self Regulation-The Key to Institution Building - Framework of Institution Building

NPTEL : Management Information System (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Biswajit Mahanty

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Introduction - III

Lecture 4 - Concept of Information - I

Lecture 5 - Concept of Information - II

Lecture 6 - Decision Making Process

Lecture 7 - Impact of IS on Management - I

Lecture 8 - Impact of IS on Management - II

Lecture 9 - Hardware Software Overview - I

Lecture 10 - Hardware Software Overview - II

Lecture 11 - Knowledge Management

Lecture 12 - Learning Organization

Lecture 13 - Decision Analysis - I

Lecture 14 - Decision Analysis - II

Lecture 15 - Decision Analysis - III

Lecture 16 - Data Flow Diagrams - I

Lecture 17 - Data Flow Diagrams - II

Lecture 18 - Data Flow Diagrams - III

Lecture 19 - Data Flow Diagrams - IV

Lecture 20 - System Design - I

Lecture 21 - System Design - II

Lecture 22 - DBMS - I

Lecture 23 - DBMS - II

Lecture 24 - DBMS - III

Lecture 25 - DBMS - IV

Lecture 26 - DBMS - V

Lecture 27 - OOAD - I

Lecture 28 - OOAD - II

Lecture 29 - OOAD - III

NPTEL : Physics I - Oscillations and Waves (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. S. Bharadwaj

Lecture 1 - Simple Harmonic Oscillators

Lecture 2 - Damped Oscillator - I

Lecture 3 - Damped Oscillator - II

Lecture 4 - Oscillator With External Forcing - I

Lecture 5 - Oscillator With External Forcing

Lecture 6 - Resonance

Lecture 7 - Coupled Oscillations

Lecture 8 - Sinusoidal Plane Waves - I

Lecture 9 - Electromagnetic waves - I

Lecture 10 - Electromagnetic Waves - II

Lecture 11 - The Vector Nature of Electromagnetic Waves

Lecture 12 - The Electromagnetic Spectrum

Lecture 13 - The Electromagnetic Spectrum - II

Lecture 14 - Interference - I

Lecture 15 - Interference - II

Lecture 16 - Interference - III

Lecture 17 - Interference - IV

Lecture 18 - Coherence

Lecture 19 - Coherence

Lecture 20 - Diffraction - I

Lecture 21 - Diffraction - II

Lecture 22 - Diffraction - III

Lecture 23 - Diffraction - IV

Lecture 24 - X-Ray Diffraction

Lecture 25 - Beats

Lecture 26 - The Wave Equation

Lecture 27 - Solving the Wave Equation

Lecture 28 - Waves

Lecture 29 - Standing Waves

Lecture 30 - Standing Waves

Lecture 31 - Polarization

Lecture 32 - Compton Effect

Lecture 33 - Wave - Particle Duality

Lecture 34 - Wave - Particle Duality

Lecture 35 - Probability Amplitude

Lecture 36 - Probability

Lecture 37 - Schrodinger Wave Equation

Lecture 38 - Measurements

Lecture 39 - Particle in a Potential

Lecture 40 - Potential Well

Lecture 41 - Potential Well

Lecture 42 - Potential Well

Lecture 43 - Quantum Tunneling

Lecture 44 - Quantum Tunneling

NPTEL : Strategic Management (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Kalyan Chakravarti

Lecture 1 - Strategy: Philosophy;Competition;Competitive Advantage - Part - I

Lecture 2 - Strategy: Philosophy;Competition;Competitive Advantage - Part - II

Lecture 3 - Case Study - Group Presentation on Case - I (Baddi`s Solvent)

Lecture 4 - Case Study - Group Presentation on Case - II

Lecture 5 - Case Study - Group Presentation on Case - III

Lecture 6 - Case Study - Group Presentation on Case - IV Form

Lecture 7 - Strategy: Implementation in Organizations

Lecture 8 - Strategy: Design: Process: Managing Strategic Change

Lecture 9 - Case Study: The House of Tata

Lecture 10 - Case Study: The House of Tata

Lecture 11 - Group Presentation - II

NPTEL : Basic Electronics and Lab (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. T.S. Natarajan

Lecture 1 - Introduction to Basic Electronics

Lecture 2 - Electronic Devices 1

Lecture 3 - Electronics Devices II Resistor in series and parallel

Lecture 4 - Some Useful Laws in Basic Electronics

Lecture 5 - Some Useful Theorems in Basic Electronics

Lecture 6 - Semi Conductor Diodes

Lecture 7 - Applications of Diodes

Lecture 8 - Wave Shaping using Diodes

Lecture 9 - Zener Diode Characteristics

Lecture 10 - Transistors

Lecture 11 - Transistor Biasing - Common Emitter Circuits, Fixed Bias, Collector to base Bias

Lecture 12 - Transistor Biasing - Emitter Current Bias, Thermal Stability (RC Coupled Amplifier)

Lecture 13 - Basic Characteristic of an Amplifier - Simple Transistor model, Common emitter Amplifier

Lecture 14 - Hybrid Equivalent Circuit, H-Parameters

Lecture 15 - Circuit Analysis using H-Parameters

Lecture 16 - Frequency Response of Amplifiers

Lecture 17 - Frequency Analysis

Lecture 18 - Power Amplifiers

Lecture 19 - Differential Amplifiers Circuit

Lecture 20 - Integrated Chip

Lecture 21 - Typical Characteristic of Operation Amplifier

Lecture 22 - Four Types of Feed Back

Lecture 23 - Four Types of Feed Back

Lecture 24 - Mathematical Operations

Lecture 25 - Mathematical Operations

Lecture 26 - Mathematical Operations

Lecture 27 - Characteristics of Operation Amplifier

Lecture 28 - Characteristics of Operation Amplifier

Lecture 29 - Characteristics of Operation Amplifier

Lecture 30 - Inverter/Non-Inverter Circuits

Lecture 31 - Applications of Op Amps

Lecture 32 - Non-Linear Op Amp circuits

Lecture 33 - Applications of Op Amps

Lecture 34 - Active Diode Circuits

Lecture 35 - Oscillators

Lecture 36 - Logarithmic and Anti-Logarithmic Amplifier

Lecture 37 - Filters

Lecture 38 - Unit Junction Transistor

Lecture 39 - Silicon Controlled Rectifier

Lecture 40 - Field Effect Transistor

NPTEL : Classical Physics (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Introduction

Lecture 2 - Newtonian mechanics

Lecture 3 - Dynamics in phase space

Lecture 4 - Linear dynamical systems

Lecture 5 - Autonomous dynamical systems (Part 1)

Lecture 6 - Autonomous dynamical systems (Part 2)

Lecture 7 - Lagrangian formalism

Lecture 8 - Summary of classical electromagnetism

Lecture 9 - Charged particle in an electromagnetic field

Lecture 10 - Hamiltonian dynamics (Part 1)

Lecture 11 - Hamiltonian dynamics (Part 2)

Lecture 12 - Hamiltonian dynamics (Part 3)

Lecture 13 - Dynamical symmetry (Part 1)

Lecture 14 - Dynamical symmetry (Part 2)

Lecture 15 - Randomness in phase space; chaos

Lecture 16 - Discrete-time dynamics: maps (Part 1)

Lecture 17 - Discrete-time dynamics: maps (Part 2)

Lecture 18 - Problems and solutions (Part 1)

Lecture 19 - Problems and solutions (Part 2)

Lecture 20 - Classical statistical mechanics: Introduction

Lecture 21 - Some probability distributions; isolated system

Lecture 22 - The microcanonical emsemble

Lecture 23 - Thermodynamics

Lecture 24 - The canonical ensemble

Lecture 25 - Connection between statistical mechanics and ther-modynamics

Lecture 26 - Probability distributions

Lecture 27 - Probability distributions (concld.). Phase transitions (Part 1)

Lecture 28 - Phase transitions (Part 2)

Lecture 29 - Phase transitions (Part 3)

Lecture 30 - Phase transitions (Part 4); misc. topics

Lecture 31 - Problems and solutions (Part 3)

Lecture 32 - Continuous groups in physics (Part 1)

Lecture 33 - Continuous groups in physics (Part 2)

Lecture 34 - Continuous groups in physics (Part 3)

Lecture 35 - Noether's Theorem. Special Relativity (Part 1)

Lecture 36 - Special Relativity (Part 2)

Lecture 37 - Special Relativity (Part 3)

Lecture 38 - Special Relativity (Part 4)

NPTEL : Engineering Chemistry I (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. K. Mangala Sunder

Lecture 1 - Introduction to Chemistry & Quantum Chemical Mechanics

Lecture 2 - Particle in a box (one and two dimensions)

Lecture 3 - Particle in a box (One and Two Dimensions) Continued

Lecture 4 - Harmonic Oscillator and Molecular Vibration

Lecture 5 - Harmonic Oscillator (Continued)

Lecture 6 - Hydrogen Atom - Radial Solution

Lecture 7 - Hydrogen Atom Part III Angular Solutions

Lecture 8 - Hydrogen Atom - Angular Solutions (Continued)

Lecture 9 - Hydrogen Atom - Angular Solutions (Continued)

Lecture 10 - Oppenheimer Approximation and Superposition

NPTEL : Numerical Methods and Programing (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. P.B. Sunil Kumar

Lecture 1 - Programing Basics

Lecture 2 - Introduction to Pointers

Lecture 3 - Pointers And Arrays

Lecture 4 - External Functions and Argument Passing

Lecture 5 - Representation of Numbers

Lecture 6 - Numerical Error

Lecture 7 - Error Propagation and Stability

Lecture 8 - Polynomial Interpolation-1

Lecture 9 - Polynomial Interpolation-2

Lecture 10 - Error In Interpolation Polynomial

Lecture 11 - Polynomial Interpolation

Lecture 12 - Cubic Spline Interpolation

Lecture 13 - Data Fitting : Linear Fit

Lecture 14 - Data Fitting : Linear Fit

Lecture 15 - Data Fitting : Non Linear Fit

Lecture 16 - Matrix Elimination and Solution

Lecture 17 - Solution To Linear Equations

Lecture 18 - Matrix Elimination

Lecture 19 - Eigen Values of A Matrix

Lecture 20 - Eigen Values And Eigen Vectors

Lecture 21 - Solving NonLinear Equations

Lecture 22 - Solving NonLinear Equations Newton Raphson Method

Lecture 23 - Methods For Solving NonLinear Equations

Lecture 24 - System of NonLinear Equations

Lecture 25 - Numerical Derivations

Lecture 26 - High order Derivatives From Difference Formula

Lecture 27 - Numerical Integration - Basic Rules

Lecture 28 - Comparison of Different Basic Rules

Lecture 29 - Gaussian Rules

Lecture 30 - Comparison of Gaussian Rules

Lecture 31 - Solving Ordinary Differential Equations

Lecture 32 - Solving ordinary differential equations

Lecture 33 - Adaptive step size Runge Kutta scheme

Lecture 34 - Partial Differential Equations

Lecture 35 - Explicit and Implicit Methods

Lecture 36 - The Crank - Nicholson Scheme For Two Spatial

Lecture 37 - Fourier Transforms

Lecture 38 - Fast Fourier Transforms

NPTEL : Quantum Physics (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Introduction to Quantum Physics;Heisenberg's uncertainty principle

Lecture 2 - Introduction to linear vector spaces

Lecture 3 - Characteristics of linear vector spaces

Lecture 4 - Functions in a linear vector space

Lecture 5 - Linear operations in a linear vector space and their eigenvalues

Lecture 6 - Classical Vs Quantum Mechanics

Lecture 7 - Quantum Physics

Lecture 8 - Quantum Physics

Lecture 9 - Quantum Physics

Lecture 10 - Quantum Physics

Lecture 11 - Quantum Physics

Lecture 12 - Quantum Physics

Lecture 13 - Quantum Physics

Lecture 14 - Quantum Physics

Lecture 15 - Quantum Physics

Lecture 16 - Quantum Physics

Lecture 17 - Quantum Physics

Lecture 18 - Quantum Physics

Lecture 19 - Quantum Physics

Lecture 20 - Quantum Physics

Lecture 21 - Quantum Physics

Lecture 22 - Quantum Physics

Lecture 23 - Quantum Physics

Lecture 24 - Quantum Physics

Lecture 25 - Quantum Physics

Lecture 26 - Quantum Physics

Lecture 27 - Quantum Physics

Lecture 28 - Quantum Physics

Lecture 29 - Quantum Physics

Lecture 30 - Quantum Physics

Lecture 31 - Quantum Physics

NPTEL : Engineering Physics I (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. Rajdeep Chatterjee, Prof. B.K. Patra, Prof. M.K. Srivastava, Prof. G.D. Verma

Lecture 1 - Introduction

Lecture 2 - Malus law & Superposition of ways

Lecture 3 - Double Refraction

Lecture 4 - Interference of polarized light

Lecture 5 - Optical Activity

Lecture 6 - Introduction

Lecture 7 - Stationary Waves & Reflection, Refraction and Diffraction

Lecture 8 - Ultrasonics

Lecture 9 - Acoustics of Buildings - Part I

Lecture 10 - Acoustics of Buildings - Part II

Lecture 11 - Interference of light Part-1

Lecture 12 - Interference of light Part-2

Lecture 13 - Interference of light Part-3

Lecture 14 - Interference by Division of Wave front

Lecture 15 - Interference by Division of Amplitude

Lecture 16 - Coherence and Application of Interference

Lecture 17 - Diffraction Part-1

Lecture 18 - Diffraction Part-2

Lecture 19 - Diffraction Part-3

Lecture 20 - Diffraction by a circular aperture

Lecture 21 - Kinetic theory of gases - Part-1

Lecture 22 - Kinetic theory of gases - Part-2

Lecture 23 - Maxwellian distribution law of velocity - Part-1

Lecture 24 - Maxwellian distribution law of velocity - Part-2

Lecture 25 - Maxwellian distribution law of velocity - Part-3

Lecture 26 - Vanderwaal's equation of states - Part-1

Lecture 27 - Vanderwaal's equation of states - Part-2

Lecture 28 - Vanderwaal's equation of states - Part-3

Lecture 29 - Fluid Mechanics - Part-1

Lecture 30 - Fluid Mechanics - Part-2

Lecture 31 - Introduction of special relativity

Lecture 32 - Consequences of special relativity-1

Lecture 33 - Consequences of special relativity-2

Lecture 34 - Consequences of special relativity-3

Lecture 35 - Consequences of special relativity-4

Lecture 36 - Consequences of special relativity-5

Lecture 37 - Introduction

Lecture 38 - Image formation by lenses

Lecture 39 - Lens aberrations - Part I

Lecture 40 - Lens aberrations - Part II

NPTEL : Mathematics II (Basic Courses (Semester 1 and 2))

Co-ordinators : Dr. Sunita Gakkhar, Prof. H.G. Sharma, Dr. Tanuja Srivastava

Lecture 1 - Complex Integration

Lecture 2 - Contour Integration

Lecture 3 - Cauchy's Integral Theorem

Lecture 4 - Cauchy's Integral Formula

Lecture 5 - Application of Cauchy Integral Formula

Lecture 6 - Zeros, Singularities and Poles

Lecture 7 - Residue Integration Method

Lecture 8 - Residue Theorem

Lecture 9 - Evaluation of Real Integrals

Lecture 10 - Evaluation of Real Improper Integrals-1

Lecture 11 - Evaluation of Real Improper Integrals-2

Lecture 12 - Evaluation of Real Improper Integrals-3

Lecture 13 - Evaluation of Real Improper Integrals-4

Lecture 14 - Evaluation of Real Integrals - Revision

Lecture 15 - Matrix Algebra Part - 1

Lecture 16 - Matrix Algebra Part - 2

Lecture 17 - Determinants Part - 1

Lecture 18 - Determinants Part - 2

Lecture 19 - Solution of System Equation

Lecture 20 - Linear Algebra Part - 1

Lecture 21 - Linear Algebra part - 2

Lecture 22 - Linear Algebra Part - 3

Lecture 23 - Linear Algebra Part - 4

Lecture 24 - Inner Product

Lecture 25 - Linear Transformation Part - 1

Lecture 26 - Linear Transformation Part - 2

Lecture 27 - Eigenvalues Eigenvectors Part - 1

Lecture 28 - Eigenvalues Eigenvectors Part - 2

Lecture 29 - Quadratic Forms

Lecture 30 - Diagonalization Part - 1

Lecture 31 - Diagonalization Part - 2

Lecture 32 - Solution of System of Linear Equation

Lecture 33 - Functions of Complex Variables Part - 1

Lecture 34 - Functions of Complex Variables Part - 2

Lecture 35 - Taylor Series

Lecture 36 - Laurent Series

Lecture 37 - Rank of a Matrix

Lecture 38 - Complex Numbers Their Geometrical Representation

NPTEL : Mathematics III (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. P.N. Agrawal, Dr. Tanuja Srivastava

Lecture 1 - Solution of ODE of First Order and First Degree

Lecture 2 - Linear Differential Equations of the First Order

Lecture 3 - Approximate Solution of An Initial Value

Lecture 4 - Series Solution of Homogeneous Linear I

Lecture 5 - Series Solution of Homogeneous Linear II

Lecture 6 - Bessel Functions and Their Properties

Lecture 7 - Bessel Functions And Their Properties (Continued..)

Lecture 8 - Laplace Transformation

Lecture 9 - Laplace Transformation (Continued..)

Lecture 10 - Applications Of Laplace Transformation

Lecture 11 - Applications Of Laplace Transformation (Continued..)

Lecture 12 - One Dimensional Wave Equation

Lecture 13 - One Dimensional Heat Equation

Lecture 14 - Introduction to Differential Equation

Lecture 15 - First Order Differential Equations and Their Geometric Interpretation

Lecture 16 - Differential Equations of First Order Higher Degree

Lecture 17 - Linear Differential Equation of Second Order-Part - 1

Lecture 18 - Linear Differential equation of Second Order-Part - 2

Lecture 19 - Euler-Cauchy Theorem

Lecture 20 - Higher Order Linear Differential Equations

Lecture 21 - Higher Order Non homogeneous Linear Equations

Lecture 22 - Boundary Value Problems

Lecture 23 - Strum Liouville boundary Value Problem

Lecture 24 - Fourier Series-Part - 1

Lecture 25 - Fourier Series-Part - 2

Lecture 26 - Convergence of the Fourier Series

Lecture 27 - Fourier Integrals

Lecture 28 - Fourier Transforms

Lecture 29 - Partial Differential Equation

Lecture 30 - First Order Partial Differential Equation

Lecture 31 - Second Order Partial Differential Equations - I

Lecture 32 - Second Order Partial Differential Equations - II

Lecture 33 - Solution of One Dimensional Wave Equation

Lecture 34 - Solution of HomogeneousNon Homogeneous Equations

Lecture 35 - Fourier Integral Transform Method for Heat Equation

Lecture 36 - Three Dimensional Laplace Equation

Lecture 37 - Solution of Drichlet Problem

Lecture 38 - Numerical Method for Laplace Poisson equation

Lecture 39 - ADI Method for Laplace and Poisson Equation

NPTEL : Concept of Management and Evolution of Management Thought (Basic Courses (Semester 1 and 2))

Co-ordinators : Prof. K.B. Akhilesh

Lecture 1 - Introduction - Concept of Management

Lecture 2 - Lecture 2

Lecture 3 - Management By Objectives

Lecture 4 - Organizing & Organization

Lecture 5 - Organizing - II

Lecture 6 - Coordinating

Lecture 7 - Communication - I

Lecture 8 - Communication - II

Lecture 9 - Leadership

Lecture 10 - Controlling

Lecture 11 - Motivation and Organization Culture

Lecture 12 - Japanese Management

Lecture 13 - Comparison of Japanese and American Management

Lecture 14 - Managerial Functions in International Business

Lecture 15 - Marketing Functions: Channels of Distribution

Lecture 16 - Management and Society

Lecture 17 - Social Responsibility and Ethics - II

Lecture 18 - Functions of Personnel Management

Lecture 19 - Manpower Planning

Lecture 20 - Selection - I

Lecture 21 - Selection - II

Lecture 22 - Performance Appraisal - I

Lecture 23 - Performance Appraisal - II

Lecture 24 - Training and Development - I

Lecture 25 - Training and Development - II

Lecture 26 - Job Design and Payment Systems - I

Lecture 27 - Job Design and Compensation Systems

Lecture 28 - Organizational Development - I

Lecture 29 - Organizational Development - II

Lecture 30 - Organization Theory - I

Lecture 31 - Organization Theory - II

Lecture 32 - Group Dynamics - I

Lecture 33 - Group Dynamics - II

Lecture 34 - Group Dynamics - III

Lecture 35 - Conflict Management - I

Lecture 36 - Conflict Management - II

Lecture 37 - Managing Creativity and Innovation

Lecture 38 - Creativity and Managing Innovation Process - II

Lecture 39 - Stress Management - I

Lecture 40 - Stress Management - II

NPTEL : Biomathematics (Biotechnology)

Co-ordinators : Dr. Ranjith Padinhateeri

Lecture 1 - Introduction

Lecture 2 - Graphs and functions - I

Lecture 3 - Graphs and functions - II

Lecture 4 - Functions and derivatives

Lecture 5 - Calculation of derivatives

Lecture 6 - Differentiation and its application in Biology - I

Lecture 7 - Differentiation and its application in Biology - II

Lecture 8 - Differentiation and its application in Biology - III

Lecture 9 - Differentiation and its application in Biology - IV

Lecture 10 - Integration - I

Lecture 11 - Integration - II

Lecture 12 - Differential equations - I

Lecture 13 - Differential equations - II

Lecture 14 - Vectors - I

Lecture 15 - Vectors - II

Lecture 16 - Vectors - III

Lecture 17 - Nernst equation

Lecture 18 - Diffusion - I : Diffusion equation

Lecture 19 - Diffusion - II : Mean-square displacement

Lecture 20 - Diffusion - III : Einsteinâ€™s relation

Lecture 21 - Statistics : Mean and variance

Lecture 22 - Statistics : Distribution function

Lecture 23 - Understanding Normal distribution

Lecture 24 - Fitting a function to experimental data

Lecture 25 - Size of a flexible protein: Simplest model

Lecture 26 - Uniform and Poisson distributions; Knudsonâ€™s analysis

Lecture 27 - Fourier Series - I

Lecture 28 - Fourier Series - II

Lecture 29 - Fourier transform

Lecture 30 - Master equation: Polymerization dynamics, Molecular motor motion

Lecture 31 - Evolution: Simplest model

Lecture 32 - Tutorial - I

Lecture 33 - Tutorial - II

Lecture 34 - Temperature, Energy and Entropy

Lecture 35 - Partition function, Free energy

Lecture 36 - Bending fluctuations of DNA and spring-like proteins

Lecture 37 - Force-extension and looping of DNA

Lecture 38 - Thermodynamics of protein organization along DNA

Lecture 39 - Learning mathematics with the help of a computer

NPTEL : Proteomics: Principles and Techniques (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Proteins and Gel-Based Proteomics (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 0 - Proteins and Gel-Based Proteomics; Course Introduction

Lecture 1 - Introduction to amino acids

Lecture 2 - Introduction to proteins

Lecture 3 - Protein folding & misfolding

Lecture 4 - Protein purification techniques

Lecture 5 - Introduction to proteomics

Lecture 6 - Systems biology and proteomics

Lecture 7 - Sample preparation and pre-analytical factors

Lecture 8 - Sample preparation: Pre-analytical factors (Continued...)

Lecture 9 - Sample preparation: Protein extraction and quantification

Lecture 10 - One-dimensional electrophoresis

Lecture 11 - 2-DE: Rehydration, IEF & Equilibration

Lecture 12 - 2-DE: Second dimension, staining & destaining

Lecture 13 - 2-DE: Gel analysis

Lecture 14 - 2-DE: Applications

Lecture 15 - 2-DE: Applications (Continued...) & Challenges

Lecture 16 - 2D-DIGE: Basics

Lecture 17 - 2D-DIGE: Data analysis

Lecture 18 - 2D-DIGE: Applications

Lecture 19 - Protein identification using MALDI-TOF/TOF

Lecture 20 - Proteomics experiment data analysis & challenges

NPTEL : NOC:Mass spectrometry based proteomics (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 0 - Introductory lecture

Lecture 1 - Introduction to proteomics

Lecture 2 - Proteomics and sample preparation

Lecture 3 - Bacterial protein extraction

Lecture 4 - In-gel digestion

Lecture 5 - Fundamentals of mass spectrometry

Lecture 6 - Chromatography technologies

Lecture 7 - Liquid chromatography

Lecture 8 - Mass spectrometry: Ionization sources

Lecture 9 - Mass spectrometry: Mass analyzers

Lecture 10 - MALDI sample preparation and analysis

Lecture 11 - Introduction to quantitative proteomics

Lecture 12 - Hybrid mass spectrometry configurations

Lecture 13 - SILAC: In Vivo labeling

Lecture 14 - iTRAQ: In Vitro labeling

Lecture 15 - TMT: In vitro labeling

Lecture 16 - Quantitative proteomics data analysis

Lecture 17 - Proteomics and Systems biology I

Lecture 18 - Proteomics & Systems biology II

Lecture 19 - Proteomics applications

Lecture 20 - Advances and challenges in proteomics

NPTEL : NOC:Interactomics: Protein Arrays and Label-free Biosensors (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Introduction to Interactomics

Lecture 2 - An overview of label-free technologies

Lecture 3 - An overview of surface plasmon resonance (SPR)

Lecture 4 - An overview of surface plasmon resonance imaging (SPRi)

Lecture 5 - Basics of SPR: Surface chemistry

Lecture 6 - Basics of SPR: Experimental design

Lecture 7 - Protein immobilization for protein-protein interaction studies

Lecture 8 - Protein-protein interaction study: Binding analysis

Lecture 9 - Protein-protein interaction study: Kinetic analysis

Lecture 10 - Protein-small molecule interaction study: Immobilization and binding analysis

Lecture 11 - Protein-small molecule interaction study: Kinetic analysis

Lecture 12 - SPR: Interactive Session - I

Lecture 13 - SPR: Interactive Session - II

Lecture 14 - An overview of ellipsometry and interferometry techniques

Lecture 15 - An introduction to BioLayer Interferometry (BLI) and its applications in protein research

Lecture 16 - Kinetic analysis of protein-protein interaction using BLI

Lecture 17 - Label-free quantification of proteins using BLI

Lecture 18 - Diffraction-based biosensors - I

Lecture 19 - Diffraction-based biosensors - II

Lecture 20 - Nanotechniques in proteomics - I

Lecture 21 - Nanotechniques in proteomics - II

Lecture 22 - High throughputplatforms of interactomics: Protein arrays

Lecture 23 - Conventional label based detection techniques for Protein microarrays

Lecture 24 - Novel detection techniques for Protein microarrays

Lecture 25 - Recombinational cloning and its application for Protein microarrays

Lecture 26 - An introduction to Cell-free protein synthesis

Lecture 27 - Cell-free synthesis based protein microarrays: PISA and NAPPA

Lecture 28 - Cell-free synthesis based protein microarrays: MIST, DAPA and Halotag Arrays

Lecture 29 - Digging deeper into NAPPA: Basic Workflow

Lecture 30 - Digging deeper into NAPPA: Surface Chemistry, Printing and Assessment

Lecture 31 - Application of cell free expression protein microarrays in biomarker discovery

Lecture 32 - Application of cell free expression protein microarrays in immunological studies

Lecture 33 - Basics of microarray image scanning

Lecture 34 - Software for Image scanning and data processing

Lecture 35 - Microarray Data Analysis - Part I

Lecture 36 - Microarray Data Analysis - Part II

Lecture 37 - Application of protein microarray in biomarker discovery - I

Lecture 38 - Application of protein microarray in biomarker discovery - II

Lecture 39 - Systems biology and networks

Lecture 40 - Challenges in proteomics

NPTEL : NOC:Introduction to Proteomics (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Introduction to amino acids

Lecture 2 - Introduction to proteins

Lecture 3 - Protein folding and misfolding

Lecture 4 - Introduction to proteomics

Lecture 5 - Lab session â€“ Protein-protein interaction using label-free biosensors

Lecture 6 - Sample preparation and pre-analytical factors

Lecture 7 - Sample preparation: Pre-analytical factors (Continued...)

Lecture 8 - Sample preparation: Protein extraction and quantification

Lecture 9 - One-dimensional electrophoresis

Lecture 10 - Introduction to 2-DE

Lecture 11 - 2-DE: Second dimension, staining and destaining

Lecture 12 - 2-DE: Gel analysis

Lecture 13 - 2-DE Applications

Lecture 14 - 2-DE Applications (Continued...) and Challenges

Lecture 15 - Lab session - Protein/peptide pre-fractionation using OFFGEL FRACTIONATOR and data analysis

Lecture 16 - 2D-DIGE: Basics

Lecture 17 - 2D-DIGE: Data analysis

Lecture 18 - 2D-DIGE: Applications

Lecture 19 - Systems biology and proteomics - I

Lecture 20 - Systems biology and proteomics - II

Lecture 21 - Fundamentals of mass spectrometry

Lecture 22 - Chromatography technologies

Lecture 23 - Liquid chromatography

Lecture 24 - Mass spectrometry: Ionization sources

Lecture 25 - Mass spectrometry: Mass analyzers

Lecture 26 - MALDI sample preparation and analysis

Lecture 27 - Hybrid mass spectrometry configurations

Lecture 28 - Lab session - Demonstration of Q-TOF MS technology

Lecture 29 - In-gel and in-solution digestion

Lecture 30 - Lab session - Sample preparation: tissue sample preservation technology

Lecture 31 - Introduction to quantitative proteomics

Lecture 32 - SILAC: In vivo labeling

Lecture 33 - iTRAQ: In vitro labeling

Lecture 34 - TMT: In vitro labeling

Lecture 35 - Quantitative proteomics data analysis

Lecture 36 - Proteomics applications

Lecture 37 - Challenges in proteomics

Lecture 38 - OMICS and translational research

Lecture 39 - Lab session â€“ Targeted proteomics using triple quadrupole mass spectrometry

Lecture 40 - Lab session â€“ Targeted proteomics: multiple reaction monitoring

NPTEL : NOC:Introduction to Biostatistics (Biotechnology)

Co-ordinators : Prof. Shamik Sen

Lecture 1 - Introduction to the course

Lecture 2 - Data representation and plotting

Lecture 3 - Arithmetic mean

Lecture 4 - Geometric mean

Lecture 5 - Measure of Variability, Standard deviation

Lecture 6 - SME, Z-Score, Box plot

Lecture 7 - Moments, Skewness

Lecture 8 - Kurtosis, R programming

Lecture 9 - R programming

Lecture 10 - Correlation

Lecture 11 - Correlation and Regression - Part-I

Lecture 12 - Correlation and Regression - Part-II

Lecture 13 - Interpolation and extrapolation

Lecture 14 - Nonlinear data fitting

Lecture 15 - Concept of Probability: introduction and basics

Lecture 16 - Counting principle, Permutations, and Combinations

Lecture 17 - Conditional probability

Lecture 18 - Conditional probability and Random variables

Lecture 19 - Random variables, Probability mass function, and Probability density function

Lecture 20 - Expectation, Variance and Covariance - Part-I

Lecture 21 - Expectation, Variance and Covariance - Part-II

Lecture 22 - Binomial random variables and Moment generating function

Lecture 23 - Probability distribution: Poisson distribution and Uniform distribution Part-I

Lecture 24 - Uniform distribution Part-II and Normal distribution Part-I

Lecture 25 - Normal distribution Part-II and Exponential distribution

Lecture 26 - Sampling distributions and Central limit theorem - Part-I

Lecture 27 - Sampling distributions and Central limit theorem - Part-II

Lecture 28 - Central limit theorem - Part-III and Sampling distributions of sample mean

Lecture 29 - Central limit theorem - Part-IV and Confidence intervals

Lecture 30 - Confidence intervals Part- II

Lecture 31 - Test of Hypothesis - 1

Lecture 32 - Test of Hypothesis - 2 (1 tailed and 2 tailed Test of Hypothesis, p-value)

Lecture 33 - Test of Hypothesis - 3 (1 tailed and 2 tailed Test of Hypothesis, p-value)

Lecture 34 - Test of Hypothesis - 4 (Type -1 and Type -2 error)

Lecture 35 - T-test

Lecture 36 - 1 tailed and 2 tailed T-distribution, Chi-square test

Lecture 37 - ANOVA - 1

Lecture 38 - ANOVA - 2

Lecture 39 - ANOVA - 3

Lecture 40 - ANOVA for linear regression, Block Design

NPTEL : NOC:Introduction to Mechanobiology (Biotechnology)

Co-ordinators : Prof. Shamik Sen

Lecture 1 - Need to Study Mechanobiology

Lecture 2 - Cell as a Tent, Individual Components

Lecture 3 - Cell-ECM Crosstalk

Lecture 4 - ECM Proteins: Collagen

Lecture 5 - Measuring Properties of Collagen Networks

Lecture 6 - Properties of Collagen Networks

Lecture 7 - Rheology

Lecture 8 - Rheology of Biopolymer Networks

Lecture 9 - Atomic Force Microscopy (AFM)

Lecture 10 - Design of Protein Constructs for AFM

Lecture 11 - Protein Unfolding using AFM

Lecture 12 - Protein Unfolding using AFM

Lecture 13 - Focal Adhesions: Focal Adhesion Proteins

Lecture 14 - Focal Adhesion Organization

Lecture 15 - Focal Adhesions: Role of Forces

Lecture 16 - Cytoskeleton: Actin

Lecture 17 - Force-velocity Relationships of Actin Networks

Lecture 18 - Mesenchymal Cell Migration

Lecture 19 - Actin Dynamics during Mesenchymal Migration

Lecture 20 - Actin Dynamics during Mesenchymal Migration

Lecture 21 - Adhesion Independent Migration

Lecture 22 - Adhesion Independent and Collective Cell Migration

Lecture 23 - Collective Cell Migration

Lecture 24 - Mechanobiology of Stem Cell Fate - I

Lecture 25 - Mechanobiology of Stem Cell Fate - II

Lecture 26 - Mechanobiology of Stem Cell Fate - III

Lecture 27 - Mechanobiology of Diseases: Cancer - I

Lecture 28 - Mechanobiology of Diseases: Cancer - II

Lecture 29 - Mechanobiology of Diseases: Cancer - III

Lecture 30 - Mechanobiology of Diseases: Atherosclerosis and Hypertension

Lecture 31 - Mechanobiology of Diseases: Muscular Dystrophy

Lecture 32 - Nuclear Mechanotransduction: LINC complex

Lecture 33 - Nuclear Mechanotransduction: LINC Complex in Cell Migration

Lecture 34 - Nuclear Mechanotransduction: Gene Regulation

Lecture 35 - Mechanical Forces and DNA damage

Lecture 36 - Techniques in Mechanobiology: Hydrogels

Lecture 37 - Techniques in Mechanobiology: AFM

Lecture 38 - Techniques in Mechanobiology: Traction Force Microscopy, Trypson Deadhesion and Laser Ablation

Lecture 39 - Techniques in Mechanobiology: Microfabrication

Lecture 40 - Techniques in Mechanobiology: FRET

NPTEL : NOC:Introductory Mathematical Methods for Biologists (Biotechnology)

Co-ordinators : Dr. Ranjith Padinhateeri

Lecture 1 - Introduction

Lecture 2 - Graphs and Functions

Lecture 3 - Equations as Graphs

Lecture 4 - Graphs : Exponential and Periodic Functions

Lecture 5 - Graphs : Logarithmic and Other Functions

Lecture 6 - Images as 2D/3D Functions

Lecture 7 - Functions and its Derivatives

Lecture 8 - Computing Derivatives of Curves

Lecture 9 - Rules for Calculating Derivatives

Lecture 10 - Understanding Derivatives

Lecture 11 - Curvature and Second Derivative

Lecture 12 - Plotting Curves

Lecture 13 - Numerical Calculation of Derivatives

Lecture 14 - Function, Derivatives and Series Expansion

Lecture 15 - L'Hopital's Rule and Partial Derivatives

Lecture 16 - Integration

Lecture 17 - Integration : Rules

Lecture 18 - Integration : Graphical Understanding

Lecture 19 - Integration : More Examples

Lecture 20 - Integration : Product of Two Functions

Lecture 21 - Exponential Growth and Decay

Lecture 22 - Scalars and Vectors

Lecture 23 - Vectors : Position and Movement in 2D

Lecture 24 - Cell Symmetry : Use of Polar Coordinates

Lecture 25 - Gradient, Forces and Flows : Part I

Lecture 26 - Gradient, Forces and Flows : Part II

Lecture 27 - Understanding Diffusion

Lecture 28 - Diffusion Constant and Einstein Relation 1905

Lecture 29 - Diffusion Equation

Lecture 30 - Diffusion vs. Active Transport

Lecture 31 - Nernst Equation

Lecture 32 - Fourier Series : Part I

Lecture 33 - Fourier Series : Part II

Lecture 34 - Fourier Transform

Lecture 35 - Introduction to Statistics

Lecture 36 - Mean, Standard deviation and Distribution

Lecture 37 - Frequency Distribution and Probability Distribution

Lecture 38 - Binomial Distribution

Lecture 39 - Normal Distribution

Lecture 40 - Hypothesis Testing and Mathematical Modeling

NPTEL : NOC:Bioengineering: An Interface with Biology and Medicine (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Why biology for engineers - Part I

Lecture 2 - Why biology for engineers - Part II

Lecture 3 - Life processes and Cell

Lecture 4 - Cell and its properties

Lecture 5 - Clinicianâ€™s Perspective - I

Lecture 6 - Nucleic Acid and Central Dogma

Lecture 7 - DNA Tools: Gene Cloning - I

Lecture 8 - DNA Tools: Gene Cloning - II

Lecture 9 - DNA Tools and Biotechnology - I

Lecture 10 - DNA Tools and Biotechnology - II

Lecture 11 - DNA Tools and Biotechnology - III

Lecture 12 - DNA Tools and Biotechnology - IV

Lecture 13 - DNA Tools and Biotechnology - V

Lecture 14 - DNA Tools and Biotechnology - VI

Lecture 15 - Clinicianâ€™s Perspective - II

Lecture 16 - Genetics - I

Lecture 17 - Genetics - II

Lecture 18 - Genetics - III

Lecture 19 - Genetics - IV

Lecture 20 - Clinicianâ€™s Perspective - III

Lecture 21 - Chromosomal basis of inheritance

Lecture 22 - Linkage, chromosomal disorders

Lecture 23 - Classical Genetics Experiments

Lecture 24 - Bacteria and Viruses

Lecture 25 - Clinicianâ€™s Perspective - IV

Lecture 26 - Cell cycle disregulation and Cancer

Lecture 27 - Developmental Biology

Lecture 28 - Principles and application of Animal Cloning

Lecture 29 - Evolution

Lecture 30 - Clinicianâ€™s Perspective - V

Lecture 31 - Amino acids and proteins

Lecture 32 - Proteins and Proteomics

Lecture 33 - Techniques to Study Protein and Proteome - I

Lecture 34 - Techniques to Study Protein and Proteome - II

Lecture 35 - Bioinformatics - I

Lecture 36 - Techniques to Study Protein and Proteome - III

Lecture 37 - Protein Interactions and Microarrays

Lecture 38 - Protein interactions and Systems biology

Lecture 39 - Bioinformatics - II

Lecture 40 - Ethics in Research and Publications

NPTEL : NOC:Applications of Interactomics using Genomics and Proteomics Technologies (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Introduction to Interactomics and Protein Arrays

Lecture 2 - NAPPA Technology and Protein Arrays - I

Lecture 3 - NAPPA Technology and Protein Arrays - II

Lecture 4 - Biomarkers: Harnessing the immune system for early detection of disease - I

Lecture 5 - Biomarkers: Harnessing the immune system for early detection of disease - II

Lecture 6 - Biomarkers: Harnessing the immune system for early detection of disease - III

Lecture 7 - NAPPA and its applications in study of antibody immune response in disease and in drug Screening - I

Lecture 8 - NAPPA and its applications in study of antibody immune response in disease and in drug screening - II

Lecture 9 - NAPPA and its applications in study of antibody immune response in disease and in drug screening - III

Lecture 10 - Using functional proteomics to identify biomarkers and therapeutic targets - I

Lecture 11 - Using functional proteomics to identify biomarkers and therapeutic targets - II

Lecture 12 - Applications of protein microarrays in Malaria Research - I

Lecture 13 - Applications of protein microarrays in Malaria Research - II

Lecture 14 - Applications of protein microarrays in Cancer Research - I

Lecture 15 - Applications of protein microarrays in Cancer Research - II

Lecture 16 - Introduction to Bioprinting and IrisÃ¢ Optical QC Benefits - I

Lecture 17 - Introduction to Bioprinting and IrisÃ¢ Optical QC Benefits - II

Lecture 18 - Basics and Applications of Reverse Phase Protein Arrays - I

Lecture 19 - Basics and Applications of Reverse Phase Protein Arrays - II

Lecture 20 - Basics and Applications of Reverse Phase Protein Arrays - III

Lecture 21 - Antibody signatures defined by high-content peptide microarray analysis

Lecture 22 - An overview of label-free technologies - I

Lecture 23 - An overview of label-free technologies - II

Lecture 24 - Mass Spectrometry coupled Interactomics - I

Lecture 25 - Mass Spectrometry coupled Interactomics - II

Lecture 26 - Biomolecular interactions using Bio-Layer Interferometry (BLI) - I

Lecture 27 - Biomolecular interactions using Bio-Layer Interferometry (BLI) - II

Lecture 28 - Biomolecular interaction analytics using MicroScale Thermophoresis

Lecture 29 - Surface Plasmon Resonance- Principles and Assays - I

Lecture 30 - Surface Plasmon Resonance- Principles and Assays - II

Lecture 31 - Use of SPR in unravelling domain motif interactions of proteasomal assembly chaperones

Lecture 32 - Next-Generation Sequencing Technology- Ion TorrentÃ¢

Lecture 33 - NGS Technology- Bioinformatics and data analysis - I

Lecture 34 - NGS Technology- Bioinformatics and data analysis - II

Lecture 35 - Next-Generation Sequencing Technology-MiSeq System

Lecture 36 - NGS target enrichment workflow for exomes, targeted panels and beyond

Lecture 37 - The Human Pathology Atlas: A Pathology Atlas of the Human Transcriptome - I

Lecture 38 - The Human Pathology Atlas: A Pathology Atlas of the Human Transcriptome - II

Lecture 39 - Conclusions and Overview - I (Statistical analysis - I)

Lecture 40 - Conclusions and overview - II (Statistical analysis - II)

NPTEL : NOC:Introduction to Proteogenomics (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Proteogenomics overview - I

Lecture 2 - Proteogenomics overview - II

Lecture 3 - Introduction to Genomics - Part I : Gene sequencing and mutations

Lecture 4 - Introduction to Genomics - Part II : Sequence Alignment

Lecture 5 - Introduction to Genomics - Part III : Transcriptome

Lecture 6 - Perspectives in Proteogenomics - I

Lecture 7 - Advancement in Cancer Genomics

Lecture 8 - Introduction to Genomics - Part IV : Epigenome

Lecture 9 - Introduction to Genomics - cBioPortal

Lecture 10 - Genotype, Gene expression and Phenotype - I

Lecture 11 - Genotype, Gene expression and Phenotype - II

Lecture 12 - An overview of NGS technology

Lecture 13 - NGS - Sequencing by synthesis - I

Lecture 14 - NGS - Sequencing by synthesis - II

Lecture 15 - Introduction to Proteomics

Lecture 16 - Proteomics: Sample Prep and Protein Quantification

Lecture 17 - Applications of Proteomics

Lecture 18 - Introduction to MS-based Proteomics - I

Lecture 19 - Introduction to MS-based Proteomics - II

Lecture 20 - Applications of NGS - IonTorrent

Lecture 21 - Genomic Analysis using Droplet PCR - I

Lecture 22 - Introduction to MS-based Proteomics - I (Hands-on session)

Lecture 23 - Introduction to MS-based Proteomics - II (Hands-on session)

Lecture 24 - Data analysis : Normalization

Lecture 25 - Data analysis : Batch Correction and Missing values

Lecture 26 - Data analysis : Statistical Test

Lecture 27 - Genomic Analysis using Droplet PCR - II

Lecture 28 - Topics in Proteogenomics : Malaria case study

Lecture 29 - Machine learning and Clustering

Lecture 30 - Hypothesis testing

Lecture 31 - ProTIGY - I

Lecture 32 - ProTIGY - II

Lecture 33 - Proteomics Data Analysis

Lecture 34 - Proteomics Lab Demonstration - I

Lecture 35 - Proteomics Lab Demonstration - II

Lecture 36 - Workflow to Automated Data Processing

Lecture 37 - Introduction to Fire Cloud

Lecture 38 - FireCloud and Data Model

Lecture 39 - Bioinformatics solutions for Big Data Analysis - I

Lecture 40 - Bioinformatics solutions for Big Data Analysis - II

Lecture 41 - Introduction to Targeted Proteomics

Lecture 42 - Data analysis using Skyline

Lecture 43 - Large-scale data Science - I

Lecture 44 - Large-scale data Science - II

Lecture 45 - Large-scale data Science - III

Lecture 46 - DIA-SWATH Atlas - I

Lecture 47 - DIA-SWATH Atlas - II

Lecture 48 - Prediction Analysis

Lecture 49 - Pathway Enrichment and Network Analysis

Lecture 50 - Human Protein Atlas - I

Lecture 51 - Human Protein Atlas - II

Lecture 52 - Affinity based proteomics & HPA

Lecture 53 - Clinical Considerations for OMICS - I

Lecture 54 - Clinical Considerations for OMICS - II

Lecture 55 - Topics in Proteogenomics: Cancer case study

Lecture 56 - Integrative Genomics Viewer (IGV)

Lecture 57 - Introduction to Proteogenomics - I

Lecture 58 - Introduction to Proteogenomics - II

Lecture 59 - Sequence centric proteogenomics

Lecture 60 - Variant Analysis

Lecture 61 - Proteomics - Clinical Applications

Lecture 62 - Perspectives in Proteogenomics - II

Lecture 63 - Predictive Analysis - I

Lecture 64 - Predictive Analysis - II

Lecture 65 - Association/ Marker Selection

Lecture 66 - WebGestalt - I

Lecture 67 - WebGestalt - II

Lecture 68 - Perspectives in Proteogenomics - III

Lecture 69 - Network Analysis - I

Lecture 70 - Network Analysis - II

Lecture 71 - Mutations and Signaling - I

Lecture 72 - Mutations and Signaling - II

Lecture 73 - Pathway Enrichment - I

Lecture 74 - Perspectives in Proteogenomics - IV

Lecture 75 - Pathway Enrichment - II

Lecture 76 - Sequence - GSEA

Lecture 77 - Linked Omics - I

Lecture 78 - Linked Omics - II

Lecture 79 - Proteogenomics - Opportunities and Challenges

Lecture 80 - Perspectives in Proteogenomics - V

NPTEL : NOC:Interactomics: Basics and Applications (Biotechnology)

Co-ordinators : Prof. Sanjeeva Srivastava

Lecture 1 - Introduction to Proteomics

Lecture 2 - Introduction to Interactomics

Lecture 3 - High throughput platforms of interactomics: Protein arrays

Lecture 4 - Cell-free expression based protein microarrays

Lecture 5 - NAPPA: Recombinational Cloning, Basic workflow, Surface Chemistry, Printing and Assessment

Lecture 6 - NAPPA Technology and Protein Arrays - I

Lecture 7 - NAPPA Technology and Protein Arrays - II

Lecture 8 - Biomarkers: Harnessing the immune system for early detection of disease - I

Lecture 9 - Biomarkers: Harnessing the immune system for early detection of disease - II

Lecture 10 - Biomarkers: Harnessing the immune system for early detection of disease - III

Lecture 11 - NAPPA and its applications in study of antibody immune response in disease and in drug screening - I

Lecture 12 - NAPPA and its applications in study of antibody immune response in disease and in drug screening - II

Lecture 13 - NAPPA and its applications in study of antibody immune response in disease and in drug screening - III

Lecture 14 - Using functional proteomics to identify biomarkers and therapeutic targets - I

Lecture 15 - Using functional proteomics to identify biomarkers and therapeutic targets - II

Lecture 16 - Applications of protein microarrays in Malaria Research - I

Lecture 17 - Applications of protein microarrays in Malaria Research - II

Lecture 18 - Introduction to Bioprinting and IrisOptical QC Benefits - I

Lecture 19 - Introduction to Bioprinting and IrisOptical QC Benefits - II

Lecture 20 - Screening of autoantibody signatures in cancer patients: Lab demonstration

Lecture 21 - Basics of Image Scanning and data acquisition

Lecture 22 - Applications of protein arrays in identification of autoantibody signatures - I

Lecture 23 - Applications of protein arrays in identification of autoantibody signatures - II

Lecture 24 - Applications of protein microarrays in deciphering PTMs and biological networks

Lecture 25 - Basics and Applications of Reverse Phase Protein Arrays - I

Lecture 26 - Basics and Applications of Reverse Phase Protein Arrays - II

Lecture 27 - Basics and Applications of Reverse Phase Protein Arrays - III

Lecture 28 - An overview of label-free technologies

Lecture 29 - Surface Plasmon Resonance - Principles and Assays - I

Lecture 30 - Surface Plasmon Resonance - Principles and Assays - II

Lecture 31 - Basics of SPR: Surface chemistry

Lecture 32 - Basics of SPR: Experimental design

Lecture 33 - Protein immobilization for protein-protein interaction studies

Lecture 34 - Protein-protein interaction study: Binding analysis

Lecture 35 - Protein-protein interaction study: Kinetic analysis

Lecture 36 - Use of SPR in unravelling domain motif interactions of proteasomal assembly chaperones

Lecture 37 - Protein-small molecule interaction study: Immobilization and binding analysis

Lecture 38 - Protein-small molecule interaction study: Kinetic analysis

Lecture 39 - An introduction to biolayer interferometry (BLI)and its applications in protein research

Lecture 40 - Biomolecular interactions using Bio-Layer Interferometry (BLI) - I

Lecture 41 - Biomolecular interactions using Bio-Layer Interferometry (BLI) - II

Lecture 42 - Lab session- An introduction to BioLayer Interferometry (BLI) and its applications in protein research

Lecture 43 - Applications of label-free technologies - II

Lecture 44 - Biomolecular interaction analytics using MicroScale Thermophoresis

Lecture 45 - Mass Spectrometry coupled Interactomics - I

Lecture 46 - Mass Spectrometry coupled Interactomics - II

Lecture 47 - Next-Generation Sequencing Technology - Ion Torrent

Lecture 48 - NGS Technology - Bioinformatics and data analysis - I

Lecture 49 - NGS Technology - Bioinformatics and data analysis - II

Lecture 50 - Next-Generation Sequencing Technology- Illumina

Lecture 51 - Agilent complete NGS target enrichment workflow for exomes, targeted panels and beyond

Lecture 52 - The Human Pathology Atlas: A Pathology Atlas of the Human Transcriptome - I

Lecture 53 - The Human Pathology Atlas: A Pathology Atlas of the Human Transcriptome - II

Lecture 54 - Statistical Analysis - I

Lecture 55 - Statistical Analysis - II

Lecture 56 - Secondary Data Analysis

Lecture 57 - Pathway Enrichment and Network Analysis

Lecture 58 - Data Repositories and Databases

Lecture 59 - Application of multi-omics approach for better understanding of cancers

Lecture 60 - Integrated Omics and Systems Biology- Conclusion

NPTEL : NOC:Maternal Infant Young Child Nutrition (Biotechnology)

Co-ordinators : Prof. Rupal Dalal

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

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Lecture 54

Lecture 55

Lecture 56

Lecture 57

Lecture 58

Lecture 59

Lecture 60

Lecture 61

NPTEL : NOC:Maternal Infant Young Child Nutrition (Hindi) (Biotechnology)

Co-ordinators : Prof. Rupal Dalal

Lecture 1 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤à¤¨à¤šà¤«à¤à¤, 5 à¤¡à¥‡à¤Ÿà¤¾

Lecture 2 - à¤¡à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤•à¤¾à¤°à¥à¤¯à¤° à¤¸à¥‡ à¤¸à¤¾à¤•à¥à¤·à¥à¤¯

Lecture 3 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤®à¤¾à¤¤à¤¾ à¤¶à¤¿à¤¶à¥ à¤¯à¥à¤µà¤¾ à¤¬à¤¾à¤¹à¤¾à¤° à¤•à¥€ à¤°à¥,à¤ªà¤°à¥‡à¤–à¤¾ à¤”à¤° à¤•à¥à¤·à¤®à¤¤à¤¾ à¤¨à¤¿à¤°à¥à¤®à¤¾à¤£

Lecture 4 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤²à¤¾à¤‡à¤µ à¤¸à¥‡à¤¶à¤¨

Lecture 5 - à¤¡à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤ªà¤¹à¤²à¥‡ à¤ªà¥à¤°à¤•à¤¾à¤° à¤”à¤° à¤¡à¥,à¤¸à¤°à¥‡ à¤ªà¥à¤°à¤•à¤¾à¤° à¤•à¥‡ à¤ªà¥à¤•à¤·à¤• à¤¤à¤¤à¥à¤µ - à¤¹à¥‡à¤²à¥à¤¥ à¤¸à¥à¤ªà¥‹à¤•à¤¨ à¤Ÿà¥à¤¯à¤¾à¥,à¤Ÿà¥‹à¤°à¤¿à¤¯à¤²

Lecture 6 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤ªà¥à¤°à¥‹à¥€à¤¨ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 7 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤•à¥‹à¤²à¥€à¤¨ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 8 - à¤ªà¤¾à¤¸à¤šà¤µà¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤«à¥‹à¤²à¥‡à¤Ÿ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 9 - à¤›à¤ à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¬à¥€ 12 à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 10 - à¤¸à¤¾à¤¤à¤µà¤¾à¤, à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥‡à¤²à¥‡à¤¨à¤¿à¤¯à¤® à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ à¤µà¤¿à¤Ÿà¤¾à¤®à¤¿à¤¨ à¤ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 11 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤•à¥^à¤²à¥à¤¶à¤¿à¤¯à¤® à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 12 - à¤¡à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤®à¥^à¤—à¥à¤¨à¥€à¤¶à¤¿à¤¯à¤® à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 13 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤ªà¥‹à¤·Ÿà¥‡à¤¶à¤¿à¤¯à¤® à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 14 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤œà¤,à¤• à¤«à¥,à¤¡

Lecture 15 - à¤ªà¤¾à¤,à¤šà¤µà¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤‡à¤,à¤¸à¥à¤²à¤¿à¤¨ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 16 - à¤›à¤ à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤®à¥^à¤•à¥à¤°à¥‹à¤¨à¥à¤¯à¤¾à¥,à¤Ÿà¥à¤°à¤¿à¤à¤,à¤Ÿà¥à¤¤, à¤•à¤¾ à¤ªà¤°à¤¿à¤šà¤¯

Lecture 17 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤ªà¤¹à¤²à¥‡ 1,000 à¤¦à¤¿à¤¨

Lecture 18 - à¤¡à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤—à¤°à¥à¤à¤µà¤¤à¥€ à¤®à¤¹à¤¿à¤²à¤¾à¤“ à¤•à¥‡ à¤²à¤¿à¤ à¥›à¤°à¥,à¤°à¥€ à¤ªà¥‹à¤·à¤£ à¤•à¥à¤°à¤¿à¤¯à¤¾à¤

Lecture 19 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤†à¤¯à¤¾ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 20 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤µà¤¿à¤Ÿà¤¾à¤®à¤¿à¤¨ à¤,à¥€ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 21 - à¤ªà¤¾à¤,à¤šà¤µà¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¤²à¥à¤«à¤° à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 22 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤¾à¤¨ à¤•à¤¾ à¤µà¤¿à¤œà¥à¤žà¤¾à¤¨

Lecture 23 - à¤¡à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¨à¤¹à¤°à¤¾ à¤˜à¤,à¤Ÿà¤¾ à¤”à¤° à¤–à¥€à¤, à¤ªà¤¿à¤²à¤¾à¤¨à¥‡ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 24 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤¾à¤¨ à¤•à¤¾ à¤®à¤¹à¤¤à¥à¤µ

Lecture 25 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¬à¥à¤°à¥‡à¤¸à¥à¤Ÿ à¤•à¥à¤°à¥‰à¤²

Lecture 26 - à¤ªà¤¾à¤,à¤šà¤µà¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤¾à¤¨ à¤•à¥€ à¤°à¤•à¥à¤·à¤¾ à¤•à¥‡ à¤²à¤¿à¤¯à¥‡ à¤¬à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¤¾ à¤¤à¤¤à¥à¤µ à¤¬à¤¾à¤°à¤¤à¥€à¤¯ à¤•à¤¾à¤¨à¤¾à¤¨

Lecture 27 - à¤›à¤ à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¨à¤µà¤œà¤¾à¤¤ à¤¶à¤¿à¤¶à¥ à¤•à¥‡ à¤²à¥‡à¤––à¤à¤¾à¤² à¤•à¥€ à¥›à¤°à¥,à¤°à¥€ à¤¬à¤¾à¤¤à¤µà¤¾à¤, - à¤¨à¤µà¤œà¤¾à¤¤ à¤¶à¤¿à¤‹ à¤¨à¤¹à¤²à¤¾à¤¨à¥‡ à¤•à¤¾ à¤¤à¤¤à¥à¤µ à¤¤à¤°à¥€à¤•à¤¾

Lecture 28 - à¤¸à¤¾à¤®à¤¾à¤¨à¥à¤•à¤° : à¤•à¤¤à¤—à¤¾à¤°à¥, à¤®à¤¹à¤° à¤•à¥‡à¤¯à¤° - à¤Ÿà¥‹à¤ªà¥€ à¤•à¥‡ à¤¸à¤¾à¤¥ à¤•à¤¤à¤—à¤¾à¤°à¥, à¤¬à¥ˆà¤— à¤¬à¤¨à¤¾à¤¤à¥‡ à¤•à¤¾ à¤¤à¤°à¥€à¤•à¤¾

Lecture 29 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¤° : à¤®à¤¾à¤ à¤•à¥€ à¤¤à¥ˆà¤¯à¤°à¥€ à¤”à¤° à¤¬à¤šà¥à¤šà¥‡ à¤•à¥€ à¤¸à¥à¤¿à¤¤à¤¿

Lecture 30 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¤° : à¤¸à¥à¤¤à¤¨ à¤•à¥‹ à¤ªà¤•à¤¡à¤¼à¤¨à¤¾ à¤”à¤° à¤¬à¤šà¥à¤šà¥‡ à¤•à¥‹ à¤¸à¥à¤¤à¤¨ à¤¸à¥‡ à¤²à¤—à¤¨à¤¾

Lecture 31 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¤° : à¤…à¤¨à¥à¤¯ à¤ªà¤°à¤¾à¤®à¤°à¥à¤¶ à¤¬à¤¿à¤¤à¥

Lecture 32 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¤° : à¤•à¥à¤°à¥‰à¤¸ à¤•à¥à¤°à¥‡à¤¡à¤¿à¤² à¤¸à¥à¤¥à¤¿à¤¿ à¤”à¤° à¤²à¥ˆà¤šà¤¿à¤¸à¤— à¤ªà¤° à¤¹à¥‡à¤²à¥à¤¥ à¤¸à¥à¤ªà¥‹à¤•à¤° à¤Ÿà¥à¤¯à¤¨à¥‹à¤Ÿà¥‹à¤°à¤¿à¤¯à¤²

Lecture 33 - à¤ªà¤¾à¤¸à¤šà¤µà¤¾ à¤²à¥‡à¤•à¤°à¤šà¤°: à¤•à¥à¤°à¥‰à¤¸ à¤•à¥à¤°à¥‡à¤¡à¤¿à¤² à¤¸à¥à¤¥à¤¿à¤¿ à¤®à¥‡à¤¡à¤¿à¤¸à¤¨à¥à¤¸à¥‡ à¤•à¥‹ à¤¦à¥,à¤§ à¤ªà¤¿à¤²à¤¾à¤¨à¥‡ à¤®à¥‡à¤¡à¤¿, à¤†à¤¨à¥‡ à¤µà¤¾à¤²à¥€ à¤¸à¤¾à¤¥à¤¿, à¤•à¤¾ à¤¸à¤®à¤¾à¤§à¤¾à¤¨

Lecture 34 - à¤›à¤¾ à¤²à¥‡à¤•à¤° : à¤¸à¥à¤¥à¤¿à¤¿à¤¿ à¤”à¤° à¤—à¤¹à¤°à¥‡ à¤œà¥à¤¡à¤¼à¤¾à¤µ à¤•à¥‡ à¤²à¤¿à¤‡à¤¨à¤¿à¤¯à¤®à¥‹à¤¨

Lecture 35 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¥‡ à¤²à¤¿à¤¿ à¤«à¥à¤Ÿà¤¬à¥‰à¤² à¤ªà¤•à¤¡à¤¼

Lecture 36 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤à¤• à¤¤à¤°à¤« à¤²à¥‡à¤Ÿ à¤•à¤° à¤¸à¥à¤¤à¤¨à¤¾à¤¨ à¤•à¤°à¤¾à¤¨à¥‡ à¤•à¥€ à¤•à¤¡à¤¼

Lecture 37 - à¤¤à¥€à¤¸,à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¤¾à¤°à¤à¤•à¤, à¤”à¤° à¤…à¤¨à¥à¤¯ à¤•à¤¾à¤°à¤•à¥‹, à¤•à¥‡ à¤•à¤¾à¤°à¤£ à¤•à¤® à¤µà¥›à¤¨ à¤¬à¥à¤¨à¤¾|

Lecture 38 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¤° : à¤•à¥‹à¤µà¤¿à¤¡ - 19 à¤•à¥‡ à¤¦à¥Œà¤°à¤¾à¤¨ à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨

Lecture 39 - à¤ªà¤¾à¤¸à¤šà¤µà¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¹à¤¾à¥ à¤¸à¥‡ à¤¸à¥à¤¤à¤¨ à¤•à¤¾ à¤¦à¥,à¤§ à¤¤à¤¿à¤¨à¤¿à¤¯à¤®à¤¿à¤¤ à¤•à¤°à¤¾à¤¨à¤¾

Lecture 40 - à¤›à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¤°à¤¾à¤¤à¥€ à¤®à¤¾à¤“à¤, à¤•à¥‡ à¤¨à¤¿à¤ªà¥à¤ªà¤² à¤•à¥€ à¤¸à¥à¤¥à¤¿à¤¤à¤¿

Lecture 41 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¤°-à¤… : 6 à¤¸à¥‡ 24 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¶à¤¿à¤•à¥à¤“à¤, à¤•à¥‡ à¤²à¤¿à¤ à¤ªà¤¹à¤²à¤¾ à¤•à¤¦à¤® à¤†à¤¹à¤¾à¤°à¤• à¤•à¥‡ à¤¸à¤¾à¤¥ à¤¸à¤¾à¤¥ à¤¬à¤¨à¤¾à¤¨à¤¾ à¤¹à¥‹à¤—à¤¾-à¤¨à¤¿à¤°à¥à¤¯à¤¿à¤¤à¤¾

Lecture 42 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¶à¤¿à¤¶à¥ à¤•à¤¾ à¤–à¤¾à¤¨à¤¾ à¤¬à¤¨à¤¾à¤¨à¥‡ à¤”à¤° à¤–à¤¿à¤²à¤¾à¤¨à¤¾ à¤¹à¥à¤¨ à¤–à¥à¤¡ à¤•à¥€ à¤¤à¤«à¤¾à¤ à¤•à¥€ à¥›à¤°à¥,à¤°à¤¤

Lecture 43 - à¤¤à¥€à¤¸,à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : 6 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¬à¤šà¥à¤šà¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤”à¤° à¤®à¤¾à¤¤à¤,à¤¸à¤¾à¤¹à¥à¤¯à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¬à¤¨à¤¾à¤¨à¥‡ à¤¤à¤°à¥€à¤•à¥‡

Lecture 44 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¤°-à¤… : 7 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¬à¤šà¥à¤šà¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤¤à¤°à¥€à¤•à¥‡

Lecture 45 - à¤ªà¤¾à¤¸à¤šà¤µà¤¾ à¤²à¥‡à¤•à¤°-à¤… : 8 à¤¸à¥‡ 11 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¬à¤¿à¤¨à¤¾à¤¨à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤¤à¤°à¥€à¤•à¥‡

Lecture 46 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤ªà¥,à¤°à¤• à¤†à¤¹à¤¾à¤° à¤•à¥‡ à¤¦à¥Œà¤°à¤¾à¤¨ à¤¹à¥‹à¤›à¤¨à¥‡ à¤µà¤¾à¤²à¥€ à¤®à¤¾à¤²à¥€ à¤®à¤¾à¤¨à¤¾à¤¨,

Lecture 47 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : 12 à¤¸à¥‡ 18 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¬à¤¿à¤¨à¤¾à¤¨à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡|

Lecture 48 - à¤¤à¥€à¤¸,à¤°à¤¾ à¤²à¥‡à¤•à¤°-à¤… : 19 à¤¸à¥‡ 24 à¤®à¤¹à¥€à¤¨à¥‡ à¤•à¥‡ à¤¬à¤¿à¤¨à¤¾à¤¨à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡ |

Lecture 49 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤¬à¤šà¥à¤šà¥‹, à¤•à¥‡ à¤ªà¤¾à¤¾à¤°à¥à¤Ÿà¤¿à¤¯à¤¨à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¥à¤µà¤¾à¤¿à¤¿à¤·à¥à¤Ÿ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡ |

Lecture 50 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¤°-à¤… : à¤•à¤¿à¤¶à¥‹à¤°à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤¶à¤¿à¤•à¤¾à¤¨à¤¾à¤¹à¥€ à¤”à¤° à¤®à¤¾à¤¨à¤¾à¤¹à¥€ à¤–à¤¾à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡| à¤ªà¥,à¤°à¥à¤µ à¤—à¤°à¥à¤-

à¤¾à¤µà¤¸à¥à¤¥à¤¾ à¤ªà¥‹à¤·à¤£

Lecture 51 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤—à¤°à¥à¤à¤µà¤¤à¤¿à¤¯à¥‹, à¤•à¥‡ à¤²à¤¿à¤ à¤ªà¥Œà¤·à¥à¤Ÿà¤¿à¤• à¤¶à¤¾à¤•à¤¾à¤¹à¤¾à¤°à¥€ à¤”à¤° à¤®à¤¾à¤‚à¤¸à¤¾à¤¹à¤¾à¤°à¥€ à¤–à¤¾à¤¨à¤¾ à¤¬à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡

Lecture 52 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¤°à¤¾à¤¨à¥‡ à¤µà¤¾à¤²à¥€ à¤®à¤¾à¤²à¥€ à¤®à¤¾à¤“à¤¸, à¤•à¥‡ à¤²à¤¿à¤ à¤ªà¥Œà¤·à¥à¤Ÿà¤¿à¤• à¤¶à¤¾à¤•à¤¾à¤¹à¤¾à¤°à¥€ à¤”à¤° à¤®à¤¾à¤‚à¤¸à¤¾à¤¹à¤¾à¤°à¥€ à¤–à¤¾à¤¨à¤¾ à¤¬à¤¨à¤¾à¤¨à¥‡ à¤•à¥‡ à¤¤à¤°à¥€à¤•à¥‡

Lecture 53 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¡à¤¾à¤¯à¤²à¤¾à¤¸à¤¿à¤“ à¤¬à¤¹à¥à¤•à¥‡à¤¤à¤¾à¤¨à¤¿à¤¯à¤°à¥€à¤¯ à¤µà¤¿à¤¶à¤•à¤¾à¤¯à¤¤à¤¾à¤¨à¤¿ à¤¤à¤¾à¤¨à¤¾à¤¶à¤¾à¤¹à¤¾à¤°à¥€ à¤…à¤§à¥à¤¯à¤¯à¤¨ à¤¸à¤¤à¥à¤°à¤¾à¤¨à¥à¤¸à¤¾à¤¨ (1997-2003)| à¤ªà¥à¤°à¤¤à¤¿à¤¯à¥‹à¤à¤¿à¤• à¤µà¥ƒà¤¹à¥à¤¸à¤¿à¤¿ à¤¤à¤¾à¤¨à¤¾à¤¶à¤¾à¤¹à¤¾à¤°à¥€

Lecture 54 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤®à¤¾à¤¨à¤¾à¤• à¤¸à¤¾à¤®à¤¾à¤¨à¥à¤¯ à¤µà¤¿à¤¶à¤²à¤¾| à¤¡à¤¾à¤¯à¤²à¤¾à¤¸à¤¿à¤“ à¤œà¥‡à¤¡ à¤¸à¥à¤•à¤¾à¤°à¥à¤Ÿ à¤•à¤° à¤¬à¤¾à¤°à¥‡ à¤•à¤¾à¤°à¥€

Lecture 55 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤°:à¤¡à¤¾à¤¯à¤²à¤¾à¤¸à¤¿à¤“-à¤‰à¤®à¥à¤•à¤° à¤•à¥‡ à¤¹à¤¿à¤¤ à¤¸à¤¾à¤¨ à¤¸à¥‡ à¤µà¥›à¤¨ à¤”à¤° à¤²à¤¾à¤‚à¤¸à¤¾à¤ˆ à¤µà¥ƒà¤¹à¥à¤¸à¤¿à¤“ à¤œà¥‡à¤¡ à¤ªà¤° à¤¬à¤¨à¥‡ à¤¸à¥à¤ªà¥‹à¤•à¤¨ à¤Ÿà¥à¤¯à¥‚à¤Ÿà¥‹à¤°à¤¿à¤¯à¤²à¥

Lecture 56 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤à¤¸à¥à¤¥à¤°à¥‹à¥›à¤ªà¥›à¤®à¥‡à¤Ÿà¥à¤°à¤¿à¤• à¤®à¤¾à¤ª

Lecture 57 - à¤ªà¤¹à¤²à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¥‡ à¤²à¤¿à¤ à¥ªà¥« à¤ªà¤°à¤¾à¤®à¤°à¥à¤¶ à¤¬à¤¿à¤¸à¤¾à¤¦ - à¤à¤¾à¤— 1

Lecture 58 - à¤¦à¥,à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤•à¥‡ à¤²à¤¿à¤ à¥ªà¥« à¤ªà¤°à¤¾à¤®à¤°à¥à¤¶ à¤¬à¤¿à¤¸à¤¾à¤¦ - à¤à¤¾à¤— 2| à¤¸à¥à¤¤à¤¨à¤ªà¤¾à¤¨ à¤®à¥,à¤²à¥à¤¯à¤¾à¤‚à¤•à¤¨ à¤«à¥‰à¤°à¥à¤®

Lecture 59 - à¤¤à¥€à¤¸à¤°à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤ªà¥‹à¤·à¤£ à¤šà¤¾à¤°à¥à¤Ÿ

Lecture 60 - à¤šà¥Œà¤¥à¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤²à¤°à¥à¤¿à¤,à¤— à¤à¤•à¥à¤¶à¤¨ à¤ªà¥à¤°à¥‹à¥›à¤Ÿà¥›à¤•à¥‰à¤² - à¤à¤¾à¤— 1

Lecture 61 - à¤ªà¤¾à¤,à¤šà¤µà¤¾ à¤²à¥‡à¤•à¥à¤šà¤° : à¤²à¤°à¥à¤¿à¤,à¤— à¤à¤•à¥à¤¶à¤¨ à¤ªà¥à¤°à¥‹à¥›à¤Ÿà¥›à¤•à¥‰à¤² - à¤-à¤¾à¤— 2

Lecture 62 - à¤›à¤ à¤¾à¥‡à¤•à¥à¤šà¤° : à¤®à¤¾à¤¤à¥ƒ, à¤¶à¤¿à¥¶à¥ à¤”à¤° à¤¬à¤¾à¤² à¤ªà¥›à¤·à¤£ à¤•à¥‡ à¤ªà¥à¤°à¤®à¥à¤–à¤¬à¤¿à¥¶à¥

NPTEL : Enzyme Science and Engineering (Biotechnology)

Co-ordinators : Prof. Subhash Chand

Lecture 1 - Introduction and Scope to Enzyme Science and Engineering

Lecture 2 - Characteristic Features of Enzymes

Lecture 3 - Enzymes as Biocatalysts

Lecture 4 - Enzymatic Catalysis

Lecture 5 - Specificity of Enzyme Action

Lecture 6 - Kinetics of Enzyme Catalyzed Reactions

Lecture 7 - Kinetics of Enzyme Catalyzed Reactions

Lecture 8 - Deviation from Hyperbolic Enzyme Kinetics

Lecture 9 - Role of Effector Molecules in Enzyme Kinetics

Lecture 10 - Reversible Inhibition

Lecture 11 - Effect of PH and Temperature on Enzyme

Lecture 12 - Kinetics of Bi substrate Enzyme

Lecture 13 - Kinetics of Bi substrate Enzyme

Lecture 14 - Immobilized Enzymes - I

Lecture 15 - Immobilized Enzymes - II

Lecture 16 - Immobilized Enzymes - III

Lecture 17 - Immobilization of Enzymes by Entrapment

Lecture 18 - Effect of Immobilization

Lecture 19 - Reactors for Enzyme Catalyzed Reactions

Lecture 20 - Idealized Enzyme Reactor Performance

Lecture 21 - Idealized Enzyme Reactor Performance

Lecture 22 - Kinetic Parameters for IME Systems

Lecture 23 - Steady State Analysis of Mass Transfer

Lecture 24 - Steady State Analysis of Mass Transfer

Lecture 25 - Non Ideal Flow in Continuous Immobilized Enzyme

Lecture 26 - Applications of Immobilized Enzymes in Process

Lecture 27 - Analytical Applications

Lecture 28 - Enzyme Technology Challenges

NPTEL : NOC:Introduction to Dynamical Models in Biology (Biotechnology)

Co-ordinators : Prof. Biplab Bose

Lecture 1 - Mathematical modeling in Biology

Lecture 2 - How to Start Modeling

Lecture 3 - Modeling the spread of infectious disease

Lecture 4 - Modeling population growth

Lecture 5 - Numerical solution of ODE-1

Lecture 6 - Numerical solution of ODE-2

Lecture 7 - Simulating ODE-based models: Introduction to JSim

Lecture 8 - Simulating ODE-based models: Examples of simulation in JSim

Lecture 9 - Steady state and stability analysis: Understanding Steady State

Lecture 10 - Steady state and stability analysis: Stability of Steady States

Lecture 11 - Phase Plane Analysis - I

Lecture 12 - Phase Plane Analysis - II

Lecture 13 - Concepts of Bifurcation:Introduction

Lecture 14 - Concepts of Bifurcation:Bifurcation in Biological Systems

Lecture 15 - Modeling Molecular Processes in Cell: Introduction

Lecture 16 - Modeling Molecular Processes in Cell: Receptor-Ligand Interaction

Lecture 17 - Modeling Molecular Processes in Cell: Enzymatic Processes

Lecture 18 - Modeling Molecular Processes in Cell: Transcription and Translation

Lecture 19 - Modeling Cell Signaling: Negative Feedback Motif

Lecture 20 - Modeling Cell Signaling: Positive Feedback Motif

Lecture 21 - Modeling Cell Signaling: Incoherent Feedforward Motif

Lecture 22 - Modeling Transcriptional Circuits-1

Lecture 23 - Modeling Transcriptional Circuits-2

Lecture 24 - Online Resources for Mathematical Modeling in Biology

NPTEL : NOC:Genetic Engineering: Theory and Application (Biotechnology)

Co-ordinators : Dr. Vishal Trivedi

Lecture 1 - Cellular Structure - Part I

Lecture 2 - Cellular Structure - Part II

Lecture 3 - Cellular Structure - Part III

Lecture 4 - Metabolic Reactions in Biological System

Lecture 5 - Growth Media For Different Expression System

Lecture 6 - Microbial Growth Kinetics

Lecture 7 - Isolation of a Gene Fragment - Part I

Lecture 8 - Isolation of a Gene Fragment - Part II

Lecture 9 - Isolation of a Gene Fragment - Part III

Lecture 10 - Polymerase Chain Reaction

Lecture 11 - Molecular Tools for Cloning

Lecture 12 - Cloning Vectors - I

Lecture 13 - Cloning Vectors - II

Lecture 14 - DNA Delivery In Host - Part I

Lecture 15 - DNA Delivery In Host - Part II

Lecture 16 - Screening of Recombinant Clones

Lecture 17 - Protein Production in Host - Part 1

Lecture 18 - Protein Production in Host - Part 2

Lecture 19 - Protein Production in Host - Part 3

Lecture 20 - Product Recovery from Host Cells

Lecture 21 - Basics of Chromatography - Part 1

Lecture 22 - Basics of Chromatography - Part 2

Lecture 23 - Ion-exchange Chromatography

Lecture 24 - Hydrophobic Interaction Chromatography

Lecture 25 - Gel Filtration chromatography - Part 1

Lecture 26 - Gel Filtration chromatography - Part 2

Lecture 27 - Affinity Chromatography - Part 1

Lecture 28 - Affinity Chromatography - Part 2

Lecture 29 - Affinity Chromatography - Part 3

Lecture 30 - Affinity Chromatography - Part 4

Lecture 31 - Electrophoresis - Part 1

Lecture 32 - Electrophoresis - Part 2

Lecture 33 - Electrophoresis - Part 3

Lecture 34 - Protein Sequencing

Lecture 35 - Spectroscopy - Part I

Lecture 36 - Spectroscopy - Part II

Lecture 37 - Biotechnology Applications - Part 1

Lecture 38 - Biotechnology Applications - Part 2

Lecture 39 - Biotechnology Applications - Part 3

Lecture 40 - Summary and Conclusions - Part 1

Lecture 41 - Summary and Conclusions - Part 2

NPTEL : NOC:Experimental Biotechnology (Biotechnology)

Co-ordinators : Dr. Vishal Trivedi

Lecture 1 - Good Lab Practices - Part 1

Lecture 2 - Good Lab Practices - Part 2

Lecture 3 - Operation of Laboratory Instruments - Part 1

Lecture 4 - Operation of Laboratory Instruments - Part 2

Lecture 5 - Operation of Laboratory Instruments - Part 3

Lecture 6 - Solution and Buffer Preparation

Lecture 7 - Basics of Electrophoresis - Part 1

Lecture 8 - Basics of Electrophoresis - Part 2

Lecture 9 - Horizontal Gel Electrophoresis

Lecture 10 - Different Varients of Gel Electrophoresis

Lecture 11 - Scientific Questions - Part 1

Lecture 12 - Scientific Questions - Part 2

Lecture 13 - Scientific Questions - Part 3

Lecture 14 - Scientific Questions - Part 4

Lecture 15 - Basics of Chromatography - Part 1

Lecture 16 - Basics of Chromatography - Part 2

Lecture 17 - Ion-Exchange Chromatography - Part 1

Lecture 18 - Ion-Exchange Chromatography - Part 2

Lecture 19 - Hydrophobic Interaction Chromatography

Lecture 20 - Gel Filtration Chromatography - Part 1

Lecture 21 - Gel Filtration Chromatography - Part 2

Lecture 22 - Gel Filtration Chromatography - Part 3

Lecture 23 - Affinity Chromatography - Part 1

Lecture 24 - Affinity Chromatography - Part 2

Lecture 25 - Affinity Chromatography - Part 3

Lecture 26 - Affinity Chromatography - Part 4

Lecture 27 - Antibody Generation

Lecture 28 - Antibody-Antigen Interaction - Part 1

Lecture 29 - Immunoassay

Lecture 30 - Antibody-Antigen Interaction - Part 2

Lecture 31 - Antibody-Antigen Interaction - Part 3

Lecture 32 - Cell Culture Medium

Lecture 33 - Cell Fractionation

Lecture 34 - Microscopy - Part 1

Lecture 35 - Microscopy - Part 2

Lecture 36 - Cell Biology Experiments

Lecture 37 - Flow Cytometry

Lecture 38 - Polymerase Chain Reaction - Part 1

Lecture 39 - Polymerase Chain Reaction - Part 2

Lecture 40 - Polymerase Chain Reaction - Part 3

Lecture 41 - Polymerase Chain Reaction - Part 4

Lecture 42 - Sequencing Techniques

Lecture 43 - Blotting Techniques - Part 1

Lecture 44 - Blotting Techniques - Part 2

Lecture 45 - Designing Experiments

NPTEL : NOC:Biointerface Engineering (Biotechnology)

Co-ordinators : Prof. Lalit M. Pandey

Lecture 1 - Intermolecular Forces

Lecture 2 - Classification of Intermolecular Forces

Lecture 3 - Thermodynamics Aspects of Intermolecular Forces

Lecture 4 - Surface Tension and Energy

Lecture 5 - Wettability

Lecture 6 - Adhesion and Cohesion

Lecture 7 - Methods for Surface Tension Measurement

Lecture 8 - Methods for Contact Angle Measurement

Lecture 9 - Determination of Surface Tension of Solids

Lecture 10 - Protein Adsorption

Lecture 11 - Characterization of Protein Adsorption

Lecture 12 - Kinetics of Protein Adsorption

Lecture 13 - Aggregation of Proteins

Lecture 14 - Kinetics of Protein Aggregation

Lecture 15 - Effect of Surfaces on the Aggregation of Protein

Lecture 16 - Host Responses to Biomaterials

Lecture 17 - Cell Adhesion

Lecture 18 - Biocompatibility of Biomaterials

Lecture 19 - Surface Modification

Lecture 20 - Surface Modification Techniques

Lecture 21 - Coating of Calcium Phosphates on Ti-6Al-4V

Lecture 22 - Surface Characterization

Lecture 23 - Self-Assembled Monolayers

Lecture 24 - Effect of SAMs on Biointerfacial Interactions

NPTEL : NOC:Basics of Biology (Biotechnology)

Co-ordinators : Prof. Vishal Trivedi

Lecture 1 - Introduction to Living Organisms

Lecture 2 - Classification of Living Organisms - Part 1

Lecture 3 - Classification of Living Organisms - Part 2

Lecture 4 - Classification of Living Organisms - Part 3

Lecture 5 - Classification of Living Organisms - Part 4

Lecture 6 - Origin of Life - Part 1

Lecture 7 - Origin of Life - Part 2

Lecture 8 - Evolution - Part 1

Lecture 9 - Evolution - Part 2

Lecture 10 - Evolution - Part 3

Lecture 11 - Basics of Cells - Part 1

Lecture 12 - Basics of Cells - Part 2

Lecture 13 - Basics of Cells - Part 3

Lecture 14 - Cell Division and regulation

Lecture 15 - Nucleic acids

Lecture 16 - Carbohydrates - Part 1

Lecture 17 - Carbohydrates - Part 2

Lecture 18 - Carbohydrates - Part 3

Lecture 19 - Lipids

Lecture 20 - Proteins - Part 1

Lecture 21 - Proteins - Part 2

Lecture 22 - Proteins - Part 3

Lecture 23 - Proteins - Part 4

Lecture 24 - Central Dogma of Life

Lecture 25 - Replication

Lecture 26 - Polymerase chain reaction

Lecture 27 - Transcription - Part 1

Lecture 28 - Transcription - Part 2

Lecture 29 - Translation - Part 1

Lecture 30 - Translation - Part 2

Lecture 31 - Immune system - Part 1

Lecture 32 - Immune system - Part 2

Lecture 33 - Phagocytosis

Lecture 34 - Cell Death and Apoptosis

Lecture 35 - Vesicular Transport

Lecture 36 - Digestion - Part 1

Lecture 37 - Digestion - Part 2

Lecture 38 - Digestion - Part 3

Lecture 39 - Circulatory System - Part 1

Lecture 40 - Circulatory System - Part 2

Lecture 41 - Muscular System - Part 1

Lecture 42 - Muscular System - Part 2

Lecture 43 - Nervous System - Part 1

Lecture 44 - Nervous System - Part 2

Lecture 45 - Nervous System - Part 3

Lecture 46 - Homeostasis - Part 1

Lecture 47 - Homeostasis - Part 2

Lecture 48 - Homeostasis - Part 3

Lecture 49 - Summary and Conclusions - Part 1

Lecture 50 - Summary and Conclusions - Part 2

NPTEL : NOC:Data Analysis for Biologists (Biotechnology)

Co-ordinators : Prof. Biplab Bose

Lecture 1 - Rules of probability

Lecture 2 - Discrete probability distribution

Lecture 3 - Continuous probability distribution

Lecture 4 - Moments: mean and variance

Lecture 5 - Moments: variance and covariance

Lecture 6 - Bayes theorem and likelihood

Lecture 7 - Concept of statistical tests

Lecture 8 - Vector and vector operations

Lecture 9 - Matrix and matrix operations

Lecture 10 - Determinant and Inverse of a matrix

Lecture 11 - Eigenvalue and eigenvector

Lecture 12 - Linear system of equations

Lecture 13 - Singular value decomposition

Lecture 14 - Getting ready with R

Lecture 15 - Algebraic and logical operations in R

Lecture 16 - Reading and writing data

Lecture 17 - Statistics using R - descriptive statistics

Lecture 18 - Statistics using R - t-test and ANOVA

Lecture 19 - Linear algebra using R

Lecture 20 - Scatter plot, Line plot and Bar plot

Lecture 21 - Histogram and Box plot

Lecture 22 - Heatmap and Volcano plot

Lecture 23 - Network visualization

Lecture 24 - Data visualization using ggplot2 - I

Lecture 25 - Data visualization using ggplot2 - II

Lecture 26 - Correlations

Lecture 27 - Linear regression - I

Lecture 28 - Linear regression - II

Lecture 29 - Linear regression using R

Lecture 30 - Multiple linear regression

Lecture 31 - Multiple linear regression using R

Lecture 32 - Nonlinear regression

Lecture 33 - Nonlinear regression using R

Lecture 34 - Clustering and classification

Lecture 35 - Logistic regression

Lecture 36 - Logistic regression using R

Lecture 37 - Distance mesaures for clustering

Lecture 38 - k-means clustering

Lecture 39 - k-means clustering using R

Lecture 40 - Hierarchical clustering

Lecture 41 - Hierarchical clustering using R

Lecture 42 - Decision tree classifier

Lecture 43 - Support vector machines

Lecture 44 - Higher-dimensional data in biology

Lecture 45 - Principle component analysis

Lecture 46 - Principle component analysis using R

Lecture 47 - t-SNE

Lecture 48 - t-SNE using R

Lecture 49 - Diffusion maps

NPTEL : NOC:Genome Editing and Engineering (Biotechnology)

Co-ordinators : Prof. Utpal Bora

Lecture 1 - Introduction: Genes and Genome Organization

Lecture 2 - History and Basics of Genetic Engineering

Lecture 3 - Advantages and Limitations of Genetic Engineering

Lecture 4 - Breakage of Genomic DNA

Lecture 5 - Repair of Genomic DNA

Lecture 6 - Homologous and non homologous recombination

Lecture 7 - Site specific recombination

Lecture 8 - Targeted genetic modification - I

Lecture 9 - Targeted genetic modification - II

Lecture 10 - Basics of Zinc Finger Nucleases

Lecture 11 - Design of Zinc Finger Nucleases for genome editing

Lecture 12 - Applications of Zinc Finger Nucleases - Part A

Lecture 13 - Applications of Zinc Finger Nucleases - Part B

Lecture 14 - Basics of TALEN - Part A

Lecture 15 - Basics of TALEN - Part B

Lecture 16 - Design of TALEN for genome editing - Part A

Lecture 17 - Design of TALEN for genome editing - Part B

Lecture 18 - Application of TALEN - Part A

Lecture 19 - Application of TALEN - Part B

Lecture 20 - CRISPR system in bacteria - Part A

Lecture 21 - CRISPR system in bacteria - Part B

Lecture 22 - CRISPR/Cas9 in Genome Editing - Part A

Lecture 23 - CRISPR/Cas9 in Genome Editing - Part B

Lecture 24 - Applications of CRISPR/Cas9 - Part A

Lecture 25 - Applications of CRISPR/Cas9 - Part B

Lecture 26 - Computational Resources for CRISPR / Cas - Part A

Lecture 27 - Computational Resources for CRISPR / Cas - Part B

Lecture 28 - Human cell engineering in diseases : Thalassemia - Part A

Lecture 29 - Human cell engineering in diseases : Thalassemia - Part B

Lecture 30 - Human cell engineering in diseases : Severe combined immunodeficiency (SCID) - Part A

Lecture 31 - Human cell engineering in diseases : Severe combined immunodeficiency (SCID) - Part B

Lecture 32 - Human cell engineering in diseases : Hemophilia - Part A

Lecture 33 - Human cell engineering in diseases : Hemophilia - Part B

Lecture 34 - Animal models - Part A

Lecture 35 - Animal models - Part B

Lecture 36 - iPSc models - Part A

Lecture 37 - iPSc models - Part B

Lecture 38 - Cancer disease models - Part A

Lecture 39 - Cancer disease models - Part B

Lecture 40 - Engineered immune cells for Cancer therapy (I) - Part A

Lecture 41 - Engineered immune cells for Cancer therapy (I) - Part B

Lecture 42 - Engineered immune cells for Cancer therapy (II) - Part A

Lecture 43 - Engineered immune cells for Cancer therapy (II) - Part B

Lecture 44 - History and Basics - Part A

Lecture 45 - History and Basics - Part B

Lecture 46 - Genome editing and personalized therapy

Lecture 47 - Bioethics and Biosafety - Part A

Lecture 48 - Bioethics and Biosafety - Part B

Lecture 49 - Regulatory issues in Genome Editing

NPTEL : NOC:Enzyme Sciences and Technology (Biotechnology)

Co-ordinators : Prof. Vishal Trivedi

Lecture 1 - Introduction to Enzymes

Lecture 2 - Basics of Enzyme

Lecture 3 - Enzyme Classification - Part I

Lecture 4 - Enzyme Classification - Part II

Lecture 5 - Enzyme Nomenclature

Lecture 6 - Primary Structure of Enzyme

Lecture 7 - Determination of Primary Structure

Lecture 8 - Secondary Structure of Protein

Lecture 9 - Tertiary Structure of Enzyme - Part I

Lecture 10 - Tertiary Structure of Enzyme - Part II

Lecture 11 - Molecular Modelling of Enzyme Structure - Part II

Lecture 12 - Identification of Enzyme Gene - Part II

Lecture 13 - Identification of Enzyme Gene - Part II

Lecture 14 - Polymerase Chain Reaction

Lecture 15 - Enzymes in Molecular Cloning

Lecture 16 - Cloning of Enzyme Coding Gene

Lecture 17 - DNA Delivery in host - Part I

Lecture 18 - DNA Delivery in host - Part II

Lecture 19 - Screening of Recombinant Clones

Lecture 20 - Over-expression of Enzyme in host - Part I

Lecture 21 - Over-expression of Enzyme in host - Part II

Lecture 22 - Over-expression of Enzyme in host - Part III

Lecture 23 - Host Cell Disruption Methods

Lecture 24 - Basics of Chromatography

Lecture 25 - Chromatography - Part I

Lecture 26 - Chromatography - Part II

Lecture 27 - Chromatography - Part III

Lecture 28 - Carbohydrate Metabolism

Lecture 29 - Lipid Metabolism

Lecture 30 - Amino acid Metabolism and Detoxification

Lecture 31 - Enzyme-Substrate Interactions - Part I - Chromatographic Methods

Lecture 32 - Enzyme-Substrate Interactions - Part II - Spectroscopic Methods

Lecture 33 - Enzyme-Substrate Interactions - Part III - ITC

Lecture 34 - Enzyme-Substrate Interactions - Part IV - SPR

Lecture 35 - Enzyme Assay System - Part I

Lecture 36 - Enzyme Assay System - Part II

Lecture 37 - Enzyme Assay System - Part III

Lecture 38 - Enzyme Kinetics

Lecture 39 - Inhibitor Designing - Part I - Traditional Approach

Lecture 40 - Inhibitor Designing - Part II - Modern Approach

Lecture 41 - Inhibitor Designing - Part III - Computational Approach

Lecture 42 - Enzyme Inhibition - Part I

Lecture 43 - Enzyme Inhibition - Part II

Lecture 44 - Application of Enzyme - Part I - Food Industry

Lecture 45 - Application of Enzyme - Part II - Medical Field

Lecture 46 - Enzyme in Drug Discovery

Lecture 47 - Enzymes in Environmental Field

NPTEL : NOC:Molecular Biology (Biotechnology)

Co-ordinators : Prof. Vishal Trivedi

Lecture 1 - Cellular Structure (Prokaryotic cells)

Lecture 2 - Cellular Structure (Eukarytotic cells)

Lecture 3 - Cellular Structure (Eukarytotic cells)

Lecture 4 - Cell Fractionation - Part 1

Lecture 5 - Cell Fractionation - Part 2

Lecture 6 - Cellular Metabolism - Part 1

Lecture 7 - Cellular Metabolism - Part 2

Lecture 8 - Cell Cycle and Control - Part 1

Lecture 9 - Cell Cycle and Control - Part 2

Lecture 10 - Program Cell Death

Lecture 11 - Biomolecules - Part 1 : DNA

Lecture 12 - Biomolecules - Part 2 : DNA Sequencing

Lecture 13 - Biomolecules - Part 2 : RNA

Lecture 14 - Amino acids

Lecture 15 - Protein

Lecture 16 - Enzymes

Lecture 17 - Genetic Material - Part 1

Lecture 18 - Genetic Material - Part 2

Lecture 19 - Genetic Material - Part 3

Lecture 20 - Central Dogma of Molecular Biology

Lecture 21 - Replication - Part 1 : Prokaryotic System

Lecture 22 - Replication - Part 2 : Prokaryotic System

Lecture 23 - Replication - Part 2 : Eukaryotic System

Lecture 24 - Mutagenesis and repair Mechanism

Lecture 25 - Transcription in Prokaryotic system

Lecture 26 - Transcription in Eukaryotic System

Lecture 27 - Post Transcriptional modifications

Lecture 28 - Gene Control Mechanism - Part 1

Lecture 29 - Gene Control Mechanism - Part 2

Lecture 30 - Translation in Prokaryotic system

Lecture 31 - Translation in Eukaryotic System

Lecture 32 - Post Translational modifications

Lecture 33 - Southern Blotting

Lecture 34 - Northern Blotting

Lecture 35 - Western Blotting - Part 1

Lecture 36 - Western Blotting - Part 2

Lecture 37 - Polymerase Chain Reaction - Part 1

Lecture 38 - Polymerase Chain Reaction - Part 2

Lecture 39 - Real-Time PCR

Lecture 40 - Cloning - Part 1

Lecture 41 - Cloning - Part 2

Lecture 42 - Cloning Vectors

Lecture 43 - DNA Delivery - Part 1

Lecture 44 - DNA Delivery - Part 2

Lecture 45 - Screening of Recombinant Clones

Lecture 46 - Protein Over-expression

Lecture 47 - Genome Editing - Part 1

Lecture 48 - Genome Editing - Part 2

Lecture 49 - Applications of Molecular Biology - Part 1

Lecture 50 - Applications of Molecular Biology - Part 2

Lecture 51 - Applications of Molecular Biology - Part 3

Lecture 52 - Applications of Molecular Biology - Part 4

NPTEL : Animal Physiology (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Animal Physiology

Lecture 2 - Animal Physiology

Lecture 3 - Animal Physiology

Lecture 4 - Animal Physiology

Lecture 5 - Animal Physiology

Lecture 6 - Animal Physiology

Lecture 7 - Animal Physiology

Lecture 8 - Animal Physiology

Lecture 9 - Animal Physiology

Lecture 10 - Animal Physiology

Lecture 11 - Animal Physiology

Lecture 12 - Animal Physiology

Lecture 13 - Animal Physiology

Lecture 14 - Animal Physiology

Lecture 15 - Animal Physiology

Lecture 16 - Animal Physiology

Lecture 17 - Animal Physiology

Lecture 18 - Animal Physiology

Lecture 19 - Animal Physiology

Lecture 20 - Animal Physiology

Lecture 21 - Animal Physiology

Lecture 22 - Animal Physiology

Lecture 23 - Animal Physiology

Lecture 24 - Animal Physiology

Lecture 25 - Animal Physiology

Lecture 26 - Animal Physiology

Lecture 27 - Animal Physiology

Lecture 28 - Animal Physiology

Lecture 29 - Animal Physiology

Lecture 30 - Animal Physiology

Lecture 31 - Animal Physiology

Lecture 32 - Animal Physiology

Lecture 33 - Animal Physiology

Lecture 34 - Animal Physiology

Lecture 35 - Animal Physiology

Lecture 36 - Animal Physiology

Lecture 37 - Animal Physiology

Lecture 38 - Animal Physiology

Lecture 39 - Animal Physiology

Lecture 40 - Animal Physiology

NPTEL : Bio electricity (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Bio electricity

Lecture 2 - Bio electricity

Lecture 3 - Bio electricity

Lecture 4 - Bio electricity

Lecture 5 - Bio electricity

Lecture 6 - Bio electricity

Lecture 7 - Bio electricity

Lecture 8 - Bio electricity

Lecture 9 - Bio electricity

Lecture 10 - Bio electricity

Lecture 11 - Bio electricity

Lecture 12 - Bio electricity

Lecture 13 - Bio electricity

Lecture 14 - Bio electricity

Lecture 15 - Bio electricity

Lecture 16 - Bio electricity

Lecture 17 - Bio electricity

Lecture 18 - Bio electricity

Lecture 19 - Bio electricity

Lecture 20 - Bio electricity

Lecture 21 - Bio electricity

Lecture 22 - Bio electricity

Lecture 23 - Bio electricity

Lecture 24 - Bio electricity

Lecture 25 - Bio electricity

Lecture 26 - Bio electricity

Lecture 27 - Bio electricity

Lecture 28 - Bio electricity

Lecture 29 - Bio electricity

Lecture 30 - Bio electricity

Lecture 31 - Bio electricity

Lecture 32 - Bio electricity

Lecture 33 - Bio electricity

Lecture 34 - Bio electricity

Lecture 35 - Bio electricity

Lecture 36 - Bio electricity

Lecture 37 - Bio electricity

Lecture 38 - Bio electricity

Lecture 39 - Bio electricity

Lecture 40 - Bio electricity

NPTEL : NOC:Human Molecular Genetics (Biotechnology)

Co-ordinators : Mr.S. Ganesh

Lecture 1 - Fundamentals of central dogma, Part 1

Lecture 2 - Fundamentals of central dogma, Part 2

Lecture 3 - Fundamentals of central dogma, Part 3

Lecture 4 - Chromosome Structure and Function

Lecture 5 - Pedigree Analysis

Lecture 6 - Complications in Mendelian Pedigree Patterns

Lecture 7 - DNA Cloning and Hybridization Techniques - Part 1

Lecture 8 - DNA Cloning and Hybridization Techniques - Part 2

Lecture 9 - Practice Session 1: Problems Related to Pedigree Analysis

Lecture 10 - Practice Session 2: Restriction Fragment Length Polymorphism and its Applications in Pedigree Analysis

Lecture 11 - Mutations and instability of human DNA (Part 1)

Lecture 12 - Mutations and instability of human DNA (Part 2)

Lecture 13 - Animal Models for Human Diseases

Lecture 14 - Positional cloning of genes for monogenic disorders

Lecture 15 - Human Genome Project and HapMap project

NPTEL : NOC:Functional Genomics (Biotechnology)

Co-ordinators : S. Ganesh

Lecture 1 - Introduction to Functional Genomics

Lecture 2 - The Genomics Era

Lecture 3 - Epigenetics

Lecture 4 - Forward Genetics vs Reverse Genetics

Lecture 5 - Genome Editing Approaches - Part 1

Lecture 6 - Genome Editing Approaches - Part 2

Lecture 7 - Transcriptomics - Part 1

Lecture 8 - Transcriptomics - Part 2

Lecture 9 - Genome Sequence Databases

Lecture 10 - DNA Sequencing Methods - Part 1

Lecture 11 - DNA Sequencing Methods - Part 2

Lecture 12 - Applications of Next-Generation Sequencing (NGS)

Lecture 13 - Tutorial - Session 1

Lecture 14 - Tutorial - Session 2

Lecture 15 - Genomic Insight into Evolution

Lecture 16 - Genome sequence: Different Questions, Different Comparisons

Lecture 17 - Outcome of Comparative Genomics

Lecture 18 - Laboratory - Session 1

Lecture 19 - Laboratory - Session 2

NPTEL : NOC:Bioenergy (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Introduction

Lecture 2 - Oil Economy of the World

Lecture 3 - Unit of Energy and Introduction of Bioenergy

Lecture 4 - How Biomass Formed on the Earth

Lecture 5 - Road Map of Bioenergy

Lecture 6 - Basic Biomass Technology (Resources and Production)

Lecture 7 - Basics of Mechanism of Light Reaction

Lecture 8 - Exploration of Photosynthesis Process

Lecture 9 - In Photosynthesis Oxygen Comes from Water Molecule

Lecture 10 - Hill Reaction

Lecture 11 - Electron Transport Process in Light Reaction

Lecture 12 - How Carbon dioxide converted in Carbohydrate

Lecture 13 - From Carbon dioxide to two Molecules of 3 - Phospho Glycerate by RUBISCO

Lecture 14 - RUBISCO enzyme

Lecture 15 - Photo respiration and Calvin Cycle

Lecture 16 - Efficiency Calculation of Photosynthesis Process

Lecture 17 - C3 and C4 Plant Structure and Photosynthesis Process

Lecture 18 - Biomass production System and their Categorization

Lecture 19 - Important Parameters for Selecting Biomass Crops

Lecture 20 - Factors Determining the Conversion Process - I

Lecture 21 - Factors Determining the Conversion Process - II

Lecture 22 - Factors Determining the Conversion Process - III

Lecture 23 - Conversion Technology

Lecture 24 - Conversion Process- (Combustion Process)

Lecture 25 - Pyrolysis Process

Lecture 26 - Classification of Pyrolysis

Lecture 27 - Bio Oil - (Solution for Thermal Instability and Corrosivity)

Lecture 28 - Spark Ignition Engine

Lecture 29 - Compression Ignition Engine

Lecture 30 - Carbonization - Graphene like material

Lecture 31 - Introduction of Gasification

Lecture 32 - Thermo Chemical Process of Gasification

Lecture 33 - Feed Stock Treatment of Gasification

Lecture 34 - Feed Stock Property

Lecture 35 - Gasification Types - Up Drift Gasifier

Lecture 36 - Down drift and Cross Flow Gasifier

Lecture 37 - Operation and Performance of Fixed Bed Gasifier

Lecture 38 - Fludized Bed Gasification

Lecture 39 - Operation and Performance of Fluidized Bed Gasifier

Lecture 40 - Biological Root of Gasification and Summary of Course

NPTEL : NOC:Animal Physiology (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - An Introduction to Anatomy and Physiology

Lecture 2 - Organization of living system

Lecture 3 - Homeostasis and system integration

Lecture 4 - Positive feedback loop in homeostasis

Lecture 5 - Chemical basis of organization of the body

Lecture 6 - Integumentary System - I

Lecture 7 - Integumentary system - II

Lecture 8 - Integumentary System - III

Lecture 9 - Bone and Cartilage - I

Lecture 10 - Bone and Cartilage - II

Lecture 11 - Introduction of muscle

Lecture 12 - Skeletal muscle formation

Lecture 13 - Anatomy of skeletal muscle

Lecture 14 - Contraction in muscle

Lecture 15 - Function of actin and myosin

Lecture 16 - Length tension relationship of skeletal muscle

Lecture 17 - Excitation contraction coupling with nervous system

Lecture 18 - Stretch reflex phenomena

Lecture 19 - Nervous system anatomy and signaling

Lecture 20 - Structure and circuit of neurons

Lecture 21 - Origin of biological cell

Lecture 22 - Excitability in cell

Lecture 23 - Ion transportation in the cell

Lecture 24 - Signal propagation in neurons

Lecture 25 - Neurotransmitter and action potential

Lecture 26 - Spatial temporal summation of signal in mesh neurons

Lecture 27 - Anatomy of Hippo-campus

Lecture 28 - Epilepsy and memory

Lecture 29 - Long term potentiation

Lecture 30 - Long term depression

Lecture 31 - Alzheimers disease

Lecture 32 - Parkinsons disease

Lecture 33 - Amyotrophic lateral sclerosis

Lecture 34 - Spinal cord injury

Lecture 35 - Glial cells

Lecture 36 - Stretch reflex arc circuit - I

Lecture 37 - Stretch reflex arc circuit - II

Lecture 38 - Neuro muscular junction

Lecture 39 - Hearing system

Lecture 40 - Olfaction system

Lecture 41 - Anatomy of eye

Lecture 42 - Eye lens and cataract

Lecture 43 - Structure of Retina

Lecture 44 - Image formation and processing in eyes

Lecture 45 - Mechanism of photo processing by rods

Lecture 46 - Structure and Function of Heart - I

Lecture 47 - Structure and Function of Heart - II

Lecture 48 - Conduction circuit of heart

Lecture 49 - Contractile system and Conducting system

Lecture 50 - EKG and Comparison of action potential between pace make cell and work cell

Lecture 51 - Respiratory Physiology

Lecture 52 - Anatomy and physiology of Blood vessels - I

Lecture 53 - Anatomy and Physiology of Blood vessels - II

Lecture 54 - Anatomy and physiology of blood vessels - III

Lecture 55 - Anatomy and physiology of blood vessels - IV

Lecture 56 - Endocrine system - I

Lecture 57 - Digestive system and Endocrine system - II

Lecture 58 - Blood

Lecture 59 - Kidney and immune system

Lecture 60 - Reproductive system

NPTEL : NOC:Cell Culture Technologies (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Introduction of Cell Culture Technology

Lecture 2 - Philosophy and complexity in cell culture

Lecture 3 - To grow the cell outside the body

Lecture 4 - Cell cycle concept

Lecture 5 - Dividing cells

Lecture 6 - Biology of cell culture

Lecture 7 - Layout(s) and design(s) of cell culture facility

Lecture 8 - Precautions during designing the lab layout - I

Lecture 9 - Precautions during designing the lab layout - II

Lecture 10 - Precautions during designing the lab layout - III

Lecture 11 - State of the art facility in cell culture lab - I

Lecture 12 - State of the art facility in cell culture lab - II

Lecture 13 - Specialized facility in cell culture lab

Lecture 14 - Interaction of cell and glass/polycorbonate surface - I

Lecture 15 - Interaction of cell and glass/polycorbonate surface - II

Lecture 16 - Poly D lysine deposition

Lecture 17 - Surface chemical analysis

Lecture 18 - Cell growth process

Lecture 19 - Cell surface interface

Lecture 20 - Cell culture substrate patterning

Lecture 21 - Introduction of define system

Lecture 22 - Mechanical dissociation of hippocampal tissue

Lecture 23 - Rules for mechanical dissociation of tissue

Lecture 24 - Drum molecule testing

Lecture 25 - Adult hippocampal neuron dissociation

Lecture 26 - Cell separation and In vitro myelination cell culture mode - I

Lecture 27 - Cell separation and In vitro myelination cell culture mode - II

Lecture 28 - Cell separation and In vitro myelination cell culture mode - III

Lecture 29 - Cell Separation and In vitro myelination cell culture mode - IV

Lecture 30 - Cell separation and in vitro myelination cell culture mode - V

Lecture 31 - Fluorescent assisted cell sorting

Lecture 32 - Condition for regenerated cells

Lecture 33 - Introduction of skeletal muscle cell culture

Lecture 34 - Skeletal muscle cell culture

Lecture 35 - Cardiac muscle cell culture

Lecture 36 - Advance cell culture modules - I

Lecture 37 - Advance cell culture modules - II

Lecture 38 - Advance cell culture modules - III

Lecture 39 - Advance cell culture modules - IV

Lecture 40 - Advance cell culture modules - V

NPTEL : NOC:Forest Biometry (Biotechnology)

Co-ordinators : Prof. Mainak Das, Dr. Ankur Awadhiya

Lecture 1 - Introduction

Lecture 2 - Recap of formulae: area and volume

Lecture 3 - Recap of trigonometry

Lecture 4 - Measurment of central tendency and dispersion

Lecture 5 - Graphical presentation of data

Lecture 6 - Shape of a tree: Form and Taper

Lecture 7 - Metzgers theory

Lecture 8 - Form factor and form quotients

Lecture 9 - Taper equations

Lecture 10 - Making the cuts

Lecture 11 - Cross-section of a tree

Lecture 12 - Where to measure the diameter

Lecture 13 - Callipers - Usages and Issues

Lecture 14 - Tape: Usage and issue

Lecture 15 - Measurement of bark and growth rings

Lecture 16 - Tree height: Direct and indirect measurements

Lecture 17 - Method of similar triangles: Shadow and sticks

Lecture 18 - Distance measurements: foot, tape and rangefinder

Lecture 19 - Angular measurement

Lecture 20 - LIDAR

Lecture 21 - Canopy attributes - Part I

Lecture 22 - Canopy attributes - Part II

Lecture 23 - Canopy attributes - Part III

Lecture 24 - Canopy cover and closure

Lecture 25 - Photogrammetry

Lecture 26 - Basal area of a tree and stand

Lecture 27 - Stand basal area, crop diameter and crop age

Lecture 28 - Point sampling - I

Lecture 29 - Point sampling - II

Lecture 30 - Number density and sample calculations

Lecture 31 - Volume: Direct calculations through sections

Lecture 32 - The Quarter - girth formula

Lecture 33 - Volume computations in the field

Lecture 34 - Volume Table

Lecture 35 - Forest Sampling

Lecture 36 - Density and mass measurement

Lecture 37 - Normalized difference vegetation Index (NDVI)

Lecture 38 - Site quality

Lecture 39 - Recap - I

Lecture 40 - Recap - II

NPTEL : NOC:Introduction to Professional and Scientific Communication (Biotechnology)

Co-ordinators : Mr. S. Ganesh

Lecture 1 - Introduction to the topic

Lecture 2 - Where do research ideas come from?

Lecture 3 - Inductive vs Deductive Reasoning

Lecture 4 - Scientific Hypothesis

Lecture 5 - Scientific Hypothesis (Continued...)

Lecture 6 - Testing the Hypothesis

Lecture 7 - Introduction to Scientific Writing

Lecture 8 - Writing an Abstract

Lecture 9 - Title for a Research Paper

Lecture 10 - Title and Keywords

Lecture 11 - Mileposts for the Article Writing

Lecture 12 - Writing the Methods Section

Lecture 13 - Writing the Results Section

Lecture 14 - Writing Results Section (Continued...)

Lecture 15 - How to Prepare Figures

Lecture 16 - How to Prepare Schematics

Lecture 17 - How to write Introduction and Discussion Sections

Lecture 18 - Finalizing the Manuscript and Ethics in Research

Lecture 19 - Writing a Research Proposal and Preparing for a Presentation

Lecture 20 - Tutorial Session : Oral communication

NPTEL : NOC:Bioelectrochemistry (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Basic Concepts - I

Lecture 2 - Basic Concepts - II

Lecture 3 - Key Terms

Lecture 4 - Galvanic Cells - I

Lecture 5 - Galvanic Cells - II

Lecture 6 - Salt Bridge

Lecture 7 - Standard Potentials - I

Lecture 8 - Standard Potentials - II

Lecture 9 - Standard Potentials - III

Lecture 10 - Nernst Equation

Lecture 11 - Relationship between Standard electrode potential (EÂ°) and Equilibrium constant (K)

Lecture 12 - Cell as chemical probe and Biochemist's formal potential

Lecture 13 - Concept of Concentration Cell - I

Lecture 14 - Concept of Concentration Cell - II

Lecture 15 - Bio-electrochemistry of excitable cells (nerve cells)

Lecture 16 - Types of electrodes

Lecture 17 - Critical care profile and metal electrode

Lecture 18 - pH measurement: Ion selective electrode

Lecture 19 - Redox indicators amperometry: glucose, oxygen sensors

Lecture 20 - Redox proteins, Metalloproteins and Cyclic Voltammetry

NPTEL : NOC:Bioenergetics of Life Processes (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Bioenergetics of Life Processes: An Overview

Lecture 2 - Bioenergetics: Origin of life

Lecture 3 - Iron-Sulfur world

Lecture 4 - Evolution of complex cellular membranes

Lecture 5 - Charge transfer across membrane: Key terms

Lecture 6 - Biological order and energy - I

Lecture 7 - Biological order and energy - II

Lecture 8 - Biological order and energy - III

Lecture 9 - Summary of thermodynamical parameters - I

Lecture 10 - Summary of thermodynamical parameters - II

Lecture 11 - Photosynthesis - I

Lecture 12 - Photosynthesis - II

Lecture 13 - Photosynthesis - III

Lecture 14 - Photosynthesis - IV

Lecture 15 - Photosynthesis - V

Lecture 16 - Photosynthesis - VI

Lecture 17 - Photosynthesis - VII

Lecture 18 - Photosynthesis - VIII

Lecture 19 - ATP Synthesis

Lecture 20 - Mitochondria and Chemiosmotic hypothesis

NPTEL : NOC:WildLife Conservation (Biotechnology)

Co-ordinators : Dr. Ankur Awadhiya

Lecture 1 - Preliminaries

Lecture 2 - A closer look at Biodiversity

Lecture 3 - Economics Valuation of Biodiversity

Lecture 4 - Threats to Biodiversity

Lecture 5 - Preliminaries

Lecture 6 - Basics of Sampling

Lecture 7 - Distance Sampling - I

Lecture 8 - Distance Sampling - II

Lecture 9 - Radio-telemetry

Lecture 10 - Behavioural monitoring

Lecture 11 - What is a habitat

Lecture 12 - Habitat degradation, loss, fragmentation and displacement

Lecture 13 - Reserve selection and design

Lecture 14 - Habitat management and improvement

Lecture 15 - Some terminologies

Lecture 16 - Some common wildlife diseases

Lecture 17 - Principles of disease management

Lecture 18 - Preliminaries

Lecture 19 - Mechanical capture

Lecture 20 - Chemical capture

Lecture 21 - Capture myopathy

Lecture 22 - Care of immobilised animal

Lecture 23 - Legal aspects of capture and restraint

Lecture 24 - Other topics in capture and restraint

Lecture 25 - Preliminaries and introduction to genetics

Lecture 26 - Population genetics

Lecture 27 - Chromosomal and genetic disorders, inbreeding

Lecture 28 - Population viability analysis

Lecture 29 - Reintroductions and outbreeding

Lecture 30 - Fundamentals

Lecture 31 - Zoos and their management

Lecture 32 - Botanical gardens

Lecture 33 - Other aspects: cryopreservation, seed banks, etc.

Lecture 34 - Impacts of climate change

Lecture 35 - Plastics and biodiversity

Lecture 36 - Oil spills

Lecture 37 - Crisis and learnings: The Sariska case-study

Lecture 38 - Revision - I

Lecture 39 - Revision - II

Lecture 40 - Revision - III

NPTEL : NOC:Nanotechnology in Agriculture (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Introduction

Lecture 2 - What is Nanotechnology

Lecture 3 - An outline

Lecture 4 - Agriculture: Natural versus Modern

Lecture 5 - Modern Agriculture: controlled or out of control

Lecture 6 - A Restart:Utilising Our Discoveries

Lecture 7 - Classifying nanomaterials Based on Shape and Geometry

Lecture 8 - Classifying Nanomaterials Based on Chemical Nature

Lecture 9 - Physical Approaches to Nanomaterial Synthesis

Lecture 10 - Biological and Chemical Approaches to Nanomaterial Synthesis

Lecture 11 - Detailed Physical Techniques - I

Lecture 12 - Detailed Physical Techniques - II

Lecture 13 - Detailed Chemical Techniques

Lecture 14 - Detailed Biological Techniques

Lecture 15 - Basic Characterisation Techniques of Nanomaterials

Lecture 16 - Characterisation techniques for physical and chemical surface properties of a material

Lecture 17 - Nanomaterials in Agriculture

Lecture 18 - Iron pyrite and seed pre-treatment

Lecture 19 - nano-Pyrite and its lab trial with chickpea

Lecture 20 - nano-Pyrite field trial with spinach and its mechanistic details

Lecture 21 - Mechanistic details of the action of Pyrite nano-particle

Lecture 22 - Application of Pyrite nano-particle in different crops

Lecture 23 - Application of different nano-particles in Agriculture - I

Lecture 24 - Benefits of nanoparticles in Agriculture

Lecture 25 - Nanotechnology in animal production

Lecture 26 - Antioxidant nanomaterial in animal production - I

Lecture 27 - Antioxidant nanomaterial in animal production - II

Lecture 28 - Antioxidant nanomaterial in animal production - III

Lecture 29 - Antioxidant nanomaterial in skeletal muscle development - I

Lecture 30 - Antioxidant nanomaterial in skeletal muscle development - II

Lecture 31 - Skeletal muscle development and nanomaterial intervention

Lecture 32 - Fabrication of nano-micro devices to study force generation in muscles

Lecture 33 - Summarising role of nanomaterials in animal production

Lecture 34 - Nanomaterials in food processing and preservation - I

Lecture 35 - Nanomaterials in food processing and preservation - II

Lecture 36 - Multifunctionality of nanomaterial: water purification, waste disposal, and energy

Lecture 37 - Futuristic multifunctional, sustainable and green nanomaterial

Lecture 38 - Case study of Titanium dioxide - I

Lecture 39 - Case study of Titanium dioxide - II

Lecture 40 - The future: evolving nano world

NPTEL : NOC:Wild Life Ecology (Biotechnology)

Co-ordinators : Dr. Ankur Awadhiya, Prof. Mainak Das

Lecture 1 - Introduction to the course

Lecture 2 - A historical overview of Ecology

Lecture 3 - Ecology and Evolution

Lecture 4 - The levels of organisation

Lecture 5 - Species abundance and composition: Biodiversity

Lecture 6 - Biodiversity - II

Lecture 7 - Positive Interactions

Lecture 8 - Negative Interactions

Lecture 9 - Study of Behaviour and Behavioral Ecology

Lecture 10 - Food chains, Food webs and trophic levels

Lecture 11 - Primary Production

Lecture 12 - Nutrient Cycles

Lecture 13 - Population parameters and demographic techniques

Lecture 14 - Population growth and regulation

Lecture 15 - Population studies and applications

Lecture 16 - Community nature and parameters

Lecture 17 - Community changes and ecological succession

Lecture 18 - Community organisation

Lecture 19 - Biography: Analysis of geographic distributions

Lecture 20 - Why are things where they are?

Lecture 21 - Some push and pull factors in greater detail

Lecture 22 - Threats to species

Lecture 23 - In-situ conservation

Lecture 24 - Ex-situ conservation

Lecture 25 - Introduction and impacts

Lecture 26 - Human population growth and food requirements

Lecture 27 - Sustainable development

Lecture 28 - Oil spills

Lecture 29 - Plastic and biodiversity

Lecture 30 - Impacts of climate change

Lecture 31 - Optimum yield problem

Lecture 32 - Biological control

Lecture 33 - Ecotoxicology and pollution management, Restoration ecology

Lecture 34 - Revision

Lecture 35 - Revision

Lecture 36 - Revision

NPTEL : NOC:Forests and their Management (Biotechnology)

Co-ordinators : Dr. Ankur Awadhiya

Lecture 1 - What is a forest ?

Lecture 2 - Classification of forests

Lecture 3 - Value of forests

Lecture 4 - What is Silviculture ?

Lecture 5 - Plant Growth Factors

Lecture 6 - Ecological Succession

Lecture 7 - Soil and Soil Profile

Lecture 8 - Major Soil Types

Lecture 9 - Nutrient Cycles

Lecture 10 - Tree Form

Lecture 11 - Measurement of Tree attributes - I

Lecture 12 - Measurement of Tree attributes - II

Lecture 13 - Classical Tools

Lecture 14 - Photogrammetry

Lecture 15 - LiDAR

Lecture 16 - Kinds of Threats

Lecture 17 - Forest Fire

Lecture 18 - Forest Law

Lecture 19 - Regeneration

Lecture 20 - Silvicultureal Systems

Lecture 21 - Clear Felling System

Lecture 22 - Shelterwood System - I

Lecture 23 - Shelterwood System - II

Lecture 24 - Selection System and Irregular Shelterwood System

Lecture 25 - Logging and Processing

Lecture 26 - Growing Stock and Increment

Lecture 27 - Yield and Sustained Yield

Lecture 28 - Seed Collection and Treatment

Lecture 29 - Nursery Techniques

Lecture 30 - Planting and Tending

Lecture 31 - NTFP

Lecture 32 - Social Forestry and Tribal Welfare

Lecture 33 - Conservation of Wild Animals

Lecture 34 - Revision - Part 1

Lecture 35 - Revision - Part 2

Lecture 36 - Revision - Part 3

NPTEL : NOC:Conservation Economics (Biotechnology)

Co-ordinators : Dr. Ankur Awadhiya

Lecture 1 - Introduction to the Course, Making Decisions - I

Lecture 2 - Making Decisions - II and Interactions - I

Lecture 3 - Intecractions-II and Working of the Economy

Lecture 4 - Conservation in the Anthropocene

Lecture 5 - Human population growth and food requirements

Lecture 6 - Unsustainable development

Lecture 7 - Climate change

Lecture 8 - Plastics

Lecture 9 - Oil spills and mining

Lecture 10 - Push and pull factors: Localisation of species

Lecture 11 - Threats to species

Lecture 12 - Developmental Hazards and Ecotoxicology

Lecture 13 - Need to understand controls

Lecture 14 - Thinking as an Economist

Lecture 15 - Interdependence and gains from trade

Lecture 16 - Demand and supply

Lecture 17 - Elasticity

Lecture 18 - Government policy

Lecture 19 - Surplus and market efficiency

Lecture 20 - Market Efficiency and Cost of Taxation

Lecture 21 - International Trade

Lecture 22 - Externalities

Lecture 23 - Public goods and common resources

Lecture 24 - The design of the tax system

Lecture 25 - The Costs of Production

Lecture 26 - Competition

Lecture 27 - Monopoly

Lecture 28 - Markets for factors of production

Lecture 29 - Earnings and discrimination

Lecture 30 - Income inequality and poverty

Lecture 31 - Consumer choice

Lecture 32 - Asymmetric information, Politics and Behavioural Economics

Lecture 33 - Valuation of natural resources

Lecture 34 - Economics of Protected Areas

Lecture 35 - Economics of Environmental Disasters - 1

Lecture 36 - Economics of Environmental Disasters - 2

NPTEL : NOC:Conservation Geography (Biotechnology)

Co-ordinators : Dr. Ankur Awadhiya

Lecture 1 - The need for conservation

Lecture 2 - Geography and conservation

Lecture 3 - Biogeography

Lecture 4 - Origin and evolution of the earth

Lecture 5 - Structure of the earth

Lecture 6 - Features of the earth

Lecture 7 - Rocks and minerals

Lecture 8 - Geomorphology and processes

Lecture 9 - Evolution of landforms

Lecture 10 - Structure and composition

Lecture 11 - Atmospheric circulation and weather

Lecture 12 - Climate and climate change

Lecture 13 - Structure and composition

Lecture 14 - Oceans and water movement

Lecture 15 - Hydrological cycle

Lecture 16 - Structure and physiography of India

Lecture 17 - Climate and habitats of India

Lecture 18 - Drainage systems

Lecture 19 - Soil

Lecture 20 - Life on Earth

Lecture 21 - Biodiversity

Lecture 22 - Threats to species

Lecture 23 - Ex-situ and in-situ conservation

Lecture 24 - Benefits from conservation

Lecture 25 - Population and population growth - I

Lecture 26 - Population and population growth - II

Lecture 27 - Human development and sustainable development

Lecture 28 - Resources and Conservation

Lecture 29 - Water Resources

Lecture 30 - Mineral and Energy Resources

Lecture 31 - Economic Geography and Conservation

Lecture 32 - Trade

Lecture 33 - Settlements

Lecture 34 - Special Topics in Geography and Conservation

Lecture 35 - Disasters

Lecture 36 - Valuation of Natural Resources

NPTEL : NOC:Neurobiology (Biotechnology)

Co-ordinators : Prof. Nitin Gupta

Lecture 1 - L1 Module 1

Lecture 2 - L1 Module 2

Lecture 3 - L1 Module 3

Lecture 4 - L1 Module 4

Lecture 5 - L1 Module 5

Lecture 6 - L1 Module 6

Lecture 7 - L1 Module 7

Lecture 8 - L1 Module 8

Lecture 9 - L1 Module 9

Lecture 10 - L2 Module 1

Lecture 11 - L2 Module 2

Lecture 12 - L2 Module 3

Lecture 13 - L2 Module 4

Lecture 14 - L2 Module 5

Lecture 15 - L2 Module 6

Lecture 16 - L2 Module 7

Lecture 17 - L2 Module 8

Lecture 18 - L2 Module 9

Lecture 19 - L3 Module 1

Lecture 20 - L3 Module 2

Lecture 21 - L3 Module 3

Lecture 22 - L3 Module 4

Lecture 23 - L3 Module 5

Lecture 24 - L4 Module 1

Lecture 25 - L4 Module 2

Lecture 26 - L4 Module 3

Lecture 27 - L4 Module 4

Lecture 28 - L4 Module 5

Lecture 29 - L5 Module 1

Lecture 30 - L5 Module 2

Lecture 31 - L5 Module 3

Lecture 32 - L5 Module 4

Lecture 33 - L5 Module 5

Lecture 34 - L5 Module 6

NPTEL : NOC:Design for Biosecurity (Biotechnology)

Co-ordinators : Prof. Mainak Das

Lecture 1 - Introduction to Biosecurity and Course Overview

Lecture 2 - Allelopathic Interferences and Case Study

Lecture 3 - U.N.W.H.I.M.A.A.I

Lecture 4 - Livestock Biosecurity and its Preventive Measures

Lecture 5 - Bioterrorist Agents and Modes of Attack

Lecture 6 - History of Bioterrorism : Black Death

Lecture 7 - Bioweapons Used in Warfare and Biological Weapon and Toxin Convention (BWC)

Lecture 8 - Ebola and Marburg Virology in context to Biosensor Development

Lecture 9 - Bacillus Anthrax Bacteriology in context to Biosensor Development

Lecture 10 - Anthrax Types and Preventive Measures

Lecture 11 - Unraveling the Ingenious Bacillus Anthracis Attack and Case Study for Anthrax Sensor

Lecture 12 - Components for Designing Biosensors

Lecture 13 - Principle of Quartz Crystal Microbalance (QCM)

Lecture 14 - Sauerbrey Equation and QCM-D

Lecture 15 - Principle, Setup and Applications of E-QCM-D

Lecture 16 - Use of AFM Tool for Sensing - Part 1

Lecture 17 - AFM for Bio-sensing - Part 2

Lecture 18 - AFM and Recap Raman and IR Spectroscopy

Lecture 19 - Applications of Raman

Lecture 20 - AFM Cum Electrochemistry Workstation

Lecture 21 - Monoclonal Antibody

Lecture 22 - Monoclonal Antibody Production

Lecture 23 - MAB Production Via Hybridomas

Lecture 24 - Recognition Elements scFvs

Lecture 25 - SPR : Surface Plasmon Resonance

Lecture 26 - Design and Fabrication of Lateral-Flow Immunoassays

Lecture 27 - Sandwich (Non-Competitive) Assays

Lecture 28 - Botulism Toxin

Lecture 29 - Botox Therapy

Lecture 30 - Developing Biosensor for Botulinum Toxin

Lecture 31 - Story of Insulin

Lecture 32 - Setting the Stage for the Discovery of Insulin

Lecture 33 - Insulin Controversy

Lecture 34 - Insulin Chemistry

Lecture 35 - Insulin as Weapon of Murder

Lecture 36 - Electrochemical Biosensors

Lecture 37 - Electrode System in the Glucose Sensor

Lecture 38 - World of Electrochemical Biosensors

Lecture 39 - Glucose Sensor - Part 1

Lecture 40 - Glucose Sensor - Part 2

Lecture 41 - Non Enzymatic Glucose Sensor - Part 1

Lecture 42 - Non Enzymatic Glucose Sensor - Part 2

Lecture 43 - Summarizing Glucose Sensing - Part 1

Lecture 44 - Summarizing Glucose Sensing - Part 2

Lecture 45 - Summarizing Glucose Sensing - Part 3

Lecture 46 - Far-Infrared Spectroscopy

Lecture 47 - Metabolic Heat Conformation

Lecture 48 - Electromagnetic Sensing

Lecture 49 - World of Biohybrid Biosensors

Lecture 50 - Whole Cell Biosensor

Lecture 51 - Action Potential - Part 1

Lecture 52 - Action Potential - Part 2

Lecture 53 - Action Potential - Part 3

Lecture 54 - Action Potential - Part 4

Lecture 55 - Action Potential - Part 5

Lecture 56 - Cell Based Biosensors - Part 1

Lecture 57 - Cell Based Biosensors - Part 2

Lecture 58 - Cell Based Biosensors - Part 3

Lecture 59 - Cell Based Biosensors - Part 4

Lecture 60 - Cell Based Biosensors - Part 5

NPTEL : BioChemistry I (Biotechnology)

Co-ordinators : Prof. S. Dasgupta

Lecture 1 - Amino Acids - I

Lecture 2 - Amino Acids - II

Lecture 3 - Protein Structure - I

Lecture 4 - Protein structure - II

Lecture 5 - Protein Structure - III

Lecture 6 - Protein Structure - IV

Lecture 7 - Enzymes - I

Lecture 8 - Enzymes - II

Lecture 9 - Enzymes - III

Lecture 10 - Enzymes Mechanisms - I

Lecture 11 - Enzymes Mechanisms - II

Lecture 12 - Myoglobin and Hemoglobin

Lecture 13 - Lipids and Membranes - I

Lecture 14 - Lipids and Membranes - II

Lecture 15 - Membrane Transport

Lecture 16 - Carbohydrates - I

Lecture 17 - Carbohydrates - II

Lecture 18 - Vitamins and Coenzymes - I

Lecture 19 - Vitamins and Coenzymes - II

Lecture 20 - Nucleic Acids - I

Lecture 21 - Nucleic Acids - II

Lecture 22 - Nucleic Acids - III

Lecture 23 - Bioenergetics - I

Lecture 24 - Bioenergetics - II

Lecture 25 - Metabolism - I

Lecture 26 - Metabolism - II

Lecture 27 - Metabolism - III

Lecture 28 - Overview of the Course

NPTEL : NOC:Industrial Biotechnology (Biotechnology)

Co-ordinators : Prof. Debabrata Das

Lecture 1 - Industrial Biotechnology

Lecture 2 - Development of industrial strain

Lecture 3 - Medium characteristics and biochemical pathways

Lecture 4 - Chemical reaction kinetics

Lecture 5 - Chemical reaction analysis (Continued...)

Lecture 6 - Different types of reactors

Lecture 7 - Reactor analysis

Lecture 8 - Reactor analysis (Continued...)

Lecture 9 - Stoichiometry of bioprocesses

Lecture 10 - Stoichiometry of bioprocesses (Continued...)

Lecture 11 - Enzymatic reaction Kinetics

Lecture 12 - Enzymatic reaction Kinetics (Continued...)

Lecture 13 - Enzymatic reaction Kinetics (Continued...)

Lecture 14 - Immobilization techniques

Lecture 15 - Immobilization techniques (Continued...)

Lecture 16 - Life cycle of the microbial cell, Microbial growth kinetics, product formation and substrate degradation

Lecture 17 - Life cycle of the microbial cell, Microbial growth kinetics, product formation and substrate degradation (Continued...)

Lecture 18 - Life cycle of the microbial cell, Microbial growth kinetics, product formation and substrate degradation (Continued...)

Lecture 19 - Overview of the fermenter

Lecture 20 - Flow diagrams and pumps and valves used in fermentation industries

Lecture 21 - Upstream processing: Air sterilizer

Lecture 22 - Upstream processing: Medium sterilizer

Lecture 23 - Upstream processing: Medium sterilizer (Continued...)

Lecture 24 - Downstream processing: solid-liquid separators

Lecture 25 - Downstream processing: evaporator, crystallizer

Lecture 26 - Downstream processing: liquid-liquid extraction, distillation, chromatography

Lecture 27 - Ethanol fermentation

Lecture 28 - Ethanol fermentation (Continued...)

Lecture 29 - Brewing industry

Lecture 30 - Brewing industry (Continued...)

Lecture 31 - Wine industry

Lecture 32 - Vinegar production

Lecture 33 - Citric acid production

Lecture 34 - Citric acid production (Continued...)

Lecture 35 - Citric acid production (Continued...)

Lecture 36 - Lactic acid production

Lecture 37 - Lactic acid production (Continued...)

Lecture 38 - Glutamic acid production

Lecture 39 - Penicillin production

Lecture 40 - Penicillin production (Continued...)

Lecture 41 - Cephalosporin production

Lecture 42 - Streptomycin production

Lecture 43 - Bakerâ€™s yeast fermentation

Lecture 44 - Bakerâ€™s yeast fermentation (Continued...)

Lecture 45 - Fodder yeast production

Lecture 46 - Spirulina production

Lecture 47 - Alpha amylase production

Lecture 48 - High fructose corn syrup production

Lecture 49 - Metal leaching

Lecture 50 - Cheese production

Lecture 51 - Cheese production (Continued...)

Lecture 52 - Biodiesel production

Lecture 53 - Butanol production

Lecture 54 - Biofertilizer

Lecture 55 - Aerobic effluent treatment process

Lecture 56 - Aerobic effluent treatment process (Continued...)

Lecture 57 - Anaerobic effluent treatment process: Biomethanation process

Lecture 58 - Anaerobic effluent treatment process: Biomethanation process (Continued...)

Lecture 59 - 10 m^3 Pilot Plant operation for Biohydrogen production

Lecture 60 - Summary and conclusion

NPTEL : NOC:Aspects Of Biochemical Engineering (Biotechnology)

Co-ordinators : Prof. Debabrata Das

Lecture 1 - Introduction

Lecture 2 - Microbiology - I

Lecture 3 - Microbiology - II

Lecture 4 - Fundamentals of Biochemistry

Lecture 5 - Bioproducts and their market values

Lecture 6 - Stoichiometry of Biochemical Processes - I

Lecture 7 - Stoichiometry of Biochemical Processes - II

Lecture 8 - Stoichiometry of Biochemical Processes - III

Lecture 9 - Reaction Thermodynamics - I

Lecture 10 - Reaction Thermodynamics - II

Lecture 11 - Kinetics of homogeneous chemical reactions - I

Lecture 12 - Kinetics of homogeneous chemical reactions - II

Lecture 13 - Kinetics of homogeneous chemical reactions - III

Lecture 14 - Kinetics of homogeneous chemical reactions - IV

Lecture 15 - Kinetics of homogeneous chemical reactions - V

Lecture 16 - Different types of reactors

Lecture 17 - Reactor analysis - I

Lecture 18 - Reactor analysis - II

Lecture 19 - Reactor analysis - III

Lecture 20 - Reactor analysis - IV

Lecture 21 - Kinetics of enzyme catalyzed reactions using free enzymes - I

Lecture 22 - Kinetics of enzyme catalyzed reactions using free enzymes - II

Lecture 23 - Kinetics of enzyme catalyzed reactions using free enzymes - III

Lecture 24 - Kinetics of enzyme catalyzed reactions using free enzymes - IV

Lecture 25 - Kinetics of enzyme catalyzed reactions using free enzymes - V

Lecture 26 - Kinetics of enzyme catalyzed reactions using free enzymes - VI

Lecture 27 - Immobilization of Enzymes - I

Lecture 28 - Immobilization of Enzymes - II

Lecture 29 - Kinetics of enzyme catalyzed reactions using immobilized enzymes - I

Lecture 30 - Kinetics of enzyme catalyzed reactions using immobilized enzymes - II

Lecture 31 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - I

Lecture 32 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - II

Lecture 33 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - III

Lecture 34 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - IV

Lecture 35 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - V

Lecture 36 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - VI

Lecture 37 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - VII

Lecture 38 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - VIII

Lecture 39 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - IX

Lecture 40 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - X

Lecture 41 - Kinetics of substrate utilization, product formation and biomass production of microbial cells - XI

Lecture 42 - Design and analysis of activated sludge process - I

Lecture 43 - Design and analysis of activated sludge process - II

Lecture 44 - Design and analysis of anaerobic digestion process

Lecture 45 - Scale up of Bioreactor - I

Lecture 46 - Scale up of Bioreactor - II

Lecture 47 - Transport Phenomenon in Bioprocess - I

Lecture 48 - Transport Phenomenon in Bioprocess - II

Lecture 49 - Transport Phenomenon in Bioprocess - III

Lecture 50 - Transport Phenomenon in Bioprocess - IV

Lecture 51 - Air sterilization - I

Lecture 52 - Air sterilization - II

Lecture 53 - Medium sterilization - I

Lecture 54 - Medium sterilization - II

Lecture 55 - Operation of industrial fermenter and material analysis

Lecture 56 - Process control of the biochemical processes

Lecture 57 - Downstream processing - I

Lecture 58 - Downstream processing - II

Lecture 59 - Economic analysis of the biochemical processes

Lecture 60 - Summary and Conclusion

NPTEL : NOC:Biomicrofluidics (Biotechnology)

Co-ordinators : Prof. Tapas Kumar Maiti, Prof. Suman Chakraborty

Lecture 1 - Introduction to Biomicrofluidics

Lecture 2 - Introduction to Biomicrofluidics (Continued...)

Lecture 3 - Engineers' guide to the cell

Lecture 4 - Fluidics in living systems and mechanobiology

Lecture 5 - Pressure Driven Flows

Lecture 6 - Surface tension driven flows

Lecture 7 - Modulating surface tension

Lecture 8 - Lab on a CD

Lecture 9 - Introduction to Electrokinetics - Part I

Lecture 10 - Introduction to Electrokinetics - Part II

Lecture 11 - Microfluidic cell culture - Part I

Lecture 12 - Microfluidic cell culture - Part II

Lecture 13 - On-chip cellular assay techniques - Part I

Lecture 14 - On-chip cellular assay techniques - Part II

Lecture 15 - Microfluidics for understanding biology

Lecture 16 - Organ-on-a-chip

Lecture 17 - Lab-on-a-chip for genetic analysis

Lecture 18 - Microfluidic technology for monoclonal antibody production

Lecture 19 - Microfluidics for Healthcare

Lecture 20 - Microfluidics for Healthcare

NPTEL : NOC:Immunology (Biotechnology)

Co-ordinators : Prof. Agneyo Ganguly, Prof. S. K Ghosh

Lecture 1 - Basic Concepts in Immunology

Lecture 2 - Basic Concepts in Immunology (Continued...)

Lecture 3 - Basic Concepts in Immunology (Continued...)

Lecture 4 - Basic Concepts in Immunology (Continued...)

Lecture 5 - Basic Concepts in Immunology (Continued...)

Lecture 6 - Innate Immunity

Lecture 7 - Inflamatory Response

Lecture 8 - Adaptive Immunity

Lecture 9 - Adaptive Immunity (Humoral)

Lecture 10 - Effector Mechanisms

Lecture 11 - Stracture of antibody

Lecture 12 - Stracture of antibody and T-Cell Receptors

Lecture 13 - Generation of diversity (GOD) of lymphocyte antigen receptors (Continued...)

Lecture 14 - Generation of diversity (GOD) of lymphocyte antigen receptors (Continued...)

Lecture 15 - Generation of diversity (GOD) of lymphocyte antigen receptors (Continued...)

Lecture 16 - Generation of diversity (GOD) of lymphocyte antigen receptors (Continued...)

Lecture 17 - Structural variation in immunoglobulin constant regions and isotype switching

Lecture 18 - Structural variation in immunoglobulin constant regions and isotype switching (Continued...)

Lecture 19 - Antigen recognition by T cell : major histocompatibility complex

Lecture 20 - Antigen recognition by T cell : major histocompatibility complex (Continued...)

Lecture 21 - Antigen Recognition by T cell : Major Histocompatibility Complex (Continued...)

Lecture 22 - Antigen Recognition by T cell : Major Histocompatibility Complex (Continued...)

Lecture 23 - The Generation of Î± : Î² T - Cell receptor ligands

Lecture 24 - The Generation of Î± : Î² T - Cell receptor ligands (Continued...)

Lecture 25 - Summery of Immune system

Lecture 26 - Tools and Techniques

Lecture 27 - Tools and Techniques (Continued...)

Lecture 28 - Tools and Techniques (Continued...)

Lecture 29 - Tools and Techniques (Continued...)

Lecture 30 - Flow Cytometry

Lecture 31 - Development of T Lymphocytes

Lecture 32 - Development of T Lymphocytes (Continued...)

Lecture 33 - Development of T Lymphocytes (Continued...)

Lecture 34 - T Cell Mediated Immunity

Lecture 35 - T Cell Mediated Immunity (Continued...)

Lecture 36 - B-Cell Maturation - I

Lecture 37 - B-Cell Maturation - II

Lecture 38 - B-Cell Activation

Lecture 39 - B-Cell Activation and Differentiation

Lecture 40 - Effector T - Cells

Lecture 41 - Complement System Overview

Lecture 42 - Complement System Overview (Continued...)

Lecture 43 - Complement Biological Consequences

Lecture 44 - Complement Biological Consequences (Continued...)

Lecture 45 - Cytokines : Introduction

Lecture 46 - Cytokines : Introduction (Continued...)

Lecture 47 - Cytokines in Innate and Adaptive Immunity

Lecture 48 - Interferons

Lecture 49 - Hypersensitivity

Lecture 50 - Hypersensitivity (Continued...)

Lecture 51 - Autoimmunity

Lecture 52 - Autoimmunity (Continued...)

Lecture 53 - Autoimmunity (Continued...)

Lecture 54 - Transplantation or Graft vs. Host Reaction

Lecture 55 - Transplantation or Graft vs. Host Reaction (Continued...)

Lecture 56 - Active and Passive Immunity and Vaccination

Lecture 57 - Active and Passive Immunity and Vaccination (Continued...)

Lecture 58 - Active and Passive Immunity and Vaccination (Continued...)

Lecture 59 - Monoclonal Antibody

Lecture 60 - Monoclonal Antibody (Continued...)

NPTEL : NOC:Metabolic Engineering (Biotechnology)

Co-ordinators : Prof. Amit Ghosh, Prof. Pinaki Sar

Lecture 1 - Introduction to Metabolic Engineering

Lecture 2 - Essence of Metabolic Engineering - Part A

Lecture 3 - Essence of Metabolic Engineering - Part B

Lecture 4 - Essence of Metabolic Engineering - Part C

Lecture 5 - Essence of Metabolic Engineering - Part D

Lecture 6 - Review of Cellular Metabolism - Part A

Lecture 7 - Review of Cellular Metabolism - Part B

Lecture 8 - Review of Cellular Metabolism - Part C

Lecture 9 - Review of Cellular Metabolism - Part D

Lecture 10 - Review of Cellular Metabolism - Part E

Lecture 11 - Review of Cellular Metabolism - Part F

Lecture 12 - Introduction to Metabolic Networks

Lecture 13 - Introduction to Systems Biology

Lecture 14 - Regulatory Networks

Lecture 15 - Reconstruction of Metabolic Networks

Lecture 16 - The Stoichiometric Matrix: Representing Reconstructed Network Mathematically

Lecture 17 - Flux Balance Analysis (FBA)

Lecture 18 - Flux Variability Analysis (FVA) and Flux Coupling (FC)

Lecture 19 - Dynamic Flux Balance Analysis (DFBA) and Gene Deletion Algorithms

Lecture 20 - Optimization in MATLAB

Lecture 21 - Robustness Analysis and Phenotypic Phase Planes

Lecture 22 - Flux Sampling, Optknock and Optstrain

Lecture 23 - Extreme Pathways and Elementary modes

Lecture 24 - 13^C Metabolic Flux Analysis (13^C MFA)

Lecture 25 - 13 C Metabolic Flux Analysis (13C MFA)

Lecture 26 - Advancement in 13 C Metabolic Flux Analysis

Lecture 27 - E.coli core metabolic Network Optimization in MATLAB

Lecture 28 - Application of Metabolic Flux Analysis

Lecture 29 - CRISPR-Cas system and its application in metabolic engineering - Part I

Lecture 30 - CRISPR-Cas system and its application in metabolic engineering - Part II

Lecture 31 - CRISPR-Cas system and its application in metabolic engineering - Part III

Lecture 32 - CRISPR-Cas system and its application in metabolic engineering - Part IV

Lecture 33 - Examples of pathway manipulations by metabolic engineering - Biofuels

Lecture 34 - Metabolic engineering for biofuel production - Part A

Lecture 35 - Metabolic engineering for biofuel production - Part B

Lecture 36 - Metabolic engineering for biofuel production - Part C

Lecture 37 - Applications of metabolic engineering in amino acids production

NPTEL : NOC:Environmental Chemistry and Microbiology (Biotechnology)

Co-ordinators : Prof. Sudha Goel, Prof. Anjali Pal

Lecture 1 - Acids, Bases and Salts - Part I

Lecture 2 - Acids, Bases and Salts - Part II

Lecture 3 - Acids, Bases and Salts - Part III

Lecture 4 - Acids, Bases and Salts - Part IV

Lecture 5 - Acids, Bases and Salts - Part V

Lecture 6 - Chemical Equilibrium - I

Lecture 7 - Chemical Equilibrium - II

Lecture 8 - Chemical Equilibrium - III

Lecture 9 - Chemical Equilibrium - IV

Lecture 10 - Chemical Equilibrium - V

Lecture 11 - Chemical Kinetics - I

Lecture 12 - Chemical Kinetics - II

Lecture 13 - Chemical Kinetics - III

Lecture 14 - Chemical Kinetics - IV

Lecture 15 - Chemical Kinetics - V

Lecture 16 - Chemical Kinetics - Reaction Mechanism - Part A

Lecture 17 - Chemical Kinetics - Reaction Mechanism - Part B

Lecture 18 - Chemical Kinetics - Catalysis - Part A

Lecture 19 - Chemical Kinetics - Catalysis - Part B

Lecture 20 - Chemical Kinetics - Catalysis - Part C

Lecture 21 - Nitrogen chemistry - Part A

Lecture 22 - Nitrogen chemistry - Part B

Lecture 23 - Chlorine chemistry and disinfection - Part A

Lecture 24 - Chlorine chemistry and disinfection - Part B

Lecture 25 - Chlorine chemistry and disinfection - Part C

Lecture 26 - Radioactivity - Part A

Lecture 27 - Radioactivity - Part B

Lecture 28 - Radioactivity - Part C

Lecture 29 - Radioactivity - Part D

Lecture 30 - Radioactivity - Part E

Lecture 31 - Introduction - I

Lecture 32 - Introduction - II

Lecture 33 - Overview of microbial life - I

Lecture 34 - Overview of microbial life - II

Lecture 35 - Overview of microbial life - III

Lecture 36 - Cell chemistry - I

Lecture 37 - Cell chemistry - II

Lecture 38 - Cell Biology - I

Lecture 39 - Cell Biology - II

Lecture 40 - Cell Biology - III

Lecture 41 - Cell Biology - IV

Lecture 42 - Microscopy - I

Lecture 43 - Microscopy - II

Lecture 44 - Microbial Metabolism - I

Lecture 45 - Microbial Metabolism - II

Lecture 46 - Microbial Metabolism - III

Lecture 47 - Xenobiotics - I

Lecture 48 - Xenobiotics - II

Lecture 49 - Microbial Growth - I

Lecture 50 - Microbial Growth - II

Lecture 51 - Microbial Growth - III

Lecture 52 - Microbial Growth and Control - I

Lecture 53 - Microbial Growth and Control - II

Lecture 54 - Pathogens and diseases - I

Lecture 55 - Pathogens and diseases - II

Lecture 56 - Metabolic Diversity - I

Lecture 57 - Metabolic Diversity - II

Lecture 58 - Metabolic Diversity - III

Lecture 59 - Metabolic Diversity - IV

Lecture 60 - Metabolic Diversity - V

Lecture 61 - Metabolic Diversity - VI

Lecture 62 - Biogeochemical cycles - I

Lecture 63 - Biogeochemical cycles - II

NPTEL : NOC:Environmental Biotechnology (Biotechnology)

Co-ordinators : Prof. Pinaki Sar

Lecture 1 - Introduction of Environmental Biotechnology, Scope and applications of the subject

Lecture 2 - Introduction of Environmental Biotechnology, Scope and applications of the subject

Lecture 3 - Ecosystem : Basic concepts of structure and function

Lecture 4 - Ecosystem : Basic concepts of structure and function (Continued...)

Lecture 5 - Microbial Ecology

Lecture 6 - Microbial Ecology (Continued...)

Lecture 7 - Microbial Ecosystems and Biogeochemical Cycling

Lecture 8 - Biogeochemical Cycles

Lecture 9 - Microbial ecology and environmental biotechnology - Part A

Lecture 10 - Microbial ecology and environmental biotechnology - Part B

Lecture 11 - Microbial ecology and environmental biotechnology - Part B (Continued...)

Lecture 12 - Microbial ecology and environmental biotechnology - Part B (Continued...)

Lecture 13 - Microbial ecology and environmental biotechnology - Part C

Lecture 14 - Microbial ecology and environmental biotechnology - Part C (Continued...)

Lecture 15 - Microbial ecology and environmental biotechnology - Part C (Continued...)

Lecture 16 - Microbial Ecology and Environmental Biotechnology - Part C (Continued...)

Lecture 17 - Microbiology of Environmental Engineering System

Lecture 18 - Microbiology of Environmental Engineering System

Lecture 19 - Microbiology of Environmental Engineering System

Lecture 20 - Microbiology of Environmental Engineering System (Continued...)

Lecture 21 - Physiological Ecology and Resource Exploitation by Microorganisms

Lecture 22 - Physiological ecology and Resource Exploitation by Microorganisms (Continued...)

Lecture 23 - Physiological ecology and Resource Exploitation by Microorganisms (Continued...)

Lecture 24 - Physiological ecology and Resource Exploitation by Microorganisms (Continued...)

Lecture 25 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology

Lecture 26 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 27 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 28 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 29 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 30 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 31 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 32 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 33 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 34 - Methods in Microbial Ecology with Relevance to Environmental Biotechnology (Continued...)

Lecture 35 - Bioremediation

Lecture 36 - Bioremediation (Continued...)

Lecture 37 - Bioremediation (Continued...)

Lecture 38 - Bioremediation (Continued...)

Lecture 39 - Biodegradation

Lecture 40 - Biodegradation

Lecture 41 - Biodegradation (Continued...)

Lecture 42 - Microbial Interactions with Heavy Metals and Metalloids

Lecture 43 - Microbial Interactions with Heavy Metals and Metalloids - Bioremediation

Lecture 44 - Biohydrometallurgy

Lecture 45 - Enhanced biological phosphorus removal process (EBPR)

Lecture 46 - Biological nitrogen removal

Lecture 47 - Microbially Enhanced Oil Recovery (MEOR)

Lecture 48 - Emerging Pollutants

Lecture 49 - Carbon capture, Carbon Sequestration and Utilization

Lecture 50 - Bioenergy and Environmental Biotechnology

Lecture 51 - Bioremediation case studies

Lecture 52 - Bioremediation case studies (Continued...)

NPTEL : NOC:Fundamentals of Protein Chemistry (Biotechnology)

Co-ordinators : Prof. Swagata Dasgupta

Lecture 1 - Amino Acids - I

Lecture 2 - Amino Acids - II

Lecture 3 - Amino Acids - III

Lecture 4 - The Peptide Bond

Lecture 5 - Discussion Class

Lecture 6 - Primary Structure

Lecture 7 - Secondary Structure

Lecture 8 - Tertiary and Quaternary Structure

Lecture 9 - Protein Interactions

Lecture 10 - Discussion Class

Lecture 11 - Protein folding and structure

Lecture 12 - Thermodynamics of Protein Folding

Lecture 13 - Protein Structure Methods

Lecture 14 - Protein Denaturation

Lecture 15 - Discussion Class

Lecture 16 - Protein Isolation Methods

Lecture 17 - Protein Purification

Lecture 18 - Biophysical Methods - I

Lecture 19 - Biophysical Methods - II

Lecture 20 - Biophysical Methods - III

Lecture 21 - Types of Protein ligand interactions

Lecture 22 - Kinetics and Thermodynamics of protein-ligand binding

Lecture 23 - Experimental methods in protein ligand interactions

Lecture 24 - Protein ligand docking

Lecture 25 - Discussion class

Lecture 26 - Enzymes I - Classification

Lecture 27 - Enzymes - II

Lecture 28 - Enzyme Mechanisms - I

Lecture 29 - Enzyme Mechanisms - II

Lecture 30 - Enzyme mechanisms - III

Lecture 31 - Enzyme Kinetics - I

Lecture 32 - Enzyme Kinetics - II

Lecture 33 - Enzyme Inhibition - I

Lecture 34 - Enzyme Inhibition - II

Lecture 35 - Discussion class

Lecture 36 - Motor Proteins - I

Lecture 37 - Motor Proteins - II

Lecture 38 - Metalloproteins - I

Lecture 39 - Metalloproteins - II

Lecture 40 - Myoglobin and Hemoglobin

Lecture 41 - Membrane Proteins - I

Lecture 42 - Membrane proteins - II

Lecture 43 - Membrane Transport - I

Lecture 44 - Membrane Transport - II

Lecture 45 - Electron Transport Chain

Lecture 46 - Protein Carbohydrate Interactions - I

Lecture 47 - Protein Carbohydrate Interactions - II

Lecture 48 - Protein Nucleic Acid Interactions - I

Lecture 49 - Protein Nucleic Acid Interactions - II

Lecture 50 - Protein Nucleic Acid Interactions - III

Lecture 51 - Protein Protein Interactions - I

Lecture 52 - Protein Protein Interactions - II

Lecture 53 - Protein Peptide Interactions

Lecture 54 - Chaperone proteins

Lecture 55 - Protein Nanoparticle Interactions

Lecture 56 - Oxidative stress in Proteins

Lecture 57 - Enzyme action and Proteolytic cleavage

Lecture 58 - Intrinsically disordered proteins

Lecture 59 - Viral proteins

Lecture 60 - Overview of Course

NPTEL : NOC:Introduction to Biomedical Imaging Systems (Biotechnology)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Signals and Systems Overview

Lecture 4 - Important Signals

Lecture 5 - System

Lecture 6 - LSI Systems

Lecture 7 - Image Quality

Lecture 8 - Local Contrast

Lecture 9 - Blurring and Noise

Lecture 10 - Physics of Radiography

Lecture 11 - Types of Ionizing Radiations

Lecture 12 - EM Radiation

Lecture 13 - Attenuation Models

Lecture 14 - Radiation Dosimetry

Lecture 15 - PR_Instument

Lecture 16 - PR_Instru_CA

Lecture 17 - PR_Image_formation

Lecture 18 - Imaging Equation_updated

Lecture 19 - Film screen_Optical Density

Lecture 20 - PR_Image Quality

Lecture 21 - CT_Intsru

Lecture 22 - CT_Instru_finish

Lecture 23 - CT Back projection

Lecture 24 - CT_BP_finish

Lecture 25 - Fan beam_IQ

Lecture 26 - CT_IQ_Artifact

Lecture 27 - Nuclear Med_Phys

Lecture 28 - Nuclear_Med_Radiotracers

Lecture 29 - Planar_Scintigraphy_Instru

Lecture 30 - Planar_Scintigraphy_Im and IQ

Lecture 31 - Spect_Pet

Lecture 32 - Ultrasound_Intro_Phys

Lecture 33 - Ultrasound Phys_Interactions

Lecture 34 - US doppler and Instrumentation

Lecture 35 - US_Beampattern

Lecture 36 - Approximations

Lecture 37 - US_Imaging Equation_modes

Lecture 38 - Parameters of interest

Lecture 39 - Beam Steering : Phased Array

Lecture 40 - MRI_Intro_S1-S9

Lecture 41 - MRI_Phys_S10-S16

Lecture 42 - MRI_Phys_S17-S20

Lecture 43 - MRI_Phys_S21-S28

Lecture 44 - MRI_Phys_S29-S39

Lecture 45 - MRI_Phys_S40-S44

Lecture 46 - MRI_Phys_S45_S52

Lecture 47 - MRI_Instru_S1_S16

Lecture 48 - MRI_Instru_s17_s26

Lecture 49 - MRI_slice sel_S27_S41

Lecture 50 - MRI_Freq_Encode_S42_S60

Lecture 51 - MRI_DAQ_S61_S69

Lecture 52 - MRI_RECON_S70_S82

Lecture 53 - MRI_IQ_S83_S96

NPTEL : NOC:Next Generation Sequencing Technologies: Data Analysis and Applications (Biotechnology)

Co-ordinators : Prof. Riddhiman Dhar

Lecture 1 - Introduction

Lecture 2 - Next Generation Sequencing Technologies - 454 Sequencing

Lecture 3 - Illumina Sequencing By Synthesis (SBS)

Lecture 4 - Single Molecule Real Time (SMRT) Sequencing

Lecture 5 - Ion Torrent and Nanopore Sequencing

Lecture 6 - Sequencing Coverage, Quality Score and Experiment Design

Lecture 7 - Data Formats

Lecture 8 - Data Formats (Continued...)

Lecture 9 - Data Quality

Lecture 10 - Data QC and Trimming

Lecture 11 - Hands-on: Setting up the system

Lecture 12 - Basic Shell Commands

Lecture 13 - Data Download and Exploration

Lecture 14 - Hands-on 1 - Data exploration and QC

Lecture 15 - Hands-on 1 - Data QC and Trimming

Lecture 16 - Read Mapping

Lecture 17 - Mapping Algorithms

Lecture 18 - Suffix tree-based mapping algorithm

Lecture 19 - Burrows-Wheeler Transform (BWT)

Lecture 20 - Read Mapping with BWT

Lecture 21 - Bowtie2 tool

Lecture 22 - Mapping reads with Bowtie2

Lecture 23 - Bowtie2 output

Lecture 24 - SAM and BAM format

Lecture 25 - SAM format: Alignment section

Lecture 26 - Variant Calling

Lecture 27 - Calling SNP/SNVs and Indels

Lecture 28 - Hands-on analysis : Variant Calling

Lecture 29 - VCF Files

Lecture 30 - Variant Annotation

Lecture 31 - Analysis of CNVs and SVs

Lecture 32 - Introduction to RNA sequencing

Lecture 33 - RNA-seq data processing pipeline

Lecture 34 - Transcriptome Assembly and Quantification

Lecture 35 - Transcript Abundance Quantification

Lecture 36 - Biases in RNA-seq experiments

Lecture 37 - Data Normalization Methods

Lecture 38 - Data Normalization Methods (Continued...)

Lecture 39 - Differential Gene Expression (DGE) Analysis

Lecture 40 - DGE analysis results and visualizations

Lecture 41 - Multiple hypothesis testing correction

Lecture 42 - FDR correction and interpretation of DGE analysis results

Lecture 43 - Functional Enrichment Analysis

Lecture 44 - RNA-seq data analysis - Hands-on 2

Lecture 45 - Hands-on 2: Setting up the system

Lecture 46 - Hands-on 2: Preliminary Data Analysis

Lecture 47 - Sample Specific Bias Correction

Lecture 48 - Differential Gene Expression Analysis I

Lecture 49 - DGE Analysis with spike-ins

Lecture 50 - DGE Analysis Results and Functional Enrichment Analysis

Lecture 51 - Genome Assembly

Lecture 52 - Shortest Common Superstring (SCS) assembly

Lecture 53 - Overlap-Layout-Consensus (OLC) approach

Lecture 54 - de Bruijn Graph (DBG) based assembly

Lecture 55 - Assembly and Quality Control

Lecture 56 - Applications of NGS in Epigenomics

Lecture 57 - Detecting DNA Methylations

Lecture 58 - Genome-wide Transcription Factor(TF) Binding Sites

Lecture 59 - Chromatin Accessibility

Lecture 60 - Genome Organization in 3D

NPTEL : NOC:Computational Neuroscience (Biotechnology)

Co-ordinators : Prof. Sharba Bahdyopadhyay

Lecture 1 - Neuron Structure

Lecture 2 - Networks of Neurons and Synapses

Lecture 3 - Basic Structures in the Brain

Lecture 4 - Systems of neural processing

Lecture 5 - Methods of Recording Neural Activity

Lecture 6 - Membrane Potential and All or None Spike

Lecture 7 - Patch Clamp Measurements

Lecture 8 - Ion channels

Lecture 9 - Current injection: Synapses

Lecture 10 - Single Neuron Acitivity

Lecture 11 - Point and compartmental models of neurons

Lecture 12 - Hodgkin Huxley Equations - I

Lecture 13 - Hodgkin Huxley Equations - II

Lecture 14 - Reducing the HHE and Moris-Lecar Equations (MLE)

Lecture 15 - Properties of MLE

Lecture 16 - Phase Plane Analysis - I

Lecture 17 - Phase Plane Analysis - II

Lecture 18 - Phase Plane Analysis - III

Lecture 19 - Analysing HHE with Phase Plane Analysis - I

Lecture 20 - Analysing HHE with Phase Plane Analysis - II

Lecture 21 - Random variables and random process

Lecture 22 - Spike train statistics and response measure

Lecture 23 - Receptive fields and models of receptive fields

Lecture 24 - Stimulus to Response mapping (Coding) - I

Lecture 25 - Stimulus to Response mapping (Coding) - II

Lecture 26 - Stimulus to Response Mapping (Coding) - III

Lecture 27 - Response to Stimulus Mapping (Decoding)

Lecture 28 - Basics of Information Theory - I

Lecture 29 - Basics of Information Theory - II

Lecture 30 - Maximally Informative Dimensions

Lecture 31 - Intro to Discrimination based methods

Lecture 32 - Kullback Leibler Distance

Lecture 33 - Measuring Spike Train Distances - I

Lecture 34 - Measuring Spike Train Distances - II

Lecture 35 - Signal and Noise Correlations

Lecture 36 - Statistical Methods in Discrimination

Lecture 37 - Single Cell Decoding - I: Two Alternative Forced Choice task in Monkeys

Lecture 38 - Single Cell Decoding - II: Using ROC Curves for discrimination

Lecture 39 - Single Cell Encoding - I: Operant Conditioning Task in Ferrets

Lecture 40 - Single Cell Encoding - II: Learning in avoidance and approach methods in Ferrets

Lecture 41 - Plasticity - Synaptic Transmission and Synaptic Strength

Lecture 42 - Ways of modification of Synaptic Strength

Lecture 43 - Type of Plasticity

Lecture 44 - Short Term Plasticity - I

Lecture 45 - Short Term Plasticity - II

Lecture 46 - Long Term Plasticity

Lecture 47 - Spike Time Dependent Plasticity

Lecture 48 - Hebbian Plasticity

Lecture 49 - BCM Rule

Lecture 50 - Synaptic Normalization

Lecture 51 - Adaptation

Lecture 52 - Models of Short Term Plasticity

Lecture 53 - Attention - I

Lecture 54 - Attention - II

Lecture 55 - Developmental Cicuits

Lecture 56 - Optimal Coding in Visual System

Lecture 57 - Optimal Coding in Auditory System

Lecture 58 - Optimal Coding of Deviant Stimuli in Development

Lecture 59 - Spike Timing Dependent Plasticity - a theoretical Perspective

Lecture 60 - Important Problems in Neuroscience

NPTEL : NOC:Electrophysiology of Heart (Biotechnology)

Co-ordinators : Dr. Arijita Banerjee

Lecture 1 - Ionic basis of membrane potential

Lecture 2 - Physiology of voltage gated channels

Lecture 3 - Physiology of voltage gated channels

Lecture 4 - Cardiac muscle physiology

Lecture 5 - Action potential of cardiac muscle - 1

Lecture 6 - Action potential of cardiac muscle - 2

Lecture 7 - Conducting system of heart

Lecture 8 - ECG-Physiological basis

Lecture 9 - ECG-Normal, Technical aspects

Lecture 10 - ECG Interpretation

Lecture 11 - Abnormal ECG - 1

Lecture 12 - Abnormal ECG - 2

Lecture 13 - ECG and Myocardial Infarction

Lecture 14 - Heart rate and Blood pressure - Baroreflex pathway

Lecture 15 - ECG and Hypertension

Lecture 16 - Autonomic regulation of heart

Lecture 17 - Heart rate variability (HRV)

Lecture 18 - Heart rate variability-interpretation and clinical uses, Blood pressure variability

Lecture 19 - Autonomic Function Tests - 1

Lecture 20 - Autonomic Function Tests - 2

NPTEL : NOC:Pharmacognosy and Metabolic Engineering (Biotechnology)

Co-ordinators : Prof. Adinpunya Mitra

Lecture 1 - Pharmacognosy and Medicinal Plants

Lecture 2 - Plant Specialized Metabolites: Waste Products or Ecochemicals?

Lecture 3 - Evolution of Specialized Metabolism from Primary Metabolism

Lecture 4 - Production of specialized metabolites through cell and organ culture

Lecture 5 - Eliciting specialized metabolism in culture

Lecture 6 - Analysis of Specialized Metabolites - Tools and Techniques

Lecture 7 - Metabolic phytochemistry-based approaches for studying plant specialized metabolism

Lecture 8 - Metabolic engineering strategies in plants

Lecture 9 - Plant genetic transformation (through natural genetic engineer)

Lecture 10 - Design of vectors for Agrobacterium-mediated gene transfer; Transformed and co-

Lecture 11 - Introduction to alkaloids

Lecture 12 - Biosynthesis of tropane alkaloids

Lecture 13 - Engineering tropane alkaloid pathways in plants - I

Lecture 14 - Engineering tropane alkaloid pathways in plants - II : Engineering tropane alkaloid pathway

Lecture 15 - Isoquinoline alkaloids - Biosynthesis and tissue localization

Lecture 16 - Isoquinoline alkaloids - Late steps of biosynthetic pathway and tissue localization

Lecture 17 - Benzylisoquinoline alkaloids - Induced top1 mutant and natural T mutantEngineering

Lecture 18 - Benzylisoquinoline alkaloids - Metabolic pathway engineering

Lecture 19 - RNAi-mediated replacement of morphine with nornarcotic alkaloid reticuline in opium

Lecture 20 - Isoquinoline alkaloids - biosynthesis and tissue localization

Lecture 21 - Indole alkaloids - Early steps of biosynthesis

Lecture 22 - Indole alkaloids - Metabolic engineering of early steps of indole alkaloid pathway

Lecture 23 - Indole alkaloids - Environmental factors regulating indole alkaloid biosynthesis

Lecture 24 - Indole alkaloids - Role of elicitors in modulating alkaloids accumulation

Lecture 25 - Indole alkaloids - Late steps of indole alkaloid biosynthesis

Lecture 26 - Indole alkaloids - Regulatory roles of transcription factors in light-induced

Lecture 27 - Engineering indole alkaloid pathways in Catharanthus roseus hairy root cultures

Lecture 28 - Missing enzymes of vindoline biosynthetic pathway

Lecture 29 - Monoterpene indole alkaloid pathway cell and tissue localization

Lecture 30 - Model for biosynthesis and secretion of monoterpenoid indole alkaloids involving

Lecture 31 - Metabolic reprogramming of periwinkle plant culture

Lecture 32 - Engineered yeast brews precursors of anticancer drug vinblastine

Lecture 33 - Recent discovery of strychnine biosynthetic pathway

Lecture 34 - Indole alkaloid biosynthesis - a final overview

Lecture 35 - Recent discovery of colchicine biosynthetic pathway

Lecture 36 - Biosynthesis of terpenoids - an outline

Lecture 37 - Diversity of monoterpenoids

Lecture 38 - Biosynthesis of monoterpenoids

Lecture 39 - Diversity of sesquiterpenes, diterpenes, triterpenes and polyterpenes

Lecture 40 - Oleoresins and polyterpenes - an outline

Lecture 41 - Monoterpenoids as components of floral scent volatiles: Metabolic engineering of

Lecture 42 - Biosynthesis of carotenoids and carotenoid cleavage products

Lecture 43 - Metabolic engineering of carotenoid pathway

Lecture 44 - Metabolic engineering of carotenoid pathway: Golden Rice Story

Lecture 45 - Menthol story: Biosynthesis and pathway manipulation - I

Lecture 46 - Menthol story: Biosynthesis and pathway manipulation - II

Lecture 47 - Artemisinin, hyperforin and taxol - three promising candidates for biotechnological

Lecture 48 - Phenolics: Origin via shikimate pathway

Lecture 49 - Phenolics: Phenylpropanoids, benzenoids, coumarins, tannins

Lecture 50 - Phenolics: Monolignols, lignins and lignans

Lecture 51 - Phenolics: Metabolic engineering of monolignol pathways

Lecture 52 - Phenolics: Biosynthesis of lignans and podophyllotoxin; Caffeic acid esters

Lecture 53 - Phenolics: Flavonoids, Flavones, Isoflavonoids, Proanthocyanidins

Lecture 54 - Phenolics: Biosynthesis of anthocyanins; Metabolic pathway engineering for enhance

Lecture 55 - Phenolics: Metabolic engineering of anthocyanin pathways in flowers

Lecture 56 - Phenolics: Alcohol acetyl transferses and volatile phenolics

Lecture 57 - Phenolics: Biosynthesis of volatile benzenoids

Lecture 58 - Phenolics: Biosynthesis of vanillin in plants

Lecture 59 - Phenolics: Metabolic engineering for vanillin

Lecture 60 - Phenolics: Biosynthesis of shikonin

Lecture 61 - Phenolics: Metabolic engineering of shikonin pathway

Lecture 62 - Molecular Pharming: Transplastomic plants

Lecture 63 - Molecular Pharming: production of human somatotropin in tobacco

NPTEL : NOC:Principles of Downstream techniques in Bioprocess (Biotechnology)

Co-ordinators : Prof. Mukesh Doble

Lecture 1 - Introduction

Lecture 2 - Mass balance, Heat Balance, flow sheet

Lecture 3 - Costing

Lecture 4 - Costing (continued), Physical and chemical principles in Downs stream

Lecture 5 - Problems in Mass balance, flow sheet

Lecture 6 - Cell Breakage

Lecture 7 - Cell breakage (Continued...)

Lecture 8 - Solid Liquid Separation

Lecture 9 - Solid Liquid Separation (Continued...)

Lecture 10 - Solid Liquid separation-problems

Lecture 11 - Pre-treatment and Filters

Lecture 12 - Adsorption

Lecture 13 - Adsorption

Lecture 14 - Adsorption

Lecture 15 - Adsorption

Lecture 16 - Liquid-Liquid Extraction

Lecture 17 - Liquid-Liquid Extraction

Lecture 18 - Liquid-Liquid Extraction

Lecture 19 - Liquid liquid extraction

Lecture 20 - Reversed micellar and aqueous two phase extraction

Lecture 21 - Membranes

Lecture 22 - Membranes

Lecture 23 - Membranes

Lecture 24 - Membranes

Lecture 25 - Precipitation

Lecture 26 - Chromatography

Lecture 27 - Chromatography

Lecture 28 - Chromatography

Lecture 29 - Chromatography

Lecture 30 - Chromatography

Lecture 31 - Chromatography

Lecture 32 - Chromatography

Lecture 33 - Crystallisation

Lecture 34 - Drying

Lecture 35 - Drying and distillation

Lecture 36 - Future trends

NPTEL : Thermodynamics (Biotechnology)

Co-ordinators : Prof. G.K. Suraishkumar

Lecture 1 - Introduction and Review

Lecture 2 - Need for Analysis Additional Thermodynamic Functions State and Path Variables

Lecture 3 - Equations for a Closed system Chemical Potential Concept Gibbs-Duhem Equation

Lecture 4 - Maxwellâ€™s relations

Lecture 5 - Inter-Relationships between Thermodynamic Variables

Lecture 6 - Some Useful Mathematical Manipulations

Lecture 7 - Thermodynamic Relations for a Closed System with 1 mole of a pure Substances

Lecture 8 - Maximum Work,Lost Work Review of Closed Systems

Lecture 9 - Open Systems

Lecture 10 - Equations of State - Virial Equations

Lecture 11 - Equations of State - Cubic Equations

Lecture 12 - Volume Estimation

Lecture 13 - Volume Estimation (Continued...) Generalized correlations

Lecture 14 - Generalized correlations (Continued...) Residual Properties

Lecture 15 - Residual Properties (Continued...)

Lecture 16 - Generalized Correlations and Residual Properties

Lecture 17 - Fugacity Coefficient Estimation

Lecture 18 - Review of Module 3

Lecture 19 - Learning Aspects Chemical Potential Formulations

Lecture 20 - Lewis and Randall rule partial Molar Properties

Lecture 21 - Partial Molar Property Estimation from Mixing Experiments

Lecture 22 - Partial Molar Property Estimation (Continued...) Excess Property

Lecture 23 - Activity Coefficient from Excess Property

Lecture 24 - Activity Coefficient from Excess Property (Continued...)

Lecture 25 - Activity Coefficient from Excess Property (Continued...) Models for Activity Coefficient in Binary Systems

Lecture 26 - Models for Activity Coefficient in Binary Systems (Continued...)

Lecture 27 - Review of Module 4

Lecture 28 - Criteria for Phase Equilibrium Phase Rule for Non-reacting Biosystems

Lecture 29 - Clausius - Clayperon Equation

Lecture 30 - Clausius - Clayperon Equation (Continued...) vapour-Liquid Equilibrium

Lecture 31 - Vapour-Liquid Equilibrium (Continued...) Estimation of Fugacity coefficient from Equilibrium P-V-T Data

Lecture 32 - Liquid/Liquid and Solid/Liquid Equilibria

Lecture 33 - Review of Module 5

Lecture 34 - Criteria for Bio-reaction Equilibria

Lecture 35 - Phase rule for Reacting Biosystems Equilibrium constants

Lecture 36 - Effect of Temperature and Pressure on the Equilibrium constants

Lecture 37 - Reaction in Liquid or Solid Phases

Lecture 38 - Free energy Changes for some Bioreactions

Lecture 39 - Electrolytes

Lecture 40 - Course Review

NPTEL : NOC:Principles of Downstream Techniques in Bioprocess (Biotechnology)

Co-ordinators : Prof. Mukesh Doble

Lecture 1 - Introduction

Lecture 2 - Mass balance, Heat Balance, Flow sheet

Lecture 3 - Costing

Lecture 4 - Cell Breakage

Lecture 5 - Solid Liquid Separation

Lecture 6 - Pre-treatment and Filters/centrifuge

Lecture 7 - Liquid-Liquid Extraction

Lecture 8 - Liquid-Liquid extraction (Continued...)

Lecture 9 - Adsorption

Lecture 10 - Reversed micellar and aqueous two phase extraction

Lecture 11 - Membranes

Lecture 12 - Membranes (Continued...)

Lecture 13 - Product stabilization, Drying, Lyophilisation

Lecture 14 - Precipitation and crystallization

Lecture 15 - Electrophoresis / SDS PAGE

Lecture 16 - Chromatography

Lecture 17 - Chromatography (Continued...1)

Lecture 18 - Chromatography (Continued...2)

Lecture 19 - Chromatography (Continued...3)

Lecture 20 - Future trends, Other downstream operations/Summary of the course

NPTEL : NOC:Biostatistics and Design of Experiments (Biotechnology)

Co-ordinators : Prof. Mukesh Doble

Lecture 1 - Introduction

Lecture 2 - Experimental Design Strategy

Lecture 3 - Data types : Binomial distribution

Lecture 4 - Poisson Distribution

Lecture 5 - Normal Distribution

Lecture 6 - Standardized Normal Distribution / t-distribution

Lecture 7 - t-distribution/confidence interval

Lecture 8 - Statistical tests

Lecture 9 - t-Test

Lecture 10 - t-Tests

Lecture 11 - t-test

Lecture 12 - F-tests

Lecture 13 - F-tests

Lecture 14 - ANOVA

Lecture 15 - ANOVA

Lecture 16 - Anova

Lecture 17 - Anova

Lecture 18 - Anova

Lecture 19 - Anova

Lecture 20 - Anova

Lecture 21 - Normality test / Odds ratio

Lecture 22 - Chi square distribution

Lecture 23 - Chi square distribution / test

Lecture 24 - Chi square test

Lecture 25 - Chi square test and Weibull Distribution

Lecture 26 - Weibull Distribution

Lecture 27 - Weibull distribution.

Lecture 28 - Non-parametric test

Lecture 29 - Non parametric test/homogeneity of variance / beta distribution

Lecture 30 - Exponential / hypergeometric distributions

Lecture 31 - Hypergeometric / Log norma distribution

Lecture 32 - Design of experiments (DOE) - Introduction

Lecture 33 - Factorial Design

Lecture 34 - Full factorial design

Lecture 35 - Fractional factorial design

Lecture 36 - Other designs

Lecture 37 - Second order designs

Lecture 38 - Second order design

Lecture 39 - Regression analysis

Lecture 40 - Control charts

NPTEL : NOC:Bioreactors (Biotechnology)

Co-ordinators : Prof. G.K. Suraishkumar

Lecture 1 - Introduction

Lecture 2 - Sterilization

Lecture 3 - Solution to PP 1.1

Lecture 4 - Some important concepts

Lecture 5 - Enzyme bioreactors, enzyme kinetics

Lecture 6 - Solution to PP 2.1

Lecture 7 - Inhibited enzyme kinetics

Lecture 8 - Solution to PP 2.2

Lecture 9 - Measurement principles and methods

Lecture 10 - Batch growth kinetics

Lecture 11 - Solution to PP 3.1

Lecture 12 - Bioreactor analysis: chemostat and fed-batch

Lecture 13 - Solution to PP 3.2

Lecture 14 - Bioreactor environment parameters

Lecture 15 - Bioreactor env. par. (DO)

Lecture 16 - Solution to PP 4.1

Lecture 17 - Shear stress, scale-up, scale-down

Lecture 18 - Cell view: stoichiometry; degree of reductance

Lecture 19 - Solution to PP 5.1

Lecture 20 - Culture status, metabolic flux analysis

Lecture 21 - Course summary

NPTEL : NOC:Medical Biomaterials (Biotechnology)

Co-ordinators : Prof. Mukesh Doble

Lecture 1 - Introduction to Biomaterials

Lecture 2 - Background history

Lecture 3 - History

Lecture 4 - Properties - Mechanical and Physico-chemical

Lecture 5 - Properties - Mechanical and Physico-chemical

Lecture 6 - Mechanical properties

Lecture 7 - Mechanical Properties (Continued...)

Lecture 8 - Resorbability, biodegradation

Lecture 9 - Resorbability, biodegradation (Continued...)

Lecture 10 - Biofilm

Lecture 11 - Biofilm (Continued...)

Lecture 12 - Biofilm (Continued...)

Lecture 13 - Biofilm (Continued...)

Lecture 14 - Material characterization - Analytical instruments

Lecture 15 - Analytical instruments

Lecture 16 - Analytical instruments (Continued...)

Lecture 17 - Analytical instruments (Continued...)

Lecture 18 - Biological responses, compatibility, cytotoxicity

Lecture 19 - Biological Responses

Lecture 20 - Cell-biomaterial interaction

Lecture 21 - Animal trials (in vivo)

Lecture 22 - Animal trials

Lecture 23 - Metals-types, classifications, applications

Lecture 24 - Metals - properties

Lecture 25 - Metals - properties (Continued...)

Lecture 26 - Metals - properties (Continued...)

Lecture 27 - Metals

Lecture 28 - Polymers-types, classifications, applications

Lecture 29 - Polymers

Lecture 30 - Polymers (Continued...)

Lecture 31 - Polymer blends

Lecture 32 - Natural biopolymers

Lecture 33 - Natural biopolymers - (Continued...)

Lecture 34 - Biopolymers- proteins / hydrogels

Lecture 35 - Hydrogels

Lecture 36 - Experiments

Lecture 37 - surface modification-Demonstration

Lecture 38 - Ceramics

Lecture 39 - Cardiovascular and ocular biomaterials

Lecture 40 - Sterilisation/Device failure

NPTEL : NOC:BioInformatics - Algorithms and Applications (Biotechnology)

Co-ordinators : Prof. M. Michael Gromiha

Lecture 1 - Concepts and importance of Bioinformatics

Lecture 2 - Complexities in biological systems

Lecture 3 - DNA sequence analysis

Lecture 4 - Sequence based parameters

Lecture 5 - Database

Lecture 6 - Database categories

Lecture 7 - Protein structure and function - I

Lecture 8 - Protein structure and function - II

Lecture 9 - Protein sequence databases - I

Lecture 10 - Protein sequence databases - II

Lecture 11 - Pairwise alignment - I

Lecture 12 - Pairwise alignment - II

Lecture 13 - Uniprot Demo

Lecture 14 - Sequence alignment - I

Lecture 15 - Sequence alignment - II

Lecture 16 - Sequence alignment: Online resources - I

Lecture 17 - Sequence alignment: Online resources - II

Lecture 18 - Conservation score - I

Lecture 19 - Conservation score - II

Lecture 20 - Blast Demo

Lecture 21 - Phylogenetic trees - I

Lecture 22 - Phylogenetic trees - II

Lecture 23 - Protein sequence analysis - I

Lecture 24 - Protein sequence analysis - II

Lecture 25 - Hydrophobicity profiles

Lecture 26 - Patterns and PSSM profiles

Lecture 27 - Construction of Non-redundant datasets - I

Lecture 28 - Non-redundant datasets - II

Lecture 29 - Protein secondary structure

Lecture 30 - Secondary structure prediction - I

Lecture 31 - Secondary structure prediction - II

Lecture 32 - Secondary structure prediction - III

Lecture 33 - Protein tertiary structure - I

Lecture 34 - Protein tertiary structure - II

Lecture 35 - Protein structure analysis - I

Lecture 36 - Protein structure analysis - II

Lecture 37 - Protein structure analysis - III

Lecture 38 - Demo: PDB or Pymol or PDBParam

Lecture 39 - Protein structure analysis - IV

Lecture 40 - Protein structure prediction - I

Lecture 41 - Protein structure prediction - II

Lecture 42 - Protein stability - I

Lecture 43 - Protein stability - II

Lecture 44 - Demo: Homology Modelling

Lecture 45 - Stabilizing residues

Lecture 46 - Thermodynamic database

Lecture 47 - Stability of proteins upon mutations - I

Lecture 48 - Stability of proteins upon mutations - II

Lecture 49 - Demo: ProTherm

Lecture 50 - Protein folding rate - I

Lecture 51 - Protein folding rate - II

Lecture 52 - Protein interactions - I

Lecture 53 - Protein interactions - II

Lecture 54 - Computer aided drug design - I

Lecture 55 - Computer aided drug design - II

Lecture 56 - Virtual screening - I

Lecture 57 - Virtual screening - II

Lecture 58 - QSAR - I

Lecture 59 - QSAR - II

Lecture 60 - Demo: Autodock

Lecture 61 - awk programming - I

Lecture 62 - awk programming - II

Lecture 63 - Development of algorithms - I

Lecture 64 - Development of algorithms - II

Lecture 65 - Applications of bioinformatics - I

Lecture 66 - Applications of bioinformatics - II

Lecture 67 - Overview - I

Lecture 68 - Overview - II

Lecture 69 - Demo: Weka

NPTEL : NOC:Demystifying the Brain (Biotechnology)

Co-ordinators : Dr. V Srinivasa Chakravarthy

Lecture 1 - The Whole and Its Parts: A History of Ideas about Brain

Lecture 2 - Understanding Brainâ€™s Shape - Segment 1 - Brain size and intelligence

Lecture 3 - Understanding Brainâ€™s Shape - Segment 2 - Save Wire Principle

Lecture 4 - Understanding Brainâ€™s Shape - Segment 3 - Brain Evolution

Lecture 5 - Neurons and Neural Signaling: Outline

Lecture 6 - Neural Signalling : Molecular and Cellular Basis

Lecture 7 - Networks that Learn - Segment 1

Lecture 8 - Multilayer Perceptrons Applications in Psychology and Neuroscience

Lecture 9 - Organization of the Central Nervous System-Segment 1 - Cortex

Lecture 10 - Organization of the Central Nervous System-Segment 2 - Subcortical Structures

Lecture 11 - Maps in the Brain - Segment 1

Lecture 12 - Maps in the Brain - Segment 2

Lecture 13 - Emotions in the Brain - Segment 1

Lecture 14 - Emotions in the Brain - Segment 2

Lecture 15 - Memories and Holograms - Segment 1

Lecture 16 - Memories and Holograms - Segment 2

Lecture 17 - Consciousness - Segment 1

Lecture 18 - Consciousness - Segment 2

NPTEL : NOC:Computational Systems Biology (Biotechnology)

Co-ordinators : Prof. Karthik Raman

Lecture 1 - Introduction

Lecture 2 - Introduction to Modelling

Lecture 3 - Introduction to Modelling

Lecture 4 - Fundamentals of Mathematical Modelling

Lecture 5 - Fundamentals of Mathematical Modelling

Lecture 6 - Fundamentals of Mathematical Modelling

Lecture 7 - Some Example Models

Lecture 8 - Representation of Biological Networks

Lecture 9 - Lab: MATLAB Basics

Lecture 10 - Lab: MATLAB Basics

Lecture 11 - Lab: MATLAB Basics

Lecture 12 - Lab: MATLAB Basics

Lecture 13 - Introduction to Networks

Lecture 14 - Introduction to Networks

Lecture 15 - Introduction to Network Biology

Lecture 16 - Introduction to Network Biology

Lecture 17 - Introduction to Network Biology

Lecture 18 - Network Biology

Lecture 19 - Network Models

Lecture 20 - Network Models

Lecture 21 - Biological Networks

Lecture 22 - Network Perturbations

Lecture 23 - Community Detection

Lecture 24 - Network Motifs

Lecture 25 - Lab: Cytoscape

Lecture 26 - Lab: Cytoscape

Lecture 27 - Lab: Network Biology

Lecture 28 - Network Biology: Recap

Lecture 29 - Lab: Network Models and Perturbations

Lecture 30 - Lab: Network Models and Perturbations

Lecture 31 - Reconstruction of Gene Regulatory Networks

Lecture 32 - Reconstruction of Protein Networks

Lecture 33 - Reconstruction of Signalling Networks

Lecture 34 - Reconstruction of Signalling Networks

Lecture 35 - Introduction to Dynamic Modelling

Lecture 36 - Introduction to Dynamic Modelling

Lecture 37 - Introduction to Dynamic Modelling

Lecture 38 - Lab: Solving ODEs in MATLAB

Lecture 39 - Lab: Example Biological Model

Lecture 40 - Parameter Estimation

Lecture 41 - Parameter Estimation

Lecture 42 - Parameter Estimation

Lecture 43 - Methods for Parameter Estimation

Lecture 44 - Direct Search Methods

Lecture 45 - Genetic Algorithms

Lecture 46 - Genetic Algorithms

Lecture 47 - Other Evolutionary Algorithms

Lecture 48 - PyGMO

Lecture 49 - Dynamic Modelling Recap

Lecture 50 - Lab: Parameter Estimation

Lecture 51 - Guest Lecture: Modelling in Drug Development

Lecture 52 - Guest Lecture: Modelling in Drug Development

Lecture 53 - Guest Lecture: Quantitative Systems Pharmacology

Lecture 54 - Guest Lecture: Quantitative Systems Pharmacology

Lecture 55 - Guest Lecture: Quantitative Systems Pharmacology

Lecture 56 - Constraint-based Modelling of Metabolic Networks

Lecture 57 - Flux Balance Analysis

Lecture 58 - Flux Balance Analysis

Lecture 59 - Flux Balance Analysis

Lecture 60 - Other Constraint-Based Approaches

Lecture 61 - Other Constraint-Based Approaches

Lecture 62 - Lab: FBA using MATLAB

Lecture 63 - Perturbations to Metabolic Networks: Deletions

Lecture 64 - Lab: COBRA Toolbox

Lecture 65 - Understanding FBA

Lecture 66 - Understanding FBA

Lecture 67 - Perturbations to Metabolic Networks: Over-expression

Lecture 68 - Perturbations to Metabolic Networks: Synthetic Lethals

Lecture 69 - Perturbations to Metabolic Networks: Synthetic Lethals

Lecture 70 - Constraint-based Modelling of Metabolic Networks

Lecture 71 - Lab: Gene Deletions

Lecture 72 - Integrating Regulatory Information into Constraint-Based Models

Lecture 73 - Elementary Modes

Lecture 74 - Elementary Modes

Lecture 75 - Constraint-based Modelling of Metabolic Networks: Applications

Lecture 76 - Constraint-based Modelling of Metabolic Networks: Applications

Lecture 77 - Constraint-based Modelling of Metabolic Networks: Applications

Lecture 78 - Lab: Gene Deletions

Lecture 79 - Constraint-based Modelling of Metabolic Networks: Recap

Lecture 80 - Constraint-based Modelling of Metabolic Networks: Recap

Lecture 81 - Constraint-based Modelling of Metabolic Networks: Recap

Lecture 82 - ^{13}C-Metabolic Flux Analysis using Mass Spectrometry

Lecture 83 - ^{13}C-Metabolic Flux Analysis using Mass Spectrometry

Lecture 84 - ^{13}C-Metabolic Flux Analysis using Mass Spectrometry

Lecture 85 - Lab: ^{13}C-Metabolic Flux Analysis using Mass Spectrometry

Lecture 86 - Modelling Gene Regulatory Networks

Lecture 87 - Modelling Gene Regulatory Networks

Lecture 88 - Modelling Gene Regulatory Networks

Lecture 89 - Lab: Modelling Gene Regulatory Networks

Lecture 90 - Lab: Modelling Gene Regulatory Networks

Lecture 91 - Computational Modelling of Host-Pathogen Interactions

Lecture 92 - Computational Modelling of Host-Pathogen Interactions

Lecture 93 - Robustness in Biological Systems

Lecture 94 - Robustness in Biological Systems: Mechanisms

Lecture 95 - Robustness in Biological Systems: Organising Principles

Lecture 96 - Robustness in Biological Systems: Trade-offs

Lecture 97 - Obustness and Evolvability

Lecture 98 - obustness and Evolvability

Lecture 99 - Introduction to Synthetic Biology

Lecture 100 - Advanced Topics

Lecture 101 - Advanced Topics

Lecture 102 - Advanced Topics

Lecture 103 - Course Recap

NPTEL : NOC:Material and Energy Balances (Biotechnology)

Co-ordinators : Prof.Vignesh Muthuvijayan

Lecture 1 - Fundamentals of Engineering Calculations

Lecture 2 - Process Parameters and Variables

Lecture 3 - Fundamentals of Material Balances

Lecture 4 - Material Balance Calculations for Single Units Without Reactions - Part 1

Lecture 5 - Material Balance Calculations for Single Units Without Reactions - Part 2

Lecture 6 - Material Balance Calculations for Single Units Without Reactions - Part 3

Lecture 7 - Material Balance Calculations for Single Units Without Reactions - Part 4

Lecture 8 - Material Balance Calculations for Multiple Units Without Reactions - Part 1

Lecture 9 - Material Balance Calculations for Multiple Units Without Reactions - Part 2

Lecture 10 - Fundamentals of Reactive Processes

Lecture 11 - Material Balance Calculations For Single Units With A Single Reaction

Lecture 12 - Material Balance Calculations for Single Units with A Single Reaction (Continued...)

Lecture 13 - Material Balance Calculations for Single Units with Multiple Reactions - Part 1

Lecture 14 - Material Balance Calculations for Single Units with Multiple Reactions - Part 2

Lecture 15 - Material Balance Calculations for Single Units with Multiple Reactions - Part 3

Lecture 16 - Material Balance Calculations for Multiple Units with Reactions - Part 1

Lecture 17 - Material Balance Calculations for Multiple Units with Reactions - Part 2

Lecture 18 - Material Balances on Reactive Processes - Tutorials

Lecture 19 - Combustion Reactions: An Introduction

Lecture 20 - Material Balances for Combustion Reactions

Lecture 21 - Biochemical Reactions: Enzyme Kinetics

Lecture 22 - Biochemical Reactions: Cell Growth

Lecture 23 - Recycle Without Reactions

Lecture 24 - Recycle with Reactions

Lecture 25 - Recycle: Tutorials

Lecture 26 - Bypass

Lecture 27 - Purge

Lecture 28 - Material Balance: A Review - Part 1

Lecture 29 - Material Balance: A Review - Part 2

Lecture 30 - Material Balance: A Review - Part 3

Lecture 31 - The Unreasonable Effectiveness of Material Balance

Lecture 32 - Constraint-based modelling

Lecture 33 - Flux balance analysis - Part 1

Lecture 34 - Flux balance analysis - Part 2

Lecture 35 - Energy Balance Terminologies and Concepts

Lecture 36 - Introduction to Energy Balances - Part 1

Lecture 37 - Introduction to Energy Balances - Part 2

Lecture 38 - Introduction to Energy Balances: Tutorials

Lecture 39 - Mechanical Energy Balances

Lecture 40 - Mechanical Energy Balances: Tutorials

Lecture 41 - Energy Balance Objectives and Procedures

Lecture 42 - Introduction to Nonreactive Processes Without Phase Change

Lecture 43 - Energy Balances on Single-Phase Nonreactive Processes

Lecture 44 - Energy Balances on Single-Phase Nonreactive Processes: Tutorials

Lecture 45 - Fundamentals of Nonreactive Phase Change Processes

Lecture 46 - Estimating Latent Heats

Lecture 47 - Energy Balances on Nonreactive Processes With Phase Change

Lecture 48 - Energy Balances on Nonreactive Processes With Phase Change: Tutorials - 1

Lecture 49 - Energy Balances on Nonreactive Processes With Phase Change: Tutorials - 2

Lecture 50 - Psychrometric Charts

Lecture 51 - Energy Balances Using Psychrometric Charts

Lecture 52 - Mixing and Solution

Lecture 53 - Mixing and Solution: Tutorials - 1

Lecture 54 - Mixing and Solution: Tutorials - 2

Lecture 55 - Fundamentals for Energy Balances on Reactive Processes - Part 1

Lecture 56 - Fundamentals for Energy Balances on Reactive Processes - Part 1 and Part 2

Lecture 57 - Fundamentals for Energy Balances on Reactive Processes - Tutorials

Lecture 58 - Energy Balances on Reactive Processes - Part 1

Lecture 59 - Energy Balances on Reactive Processes - Part 2

Lecture 60 - Energy Balances on Reactive Processes - Part 3

Lecture 61 - Energy Balances on Reactive Processes - Part 4

Lecture 62 - Energy Balances on Reactive Processes - Part 5

Lecture 63 - Energy Balances on Reactive Processes - Part 6

Lecture 64 - Energy Balances: A Review - Part 1

Lecture 65 - Energy Balances: A Review - Part 2

Lecture 66 - Energy Balances: A Review - Part 3

Lecture 67 - Energy Balances: A Review - Part 4

Lecture 68 - Unsteady State Material Balances

Lecture 69 - Unsteady State Energy Balances

NPTEL : NOC:Computer Aided Drug Design (Biotechnology)

Co-ordinators : Prof. Mukesh Doble

Lecture 1 - Introduction

Lecture 2 - Drug Discovery - Issues

Lecture 3 - Target and Lead Identification

Lecture 4 - Drug And Data bases

Lecture 5 - Drug Properties

Lecture 6 - Drug - Properties / SMILES

Lecture 7 - Drug Solubility

Lecture 8 - Drug Solubility / permeability

Lecture 9 - ADME

Lecture 10 - Drug - ADME

Lecture 11 - Drug - ADME

Lecture 12 - Drug - BBB

Lecture 13 - Pgp efflux/Drug Likeness

Lecture 14 - Drug Likeness

Lecture 15 - Molecular Modelling

Lecture 16 - Molecular Mechanics / Force Field

Lecture 17 - Molecular Mechanics / Force Field

Lecture 18 - Molecular Mechanics / Force Field

Lecture 19 - Molecular Mechanics / Force Field

Lecture 20 - ODES and Numerical methods

Lecture 21 - ODES and Numerical methods

Lecture 22 - Conformational Search / MD

Lecture 23 - Quantum Mechanics

Lecture 24 - Quantum Mechanics

Lecture 25 - Quantitative Struture Activity Relationship (QSAR)

Lecture 26 - Quantitative Struture Activity Relationship (QSAR)

Lecture 27 - Quantitative Struture Activity Relationship (QSAR)

Lecture 28 - Quantitative Struture Activity Relationship (QSAR)

Lecture 29 - Quantitative Struture Activity Relationship (QSAR)

Lecture 30 - Quantitative Struture Activity Relationship (QSAR)

Lecture 31 - 3D QSAR

Lecture 32 - Pharmacophore modelling

Lecture 33 - Target based drug design

Lecture 34 - Target based drug design

Lecture 35 - Target based drug design

Lecture 36 - Target based drug design

Lecture 37 - Docking

Lecture 38 - Docking

Lecture 39 - Pharmacokinetics / pharmacodynamics

Lecture 40 - Pharmacokinetics / pharmacodynamics

NPTEL : NOC:Plant Cell Bioprocessing (Biotechnology)

Co-ordinators : Prof. Smita Srivastava

Lecture 1 - Introduction to plant cell technology

Lecture 2 - History of plant cell and tissue culture

Lecture 3 - Anatomy of plant cells

Lecture 4 - Plant tissues and functions

Lecture 5 - Photosynthesis and Photorespiration

Lecture 6 - In-vitro culture initiation

Lecture 7 - Nutritional requirements of plant cells

Lecture 8 - Organogenesis and Regeneration

Lecture 9 - Somaclonal variation and Micropropagation

Lecture 10 - Somatic embryogenesis and Protoplast culture

Lecture 11 - Synthetic seeds, Cryopreservation and Freezing methods

Lecture 12 - Secondary metabolism in plant cells - Part 1

Lecture 13 - Secondary metabolism in plant cells - Part 2

Lecture 14 - Secondary metabolism in plant cells - Part 3

Lecture 15 - Secondary metabolism in plant cells - Part 4

Lecture 16 - Optimization strategies - Part 1

Lecture 17 - Optimization strategies - Part 2

Lecture 18 - Optimization strategies - Part 3

Lecture 19 - Optimization strategies - Part 4

Lecture 20 - Biotransformation in plant cultures

Lecture 21 - Immobilization of plant cells

Lecture 22 - Genetic transformations in plant cells - Part 1

Lecture 23 - Genetic transformations in plant cells - Part 2

Lecture 24 - Genetic transformations in plant cells - Part 3

Lecture 25 - Plant Cell Bioreactors - Part 1

Lecture 26 - Plant Cell Bioreactors - Part 2

Lecture 27 - Bioreactors for Hairy Root cultures

Lecture 28 - Case study - Part 1

Lecture 29 - Case study - Part 2

NPTEL : NOC:Tissue Engineering (Biotechnology)

Co-ordinators : Prof.Vignesh Muthuvijayan

Lecture 1 - Introduction to Tissue Engineering - Part 1

Lecture 2 - Introduction to Tissue Engineering - Part 2

Lecture 3 - Introduction to Tissue Engineering - Part 3

Lecture 4 - Scaffolds: Extracellular Matrix

Lecture 5 - Scaffolds: Natural Polymers

Lecture 6 - Scaffolds: Synthetic Polymers

Lecture 7 - Hydrogels - Part 1

Lecture 8 - Hydrogels - Part 2

Lecture 9 - Bioceramics

Lecture 10 - Scaffold fabrication strategies

Lecture 11 - Self Assembly

Lecture 12 - 3D Bioprinting

Lecture 13 - Material Characterization - Part 1

Lecture 14 - Material Characterization - Part 2

Lecture 15 - Material Characterization - Part 3

Lecture 16 - Cell Source

Lecture 17 - Cell Isolation - Part 1

Lecture 18 - Cell Isolation - Part 2

Lecture 19 - Tissue Dynamics

Lecture 20 - Cell Differentiation

Lecture 21 - Cell Adhesion

Lecture 22 - Cell Migration

Lecture 23 - Signaling and biomolecule delivery in Tissue Engineering

Lecture 24 - Bioreactors in Tissue Engineering

Lecture 25 - Challenges in Tissue Engineering

Lecture 26 - Host integration and immune responses - Part 1

Lecture 27 - Host integration and immune responses - Part 2

Lecture 28 - Bioethics of Tissue Engineering - Part 1

Lecture 29 - Bioethics of Tissue Engineering - Part 2

Lecture 30 - Skin Tissue Engineering - Part 1

Lecture 31 - Skin Tissue Engineering - Part 2

Lecture 32 - Bone Tissue Engineering - Part 1

Lecture 33 - Bone Tissue Engineering - Part 2

Lecture 34 - Bone Tissue Engineering - Part 3

Lecture 35 - Vascular Tissue Engineering

Lecture 36 - Corneal Tissue Engineering - Part 1

Lecture 37 - Corneal Tissue Engineering - Part 2

NPTEL : NOC:Thermodynamics for Biological Systems: Classical and Statistical Aspect (Biotechnology)

Co-ordinators : Prof. G.K. Suraishkumar, Prof. Sanjib Senapati

Lecture 1 - Introduction and review

Lecture 2 - Review (Continued...)

Lecture 3 - Need for analysis

Lecture 4 - Additional Thermodynamic Functions

Lecture 5 - State and Path Variables

Lecture 6 - Equations for a Closed System

Lecture 7 - Chemical Potential

Lecture 8 - Gibbs Duhem equation

Lecture 9 - Maxwellâ€™s relations

Lecture 10 - Inter-relationships between thermodynamic variables (Continued...)

Lecture 11 - Some useful mathematical manipulations

Lecture 12 - Thermodynamic relations for a closed system with 1 mole of pure substance

Lecture 13 - Maximum work

Lecture 14 - Open systems

Lecture 15 - Equations of state - Virial equations

Lecture 16 - Equations of state - Cubic equations

Lecture 17 - Volume estimation

Lecture 18 - Volume estimation (Continued...)

Lecture 19 - Generalized correlations

Lecture 20 - Generalized correlations (Continued...)

Lecture 21 - Residual properties

Lecture 22 - Residual properties (Continued...)

Lecture 23 - Generalized correlations and residual properties

Lecture 24 - Fugacity coefficient estimation

Lecture 25 - Review of module 3

Lecture 26 - Learning aspects

Lecture 27 - Chemical potential formulations

Lecture 28 - Lewis and Randall rule

Lecture 29 - Partial molar properties

Lecture 30 - Partial molar property estimation from mixing experiments

Lecture 31 - Partial molar property estimation (Continued...)

Lecture 32 - Activity coefficient from excess property

Lecture 33 - Activity coefficient from excess property (Continued...)

Lecture 34 - Models for activity coefficient in a binary system

Lecture 35 - Models for activity coefficient for a binary system (Continued...)

Lecture 36 - Review of module 4

Lecture 37 - Criteria for phase equilibrium

Lecture 38 - Phase rule for non-reacting systems

Lecture 39 - Clausius Clayperon equation

Lecture 40 - Clausius Clayperon equation (Continued...)

Lecture 41 - Vapour liquid equilibrium

Lecture 42 - Vapour liquid equilibrium (Continued...)

Lecture 43 - Estimation of fugacity coefficient from P-V-T data at equilibrium

Lecture 44 - Liquid-liquid and solid-liquid equilibria

Lecture 45 - Review of module 5

Lecture 46 - Criteria for bioreaction equilibria

Lecture 47 - Phase rule for reacting biosystems

Lecture 48 - Equilibrium constants

Lecture 49 - Effect of temperature on the equilibrium constants

Lecture 50 - Reaction in liquid or solid phases

Lecture 51 - Free energy changes for some bioreactions

Lecture 52 - Electrolytes

Lecture 53 - Review of the classical thermodynamics part

Lecture 54 - Introduction to Statistical thermodynamics

Lecture 55 - Concepts of macro and microstates

Lecture 56 - Thermodynamic probability

Lecture 57 - Boltzmann distribution law

Lecture 58 - Defining Î² in Boltzmann distribution law

Lecture 59 - Relationship between partition function and thermodynamic quantities

Lecture 60 - Partition function of mono atomic gases

Lecture 61 - Entropy in terms of probablity

Lecture 62 - Gibbs paradox

Lecture 63 - Thermodynamic probability for distinguishable particles

Lecture 64 - Thermodynamic probability for indistinguishable particles

Lecture 65 - Sackur - Tetrode equation

Lecture 66 - Partition function and Helmholtz and Gibbs free energy

Lecture 67 - Ensemble approach

Lecture 68 - Ensemble average, time average, Ergodic hypothesis

Lecture 69 - Partition function for classical systems

Lecture 70 - Pair potentials for atomic systems

Lecture 71 - Potential for molecular systems

Lecture 72 - Computer code for LJ potential

Lecture 73 - Introduction to computer simulations

Lecture 74 - Computer simulations of macromolecules

Lecture 75 - MD simulation examples

Lecture 76 - Link between theory and experiments

Lecture 77 - MD protocol

Lecture 78 - Computer simulation tricks

Lecture 79 - Understanding force fields

Lecture 80 - Idea of Z-matrix

Lecture 81 - Basics of MD simulations

Lecture 82 - Integration algorithms

Lecture 83 - Calculation of Columbic force

Lecture 84 - Calculation of LJ force

Lecture 85 - Monte Carlo simulations

Lecture 86 - Analysis of MD trajectory

Lecture 87 - Case study (water)

NPTEL : NOC:Transport Phenomena in Biological Systems (Biotechnology)

Co-ordinators : Prof. G.K. Suraishkumar

Lecture 1 - Introduction

Lecture 2 - Mass Conservation

Lecture 3 - Mass Conservation for a Macroscopic System

Lecture 4 - Mass Conservation for a Microscopic System

Lecture 5 - Useful Derivatives

Lecture 6 - Equation of Continuity

Lecture 7 - Mass Flux

Lecture 8 - Mass and Molar Fluxes

Lecture 9 - Shell Balance Approach

Lecture 10 - Continuity Equation Approach

Lecture 11 - Steady-state Diffusion

Lecture 12 - Steady-state Diffusion across Tubular Walls

Lecture 13 - Steady-state Radial Diffusion

Lecture 14 - Steady-state Diffusion with Reaction

Lecture 15 - Unsteady-state Diffusion

Lecture 16 - Unsteady-state Diffusion (Continued...)

Lecture 17 - Pseudo Steady State Approximation (Continued...)

Lecture 18 - Pseudo Steady State Approximation (Continued...)

Lecture 19 - Review of Mass Flux

Lecture 20 - Momentum Flux - Introduction

Lecture 21 - Rheology

Lecture 22 - Fluid Flow types

Lecture 23 - Shell Momentum Balances

Lecture 24 - Shell Momentum Balances (Continued...)

Lecture 25 - Equation of Motion

Lecture 26 - Equation of Motion (Continued...)

Lecture 27 - Application of Equation of Motion to Flow Over an Inclined Plane

Lecture 28 - Laminar Flow through a Pipe

Lecture 29 - Laminar Flow through a Pipe (Continued...)

Lecture 30 - Capillary Flow

Lecture 31 - Couette Flow

Lecture 32 - Non-dimensional Analysis

Lecture 33 - Unsteady State Flow

Lecture 34 - Unsteady State Flow (Continued...)

Lecture 35 - Pulsatile Flow

Lecture 36 - Turbulent Flow

Lecture 37 - Macroscopic Aspects: The Engineering Bernoulli Equation

Lecture 38 - Friction Factor for Flow through a Straight Horizontal Pipe

Lecture 39 - Application of the Engineering Bernoulli Equation to a Piping Network

Lecture 40 - Stenosis in an Artery

Lecture 41 - Friction Factor for Relative Motion between a Solid and a Liquid

Lecture 42 - Friction Factor for Packed Beds

Lecture 43 - Review of Momentum Flux

Lecture 44 - Review of Momentum Flux (Continued...)

Lecture 45 - Thermal Energy Flux

Lecture 46 - Equation of Energy

Lecture 47 - Temperature Profile in a Tissue

Lecture 48 - Unsteady-state Heat Conduction

Lecture 49 - Review of Heat Flux

Lecture 50 - Charge Flux

Lecture 51 - Charge Flux - Some Fundamentals

Lecture 52 - Charge Flux - Some More Fundamentals

Lecture 53 - Getting Useful Relationships through Maxwell's Equations

Lecture 54 - Charges/Ions in Solution

Lecture 55 - Charge Flux: Review

Lecture 56 - Fluxes Under Simultaneous, Multiple Driving Forces

Lecture 57 - Simultaneous Concentration Gradient and Electrical Potential Gradient

Lecture 58 - Mobility of Ions Across a Membrane

Lecture 59 - Electrical Circuit Representation of a Membrane

Lecture 60 - Action Potential and Axial Current

Lecture 61 - Electrophoresis

Lecture 62 - Simultaneous Concentration Gradient and Velocity Gradient

Lecture 63 - Simultaneous Concentration Gradient and Velocity Gradient - Bioreactor Kla

Lecture 64 - Gas-Liquid Interphase Transport

Lecture 65 - Gas-Liquid Interphase Transport (Continued...)

Lecture 66 - Bioreactor Kla Estimation

Lecture 67 - Liquid Phase Oxygen-Supply Strategy

Lecture 68 - LPOS and Its Mechanism

Lecture 69 - LPOS for Mold Cultivations

Lecture 70 - LPOS Optimization and Costs

Lecture 71 - Couette Flow Cultivations

Lecture 72 - Pseudo-Steady State Approximation Applied to Bio-oil Production

Lecture 73 - Pseudo-Steady State Approximation Applied to Cancer Treatment

Lecture 74 - Kinetics of a Process with an Enzyme Immobilized on a Non-porous Slab

Lecture 75 - Simultaneous Temperature Gradient and Velocity Gradient

Lecture 76 - Design of Heat Exchangers

Lecture 77 - Design of Heat Exchangers (Continued...)

Lecture 78 - Course Review - Part 1

Lecture 79 - Course Review - Part 2

Lecture 80 - Course Review - Part 3

Lecture 81 - Course Review - Part 4

NPTEL : NOC:Introduction to Developmental Biology (Biotechnology)

Co-ordinators : Prof. Subramaniam K

Lecture 1 - Introduction

Lecture 2 - Life cycles and evolution of developmental patterns

Lecture 3 - Experimental embryology

Lecture 4 - Differential gene expression - Part 1

Lecture 5 - Differential gene expression - Part 2

Lecture 6 - Differential gene expression - Part 3

Lecture 7 - Differential gene expression - Part 4

Lecture 8 - Genetic basis - Part 1

Lecture 9 - Genetic basis - Part 2

Lecture 10 - Genetic basis - Part 3

Lecture 11 - Genetic basis - Part 4

Lecture 12 - Genetic basis - Part 5

Lecture 13 - Cell-cell communication - Part 1

Lecture 14 - Cell-cell communication - Part 2

Lecture 15 - Cell-cell communication - Part 3

Lecture 16 - Cell-cell communication - Part 4

Lecture 17 - Genetics of axis formation in Drosophila - Part 1

Lecture 18 - Genetics of axis formation in Drosophila - Part 2

Lecture 19 - Genetics of axis formation in Drosophila - Part 3

Lecture 20 - Genetics of axis formation in Drosophila - Part 4

Lecture 21 - Plant Development - Part 1

Lecture 22 - Plant Development - Part 2

Lecture 23 - Plant Development - Part 3

Lecture 24 - Early Mammalian Development - Part 1

Lecture 25 - Early Mammalian Development - Part 2

Lecture 26 - Evolutionary Developmental Biology - Part 1

Lecture 27 - Evolutionary Developmental Biology - Part 2

Lecture 28 - Evolutionary Developmental Biology - Part 3

NPTEL : NOC:Bioreactor Design and Analysis (Biotechnology)

Co-ordinators : Prof. Smita Srivastava

Lecture 1 - Introduction to the course - Part 1

Lecture 2 - Introduction to the course - Part 2

Lecture 3 - Design of Batch Bioreactors - Part 1

Lecture 4 - Design of Batch Bioreactors - Part 2

Lecture 5 - Design of Batch Bioreactors - Part 3

Lecture 6 - Design of Batch Bioreactors - Part 4

Lecture 7 - Design of Batch Bioreactors - Practice problems

Lecture 8 - Design of Fed Batch bioreactors - Part 1

Lecture 9 - Design of Fed Batch bioreactors - Part 2

Lecture 10 - Design of Fed Batch bioreactors - Practice problems - Part 1

Lecture 11 - Design of Fed Batch bioreactors - Practice Problems - Part 2

Lecture 12 - Design of Fed Batch bioreactors - Practice Problems - Part 3

Lecture 13 - Design of Continuous Bioreactors - Part 1

Lecture 14 - Design of Continuous Bioreactors - Part 2

Lecture 15 - Design of Continuous Bioreactors - Part 3

Lecture 16 - Design of Continuous bioreactors - Practice Problems - Part 1

Lecture 17 - Design of Continuous bioreactors - Practice Problems - Part 1

Lecture 18 - Design of Continuous bioreactors - Practice Problems - Part 2

Lecture 19 - Mass Transfer in Bioreactors - Part 1

Lecture 20 - Mass Transfer in Bioreactors - Part 2

Lecture 21 - Mass Transfer in Bioreactors - Part 3

Lecture 22 - Rheology of fluids

Lecture 23 - Mass Transfer in Bioreactors - Practice Problems

Lecture 24 - Heterogeneous reactions in Bioreactors - Part 1

Lecture 25 - Heterogeneous reactions in Bioreactors - Part 2

Lecture 26 - Heterogeneous reactions in Bioreactors - Part 3

Lecture 27 - Heterogeneous reactions in Bioreactors - Practice Problems

Lecture 28 - Heat Transfer Operations in Bioreactors - Part 1

Lecture 29 - Heat Transfer Operations in Bioreactors - Part 2

Lecture 30 - Heat Transfer Operations in Bioreactors - Part 3

Lecture 31 - Heat Transfer Operations in Bioreactors - Part 4

Lecture 32 - Heat Transfer Operations in Bioreactors - Practice Problems

Lecture 33 - Scale up of Bioreactors - Part 1

Lecture 34 - Scale up of Bioreactors - Part 2

Lecture 35 - Scale up of Bioreactors - Part 3

Lecture 36 - Scale up of Bioreactors - Part 4

Lecture 37 - Scale up of Bioreactors - Practice Problems

Lecture 38 - Non-ideal reactors: design and analysis - Part 1

Lecture 39 - Non-ideal reactors: design and analysis - Part 2

Lecture 40 - Non-ideal reactors: design and analysis - Practice Problems

NPTEL : NOC:Biochemistry (IITM) (Biotechnology)

Co-ordinators : Prof. Subramaniam K

Lecture 1 - Introduction to Biomolecules - Part 1

Lecture 2 - Introduction to Biomolecules - Part 2

Lecture 3 - Stereochemistry and Properties of Water - Part 1

Lecture 4 - Properties of Water - Part 2 and Introduction to Proteins

Lecture 5 - Characteristics of Proteins and Chromatography techniques

Lecture 6 - Electrophoresis of Proteins and Protein Sequencing

Lecture 7 - Synthesis of Polypeptides and Enzymes - Part 1

Lecture 8 - Enzymes - Part 2

Lecture 9 - Enzymes - Part 3

Lecture 10 - Enzymes - Part 4

Lecture 11 - Enzymes - Part 5 and Carbohydrates - Part 1

Lecture 12 - Carbohydrates - Part 2 and Lipids - Part 1

Lecture 13 - Lipids - Part 2

Lecture 14 - Lipids - Part 3 and Introduction to Metabolism - Part 1

Lecture 15 - Introduction to metabolism - Part 2

Lecture 16 - Bioenergetics - Part 1

Lecture 17 - Bioenergetics - Part 2

Lecture 18 - Glycolysis - Part 1

Lecture 19 - Glycolysis - Part 2

Lecture 20 - Citric Acid Cycle - Part 1

Lecture 21 - Citric Acid Cycle - Part 2

Lecture 22 - Oxidative Phosphorylation - Part 1

Lecture 23 - Oxidative Phosphorylation - Part 2

Lecture 24 - Photosynthesis and Carbon assimilation - Part 1

Lecture 25 - Photosynthesis and Carbon Assimilation - Part 2

Lecture 26 - Photosynthesis and Carbon assimilation - Part 3

Lecture 27 - Nitrogen Metabolism

Lecture 28 - Catabolism of Amino acids

Lecture 29 - Urea cycle and Fatty acid catabolism - Part 1

Lecture 30 - Fatty acid catabolism - Part 2

Lecture 31 - Fatty Acid Biosynthesis

Lecture 32 - Cholestrol Biosynthesis and Lipid transport - Part 1

Lecture 33 - Cholestrol Biosynthesis and Lipid transport - Part 2

Lecture 34 - Hormonal Regulation and Integration of Mammalian Metabolism

NPTEL : NOC:Cellular Biophysics: A Framework for Quantitative Biology (Biotechnology)

Co-ordinators : Prof. R. Chaitanya A. Athale

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Introduction - Part 3

Lecture 4 - Solids vs Fluids

Lecture 5 - Viscosity

Lecture 6 - Measuring Viscosity

Lecture 7 - Tutorial - Part 1

Lecture 8 - Tutorial - Part 2

Lecture 9 - Tutorial - Part 3

Lecture 10 - Macromolecular Nature and Hydrophobicity, Structure of Ice, Pauling-Bernal-Fowler Model of Water

Lecture 11 - Entropy and Probability of Water Conformations,Boltzmann Law of Entropy

Lecture 12 - Reynolds Number

Lecture 13 - Tutorial - Part 1

Lecture 14 - Tutorial - Part 2

Lecture 15 - Tutorial - Part 3

Lecture 16 - Hagen-Poisuielle Equation

Lecture 17 - Tutorial - Part 4

Lecture 18 - Sedimentation and Centrifugation - Part 1

Lecture 19 - Sedimentation and Centrifugation - Part 2

Lecture 20 - Blood Centrifugation

Lecture 21 - Review: Paperfuge for Hematology

Lecture 22 - Biology by Numbers

Lecture 23 - Biology by Numbers: Bomb Yield Solved

Lecture 24 - Order of Magnitude Estimates and Approximations

Lecture 25 - Physical Basis of Life

Lecture 26 - Approximating Cellular and Molecular Size Scales

Lecture 27 - Quantifying DNA and Chromatin

Lecture 28 - Protein Abundance and Spacing

Lecture 29 - Model Gene

Lecture 30 - Cell-Biology by Numbers

Lecture 31 - Experimental Techniques to Quantify Cells

Lecture 32 - Time-Scales in Cells

Lecture 33 - Energy Scale

Lecture 34 - Energy and Thermodynamics of Life - Part 1

Lecture 35 - Energy and Thermodynamics of Life - Part 2

Lecture 36 - Energy and Life- Osmotic Engine

Lecture 37 - Energy and Life- Interconversion of Energy

Lecture 38 - Random Walk Statistics, Stoke-Einstein - Part 1

Lecture 39 - Random Walk Statistics, Stoke-Einstein - Part 2

Lecture 40 - Demonstration of Diffusion of Micron Sized Particles

Lecture 41 - Macromolecular Crowding - Part 1

Lecture 42 - Macromolecular Crowding - Part 2

Lecture 43 - Cytoskeleton

Lecture 44 - Beam Theory Applied to Biopolymer

Lecture 45 - Understanding Chromosomes as Statistical Polymers - Part 1

Lecture 46 - Understanding Chromosomes as Statistical Polymers - Part 2

Lecture 47 - Brownian Ratchets and Molecular Motors

Lecture 48 - Polymerization Dynamics - Part 1

Lecture 49 - Polymerization Dynamics - Part 2

Lecture 50 - Polymerization Dynamics - Part 3

Lecture 51 - Python Programming - Part 1

Lecture 52 - Python Programming - Part 2

Lecture 53 - Python Programming - Part 3

Lecture 54 - Introduction to Membrane Mechanics

Lecture 55 - Membrane Deformation

Lecture 56 - Developmental Pattern Formation

Lecture 57 - Turing Model

Lecture 58 - Phyllotaxis - Part 1

Lecture 59 - Phyllotaxis - Part 2

Lecture 60 - Phyllotaxis - Part 3

NPTEL : NOC:Medical Image Analysis (Biotechnology)

Co-ordinators : Prof. Ganapathy Krishnamurthi

Lecture 1 - Medical Image Analysis - Introduction

Lecture 2 - X-ray imaging

Lecture 3 - MRI Physics

Lecture 4 - Magnetic Resonance Image Acquisition

Lecture 5 - Ultrasound Imaging

Lecture 6 - Radionuclide Imaging

Lecture 7 - Basic Image Processing Methods

Lecture 8 - Contrast Enhancement

Lecture 9 - Histogram Equalization

Lecture 10 - Edge Enhancement - Laplacian

Lecture 11 - Noise Reduction

Lecture 12 - Diffusion Filtering

Lecture 13 - Bayesian Image Restoration

Lecture 14 - Registration Introduction

Lecture 15 - Framework

Lecture 16 - Image Coordinates

Lecture 17 - Transforms

Lecture 18 - Metrics

Lecture 19 - NonRigid Registration

Lecture 20 - Demons part - 1

Lecture 21 - Demons part - 2

Lecture 22 - FFDBSplines

Lecture 23 - Endoscopy - Where are we with AI ?

Lecture 24 - Computer vision and DL in the operating room

Lecture 25 - ML in intraoperative tissue identification

Lecture 26 - Basic Image Processing Techniques Using MATLAB

Lecture 27 - Image Registration Using Matlab

Lecture 28 - Basic Image Processing Techniques Using Python

Lecture 29 - Calculus of variations

Lecture 30 - Snakes - Active Contour Models

Lecture 31 - Level Sets, Geodesic Active Contours, Mumford-Shah Functional, Chan-Vese

Lecture 32 - Mumford-Shah Functional, Chan-Vese

Lecture 33 - Segmentation Models Demo [Snakes (Active Contours) Chan-Vese segmentation, Geodesic active Contour]

Lecture 34 - Active Shape Models

Lecture 35 - Snake tutorial

Lecture 36 - Level Set Method

Lecture 37 - Chan Vese Segmentation

Lecture 38 - Neural Networks Introduction

Lecture 39 - Linear Regression

Lecture 40 - Gradient Descent Formulation

Lecture 41 - Linear Regression Demo

Lecture 42 - Feed forward neural Networks

Lecture 43 - Example with XOR

Lecture 44 - Introduction to CNNs

Lecture 45 - Max Pooling

Lecture 46 - Applications of Cnns

Lecture 47 - CNN Training

Lecture 48 - Semantic Segmentation

Lecture 49 - Classification Demo in Pytorch

Lecture 50 - Generative Models

Lecture 51 - GAN Final Demo

NPTEL : NOC:Organ Printing (Biotechnology)

Co-ordinators : Prof. Falguni Pati

Lecture 1 - Introduction to Organ Printing course and Content Discussion

Lecture 2 - Introduction to 3D Bioprinting

Lecture 3 - Introduction to Inkjet 3D Bioprinting

Lecture 4 - Introduction to Inkjet 3D Bioprinting (Continued...)

Lecture 5 - Introduction to Extrusion Bioprinting

Lecture 6 - Introduction to Extrusion 3D Bioprinting (Continued...)

Lecture 7 - Introduction to Laser-assisted Bioprinting

Lecture 8 - Comparison of Different Bioprinting Techniques - Part 1

Lecture 9 - Comparison of Different Bioprinting Techniques - Part 2

Lecture 10 - 3D Bioprinting in Support Bath

Lecture 11 - Introduction to Bioinks

Lecture 12 - Important material requirement for Bioink development

Lecture 13 - Crosslinking of Hydrogels for Bioprinting

Lecture 14 - Single-Material and Multimaterial Bioink Systems

Lecture 15 - Printability for Extrusion Bioprinting

Lecture 16 - What is required and how to print an organ?

Lecture 17 - Level of complexity in Tissues/Organs for Bioprinting

Lecture 18 - Design approaches in Bioprinting

Lecture 19 - Bioprinting of Vasculature

Lecture 20 - Direct printing of vasculature

Lecture 21 - Indirect printing of vasculature

Lecture 22 - Design of Cornea Tissue-Specific Bioink and 3D Bioprinting of Cornea

Lecture 23 - Design of Cornea Tissue-Specific Bioink and 3D Bioprinting of Cornea (Continued...)

Lecture 24 - Bioprinting of Heart

Lecture 25 - Bioprinting of Liver

Lecture 26 - Bioprinting of Kidney

Lecture 27 - Bioprinting of Lung

Lecture 28 - 4D Bioprinting - Part 1

Lecture 29 - 4D Bioprinting - Part 2

Lecture 30 - 4D Bioprinting - Part 3

Lecture 31 - In Situ Bioprinting

Lecture 32 - In Situ Bioprinting (Continued...)

Lecture 33 - Medical Modeling for Organ Printing

Lecture 34 - Medical Modeling for Organ Printing (Continued...)

Lecture 35 - Next Step in Bioprinting

Lecture 36 - Next Step in Bioprinting (Continued...)

Lecture 37 - Ethical Issues related to Organ Printing

NPTEL : NOC:Introduction to Cell Biology (Biotechnology)

Co-ordinators : Prof. Girish Ratnaparkhi

Lecture 1 - An Overview of Central Dogma of Molecular Biology - Part 1

Lecture 2 - An Overview of Central Dogma of Molecular Biology - Part 2

Lecture 3 - Central Dogma : The DNA Structure - Part 1

Lecture 4 - Central Dogma : The DNA Structure - Part 2

Lecture 5 - Central Dogma : The DNA Structure - Part 3

Lecture 6 - Central Dogma : Replication of DNA - Part 1

Lecture 7 - Central Dogma : Replication of DNA - Part 2

Lecture 8 - Central Dogma : Transcription - Part 1

Lecture 9 - Central Dogma : Transcription - Part 2

Lecture 10 - Central Dogma : Transcription - Part 3

Lecture 11 - Central Dogma : Tranlation - Part 1

Lecture 12 - Central Dogma : Tranlation - Part 2

Lecture 13 - Central Dogma : Tranlation - Part 3

Lecture 14 - Protein Structure, Folding and Function - Part 1

Lecture 15 - Protein Structure, Folding and Function - Part 2

Lecture 16 - Secondary Strcuture of Proteins: Ramachandran Plot - Part 1

Lecture 17 - Secondary Strcuture of Proteins: Ramachandran Plot - Part 2

Lecture 18 - Protein Structure, Folding and Function - Part 3

Lecture 19 - Protein Structure, Folding and Function - Part 4

Lecture 20 - Protein Structure, Folding and Function - Part 5

Lecture 21 - Protein Structure, Folding and Function - Part 6

Lecture 22 - Enzymes, Carbohydrates and Lipids

Lecture 23 - Introduction to Genetics - Part 1

Lecture 24 - Introduction to Genetics - Part 2

Lecture 25 - Introduction to Genetics - Part 3

Lecture 26 - Mendilian and Non-Mendilian Genetics - Part 1

Lecture 27 - Mendilian and Non-Mendilian Genetics - Part 2

Lecture 28 - Mendilian and Non-Mendilian Genetics - Part 3

Lecture 29 - Introduction to Microscopy - Part 1

Lecture 30 - Introduction to Microscopy - Part 2

Lecture 31 - Introduction to Microscopy - Part 3

Lecture 32 - Biology of Cells - Part 1

Lecture 33 - Biology of Cells - Part 2

Lecture 34 - Complexity and Compartmentalization in Cells - Part 1

Lecture 35 - Complexity and Compartmentalization in Cells - Part 2

Lecture 36 - Endosymbiont Theory

Lecture 37 - Structure of the Cell: Cell Wall and Cell Membrane

Lecture 38 - Structure of the Cell: Discussion Session

Lecture 39 - Plasma Membrane: The Boundaries of Life

Lecture 40 - Plasma Membrane: Discussion Session

Lecture 41 - Introduction to Cytoskeleton - Part 1

Lecture 42 - Cytoskeleton: Discussion Session 1

Lecture 43 - Introduction to Cytoskeleton - Part 2

Lecture 44 - Cytoskeleton: Discussion Session 2

Lecture 45 - Motor Proteins in Cell

Lecture 46 - Motor Proteins in Cell: Discussion Session

Lecture 47 - Discussion on Directionality of Motor Protein

Lecture 48 - Endomembrane System of Cells - Part 1

Lecture 49 - Endomembrane System of Cells: Discussion Session 1

Lecture 50 - Endomembrane System of Cells - Part 2

Lecture 51 - Endomembrane System of Cells: Discussion Session 2

Lecture 52 - Endomembrane System of Cells - Part 3

Lecture 53 - Endomembrane System of Cells: Discussion Session 3

Lecture 54 - Endomembrane System of Cells - Part 4

Lecture 55 - Endomembrane System of Cells: Discussion Session 4

Lecture 56 - Cell Division

Lecture 57 - Cell Division: Discussion session

Lecture 58 - Discussion Session on Organization and Function of a Cell

NPTEL : NOC:RNA Biology (Biotechnology)

Co-ordinators : Prof. Rajesh Ramachandran

Lecture 1 - Introduction to RNA Biology and RNA World - The Beginning

Lecture 2 - Introduction to RNA Biology and RNA World - Evidences

Lecture 3 - Introduction to RNA Biology and RNA World - Origin of Monomers

Lecture 4 - Introduction to RNA Biology and RNA World - Shift to DNA

Lecture 5 - Introduction to RNA Biology and RNA World - RNA Self Replication

Lecture 6 - Introduction to RNA Biology and RNA World - Origin of RNA Enzymes

Lecture 7 - RNA as Enzymes: The Ribozymes

Lecture 8 - RNA as Enzymes: Structure and Functions

Lecture 9 - RNA as Enzymes: The Present and Future

Lecture 10 - RNA Transcription: The Central Dogma

Lecture 11 - RNA Transcription: Initial Steps

Lecture 12 - RNA Transcription: Different Stages

Lecture 13 - RNA Transcription: Termination and RNA Modification

Lecture 14 - RNA Transcription: Different Polymerases

Lecture 15 - RNA Processing and Life Cycle: RNA Maturation and RNPs

Lecture 16 - RNA Processing and Life Cycle: RNA Splicing

Lecture 17 - RNA Processing and Life Cycle: Post Transcriptional Processing

Lecture 18 - Alternative RNA Processing and Editing: Alternative Splicing

Lecture 19 - Alternative RNA Processing and Editing: Implications of Introns

Lecture 20 - Alternative RNA Processing and Editing: Splicing and Pathology

Lecture 21 - Alternative RNA Processing and Editing: RNA Editing in Detail

Lecture 22 - Alternative RNA Processing and Editing: Relevance of RNA Editing

Lecture 23 - Alternative RNA Processing and Editing: Relevance in Immunology

Lecture 24 - RNA Splicing, Export and Stability: Relevance of Introns

Lecture 25 - RNA Splicing, Export and Stability: Introns in RNA Splicing

Lecture 26 - RNA Splicing, Export and Stability: Different Spliceosomes

Lecture 27 - RNA Splicing, Export and Stability: SMN Complex

Lecture 28 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: Introns and Link to Splicing

Lecture 29 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: RNA Helicases

Lecture 30 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: Nucleo Cytoplasmic Transport

Lecture 31 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: Nucleoporins and miRNAs

Lecture 32 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: RNA Export Mechanisms

Lecture 33 - snRNA, rRNA, miRNA, siRNA Processing, Export and Function: RNA Quality Control

Lecture 34 - Mechanisms of RNA Decay and Non Coding RNAs: Decay Pathways

Lecture 35 - Mechanisms of RNA Decay and Non Coding RNAs: The Exosomes

Lecture 36 - Mechanisms of RNA Decay and Non Coding RNAs: mRNA Surveillance

Lecture 37 - Mechanisms of RNA Decay and Non Coding RNAs: Mechanisms of RNA Decay

Lecture 38 - Mechanisms of RNA Decay and Non Coding RNAs: Autoregulation of RNAs

Lecture 39 - Mechanisms of RNA Decay and Non Coding RNAs: Introduction to Non-Coding RNAs

Lecture 40 - Dosage Compensation and X-Inactivation: SRP and Different Modes of Compensation

Lecture 41 - Dosage Compensation and X-Inactivation: Dosage Compensation of X

Lecture 42 - Dosage Compensation and X-Inactivation: Omprinted vs Random X Inactivation

Lecture 43 - Dosage Compensation and X-Inactivation: Molecular Basis of X-Inactivation

Lecture 44 - Dosage Compensation and X-Inactivation: ES Cells and X-Inactivation

Lecture 45 - Dosage Compensation, Xist and ncRNA in Imprinting: The Roles of YY1

Lecture 46 - Dosage Compensation, Xist and ncRNA in Imprinting: shRNAs and Gene Expression

Lecture 47 - Dosage Compensation, Xist and ncRNA in Imprinting: Mechanism of RNAi in Action

Lecture 48 - Dosage Compensation, Xist and ncRNA in Imprinting: Genomic Imprinting in Action

Lecture 49 - Dosage Compensation, Xist and ncRNA in Imprinting: Different ncRNAs and their Roles

Lecture 50 - Dosage Compensation, Xist and ncRNA in Imprinting: lncRNA-Induced Cancer

Lecture 51 - Dosage Compensation, Xist and ncRNA in Imprinting: Xist and Cancer

Lecture 52 - Telomere, Telomerase and Impact on Genomes: The Importance of Telomeres

Lecture 53 - Telomere, Telomerase and Impact on Genomes: Telomerase and Aging

Lecture 54 - Telomere, Telomerase and Impact on Genomes: Telomere Length as Marker of Aging

Lecture 55 - Telomere, Telomerase and Impact on Genomes: Telomeres and Cancer

Lecture 56 - Telomere, Telomerase and Impact on Genomes: Cell Cycle Arrest

Lecture 57 - Telomere, Telomerase and Impact on Genomes: Maintenance and Manipulation of Telomeres

Lecture 58 - Epitranscriptome and Protein Synthesis: Important RNA Modifications

Lecture 59 - Epitranscriptome and Protein Synthesis: Readers, Writes and Erasers

Lecture 60 - Epitranscriptome and Protein Synthesis: Biological Implications of RNA Modifications

Lecture 61 - Epitranscriptome and Protein Synthesis: Roles of RNAs in Translation

Lecture 62 - Epitranscriptome and Protein Synthesis: Mechanism of Translation

NPTEL : NOC:Biomechanics (Biotechnology)

Co-ordinators : Prof. Varadhan

Lecture 1 - Introduction to forces - Resolving forces, principle of transmissibility

Lecture 2 - Statics FBD and EOE

Lecture 3 - Example problems on FBD and EOE

Lecture 4 - Joints in human body

Lecture 5 - Machines and mechanical advantage

Lecture 6 - Levers and types of levers

Lecture 7 - Insertion point and torque

Lecture 8 - Practice problem - 1

Lecture 9 - Practice problem - 2

Lecture 10 - Key terminologies

Lecture 11 - Anatomical planes and axis

Lecture 12 - Sagittal plane movements

Lecture 13 - Coronal plane movements

Lecture 14 - Transverse plane movements

Lecture 15 - Muscles - Muscle fascicles

Lecture 16 - Muscle fibers- Pennation angle

Lecture 17 - More on pennation angle

Lecture 18 - Excitation contraction coupling

Lecture 19 - Sliding filament theory

Lecture 20 - Force length relationship

Lecture 21 - Shoulder joints and muscles

Lecture 22 - Shoulder problem - 1

Lecture 23 - Shoulder problem - 2

Lecture 24 - Elbow theory

Lecture 25 - Elbow problem - 1

Lecture 26 - Elbow problem - 2

Lecture 27 - Elbow problem - 3

Lecture 28 - Wrist theory

Lecture 29 - Finger theory

Lecture 30 - Finger muscles

Lecture 31 - Spine anatomy and movements

Lecture 32 - Spine muscles

Lecture 33 - Spine problem

Lecture 34 - Hip anatomy and movements

Lecture 35 - Hip muscles

Lecture 36 - Hip problem

Lecture 37 - Knee anatomy and movements

Lecture 38 - Knee muscles

Lecture 39 - Knee problem

Lecture 40 - Ankle anatomy and movements

Lecture 41 - Ankle muscles

Lecture 42 - Ankle problem

Lecture 43 - Grasping- reaching- chains

Lecture 44 - D.O.F mobility, open/closed chain

Lecture 45 - Forward kinematics and workspace

Lecture 46 - 2R inverse kinematics

Lecture 47 - 3R kinematics forward and inverse

Lecture 48 - D-H parameters

Lecture 49 - Velocity and jacobian

Lecture 50 - 3R velocity

Lecture 51 - Tissues and types of tissues

Lecture 52 - Bone microstructure and cells

Lecture 53 - Properties of bones

Lecture 54 - Wolffs Law and Hookean behavior

Lecture 55 - Elastic properties and stress strain relations

Lecture 56 - Stress strain curve and mechanical properties of biological materials

Lecture 57 - Bending of Bones

Lecture 58 - Viscolelastic modelling

Lecture 59 - Maxwell Model

Lecture 60 - Voight Model

Lecture 61 - Kelvin model

Lecture 62 - Viscoelasticity in bones

Lecture 63 - Tissues and its constituents

Lecture 64 - Cartilages, ligaments and tendons

Lecture 65 - Stress strain relations in tendons

Lecture 66 - Tendon forces and factors affecting tendon property

Lecture 67 - Gliding resistance, tendon wrapping and friction forces

Lecture 68 - Enslaving - Intertendinuos force transfer and motor units

Lecture 69 - Introduction to enslavement

Lecture 70 - Enslaving effects in finger force production - 1

Lecture 71 - Enslaving effects in finger force production - 2

Lecture 72 - Wrist posture and finger interdependence - 1

Lecture 73 - Wrist posture and finger interdependence - 2

Lecture 74 - Wrist posture and finger interdependence - 3

Lecture 75 - Measurement of orientation in 3D space - Devices

Lecture 76 - Rotation matrices in 2D and 3D2

Lecture 77 - Animating using rotation matrices- Matlab Examples

Lecture 78 - Composite rotation matrix and relative orientations

Lecture 79 - Complex numbers and quaternions

Lecture 80 - Singularity, Gimbal Lock, Advantages and disadvantages of parameterization methods

Lecture 81 - Single finger kinematics measurement using IMU's

Lecture 82 - IMU based Full hand kinematics measurement system (HKMS)

Lecture 83 - Demonstration of the Hand Kinematics Measurement System (HKMS)

Lecture 84 - Introduction to Gait and running

NPTEL : Introduction to Synthetic Biology (Biotechnology)

Co-ordinators : Prof. Karthik Raman

Lecture 1 - Introduction to Synthetic Biology - Day 1 Part 1

Lecture 2 - Introduction to Synthetic Biology - Day 1 Part 2

Lecture 3 - Introduction to Synthetic Biology - Day 1 Part 3

Lecture 4 - Introduction to Synthetic Biology - Day 1 Part 4

Lecture 5 - Introduction to Synthetic Biology - Day 2 Part 1

Lecture 6 - Introduction to Synthetic Biology - Day 2 Part 2

Lecture 7 - Introduction to Synthetic Biology - Day 2 Part 3

Lecture 8 - Introduction to Synthetic Biology - Day 2 Part 4

Lecture 9 - Introduction to Synthetic Biology - Day 3 Part 1

Lecture 10 - Introduction to Synthetic Biology - Day 3 Part 2

Lecture 11 - Introduction to Synthetic Biology - Day 3 Part 3

Lecture 12 - Introduction to Synthetic Biology - Day 3 Part 4

Lecture 13 - Introduction to Synthetic Biology - Day 4 Part 1

Lecture 14 - Introduction to Synthetic Biology - Day 4 Part 2

Lecture 15 - Introduction to Synthetic Biology - Day 4 Part 3

Lecture 16 - Introduction to Synthetic Biology - Day 5 Part 1

Lecture 17 - Introduction to Synthetic Biology - Day 5 Part 2

Lecture 18 - Introduction to Synthetic Biology - Day 5 Part 3

Lecture 19 - Introduction to Synthetic Biology - Day 5 Part 4

Lecture 20 - Introduction to Synthetic Biology - Day 6 Part 1

Lecture 21 - Introduction to Synthetic Biology - Day 6 Part 2

Lecture 22 - Introduction to Synthetic Biology - Day 6 Part 3

Lecture 23 - Introduction to Synthetic Biology - Day 7 Part 1

Lecture 24 - Introduction to Synthetic Biology - Day 7 Part 2

Lecture 25 - Introduction to Synthetic Biology - Day 7 Part 3

Lecture 26 - Introduction to Synthetic Biology - Day 8 Part 1

Lecture 27 - Introduction to Synthetic Biology - Day 8 Part 2

Lecture 28 - Introduction to Synthetic Biology - Day 9 Part 1

Lecture 29 - Introduction to Synthetic Biology - Day 9 Part 2

Lecture 30 - Introduction to Synthetic Biology - Day 9 Part 3

Lecture 31 - Introduction to Synthetic Biology - Day 10 Part 1

Lecture 32 - Introduction to Synthetic Biology - Day 10 Part 2

Lecture 33 - Introduction to Synthetic Biology - Day 10 Part 3

NPTEL : NOC:Computational Genomics (Biotechnology)

Co-ordinators : Prof. Vineet Kumar Sharma

Lecture 1 - Introduction to Different OMICS Approaches and their Applications

Lecture 2 - Genetic Information in Prokaryotic

Lecture 3 - Databases and Web Resources to Store and Access the Biological Data

Lecture 4 - First and Second Generation Sequencing Technologies

Lecture 5 - Long Read Sequencing and Linked Read Sequencing - Part 1

Lecture 6 - Long Read Sequencing and Linked Read Sequencing - Part 2

Lecture 7 - Sequence Formats and Databases for Genomic Analysis

Lecture 8 - Introduction to Linux

Lecture 9 - File Handling and Remote Connectivity in Linux

Lecture 10 - Running Linux Commands and Installation of Genomic Packages

Lecture 11 - Introduction to R and Applications in Genomic Analysis

Lecture 12 - Publicly Available Tools and Need for Workstations for Genomic Analysis

Lecture 13 - Overview of Genomic and Transcriptomic Analysis

Lecture 14 - Genomic and Transcriptomic Analysis of an Organism with Case Studies

Lecture 15 - How to Collect and Confirm Sample of the Species to be Sequenced and Transcriptome Sequencing Approaches

Lecture 16 - Estimating the Amount of Sequencing Coverage for a Genome and Hybrid Sequencing Approaches

Lecture 17 - Types of Reads, Quality Filtering, Estimating the Genome Complexity and Heterozygosity

Lecture 18 - Genome Assembly and its Completion Status, Assembly Algorithms

Lecture 19 - Commonly Used Assembly Tools

Lecture 20 - Linked-Read Sequencing and Processing

Lecture 21 - Long Reads Analysis and Assembly Workflow

Lecture 22 - De novo Assembly Using Genomic and Transcriptomic Reads

Lecture 23 - Merging Assemblies to Create Hybrid Assembly and Determining the Quality of Assembly

Lecture 24 - Chromosomal Level Assembly and Case Studies

Lecture 25 - Identification and Annotation of Repeats in Genomes

Lecture 26 - De novo Transcriptome Assembly and Making the Coding Gene Set

Lecture 27 - Prediction of tRNA, rRNA and miRNA in a Genome

Lecture 28 - Functional Annotation and Identification of Metabolic Pathways in a Genome

Lecture 29 - Comprehensive Functional Annotation of Predicted Genes in a Genome

Lecture 30 - Functional Annotation of Predicted Genes by Alternate Methods

Lecture 31 - Methods and Steps to Perform the Evolutionary Analysis of a Genome

Lecture 32 - Methods for Taxonomic Classification and Phylogeny Econstruction and Analysis

Lecture 33 - Epigenetics, ChIp-seq, Transcriptome and Microarrays for Regulation of Expression

Lecture 34 - Single Cell Genomics, 10X Chromium Linked-reads and Illumina Sequencing, Single Cell Gene Expression

Lecture 35 - Application of Multiomics Approaches in Human Health and Diseases Such as Cancer, Diabetes, etc.

Lecture 36 - Prokaryotic Genome Sequencing and Assembly Approaches

Lecture 37 - Gene Prediction Approaches and Common Methods for Bacterial Gene Prediction

Lecture 38 - Common Methods for Annotation of a Bacterial Genome, t-RNA, rRNA, Operon Prediction and Annotation

Lecture 39 - Phylogenetic Analysis of Bacterial Genomes

Lecture 40 - Metabolic and Comparative Analysis

Lecture 41 - Microbiome and Metagenome, Human, Organismal and Environmental Microbiomes

Lecture 42 - Sequencing and Assembly of Metagenomes, Gene Prediction, Annotation, MAGs - Part 1

Lecture 43 - Sequencing and Assembly of Metagenomes, Gene Prediction, Annotation, MAGs - Part 2

Lecture 44 - Taxonomic Analysis Using Amplicon Sequence Variants, Statistical Analysis

NPTEL : NOC:Human Physiology (Biotechnology)

Co-ordinators : Prof. Nishikant Subedar

Lecture 1 - Introduction to Homeostasis

Lecture 2 - Mechanisms of Homeostasis - Part 1

Lecture 3 - Mechanisms of Homeostasis - Part 2

Lecture 4 - Physiology of muscle - Part 1

Lecture 5 - Physiology of muscle - Part 2

Lecture 6 - Molecular Mechanism of muscle contractility - Part 1

Lecture 7 - Molecular Mechanism of muscle contractility - Part 2

Lecture 8 - How does the heart muscle work? - Part 1

Lecture 9 - How does the heart muscle work? - Part 2

Lecture 10 - Cardiac system : From stimuli to rhythmic muscle contraction - Part 1

Lecture 11 - Cardiac system : From stimuli to rhythmic muscle contraction - Part 2

Lecture 12 - Cardiac system : From stimuli to rhythmic muscle contraction - Part 3

Lecture 13 - Cardiac system : From stimuli to rhythmic muscle contraction - Part 4

Lecture 14 - Rhythemicity of heart beat - Part 1

Lecture 15 - Rhythemicity of heart beat - Part 2

Lecture 16 - Hemodynamics

Lecture 17 - Hemodynamics and Regulation - Part 1

Lecture 18 - Hemodynamics and Regulation - Part 2

Lecture 19 - Hemodynamics and Regulation - Part 3

Lecture 20 - Hemodynamics and Regulation - Part 4

Lecture 21 - Hemodynamics and Regulation - Part 5

Lecture 22 - Hemodynamics and Regulation - Part 6

Lecture 23 - Lymphatic system

Lecture 24 - Excretory system : Kidney - Part 1

Lecture 25 - Excretory system : Kidney - Part 2

Lecture 26 - Excretory system : Kidney - Part 3

Lecture 27 - Kidney and RBC production

Lecture 28 - Excretory system : Nephron - Part 1

Lecture 29 - Excretory system : Nephron - Part 2

Lecture 30 - Excretory system : Nephron - Part 2.1

Lecture 31 - Excretory system : Nephron - Part 3

Lecture 32 - Excretory system : Regulation of Osmolarity and counter-current mechanism - Part 1

Lecture 33 - Excretory system : Regulation of Osmolarity and counter-current mechanism - Part 2

Lecture 34 - Excretory system : Regulation of Osmolarity and counter-current mechanism - Part 3

Lecture 35 - Physiology and Introduction of Respiration - Part 1

Lecture 36 - Physiology and Introduction of Respiration - Part 2

Lecture 37 - Respiration - Part 1

Lecture 38 - Respiration - Part 2

Lecture 39 - Respiration - Part 3

Lecture 40 - Respiration - Part 4

Lecture 41 - Physiology of smooth muscles and digestive system - Part 1

Lecture 42 - Physiology of smooth muscles and digestive system - Part 2

Lecture 43 - Physiology of smooth muscles and digestive system - Part 3

Lecture 44 - Physiology of smooth muscles and digestive system - Part 4

Lecture 45 - Secretory functions of alimentary tract - Part 1

Lecture 46 - Secretory functions of alimentary tract - Part 2

Lecture 47 - Secretory functions of alimentary tract and Pancreas - Part 1

Lecture 48 - Secretory functions of alimentary tract and Pancreas - Part 2

Lecture 49 - Secretory functions of Pancreas and liver

Lecture 50 - Secretory functions of Liver and Gallbladder

Lecture 51 - Introduction to Endrocine system

Lecture 52 - Pituitary gland and growth hormone secretion - Part 1

Lecture 53 - Pituitary gland and growth hormone secretion - Part 2

Lecture 54 - Thyroid gland - Part 1

Lecture 55 - Thyroid gland - Part 2

Lecture 56 - Hormones of adrenal cortex - Part 1

Lecture 57 - Hormones of adrenal cortex - Part 2

Lecture 58 - Physiology of Glucocorticoids - Part 1

Lecture 59 - Physiology of Glucocorticoids - Part 2

Lecture 60 - Course Summary

NPTEL : NOC:I Think Biology (Biotechnology)

Co-ordinators : Prof. Kaustubh Rau, Prof. Sravanti Uppaluri, Prof. Divya Uma, Prof. Jayanti Ray Mukherjee, Prof. Sriram

Lecture 1 - What is Biology ?

Lecture 2 - Pillars of Biology

Lecture 3 - Biology and the City

Lecture 4 - The Process of Science

Lecture 5 - A Tale of Forgotten Scientists - Part I

Lecture 6 - A Tale of Forgotten Scientists - Part II

Lecture 7 - Numbers and Scales in Biology - Part I

Lecture 8 - Numbers and Scales in Biology - Part II

Lecture 9 - Experimentation vs Theory_Discussion

Lecture 10 - How to Find Reliable Information ?

Lecture 11 - How to Read a Scientific Article ?

Lecture 12 - Biomolecules - Part I

Lecture 13 - Biomolecules - Part II

Lecture 14 - Central Dogma

Lecture 15 - Gene Regulation

Lecture 16 - Non-Coding RNA

Lecture 17 - Introduction to Cells

Lecture 18 - Our Favourite Cells - Part I

Lecture 19 - Our Favourite Cells - Part II

Lecture 20 - Cell Cycle

Lecture 21 - Cell Cycle Control

Lecture 22 - Cancer Biology (Guest Lecture) - Dr. Ramray Bhat (IISc)

Lecture 23 - Discussion on Cancer Biology - Dr. Ramray Bhat (IISc) and Dr. Divya Uma (Azim Premji University)

Lecture 24 - Genetics - I

Lecture 25 - Genetics - II

Lecture 26 - Genetics - III

Lecture 27 - Gene Mutations and Genetic Disorders (Guest Lecture) Dr. Antara Das, Azim Premji University

Lecture 28 - Studying Human Genetic Disorders using Transgenic Animals - Research talk (Guest Lecture)

Lecture 29 - Bead Microscopy (Guest Lecture) Dr. Procheta Mallik (ISPF and ThinkTac)

Lecture 30 - Molecular Biology Techniques

Lecture 31 - Bacterial DNA Isolation and PCR - Hands-on (Guest Lecture) Dr. Beena DB (Azim Premji University)

Lecture 32 - BT Cotton - Part 1 (Case study)

Lecture 33 - Molecular Biology Techniques - BT Cotton - Part 2 (Case study)

Lecture 34 - Introduction to Evolution

Lecture 35 - Evidences of Evolution

Lecture 36 - Mechanism of Evolution

Lecture 37 - Misconceptions about Evolution - Discussion

Lecture 38 - Human Evolution

Lecture 39 - Species, Speciation and Biodiversity - I

Lecture 40 - Species, Speciation and Biodiversity - II

Lecture 41 - Measuring Biodiversity (Tutorial)

Lecture 42 - Speciation

Lecture 43 - Speciation (Case studies)

Lecture 44 - Introduction to Ecological Interactions - Part 1

Lecture 45 - Ecological Interactions - Part 2

Lecture 46 - Ecological Interactions - Part 3

Lecture 47 - Mutualism - Figs (Case Study)

Lecture 48 - Seed Dispersal (Case study)

Lecture 49 - Introduction to Public Health (Guest Lecture) Dr.Abha Rao (Public Health Foundation of India)

Lecture 50 - Public Health in India (Guest Lecture) Dr. Abha Rao (Public Health Foundation of India)

Lecture 51 - Discussion on Public Health - Dr. Abha Rao (PHFI) and Mr. Pratush Brahma (University of Florida)

Lecture 52 - Public Health - Rotavirus (Case study)

Lecture 53 - Public Health - Malaria (Case study) - Part 1

Lecture 54 - Public Health - Malaria (Case study) - Part 2

Lecture 55 - Biology and Climate Change - Part 1

Lecture 56 - Biology and Climate Change - Part 2

Lecture 57 - Biology and Climate Change - Part 3

Lecture 58 - Biodiversity Conservation (Guest Lecture) Dr. Krishnapriya Tamma (Azim Premji University)

Lecture 59 - Discussion on Biology and Society

Lecture 60 - Discussion on Art and Science

Lecture 61 - Biology and Society - Case study on Stray Dogs

Lecture 62 - Nature Relatedness

Lecture 63 - Course Wrap-Up

NPTEL : NOC:Classics in Neuroscience (Biotechnology)

Co-ordinators : Prof.Varadhan SKM

Lecture 1 - History of Neuroscience : Introduction - Part 1

Lecture 2 - History of Neuroscience : Introduction - Part 2

Lecture 3 - Factors that produce discoveries

Lecture 4 - Importance of the 1950s in Neuroscience

Lecture 5 - Advances in Molecular Biology (Genes to DNA)

Lecture 6 - Discovery of the structure of the DNA

Lecture 7 - How DNA works

Lecture 8 - Molecular biology of the human brain

Lecture 9 - Signaling molecule: The First growth Factor

Lecture 10 - Nerve Growth Factor

Lecture 11 - Organizing the Connections

Lecture 12 - Axonal Transport

Lecture 13 - Signaling molecules: The First Neurotransmitter in the brain

Lecture 14 - The concept of Lock and Key

Lecture 15 - The Soup vs Sparks Debate

Lecture 16 - Intracellular Electrode, Neurotransmitter in the Brain, Dales Law

Lecture 17 - Early evidence of Acetylcholine and Glutamate

Lecture 18 - Early evidence of GABA and Serotonin

Lecture 19 - Catecholamine and Hormones

Lecture 20 - Second messengers and Hormones

Lecture 21 - Pheromones

Lecture 22 - Revolution in Cytology

Lecture 23 - Synapse and the 'Neuronism vs Reticularism' debate

Lecture 24 - Contributions by Rene Couteaux and George Koelle

Lecture 25 - Chemical Synapse

Lecture 26 - Synapse and the Neuromuscular Junction

Lecture 27 - The Electrical Synapse and Myelin

Lecture 28 - Physiology: The Action Potential - Part 1

Lecture 29 - Recording nerve impulses and single action potentials

Lecture 30 - Recording from nerve and plant cells

Lecture 31 - Recording Local circuits, Hodgkin and Huxely contributions - Part 1

Lecture 32 - Hodgkin and Huxely model - Part 2 and Kenneth Cole Contributions

Lecture 33 - GHK equation and HH action potentials

Lecture 34 - First Electrophysiological Evidence for Synaptic Transmission

Lecture 35 - Bernard Katz

Lecture 36 - End-Plate Potential and Synaptic Quanta

Lecture 37 - Eccles and Spinal motor neuron

Lecture 38 - Invertebrate simple systems: Aplysia

Lecture 39 - Other studies of sensory responses

Lecture 40 - Legacy of Golgi and Ramo`n y Cajal

Lecture 41 - Dynamic polarization of Neuron

Lecture 42 - Modern Research

Lecture 43 - Synaptic Integration and Action Potential Initiation

Lecture 44 - Active properties of dendrites

Lecture 45 - Dendritic dominance

Lecture 46 - Dendritic spines

Lecture 47 - Rethinking the concept of Neuron Doctrine

Lecture 48 - Muscle spindles

Lecture 49 - Spinal cord pathways

Lecture 50 - Retinal Processing

Lecture 51 - Keffler Hartline

Lecture 52 - Stephen Kuffler and Horace Barlow

Lecture 53 - Expansion of the Reflex concept

Lecture 54 - Central Pttern genrators

Lecture 55 - The cortical column

Lecture 56 - Vernon Mountcastle

Lecture 57 - Central Visual Processing

Lecture 58 - Central Visual Processing and Feature Detectors

Lecture 59 - Intracellular recordings from the brain - Part 1

Lecture 60 - Intracellular recordings from the brain - Part 2

Lecture 61 - Two motor systems

Lecture 62 - Auditory cortex and The pattern theory of olfaction

Lecture 63 - Arousal and Reticular activating system

Lecture 64 - Sleep and Rapid Eye Movements

Lecture 65 - Operant Conditioning by brain stimulation

Lecture 66 - Hypothalamus and Feeding Behavior

Lecture 67 - Brain as a gland

Lecture 68 - Hypothalamic-Neurohypophyseal System

Lecture 69 - Hypothalamic-Adenohypophyseal System

Lecture 70 - Founding Modern Neuroanatomy

Lecture 71 - Psychology and Ethology

Lecture 72 - Karl Lashley

Lecture 73 - Donald Hebb

Lecture 74 - Limbic system- Limbic Lobe and Papez Circuit

Lecture 75 - Limbic system-Kluver-Bucy Syndrome

Lecture 76 - The Limbic system and Amygdala

Lecture 77 - The Hippocampus and Patient H.M

Lecture 78 - Brenda Milner

Lecture 79 - Neurology: Foundations of Brain Imaging

Lecture 80 - The Neurological unit of the Boston City Hospital

Lecture 81 - Derek Denny-Brown, Raymond Adams and C. Miller Fisher

Lecture 82 - Montreal Neurological Institute

Lecture 83 - Cerebral Circulation

Lecture 84 - Spreading depression of Leo and Migraine

Lecture 85 - The Eradication of Polio

Lecture 86 - Origin of Neurosurgery

Lecture 87 - Harvey Cushing

Lecture 88 - Pituitary Surgery

Lecture 89 - Stereotaxy

Lecture 90 - Epilepsy

Lecture 91 - Psychosurgery

Lecture 92 - Antipsychotic Drugs

Lecture 93 - Reserpine

Lecture 94 - Monoamine Oxidase Inhibitors

Lecture 95 - Lithium

Lecture 96 - Benzodiazepines

Lecture 97 - Stress

NPTEL : NOC:Advances in Omics (Biotechnology)

Co-ordinators : Prof. Nagarjun Vijay

Lecture 1 - Introduction to Genomics - 1

Lecture 2 - Introduction to Genomics - 2

Lecture 3 - Advent of NGS

Lecture 4 - Genome Assembly: Few Concepts and Terminology

Lecture 5 - Genome Assembly Approaches

Lecture 6 - Pyrosequencing

Lecture 7 - Reversible Chain Termination Based Sequencing

Lecture 8 - Ph Sequencing

Lecture 9 - Sequencing by Ligation (Solid)

Lecture 10 - Sequencing by Ligation (Complete Genomics)

Lecture 11 - Other Short-Read Sequencing Technologies - Part 1

Lecture 12 - Other Short-Read Sequencing Technologies - Part 2

Lecture 13 - Long-Read Sequencing

Lecture 14 - Single Molecule Long-Read Sequencing

Lecture 15 - The Omics Data Avalanche

Lecture 16 - Evolutionary Biology and Genomics

Lecture 17 - Ancient Genomics

Lecture 18 - Whole-Genome Duplication

Lecture 19 - Tests of Selection

Lecture 20 - Genomics in Experimental Evolution

Lecture 21 - Making Sense of Genomic Sequences

Lecture 22 - Transcriptomics: New Tools Leading to Deeper Insights

Lecture 23 - Single Cell Transcriptomics and Beyond

Lecture 24 - Proteomics: A Brief Introduction

Lecture 25 - Protein Quantification

Lecture 26 - Introduction to Linux for Omics

Lecture 27 - The Linux Command Line Interface

Lecture 28 - Using the CLI-1: NCBI Datasets

Lecture 29 - Using the CLI-2: Short Read Archive Toolkit

Lecture 30 - UCSC and IGV genome browsers

Lecture 31 - Mega Omics Projects

Lecture 32 - Genotype-Tissue Expression (GTEx)

Lecture 33 - Encyclopedia of DNA Element (ENCODE)

Lecture 34 - The Cancer Genome Atlas (TCGA)

Lecture 35 - Eukaryotic Genome Sequencing Consortia

Lecture 36 - The Postomics Era

Lecture 37 - RNA-Seq Differential Expression Analysis

Lecture 38 - Gene Loss and its Consequences

Lecture 39 - Establishing Gene loss: Few Examples

Lecture 40 - Course Summary

NPTEL : NOC:Statistics for Biomedical Engineers (Biotechnology)

Co-ordinators : Prof. Babji Srinivasan

Lecture 1 - Statistics - Motivation

Lecture 2 - Statistics - Introduction

Lecture 3 - Statistics: Definition and Terminology - Part I

Lecture 4 - Statistics: Definition and Terminology - Part II

Lecture 5 - Data: Primary vs Secondary

Lecture 6 - Data: Quantitative vs Qualitative

Lecture 7 - Data: Presentation

Lecture 8 - Data: Static vs Dynamic

Lecture 9 - Data: Box Plot and Spyder Graphs

Lecture 10 - Data: Summarising Data

Lecture 11 - Probability: Event and Sample space

Lecture 12 - Probability: Mutually exclusive and Independent Events

Lecture 13 - Probability: Random Variables

Lecture 14 - Probability: Expectation of Random Variable

Lecture 15 - Probability: Variance of Random Variable

Lecture 16 - Probability Distribution: Binomial, Poisson, Bernoulli

Lecture 17 - Probability Distribution: Normal Distribution

Lecture 18 - Central Limit Theorem: Statement

Lecture 19 - Central Limit Theorem: Illustration

Lecture 20 - Confidence Interval

Lecture 21 - Determining Sample Size

Lecture 22 - Hypothesis Test: Introduction

Lecture 23 - Hypothesis Test: Example

Lecture 24 - Hypothesis: P value

Lecture 25 - Hypothesis: Type 2 error

Lecture 26 - Hypothesis: Chi square Distribution - Part 1

Lecture 27 - Hypothesis: Chi square Distribution - Part 2

Lecture 28 - Hypothesis: Probability Plots

Lecture 29 - Hypothesis: Contingency Table Test

Lecture 30 - Multivariate Hypothesis: Two Sample Test

Lecture 31 - Multivariate Hypothesis: Paired T test

Lecture 32 - Multivariate Hypothesis: Paired vs Unpaired Testing

Lecture 33 - Multivariate Hypothesis: Two population variances

Lecture 34 - Multivariate Hypothesis: Multiple Random Variables - Part 1

Lecture 35 - Multivariate Hypothesis: Multiple Random Variables - Part 2

Lecture 36 - Multivariate Hypothesis: Covariance and Correlation

Lecture 37 - One Way ANOVA: Motivation and Assumptions

Lecture 38 - One Way ANOVA: Fixed and Random effects Model

Lecture 39 - One Way ANOVA: Derivation and Confidence Interval

Lecture 40 - One Way ANOVA: Confidence Interval

Lecture 41 - One Way ANOVA: Unbalanced Experiment and Residuals

Lecture 42 - One Way ANOVA: Interpretation of Results

Lecture 43 - Statistical Modeling: Introduction

Lecture 44 - Statistical Modeling: Linear Regression Derivation

Lecture 45 - Statistical Modeling: Linear Regression - Assumption and Residuals

Lecture 46 - Statistical Modeling: Multi Linear Regression

Lecture 47 - Statistical Modeling: Logistic Regression

Lecture 48 - Statistical Modeling: Cross Entropy Loss

Lecture 49 - Statistical Modeling: Gradient Descent

Lecture 50 - Statistical Modeling: One Way Anova via Linear Regression

Lecture 51 - Design Of Experiments: Randomised Complete Block Design - Part 1

Lecture 52 - Design Of Experiments: Randomised Complete Block Design - Part 2

Lecture 53 - RCBD: Math Formulation and Derivation

Lecture 54 - RCBD: Necessity and Application

Lecture 55 - Latin Square: Introduction

Lecture 56 - Latin Square: Math and Formulation

Lecture 57 - Graeco - Latin Square

Lecture 58 - Interaction Among Variables

Lecture 59 - Two-Way ANOVA: Introduction - Part 1

Lecture 60 - Two-Way ANOVA: Introduction - Part 2

Lecture 61 - Two-Way ANOVA: Math and Formulation

Lecture 62 - Factorial Design: 2^2 Experiments

Lecture 63 - Factorial Design: 2^k Experiments - Part 1

Lecture 64 - Factorial Design: 2^k Experiments - Part 2

Lecture 65 - Factorial Design: Blocking

Lecture 66 - Introduction to Python Programming for Biomedical Engineers

NPTEL : Analytical Technologies in Biotechnology (Biotechnology)

Co-ordinators : Dr. Ashwani K. Sharma

Lecture 1 - Basic concepts in microscopy - 1

Lecture 2 - Basic concepts in microscopy - 2

Lecture 3 - Dark-field and phase contrast microscopy

Lecture 4 - Differential interference contrast and polarization

Lecture 5 - Fluorescence and confocal microscopy

Lecture 6 - Transmission electron microscopy

Lecture 7 - Transmission electron microscopy cont. and scanning electron microscopy

Lecture 8 - Basic concepts - 1

Lecture 9 - Basic concepts - 2

Lecture 10 - GM counting and Scintillation counting

Lecture 11 - Scintillation counting continued

Lecture 12 - Autoradiography and RIA

Lecture 13 - Safety aspects and applications

Lecture 14 - Introduction and Basic concepts in chromatography - 1

Lecture 15 - Basic concepts in chromatography - 2

Lecture 16 - Low-pressure liquid chromatography (LPLC) and high performance liquid chromatography (HPLC)

Lecture 17 - Ion-exchange chromatography

Lecture 18 - Gel-filtration chromatography

Lecture 19 - Affinity chromatography

Lecture 20 - Gas-liquid chromatography

Lecture 21 - Basic concepts in electrophoresis

Lecture 22 - Horizontal and vertical gel electrophoresis

Lecture 23 - Native gel electrophoresis and SDS-PAGE

Lecture 24 - Isoelectric focusing (IEF), 2-D gel electrophoresis and protein detection methods

Lecture 25 - Electrophoresis of nucleic acids

Lecture 26 - Immunoelectrophoresis and capillary electrophoresis

Lecture 27 - Introduction and Basic Concepts - 1

Lecture 28 - Basic concepts - 2

Lecture 29 - Types of centrifuges and analytical ultracentrifugation method

Lecture 30 - Separation methods in preparative ultracentrifuges

Lecture 31 - Types of rotors

Lecture 32 - Types of rotors cont. and care of rotors

Lecture 33 - Introduction and basic concepts

Lecture 34 - UV-Visible spectroscopy

Lecture 35 - Infrared and fluorescence spectroscopy

Lecture 36 - Circular dichroism (CD) spectroscopy

Lecture 37 - Nuclear magnetic resonance (NMR) spectroscopy and X-ray crystallography

Lecture 38 - Atomic spectroscopy and mass spectrometry

Lecture 39 - Polymerase chain reaction(PCR)

Lecture 40 - DNA sequencing methods

Lecture 41 - Enzyme linked immunosorbent assay (ELISA)

NPTEL : NOC:Biomedical Nanotechnology (Biotechnology)

Co-ordinators : Prof. P.Gopinath

Lecture 1 - Introduction to Nano

Lecture 2 - Nano-Biomimicry

Lecture 3 - Synthesis of nanomaterials by Physical and Chemical Methods

Lecture 4 - Synthesis of nanomaterials by Biological Methods

Lecture 5 - Characterisation of Nanomaterials

Lecture 6 - DNA Nanotechnology

Lecture 7 - Protein and Glyco Nanotechnology

Lecture 8 - Lipid Nanotechnology

Lecture 9 - Bio-Nanomachines

Lecture 10 - Carbon nanotubes and Its Bio-Applications

Lecture 11 - Nanomaterials for Cancer Diagnosis

Lecture 12 - Nanomaterials for Cancer therapy

Lecture 13 - Nanotechnology in Tissue Engineering

Lecture 14 - Nano artificial cells

Lecture 15 - Nanotechnology in Organ Printing

Lecture 16 - Nanotechnology in Point-of-Care Diagnostics

Lecture 17 - Nano-Pharmacology and Drug Targeting

Lecture 18 - Cellular uptake mechanisms of nanomaterials

Lecture 19 - In vitro Methods to study antibacterial and anticancer properties of nanomaterials

Lecture 20 - Nanotoxicology

NPTEL : NOC:Plant Developmental Biology (Biotechnology)

Co-ordinators : Prof. Shri Ram Yadav

Lecture 1 - Life Cycle of an Angiosperm

Lecture 2 - Characteristics of Plant Growth and Development - I

Lecture 3 - Characteristics of Plant Growth and Development - II

Lecture 4 - Molecular Genetics of Plant Development - I

Lecture 5 - Molecular Genetics of Plant Development - II

Lecture 6 - Molecular Genetics of Plant Development - III

Lecture 7 - Molecular Genetics of Plant Development - IV

Lecture 8 - Molecular Genetics of Plant Development (Continued...) - I

Lecture 9 - Molecular Genetics of Plant Development (Continued...) - II

Lecture 10 - Molecular Genetics of Plant Development (Continued...) - III

Lecture 11 - Root Development

Lecture 12 - Root Development (Continued...)

Lecture 13 - Root Development (Vascular Development)

Lecture 14 - Root Branching: Lateral Root Development

Lecture 15 - Shoot Development: SAM Maintenance

Lecture 16 - Shoot Development: Organogenesis

Lecture 17 - Shoot Development: Leaf Development

Lecture 18 - Shoot Development: Flowering

Lecture 19 - Cell-Cell Communication During Plant Development

Lecture 20 - Techniques Used in Lab

NPTEL : NOC:Structural Biology (Biotechnology)

Co-ordinators : Prof. Saugata Hazra

Lecture 1 - Introduction: Why to Study Structural Biology

Lecture 2 - Introduction to Biological Macromolecules

Lecture 3 - Introduction: Decoding Biological Macromolecules

Lecture 4 - Introduction: Genome Sequencing

Lecture 5 - Introduction: Post Genomic Era

Lecture 6 - Amino acids and their properties

Lecture 7 - Protein: Protein Chemistry, Chirality, Peptide bond and Levels of protein structures

Lecture 8 - Protein: Dihedral angles, Peptide bond and Ramachandran Plot

Lecture 9 - Protein: Super Secondary Structures, Motif, Domains, Non-covalent interactions

Lecture 10 - Protein: Folding of Protein, Thermodynamics and Kinetics of protein folding, Characterization of Proteins

Lecture 11 - Introduction to Structural Biology Techniques - Part I

Lecture 12 - Introduction to Structural Biology Techniques - Part II

Lecture 13 - X-ray Crystallography: Crystallization - Part I

Lecture 14 - X-ray Crystallography: Crystallization - Part II

Lecture 15 - X-ray Crystallography: Crystal Mounting

Lecture 16 - X-ray Crystallography: Production of X-ray and its properties

Lecture 17 - X-ray Crystallography: Journey to 3D land

Lecture 18 - X-ray Crystallography: Crystal Symmetry

Lecture 19 - X-ray Crystallography: Instrumentation in X-ray Crystallography

Lecture 20 - X-ray Crystallography: Data collection and processing

Lecture 21 - X-ray Crystallography: Data Analysis - Part I

Lecture 22 - X-ray Crystallography: Data Analysis - Part II

Lecture 23 - X-ray Crystallography: Phase Problem - Part I

Lecture 24 - X-ray Crystallography: Phase Problem - Part II

Lecture 25 - X-ray Crystallography: Refinement and Structure deposition to PDB

Lecture 26 - Introduction to Spectroscopy and NMR

Lecture 27 - Basic Principles of NMR and Instrumentation

Lecture 28 - NMR Sample Preparation and Chemical Shift related concepts

Lecture 29 - Factors effecting NMR Spectra (1D and 2D)

Lecture 30 - 2D and 3D NMR Spectroscopy focusing on protein structure

Lecture 31 - Introduction to Spectroscopy

Lecture 32 - UV-Vis and CD spectroscopy

Lecture 33 - Fluorescence Spectroscopy and Green Fluorescence Protein (GFP)

Lecture 34 - Infrared and Raman Spectroscopy for protein

Lecture 35 - Raman Spectroscopy, Raman Microscopy and Raman Crystallography for studying protein

Lecture 36 - Introduction to Microscopy

Lecture 37 - Functioning details of Cryo Electron Microscopy (Cryo EM)

Lecture 38 - Cryo Electron Microscopy: Data Collection and Analysis

Lecture 39 - A concise story of advancement Cryo-EM

Lecture 40 - Protein Data Bank

Lecture 41 - History of Molecular Visualizations of Biological Macromolecules

Lecture 42 - Description of structure related files (.pdb, .mmcif, .mtz, etc.)

Lecture 43 - Demonstration of COOT

Lecture 44 - 3D visualization using Pymol

Lecture 45 - Demonstration of Pymol

Lecture 46 - Why we need MD Simulation

Lecture 47 - Molecular Dynamic Simulation Process - Part I

Lecture 48 - Molecular Dynamic Simulation Process - Part II

Lecture 49 - Molecular Dynamic Simulation Process - Part III

Lecture 50 - Application of Molecular Dynamic Simulation

Lecture 51 - What, How and Which of Protein Engineering

Lecture 52 - How to make logical Protein Engineering: Process of Rational design

Lecture 53 - Success story of Rational Protein designing: Focusing on De Novo Process

Lecture 54 - Designing Protein by mimicking nature: Process of Directed Evolution

Lecture 55 - Achievement, Challenges, and Future direction in the field of Protein Engineering

Lecture 56 - Introduction to Structure Based Drug Discovery (SBDD)

Lecture 57 - Rational Drug Discovery

Lecture 58 - Docking Based Virtual Screening: Progress, Challenges and Future perspective

Lecture 59 - What makes a small molecule an ideal drug: Developing in silico ADMETox Model

Lecture 60 - Structure Based Drug Discovery: Case study and Conclusion

NPTEL : NOC:Learning about Learning: A Course on Neurobiology of Learning and Memory (Biotechnology)

Co-ordinators : Prof. Balaji Jayaprakash

Lecture 1 - Introduction to Learning and Memory - I : Historical perspective

Lecture 2 - Introduction to Learning and Memory - II : Classification

Lecture 3 - Associative Learning I : Rules of Associative learning

Lecture 4 - Associative learning II : Garcia and KoellingÃ¢â‚¬â„¢s Experiment, KaminÃ¢â‚¬â„¢s Blocking Experiment

Lecture 5 - Introduction to the Rescorla Wagner Model

Lecture 6 - Application of Rescorla Wagner Model - I

Lecture 7 - Application of Rescorla Wagner Model - II

Lecture 8 - Application of Rescorla Wagner Model - III

Lecture 9 - Application of Rescorla Wagner Model - IV

Lecture 10 - Limitations of Rescorla Wagner Model

Lecture 11 - Introduction of Reinforcement Learning - I : ThorndikeÃ¢â‚¬â„¢s view, TolmanÃ¢â‚¬â„¢s views, Skinner Box

Lecture 12 - Introduction of Reinforcement Learning - II : Classification, ThorndikeÃ¢â‚¬â„¢s view, TolmanÃ¢â‚¬â„¢s views, Skinner Box (Continued...)

Lecture 13 - Introduction of Reinforcement Learning - III : Understanding scheduling of reinforcers in operant conditioning

Lecture 14 - Sign Tracking vs Goal Oriented/Tracking; Linking complex behaviors to simple molecules

Lecture 15 - Sign Tracking vs Goal Oriented; Learning Linking complex behaviors to simple molecules - II

Lecture 16 - Memory in Molecular Terms - I : Protein synthesis in memory consolidation

Lecture 17 - Memory in Molecular Terms - II : Long term potentiation

Lecture 18 - Memory in Molecular Terms - III : Properties of a memory molecule

Lecture 19 - Memory in Molecular Terms - IV : Remote memory and its characteristics

Lecture 20 - Memory in Molecular Terms - V : Selective labelling of memory encoding neurons and their manipulation

NPTEL : NOC:Drug Delivery: Principles and Engineering (Biotechnology)

Co-ordinators : Rachit Agarwal

Lecture 1 - Drug Delivery Introduction and Pharmacokinetics

Lecture 2 - Pharmacokinetics (Continued...)

Lecture 3 - Pro-drugs and Polymers Introduction

Lecture 4 - Polymers - Synthesis

Lecture 5 - Polymers - Properties

Lecture 6 - Biomedical Polymers

Lecture 7 - Biodegradable Polymers and Polymer Drug Conjugates - I

Lecture 8 - Polymer Drug Conjugates - II

Lecture 9 - Research Paper Discussion and Diffusion Controlled Systems

Lecture 10 - Controlled Release: Reservoir System - I

Lecture 11 - Controlled Release: Reservoir Systems and Non-erodible Systems

Lecture 12 - Controlled Release: Non-erodible Systems and Erodible systems

Lecture 13 - Math Exercise

Lecture 14 - Hydrogels - I

Lecture 15 - Hydrogels - II

Lecture 16 - Hydrogels - III

Lecture 17 - Hydrogels - IV

Lecture 18 - Nano and Micro-particles - I

Lecture 19 - Nano and Micro-particles - II

Lecture 20 - Nano and Micro-particles - III

Lecture 21 - Nano and Micro-particles - IV

Lecture 22 - Nano and Micro-particles - V

Lecture 23 - Nano and Micro-particles - VI

Lecture 24 - Nano and Micro-particles - VII

Lecture 25 - Protein Adsorption - I

Lecture 26 - Protein Adsorption - II

Lecture 27 - Protein Adsorption - III

Lecture 28 - Tissue Engineering - I

Lecture 29 - Tissue Engineering - II

Lecture 30 - Tissue Engineering - III

Lecture 31 - Drug Delivery in Tissue Engineering - I

Lecture 32 - Drug Delivery in Tissue Engineering - II

Lecture 33 - Implant Associated Infections - I

Lecture 34 - Implant Associated Infections - II

Lecture 35 - Route Specific Delivery: Oral Route - I

Lecture 36 - Route Specific Delivery: Oral Route - II

Lecture 37 - Route Specific Delivery: Oral and Subcutaneous Route

Lecture 38 - Route Specific Delivery: Intramuscular, Transdermal - I

Lecture 39 - Route Specific Delivery: Transdermal - II

Lecture 40 - Route Specific Delivery: Transdermal and Inhalation Route

Lecture 41 - Route Specific Delivery: Inhalation - II, Buccal and Rectal Administration

Lecture 42 - Research Paper Discussion: Dry Powder Particle Delivery

Lecture 43 - Route Specific Delivery: Intra-articular and Intravenous Administration

Lecture 44 - Intravenous Administration: Approved Nanocarriers and Immune System

Lecture 45 - Immune System - II

Lecture 46 - Complement System and Blood Clotting

Lecture 47 - Blood Clotting and Hemocompatibility of Materials; Adaptive Immune Response

Lecture 48 - Adaptive Immune Response and Vaccine

Lecture 49 - Vaccines

Lecture 50 - Vaccines and Immuno-isolated Cell Therapy

Lecture 51 - Immuno-isolated Cell Therapy

Lecture 52 - Immuno-isolated Cell and Gene Therapy

Lecture 53 - Gene Delivery: Vectors

Lecture 54 - Gene Delivery: Polymers

Lecture 55 - Genes as Vaccines

Lecture 56 - Vaccines: Gene Delivery and Other Variants

Lecture 57 - Cancer Vaccines

Lecture 58 - Cancer Vaccine: Immunotherapy

Lecture 59 - Responsive Delivery Systems - I

Lecture 60 - Responsive Delivery Systems - II

Lecture 61 - Targeted Drug Delivery System

Lecture 62 - Targeted Drug Delivery System: Research Paper Discussion

Lecture 63 - Nanotoxicology and Translation Pathways

NPTEL : NOC:Fundamentals of Micro and Nanofabrication (Biotechnology)

Co-ordinators : Prof. Shankar Selvaraja

Lecture 1 - Introduction

Lecture 2 - Substrate

Lecture 3 - Substrate (Continued...)

Lecture 4 - Introduction to cleanroom

Lecture 5 - Contamination and surface cleaning

Lecture 6 - Advanced cleaning techniques

Lecture 7 - Defects

Lecture 8 - Diffusion

Lecture 9 - Diffusion - Advanced Concepts

Lecture 10 - Ion Implantation

Lecture 11 - Ion Implantation (Continued...)

Lecture 12 - Native Films

Lecture 13 - Native Films: Advanced Concepts

Lecture 14 - Native Films: Defects at Si/SiO2 interface

Lecture 15 - Methods and Some Definitions

Lecture 16 - Chemical Vapor Depostion: Basics

Lecture 17 - Chemical Vapor Depostion: Precursor Transport

Lecture 18 - Chemical Vapor Depostion: Types of CVD Equipment

Lecture 19 - Chemical Vapor Depostion: Nucleation and Growth

Lecture 20 - Chemical Vapor Depostion: Other Details

Lecture 21 - Atomic Layer Depostion

Lecture 22 - Atomic Layer Depostion (Continued...)

Lecture 23 - Physical Vapor Deposition: Basics

Lecture 24 - Physical Vapor Deposition: Evaporation

Lecture 25 - Physical Vapor Deposition: Sputtering

Lecture 26 - Mettalization: Contact resistance

Lecture 27 - Mettalization: Electromigration and Epilogue

Lecture 28 - Pattern Transfer Bascis

Lecture 29 - Optical lithography basics: resist process - 1

Lecture 30 - Optical lithography basics: resist process - 2

Lecture 31 - Optical Lithography: Contact and Proximity printing

Lecture 32 - Optical Lithography: Stepper and Scanner

Lecture 33 - Projection Lithography: Image formation basics

Lecture 34 - Projection Lithography: Image formation in photoresist

Lecture 35 - Optical lithography: Surface Reflection

Lecture 36 - Optical Lithography: Mask Technology

Lecture 37 - Lithography process technology glossary

Lecture 38 - Optical Lithography: Resolution enhancement

Lecture 39 - Electron beam lithography: Basics

Lecture 40 - Electron beam lithography: Resist process

Lecture 41 - Emerging lithography techniques

Lecture 42 - Etching Figures of Merit

Lecture 43 - Wet etching Basics

Lecture 44 - Wet Ething Recipes

Lecture 45 - Wet Ething Recipes

Lecture 46 - Dry etch: Plasma Basics

Lecture 47 - Dry etch: Plasma etching basics

Lecture 48 - Dry etch: Plasma tool configuration

Lecture 49 - Dry etch: Etch mechanism

Lecture 50 - Dry etch: Etch chemistry

Lecture 51 - Chemical Mechanical Polishing (CMP): Basics

Lecture 52 - Chemical Mechanical Polishing (CMP): Tool and process

Lecture 53 - Design for Manufacturability - 1

Lecture 54 - Design for Manufacturability - 2

Lecture 55 - Design for Manufacturability: Case study

Lecture 56 - Process integration

Lecture 57 - PV integration

Lecture 58 - CMOS integration

Lecture 59 - Lab demo: Silicon Nitride cantilever fabrication - 1

Lecture 60 - Lab demo: Silicon Nitride cantilever fabrication - 2

Lecture 61 - CMOS process for photonics application

NPTEL : NOC:Optical Spectroscopy and Microscopy: Fundamentals of Optical Measurements and Instrumentation (Biotechnology)

Co-ordinators : Prof. Balaji Jayaprakash

Lecture 1 - Optical Focus and Localisation of Light

Lecture 2 - Relating Photon's Momentum to Spot Size

Lecture 3 - Shortest Pulse of Light: How fast can we shutter the light?

Lecture 4 - Behaviour of light through polarizers: Introduction

Lecture 5 - Nature of Light: Introduction to Photo Multiplier Tubes

Lecture 6 - Revisiting Polarisation Through Ket Vectors

Lecture 7 - Light through Polarisers: Detailed Description - I

Lecture 8 - Light through Polarisers: Detailed Description - II

Lecture 9 - Time Dependent Perturbation Theory (TDPT): Overview

Lecture 10 - TDPT in Steps-1: Unperturbed and Perturbed Hamiltonian

Lecture 11 - TDPT in Steps-2: Introducing the switch and first approximation

Lecture 12 - TDPT in Steps-3: Finding the co-efficients

Lecture 13 - Fermi's Golden Rule

Lecture 14 - Beer Lambert's Law from TDPT

Lecture 15 - Einstein's Phenomenology

Lecture 16 - Einstein's Coefficients, Fluorescence and Lifetime

Lecture 17 - Fock States and Photonic Treatment of Light

Lecture 18 - Operators in Fock State Space

Lecture 19 - Light Matter Interaction and Rudimentary Feynman Diagrams

Lecture 20 - Emergence of Spontaneous and Stimulated Emission Processes

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26 - Introduction to LASER

Lecture 27 - LASER population dynamics

Lecture 28 - LASER population dynamics - Part- 2

Lecture 29 - Real world LASER and characteristics of LASER emission

Lecture 30 - Temporal and Spatial Coherence

Lecture 31 - Transverse and Longitudinal modes of LASER

Lecture 32 - Pulsed LASER

Lecture 33 - Q-switching in detail

Lecture 34 - Q-switching in detail - Part 2

Lecture 35 - Basics of mode locking

Lecture 36 - Basics of mode locking - Part 2

Lecture 37 - Pulse compression

Lecture 38 - Real world system (Mode lock Part-2)

Lecture 39 - TEM mode

Lecture 40 - Alignment basics

Lecture 41 - Non-Linear Optics

Lecture 42 - Confocal Detection

Lecture 43 - Interference Filters

Lecture 44 - Laser Scanning System - 1

Lecture 45 - Laser Scanning System - 2

Lecture 46 - Alignment of Moving Beams

Lecture 47 - Decoding an Objective Lens - 1

Lecture 48 - Decoding an Objective Lens - 2

Lecture 49 - Designing Lens Systems

Lecture 50 - Astigmatism and Field Curvature

Lecture 51 - Intro to Lab Session

Lecture 52 - Optics in LAB: Aligning light through an optical fiber - 1

Lecture 53 - Optics in Lab: Telescope

Lecture 54 - Kinematic Mounts

Lecture 55 - Alignment with out iris

Lecture 56 - Fluorescecne Spectrometer - 1

Lecture 57 - Fluorescecne Spectrometer - 2

Lecture 58 - Ti:Sapphire Laser and Two Photon Fluorescecne

NPTEL : NOC:Cell Biology: Cellular Organization, Division and Processes (Biotechnology)

Co-ordinators : Prof. Shikha Laloraya

Lecture 1 - Introduction to Cell Biology, Cell components, organization and processes - Part I

Lecture 2 - Introduction to Cell Biology, Cell components, organization and processes - Part II

Lecture 3 - DNA: The genetic material - Part I

Lecture 4 - DNA: The genetic material - Part II

Lecture 5 - Regulation of the cell cycle - Part I

Lecture 6 - Regulation of the cell cycle - Part II

Lecture 7 - Checkpoints: The DNA damage and DNA replication checkpoints

Lecture 8 - The Ubiquitin Proteasome system

Lecture 9 - S-phase: Regulation of entry into S-phase and DNA Replication

Lecture 10 - DNA replication - Part I

Lecture 11 - DNA Replication - Part II

Lecture 12 - DNA Replication - Part III

Lecture 13 - DNA Replication - Part IV

Lecture 14 - Mitosis - Part I

Lecture 15 - Cytokinesis

Lecture 16 - Aging and Senescence

Lecture 17 - Apoptosis - Part I

Lecture 18 - Apoptosis - Part II

Lecture 19 - Meiosis - Part I

Lecture 20 - Meiosis - Part II

Lecture 21 - Nuclear organization

Lecture 22 - SMC proteins and chromosome organization - Real-Time imaging of DNA loop-extrusion by SMC complexes

Lecture 23 - The cohesin complex and its functions - The mysterious biological function of chromosome loops

Lecture 24 - Chromatin organization

Lecture 25 - SMC proteins and chromosome organization - Introduction

Lecture 26 - Meiosis - Part III

Lecture 27 - Mitosis - Part II

Lecture 28 - Cell diversity and properties of specialized cells-Budding yeast as a model system

Lecture 29 - The Plant Cell

Lecture 30 - Stem cells - Part I Intro-SL

Lecture 31 - Stem cells - Part II

Lecture 32 - Nerve cells

Lecture 33 - The Cancer Cell

NPTEL : NOC:Microsensors, Implantable Devices and Rodent Surgeries for Biomedical Applications (Biotechnology)

Co-ordinators : Prof. Shabari Girishan K V, Prof. Hardik J. Pandya

Lecture 1 - Course Introduction - I

Lecture 2 - Course Introduction - II

Lecture 3 - Neuro anatomy for Neurosurgery

Lecture 4 - Neural Implant Fabrication: PVD - I

Lecture 5 - Neural Implant Fabrication: PVD - II

Lecture 6 - Rodent Neuroanatomy

Lecture 7 - Basics of BCI and Signal Processing

Lecture 8 - Neural Implant Fabrication: Sputtering and CVD

Lecture 9 - Principles of Stereotactic Rodent MicroNeurosurgery

Lecture 10 - Neural Signal Processing: Demonstrations

Lecture 11 - Neural Implant Fabrication: Photolithography - I

Lecture 12 - Neural Implant Fabrication: Photolithography - II

Lecture 13 - Craniotomy and Stereotactic Implantation Surgeries

Lecture 14 - Lithography Numericals

Lecture 15 - IDE Patterning

Lecture 16 - Etching

Lecture 17 - Introduction to Cleanroom and Gowning

Lecture 18 - E-Beam Evaporation Demonstration

Lecture 19 - Craniotomy and Cranial Window Surgeries

Lecture 20 - Flexible MEA: Introduction and Process Flow

Lecture 21 - Flexible MEA: EIB, Characterization and Analyses

Lecture 22 - Stereotactic Implantation Surgeries

Lecture 23 - Sputtering Demonstration

Lecture 24 - 3D Printing - Part I

Lecture 25 - Bioresorbable Microelectrode Array-based System

Lecture 26 - Fundamentals of Spinal Neuroanatomy

Lecture 27 - 3D Printing - Part II

Lecture 28 - Neural Implant - Microneedle

Lecture 29 - Spinal Cord Structure, and Circuits

Lecture 30 - Surgical Steps in Spinal Surgeries

Lecture 31 - 3D Printing - Part III

Lecture 32 - 3D Printing - Demonstration

Lecture 33 - Wet Etching Demonstration

Lecture 34 - Neural Implants for Parkinson's Disease

Lecture 35 - Spinal micro neuro Surgery

Lecture 36 - Anesthesia in Rodents

Lecture 37 - Physiological Monitoring in Rodents

Lecture 38 - Lithography Demonstration

Lecture 39 - Electronic System Development for Neural Engineering - I

Lecture 40 - Anesthesia Administration Equipments and Vital Monitoring

Lecture 41 - Standard Safety Practices

Lecture 42 - Euthanasia

Lecture 43 - Euthanaisa in Rodents

Lecture 44 - Electronic System Development for Neural Engineering - II

Lecture 45 - Rodent Brain and Spinal Cord Harvest

Lecture 46 - Rodent Behavioural Setups

Lecture 47 - Study Plan for Behavioural Setups: Stroke Model

Lecture 48 - PCB Design Demonstration for Neural Systems

Lecture 49 - Electronic Systems for Brain Stimulation - I

Lecture 50 - Behavioural Taks in Rodent Models - I

Lecture 51 - Behavioural Taks in Rodent Models - II

Lecture 52 - Behavioural Setup for Rodents: Parkinsonism Model - I

Lecture 53 - Behavioural Setup for Rodents: Parkinsonism Model - II

Lecture 54 - Electronic Systems for Brain Stimulation - II

Lecture 55 - Course Concluding Remarks

NPTEL : Advanced Chemical Reaction Engineering (PG) (Chemical Engineering)

Co-ordinators : Prof. H.S. Shankar

Lecture 1 - Course Overview - I

Lecture 2 - Course Overview - II

Lecture 3 - Design Equations - I

Lecture 4 - Design Equations - Illustrative Examples

Lecture 5 - Design Equations - II : Plug Flow Recycle Reactors

Lecture 6 - Illustrative Examples : 1) Plug Flow Recycle 2) Multiple reactions - I

Lecture 7 - Illustrative Examples : 1) Recycle Reactor with Condenser 2) CSTR with Recycle

Lecture 8 - Multiple Reactions - II

Lecture 9 - Modelling Multiple Reactions in Soil Environment - III

Lecture 10 - Semi Continuous Reactor Operation

Lecture 11 - Catalyst Deactivation - I

Lecture 12 - Catalyst Deactivation - II

Lecture 13 - Illustrative Example : 1) Determination of deactivation Parameters 2) Design for Deactivating Catalyst

Lecture 14 - Energy Balance - I

Lecture 15 - Energy Balance - II

Lecture 16 - Reacting Fluids as Energy Carrier

Lecture 17 - Illustrative Example : Energy Balance in Stirred Vessels

Lecture 18 - Energy Balance - III : Design for Constant T Operation

Lecture 19 - Energy Balance - IV : Temperature Effects on Rate & Equilibria

Lecture 20 - Energy Balance - V : Stability Analysis of Exothermic Stirred Tank

Lecture 21 - Illustrative Example : Stability of Exothermic Stirred Tank

Lecture 22 - Energy Balance - VI : 1) Tubular Reactor Heated/Cooled from Wall 2) Transient Behavior of CSTR

Lecture 23 - Illustrative Example : 1) Plug Flow with Heat Effects 2) Multiple Reactions

Lecture 24 - Illustrative Example : 1) Further Considerations in Energy Balance 2) Multiple Reactions

Lecture 25 - Illustrative Example : 1) Hot Spot as Design Basis 2) Design for Instantaneous Reactions

Lecture 26 - Residence Time Distribution Methods

Lecture 27 - Residence Time Distribution Models

Lecture 28 - Shrinking core Gas-Solid reactions Model

Lecture 29 - Shrinking core Ash Diffusion Model & Combination of Resistances

Lecture 30 - 1) Gas Solid Reactions Temperature Effects on Rate & Equilibria 2) Introduction to Population Balance - I

Lecture 31 - Illustrative Example : Temperature Effects on Rate & Equilibria

Lecture 32 - Population Balance Modelling - II

Lecture 33 - Population Balance Modelling - III

Lecture 34 - Illustrative Examples : Population Balance Models

Lecture 35 - Introduction to Environmental Reactions

Lecture 36 - Reaction Engineering Examples in Biochemical & Environmental Engineering

Lecture 37 - Illustrative Examples : 1) Biomethanation 2) Alcohol via Fermentation 3) Natural Selection

Lecture 38 - Illustrative Examples : 1) Enzyme Reaction 2) Microbial Reaction 3) Waste Treatment

Lecture 39 - Oxygen Sag Analysis in Rivers

Lecture 40 - Illustrative Examples : 1) Oxygen Sag Analysis 2) Population Balance Modelling of Forest 3) Sponge Iron Process

Lecture 41 - Illustrative Example : Gas- Solid Reaction RTD Models Reaction Network

NPTEL : Advanced Process Control (Chemical Engineering)

Co-ordinators : Prof. Sachin C. Patwardhan

Lecture 1 - Introduction and Motivation

Lecture 2 - Linearization of Mechanistic Models

Lecture 3 - Linearization of Mechanistic Models (Continued...)

Lecture 4 - Introduction to z-transforms and Development of Grey-box models

Lecture 5 - Introduction to Stability Analysis and Development of Output Error Models

Lecture 6 - Introduction to Stochastic Processes

Lecture 7 - Introduction to Stochastic Processes (Continued...)

Lecture 8 - Development of ARX models

Lecture 9 - Statistical Properties of ARX models and Development of ARMAX models

Lecture 10 - Development of ARMAX models (Continued...) and Issues in Model Development

Lecture 11 - Model Structure Selection and Issues in Model Development (Continued...)

Lecture 12 - Issues in Model Development (Continued...) and State Realizations of Transfer Function Models

Lecture 13 - Stability Analysis of Discrete Time Systems

Lecture 14 - Lyapunov Functions and Interaction Analysis and Multi-loop Control

Lecture 15 - Interaction Analysis and Multi-loop Control (Continued...)

Lecture 16 - Multivariable Decoupling Control and Soft Sensing and State Estimation

Lecture 17 - Development of Luenberger Observer

Lecture 18 - Development of Luenberger Observer (Continued...) and Introduction to Kalman Filtering

Lecture 19 - Kalman Filtering

Lecture 20 - Kalman Filtering (Continued...)

Lecture 21 - Kalman Filtering (Continued...)

Lecture 22 - Pole Placement State Feedback Control Design and Introduction to Linear Quadratic Gaussian (LQG) Control

Lecture 23 - Linear Quadratic Gaussian (LQG) Regulator Design

Lecture 24 - Linear Quadratic Gaussian (LQG) Controller Design

Lecture 25 - Model Predictive Control (MPC)

Lecture 26 - Model Predictive Control (Continued...)

NPTEL : Chemical Reaction Engineering II (Chemical Engineering)

Co-ordinators : Prof. A.K. Suresh, Prof. Ganesh A. Viswanathan, Prof. Sanjay M. Mahajani

Lecture 1 - Introduction to catalysts and catalysis

Lecture 2 - Steps in catalytic reaction: adsorption, desorption and reaction

Lecture 3 - Derivation of the rate equation

Lecture 4 - Heterogenous data analysis for reactor design - I

Lecture 5 - Heterogenous data analysis for reactor design - II

Lecture 6 - Catalyst deactivation and accounting for it in design - I

Lecture 7 - Catalyst deactivation and accounting for it in design - II

Lecture 8 - Synthesize the rate equation

Lecture 9 - Introduction to intraparticle diffusion

Lecture 10 - Intraparticle diffusion: Thiele modulus and effectiveness factor Part - I

Lecture 11 - Intraparticle diffusion: Thiele modulus and effectiveness factor Part - II

Lecture 12 - Intraparticle diffusion: Thiele modulus and effectiveness factor Part - III

Lecture 13 - Effectiveness factor and Introduction to external mass transfer

Lecture 14 - External Mass Transfer

Lecture 15 - Implications to rate data interpretation and design - I

Lecture 16 - Implications to rate data interpretation and design - II

Lecture 17 - Packed-bed reactor design

Lecture 18 - Fluidized bed reactor design - I

Lecture 19 - Fluidized bed reactor design - II

Lecture 20 - Gas-liquid reactions-1: Theories of mass transfer into agitated liquids

Lecture 21 - GLR-2: Effect of chemical reaction on mass transfer: the slow reaction regime

Lecture 22 - GLR-3: Transition to fast reaction, and the Fast reaction regime

Lecture 23 - GLR-4: Fast reaction example; Instantaneous reaction regime

Lecture 24 - GLR-5: Transition to Instantaneous reaction; Reaction regimes in surface renewal theories

Lecture 25 - GLR-6: Reaction regimes in surface renewal theories (Continued..)

Lecture 26 - GLR-7: Surface renewal theories: Instantaneous reaction and Summing up

Lecture 27 - Fluid-solid non-catalytic reactions - I

Lecture 28 - Fluid-solid non-catalytic reactions - II

Lecture 29 - Fluid-solid non-catalytic reactions - III

Lecture 30 - Distribution of residence time

Lecture 31 - Measurement of residence time distribution

Lecture 32 - Residence time distribution function

Lecture 33 - Reactor diagnostics and troubleshooting

Lecture 34 - Modeling non-ideal reactors

Lecture 35 - Residence time distribution: Performance of non-ideal reactors

Lecture 36 - Non-ideal Reactors: Tanks-in-series model

Lecture 37 - Non-ideal Reactors: Dispersion model

Lecture 38 - Non-ideal Reactors: Dispersion model and introduction to multiparameter models

Lecture 39 - Non-ideal Reactors: Multiparameter models

NPTEL : Advanced Numerical Analysis (Chemical Engineering)

Co-ordinators : Prof. Sachin C. Patwardhan

Lecture 1 - Introduction and Overview

Lecture 2 - Fundamentals of Vector Spaces

Lecture 3 - Basic Dimension and Sub-space of a Vector Space

Lecture 4 - Introduction to Normed Vector Spaces

Lecture 5 - Examples of Norms,Cauchy Sequence and Convergence, Introduction to Banach Spaces

Lecture 6 - Introduction to Inner Product Spaces

Lecture 7 - Cauchy Schwaz Inequality and Orthogonal Sets

Lecture 8 - Gram-Schmidt Process and Generation of Orthogonal Sets

Lecture 9 - Problem Discretization Using Appropriation Theory

Lecture 10 - Weierstrass Theorem and Polynomial Approximation

Lecture 11 - Taylor Series Approximation and Newton's Method

Lecture 12 - Solving ODE - BVPs Using Firute Difference Method

Lecture 13 - Solving ODE - BVPs and PDEs Using Finite Difference Method

Lecture 14 - Finite Difference Method (Continued...) and Polynomial Interpolations

Lecture 15 - Polynomial and Function Interpolations,Orthogonal Collocations Method for Solving ODE -BVPs

Lecture 16 - Orthogonal Collocations Method for Solving ODE - BVPs and PDEs

Lecture 17 - Least Square Approximations, Necessary and Sufficient Conditions for Unconstrained Optimization

Lecture 18 - Least Square Approximations -Necessary and Sufficient Conditions for Unconstrained Optimization Least Square Approximations (Continued....)

Lecture 19 - Linear Least Square Estimation and Geometric Interpretation of the Least Square Solution

Lecture 20 - Geometric Interpretation of the Least Square Solution (Continued...) and Projection Theorem in a Hilbert Spaces

Lecture 21 - Projection Theorem in a Hilbert Spaces (Continued...) and Approximation Using Orthogonal Basis

Lecture 22 - Discretization of ODE-BVP using Least Square Approximation

Lecture 23 - Discretization of ODE-BVP using Least Square Approximation and Gelarkin Method

Lecture 24 - Model Parameter Estimation using Gauss-Newton Method

Lecture 25 - Solving Linear Algebraic Equations and Methods of Sparse Linear Systems

Lecture 26 - Methods of Sparse Linear Systems (Continued...) and Iterative Methods for Solving Linear Algebraic Equations

Lecture 27 - Iterative Methods for Solving Linear Algebraic Equations

Lecture 28 - Iterative Methods for Solving Linear Algebraic Equations: Convergence Analysis using Eigenvalues

Lecture 29 - Iterative Methods for Solving Linear Algebraic Equations: Convergence Analysis using Matrix Norms

Lecture 30 - Iterative Methods for Solving Linear Algebraic Equations: Convergence Analysis using Matrix Norms (Continued...)

Lecture 31 - Iterative Methods for Solving Linear Algebraic Equations: Convergence Analysis (Continued...)

Lecture 32 - Optimization Based Methods for Solving Linear Algebraic Equations: Gradient Method

Lecture 33 - Conjugate Gradient Method, Matrix Conditioning and Solutions of Linear Algebraic Equations

Lecture 34 - Matrix Conditioning and Solutions and Linear Algebraic Equations (Continued...)

Lecture 35 - Matrix Conditioning (Continued...) and Solving Nonlinear Algebraic Equations

Lecture 36 - Solving Nonlinear Algebraic Equations: Wegstein Method and Variants of Newton's Method

Lecture 37 - Solving Nonlinear Algebraic Equations: Optimization Based Methods

Lecture 38 - Solving Nonlinear Algebraic Equations: Introduction to Convergence analysis of Iterative Solution Techniques

Lecture 39 - Solving Nonlinear Algebraic Equations: Introduction to Convergence analysis (Continued...) and Solving ODE-IVPs

Lecture 40 - Solving Ordinary Differential Equations - Initial Value Problems (ODE-IVPs) : Basic Concepts

Lecture 41 - Solving Ordinary Differential Equations - Initial Value Problems (ODE-IVPs) : Runge Kutta Methods

Lecture 42 - Solving ODE-IVPs : Runge Kutta Methods (Continued...) and Multi-step Methods

Lecture 43 - Solving ODE-IVPs : Generalized Formulation of Multi-step Methods

Lecture 44 - Solving ODE-IVPs : Multi-step Methods (Continued...) and Orthogonal Collocations Method

Lecture 45 - Solving ODE-IVPs: Selection of Integration Interval and Convergence Analysis of Solution Schemes

Lecture 46 - Solving ODE-IVPs: Convergence Analysis of Solution Schemes (Continued...)

Lecture 47 - Solving ODE-IVPs: Convergence Analysis of Solution Schemes (Continued...) and Solving ODE-BVP using Single Shooting Method

Lecture 48 - Methods for Solving System of Differential Algebraic Equations

Lecture 49 - Methods for Solving System of Differential Algebraic Equations (Continued...) and Concluding Remarks

NPTEL : NOC:Introduction to Evolutionary Dynamics (Chemical Engineering)

Co-ordinators : Prof. Supreet Saini

Lecture 1 - History of the theory of Natural Selection - 1

Lecture 2 - History of the theory of Natural Selection - 2

Lecture 3 - Exponential growth models

Lecture 4 - Logistic Growth Models - 1

Lecture 5 - Logistic Growth Models - 2

Lecture 6 - Modelling selection - 1

Lecture 7 - Modelling Selection - 2 : Two species

Lecture 8 - Modelling Selection - 3 : Two and more species

Lecture 9 - Modelling Mutations - 1

Lecture 10 - Modelling Mutations - 2

Lecture 11 - Modelling Mutations - 3

Lecture 12 - Genetic Code and Sequence Spaces

Lecture 13 - Sequence Spaces as Networks

Lecture 14 - Sequence Space to Fitness Landscape

Lecture 15 - Properties of Fitness Landscapes and Quasi-species

Lecture 16 - Integrating Reproduction, Selection and Mutation

Lecture 17 - Obtaining Fitness Landscapes Experimentally

Lecture 18 - NK Model of Fitness Landscape

Lecture 19 - Modelling Evolution on Fitness Landscapes - 1

Lecture 20 - Modelling Evolution on Fitness Landscapes - 2

Lecture 21 - Modelling Evolution on Fitness Landscapes - 3

Lecture 22 - Role of Randomness in Evolution

Lecture 23 - Genetic Drift in Evolution of Microbial Populations

Lecture 24 - Dynamics of a Moran Process without Selection

Lecture 25 - Dynamics of a Moran Process without Selection

Lecture 26 - Evolution, Selection, and Genetic Drift

Lecture 27 - Representing Microbial Evolution

Lecture 28 - Estimating Timescales of Evolution

Lecture 29 - Estimating the Speed of Microbial Evolution

Lecture 30 - Evolutionary Dynamics when Mutations are Rare

Lecture 31 - Evolutionary Dynamics when Mutations are Rapid - 1

Lecture 32 - Evolutionary Dynamics when Mutations are Rapid - 2

Lecture 33 - Evolutionary Dynamics when Mutations are Rapid - 3

Lecture 34 - Evolutionary Game Theory - 1

Lecture 35 - Evolutionary Game Theory - 2

Lecture 36 - Evolutionary Game Theory - 3

Lecture 37 - Evolutionary Game Theory - 4

Lecture 38 - Evolutionary Game Theory Applied to Moran Process

Lecture 39 - Evolutionary Games During Weak Selection

Lecture 40 - Evolutionary Dynamics of HIV

NPTEL : NOC:Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. Ganesh A. Viswanathan

Lecture 1 - Introduction

Lecture 2 - Introduction to Conduction

Lecture 3 - Energy Balance

Lecture 4 - 1D Steadystate Conduction - Resistance Concept

Lecture 5 - Resistances in Composite Wall Case

Lecture 6 - Resistances in Radial Systems

Lecture 7 - Heat Generation - I Plane and Cylindrical Wall

Lecture 8 - Heat Generation - II Problem; Introduction to Extended Surfaces

Lecture 9 - Extended Surfaces I - General Formulation

Lecture 10 - Extended Surfaces II - Fixed Cross-section Area

Lecture 11 - Extended Surfaces III - Varying Cross-section Area

Lecture 12 - 2D Plane Wall

Lecture 13 - Transient Analyses I : Lumped Capacitance Method

Lecture 14 - Transient Analyses II : Full Method

Lecture 15 - Transient Analyses : Semi-infinite Case

Lecture 16 - Introduction to Convective Heat Transfer

Lecture 17 - Heat and Mass Transport Coefficients

Lecture 18 - Boundary Layer : Momentum, Thermal and Concentration

Lecture 19 - Laminar and Turbulent Flows; Momentum Balance

Lecture 20 - Energy and Mass Balances; Boundary Layer Approximations

Lecture 21 - Order of Magnitude Analysis

Lecture 22 - Transport Coefficients

Lecture 23 - Relationship between Momentum, Thermal and Concentration Boundary Layer

Lecture 24 - Reynolds and Chilton-Colburn Analogies

Lecture 25 - Forced Convection : Introduction

Lecture 26 - Flow Past Flat Plate I - Method of Blasius

Lecture 27 - Flow Past Flat Plate II - Correlations for Heat and Mass Transport

Lecture 28 - Flow Past Cylinders

Lecture 29 - Flow through Pipes - I

Lecture 30 - Flow through Pipes - II

Lecture 31 - Flow through Pipes - III

Lecture 32 - Flow through Pipes - IV - Mixing-cup Temperature

Lecture 33 - Flow through Pipes - V - Log mean Temperature Difference

Lecture 34 - Flow through Pipes - VI - Correlations for Laminar and Turbulent Conditions

Lecture 35 - Example problems : Forced Convection

Lecture 36 - Introduction to Free/Natural Convection

Lecture 37 - Heated Plate in a Quiescent Fluid - I

Lecture 38 - Heated Plate in a Quiescent Fluid - II

Lecture 39 - Boiling - I

Lecture 40 - Boiling - II

Lecture 41 - Condensation - I

Lecture 42 - Condensation - II

Lecture 43 - Radiation : Introduction

Lecture 44 - Spectral Intensity

Lecture 45 - Radiation : Spectral properties, Blackbody

Lecture 46 - Properties of a Blackbody

Lecture 47 - Surface Adsorption

Lecture 48 - Kirchoffâ€™s Law

Lecture 49 - Radiation Exchange - View Factor

Lecture 50 - View Factor Examples

Lecture 51 - View Factor - Inside Sphere Method, Blackbody Radiation Exchange

Lecture 52 - Diffuse, Gray Surfaces in an Enclosure

Lecture 53 - Resistances - Oppenheim Matrix Method

Lecture 54 - Resistances - Examples

Lecture 55 - More Examples: Volumetric Radiation

Lecture 56 - Introduction and Examples

Lecture 57 - Parallel Flow Heat Exchangers

Lecture 58 - LMTD I

Lecture 59 - Shell and Tube Heat Exchangers

Lecture 60 - Epsilon-NTU Method

NPTEL : NOC:Chemical Reaction Engineering-II (Chemical Engineering)

Co-ordinators : Prof. Ganesh Vishwanathan

Lecture 1 - Introduction

Lecture 2 - Introduction to catalysis and catalytic processes

Lecture 3 - Catalyst properties and classification

Lecture 4 - Steps in catalysis

Lecture 5 - Adsorption isotherm

Lecture 6 - Surface reaction

Lecture 7 - Rate controlling steps and Rate law

Lecture 8 - Rate law: Pseudo-steady state hypothesis

Lecture 9 - Heterogeneous data analysis for reactor design - I

Lecture 10 - Heterogeneous data analysis for reactor design - II

Lecture 11 - Design of reactors: PBR and CSTR

Lecture 12 - Case study: Chemical Vapor Deposition

Lecture 13 - Catalyst deactivation - I

Lecture 14 - Catalyst deactivation - II

Lecture 15 - Catalyst deactivation - III

Lecture 16 - Catalyst deactivation - IV : Reactor design

Lecture 17 - Diffusional effects: Introduction

Lecture 18 - Internal diffusion effects: Model development

Lecture 19 - Non-dimensionalization: Thiele modulus

Lecture 20 - Concentration profile

Lecture 21 - Internal effectiveness factor - I

Lecture 22 - Internal effectiveness factor - II

Lecture 23 - Internal effectiveness factor - III: Exothermic and endothermic reactions

Lecture 24 - Falsification of kinetics

Lecture 25 - External mass transport limitations: Mass transfer coefficient

Lecture 26 - Estimation of mass transfer coefficient

Lecture 27 - Mass transfer to a single particle with reaction

Lecture 28 - Packed-bed reactor design: External mass transfer limitations

Lecture 29 - Mass transfer coefficient in Packed-beds

Lecture 30 - Estimation of conversion in Packed-bed reactor: Example problem

Lecture 31 - Overall effectiveness factor - I

Lecture 32 - Overall effectiveness factor - II

Lecture 33 - Identification of internal diffusion and reaction-limited regimes

Lecture 34 - Packed-bed reactor design

Lecture 35 - Generalized criterion for diffusion and reaction-limited conditions

Lecture 36 - Network of first order reactions

Lecture 37 - Use of experimental data

Lecture 38 - Packed-bed reactor design: External and Internal resistances

Lecture 39 - Fluidized bed reactor design - I

Lecture 40 - Fluidized bed reactor design - II

Lecture 41 - Fluidized bed reactor design - III

Lecture 42 - Fluidized bed reactor design - IV

Lecture 43 - Fluid-solid noncatalytic reactions - I

Lecture 44 - Fluid-solid noncatalytic reactions - II

Lecture 45 - Fluid-solid noncatalytic reactions - III

Lecture 46 - Fluid-solid noncatalytic reactions - IV

Lecture 47 - Fluid-solid noncatalytic reactions - V

Lecture 48 - Fluid-solid noncatalytic reactions - VI

Lecture 49 - Residence time distribution (RTD): Introduction

Lecture 50 - RTD: Non-ideal reactors

Lecture 51 - Measurement of RTD - I

Lecture 52 - Measurement of RTD - II

Lecture 53 - RTD function

Lecture 54 - Properties of RTD function

Lecture 55 - Reactor diagnostics and troubleshooting - I

Lecture 56 - Reactor diagnostics and troubleshooting - II

Lecture 57 - Modeling nonideal reactors - I

Lecture 58 - Modeling nonideal reactors - II

Lecture 59 - Non-ideal reactors: Zero parameter models - I

Lecture 60 - Non-ideal reactors: Zero parameter models - II

NPTEL : NOC:Chemical Process Control (Chemical Engineering)

Co-ordinators : Prof. Sujit Jogwar

Lecture 1 - Motivation for process control

Lecture 2 - Functions of process control system

Lecture 3 - Common control strategies

Lecture 4 - Components of process control system

Lecture 5 - Introduction to process dynamics

Lecture 6 - First principle dynamic models

Lecture 7 - Empirical and gray box models

Lecture 8 - Degree of freedom analysis

Lecture 9 - Introduction to first order dynamical systems

Lecture 10 - Linearization of process dynamics

Lecture 11 - Response to step input

Lecture 12 - Response to sinusoidal input

Lecture 13 - Introduction to second order dynamical systems

Lecture 14 - Examples of second order dynamical systems

Lecture 15 - Response to step input

Lecture 16 - Effect of damping coefficient

Lecture 17 - Higher order dynamics

Lecture 18 - Approximation as FOPDT model

Lecture 19 - Numerator dynamics

Lecture 20 - Prediction of step response

Lecture 21 - Block diagram representation

Lecture 22 - ON-OFF control

Lecture 23 - Proportional control

Lecture 24 - Proportional-Integral control

Lecture 25 - PID control

Lecture 26 - Limitations of PID controllers

Lecture 27 - Stability of dynamical processes

Lecture 28 - Laplace domain analysis - Part I

Lecture 29 - Laplace domain analysis - Part II

Lecture 30 - Frequency response

Lecture 31 - Frequency domain analysis

Lecture 32 - Synthesis problem

Lecture 33 - Selection problem

Lecture 34 - Criteria-based controller tuning

Lecture 35 - Heuristics-based controller tuning

Lecture 36 - Direct synthesis-based controller tuning

Lecture 37 - Frequency response-based controller tuning

Lecture 38 - Cascade control

Lecture 39 - Split range control and override control

Lecture 40 - Auctioneering, ratio and inreferential control

Lecture 41 - Openloop control and Internal model control

Lecture 42 - Dynamic Matrix and Model predictive control

Lecture 43 - Introduction to multivariable control

Lecture 44 - Input-output pairing

Lecture 45 - Tuning of multi-loop SISO controller

Lecture 46 - Introduction to batch process control

Lecture 47 - Programmable logic control

Lecture 48 - Batch to batch control

NPTEL : NOC:Introduction to Interfacial Waves (Chemical Engineering)

Co-ordinators : Prof. Ratul Dasgupta

Lecture 1 - Introduction

Lecture 2 - Coupled, linear, spring-mass systems

Lecture 3 - Coupled, linear, spring-mass systems (Continued...)

Lecture 4 - Coupled, linear, spring-mass systems (Continued...)

Lecture 5 - Coupled, linear, spring-mass system: continuum limit

Lecture 6 - Normal modes of a string fixed at both ends

Lecture 7 - Vibrations of clamped membranes

Lecture 8 - Vibrations of clamped membranes (Continued...)

Lecture 9 - Introduction to Jacobian elliptic functions

Lecture 10 - The non-linear pendulum

Lecture 11 - The non-linear pendulum (Continued...)

Lecture 12 - Time period of the non-linear pendulum

Lecture 13 - Introduction to perturbation methods

Lecture 14 - Perturbation methods (Continued...)

Lecture 15 - Non-dimensionalisation

Lecture 16 - Perturbative solution to the projectile equation

Lecture 17 - Perturbative solution to the nonlinear pendulum

Lecture 18 - Lindstedt-Poincare technique

Lecture 19 - Method of multiple scales

Lecture 20 - Method of multiple scales (Continued...)

Lecture 21 - Multiple scale analysis for damped-harmonic oscillator

Lecture 22 - Duffing equation using multiple scales

Lecture 23 - Duffing equation (Continued...)

Lecture 24 - Kapitza pendulum

Lecture 25 - Introduction to Floquet theory

Lecture 26 - Floquet theorem (Continued...)

Lecture 27 - Floquet analysis of the Mathieu equation

Lecture 28 - Introduction to waves on an interface

Lecture 29 - Linearized wave equations in deep water

Lecture 30 - Linearized wave equations in deep water: dispersion relation

Lecture 31 - Linearised deep-water surface gravity waves (Continued...)

Lecture 32 - Standing and travelling waves in deep water

Lecture 33 - Cauchy-Poisson initial value problem for surface-gravity waves in deep water

Lecture 34 - Cauchy-Poisson problem (Continued...)

Lecture 35 - Cauchy-Poisson problem in cylindrical geometry

Lecture 36 - Cauchy-Poisson problem in cylindrical geometry (Continued...)

Lecture 37 - Group-velocity and the Cauchy-Poisson problem

Lecture 38 - Cauchy-Poisson problem for delta function initial condition

Lecture 39 - Cauchy-Poisson problem for delta function initial condition (Continued...)

Lecture 40 - Capillary-gravity waves

Lecture 41 - Waves on a pool of finite depth

Lecture 42 - Axisymmetric Cauchy-Poisson problem visualisation: the pebble in the deep pond problem

Lecture 43 - Rayleigh-Plateau capillary instability

Lecture 44 - Rayleigh-Plateau capillary instability (Continued...)

Lecture 45 - Rayleigh-Plateau capillary instability on thin film coating a rod

Lecture 46 - Rayleigh-Plateau capillary instability of a cylindrical air column in a liquid

Lecture 47 - Mechanism of the Rayleigh-Plateau instability

Lecture 48 - Shape oscillations of a spherical interface

Lecture 49 - Shape oscillations of a spherical interface (Continued...)

Lecture 50 - Shape oscillations of a spherical interface (Continued...)

Lecture 51 - Analysis of l=0 and l=1 modes for a spherical drop

Lecture 52 - Faraday waves on an interface - stability of time dependent base states

Lecture 53 - Mathieu equation for Faraday waves

Lecture 54 - Applications of Faraday waves - atomisation and spray formation

Lecture 55 - Waves and instability on density stratified shear flows - the KH model

Lecture 56 - Limits of KH dispersion relation: Rayleigh-Taylor instability

Lecture 57 - KH dispersion relation : model of wind wave generation

Lecture 58 - Helmholtz instability of a vortex sheet and summary

Lecture 59 - Derivation of the Stokes travelling wave

Lecture 60 - Derivation of the Stokes travelling wave (Continued...)

Lecture 61 - Derivation of the Stokes travelling wave (Continued...)

NPTEL : NOC:Hydrogen Energy: Production, Storage, Transportation and Safety (Chemical Engineering)

Co-ordinators : Prof. Pratibha Sharma

Lecture 1 - Properties of Hydrogen

Lecture 2 - Status of Hydrogen Supply and Demand

Lecture 3 - Methods of Hydrogen Production

Lecture 4 - Steam Methane Reforming - Part 1

Lecture 5 - Steam Methane Reforming - Part 2

Lecture 6 - Steam Reforming of Higher Hydrocarbons

Lecture 7 - Tutorial-1

Lecture 8 - Advanced Methods of Steam Reforming

Lecture 9 - Partial Oxidation Method for Hydrogen Production

Lecture 10 - Autothermal Reforming

Lecture 11 - Combined, Dry, Bi and Tri Reforming

Lecture 12 - Reforming using Alternate Energy Sources

Lecture 13 - Tutorial-2

Lecture 14 - Hydrogen Production by Methane Decomposition

Lecture 15 - Hydrogen Production from Biomass - Part 1

Lecture 16 - Hydrogen Production from Biomass - Part 2

Lecture 17 - Hydrogen Production from Biomass - Part 3

Lecture 18 - Hydrogen Production from Coal

Lecture 19 - Tutorial-3

Lecture 20 - Hydrogen Separation and Purification - Part 1

Lecture 21 - Hydrogen Separation and Purification - Part 2

Lecture 22 - Thermochemical Cycles for Hydrogen Production

Lecture 23 - Electrolysis of Water for Hydrogen Production

Lecture 24 - Fundamental of Electrolysis of Water

Lecture 25 - Electrolytic Cell Components and Electrolyzer stack

Lecture 26 - Different Types of ElectrolyzerTechnologies

Lecture 27 - Photoelectrochemical Hydrogen Production

Lecture 28 - Tutorial-4

Lecture 29 - Technical Comparison of Various Hydrogen Production Routes

Lecture 30 - Economics and Status of Various Hydrogen Production Routes

Lecture 31 - Introduction to Hydrogen Storage

Lecture 32 - Underground Hydrogen Storage

Lecture 33 - Fundamentals of Hydrogen Compression and Expansion

Lecture 34 - Thermodynamics of Hydrogen Compression - Part 1

Lecture 35 - Thermodynamics of Hydrogen Compression - Part 2

Lecture 36 - Reciprocating and Diaphragm compressors for Hydrogen Compression

Lecture 37 - Linear and Liquid Hydrogen Compressors

Lecture 38 - Cryogenic and Metal Hydride based Hydrogen Compressors

Lecture 39 - Electrochemical and Adsorption based Compressors

Lecture 40 - Compressed Hydrogen Tanks

Lecture 41 - Tutorial-5

Lecture 42 - Hydrogen Liquefaction

Lecture 43 - Liquid State Hydrogen Storage

Lecture 44 - Fundamentals of Adsorption based Materials for Hydrogen Storage

Lecture 45 - Adsorption based Solid State Hydrogen Storage Materials

Lecture 46 - Metal Hydrides for Solid State Hydrogen Storage - Part 1

Lecture 47 - Fundamentals of Metal hydrides for Solid State Hydrogen Storage - Part 1

Lecture 48 - Fundamentals of Metal Hydrides for Solid State Hydrogen Storage - Part 2

Lecture 49 - Different Types of Hydrides for Hydrogen Storage

Lecture 50 - Tailoring Metal Hydrides for Practical Applications: Nanostructure - Part 1

Lecture 51 - Tailoring Metal Hydrides for Practical Applications: Nanostructure - Part 2

Lecture 52 - MH System Design and Experimental Facilities on SolidState Hydrogen Storage

Lecture 53 - Tutorial-6 (MH systems design)

Lecture 54 - Novel Materials and Overall Storage

Lecture 55 - Overview of Storage Methods and Economics

Lecture 56 - Hydrogen Transportation via H2 Pipelines

Lecture 57 - Other Options for Long Distance Hydrogen Transmission

Lecture 58 - Hydrogen Transport via Road

Lecture 59 - Hydrogen Refuelling Stations

Lecture 60 - Use of Hydrogen in Internal Combustion Engines - Part 1

Lecture 61 - Use of Hydrogen in Internal Combustion Engines - Part 2

Lecture 62 - Use of Hydrogen in Fuel Cells

Lecture 63 - Hydrogen Sensing - Part 1

Lecture 64 - Hydrogen Sensing - Part 2

Lecture 65 - Properties of Hydrogen Associated with Accidents

Lecture 66 - Classification of Hydrogen related Hazards

Lecture 67 - Compressed and Liquid Hydrogen Related Hazards

Lecture 68 - Regulations, Codes and Standards

Lecture 69 - Utilisation in Different Sectors, Global Status and Future Directions

NPTEL : NOC:Modeling Stochastic Phenomena for Engineering Applications: Part-1 (Chemical Engineering)

Co-ordinators : Prof. Yelia Shankaranarayana Mayya

Lecture 1 - Stirling's Approximation

Lecture 2 - Fourier Transforms and characteristic function

Lecture 3 - Dirac Delta function

Lecture 4 - Applications of delta function and Generating functions

Lecture 5 - Laplace Transforms and Convolution theorem

Lecture 6 - Generating function for discrete variables and Binomial distribution

Lecture 7 - Bernoulli and Poisson distributions

Lecture 8 - Waiting time distributions; Gaussian approximation to Poisson distribution

Lecture 9 - Introduction to Central Limit Theorem

Lecture 10 - Proof of Central Limit Theorem (CLT)

Lecture 11 - Universality of Normal distribution and Exceptions

Lecture 12 - Introduction to Random Walk: Extension of Central Limit Theorem

Lecture 13 - Random walk and Diffusion coefficient: Conditional and Transition

Lecture 14 - Characteristics of Stochastic Phenomena: Markov Processes

Lecture 15 - Propagating Markov processes via Transition Probability Matrix with

Lecture 16 - Chapman-Kolmogorov Equation for Multistep Transition probability and solution

Lecture 17 - Transient solutions and Continuous time Markov process

Lecture 18 - Exact solution to Symmetric (or unbiased) one-dimensional Random walk (1-D RW)

Lecture 19 - Properties of the solution for 1-D unbiased RW

Lecture 20 - 1-D unbiased RW: Asymptotic form of occupancy probability and transition

Lecture 21 - Solution to the problem of 1-D Random Walk with Bias

Lecture 22 - Generalized Random Walk with Bias and Pausing

Lecture 23 - Effect of Pausing on Mean and Variance of Random walk

Lecture 24 - Random-walk in the presence of reflecting barrier

Lecture 25 - Boundary conditions for reflected Random-Walk and formulating absorbing

Lecture 26 - The survival probability and first-passage time distribution for Random walker

Lecture 27 - Random Walk with Bias and Absorber

Lecture 28 - Drift and Survival probability for Random walk with bias and absorber

Lecture 29 - Introduction to gambler's ruin problem

Lecture 30 - Solution for ultimate winning probability in Gambler's ruin problem

Lecture 31 - Solution to gambler's ruin problem with site dependent jump probabilities

Lecture 32 - Fourier transform method of solving lattice Random walks

Lecture 33 - Two and higher dimensional Random walks

Lecture 34 - Formulating the problem of Probability of Return to the origin

Lecture 35 - Relationship between occupancy probability and first-time-return probability

Lecture 36 - Proof of PolyaÃ¢â‚¬â„¢s theorem on the probability of return

Lecture 37 - Return probability estimates in various dimensions and effect of bias in 1-D

Lecture 38 - Dependence of first time return probability (Fk) on steps

Lecture 39 - Equilibrium solutions in lattice random walk models

Lecture 40 - Equilibrium solution to Ehrenfest's flea model

Lecture 41 - Differential equation formulation of stochastic phenomena

Lecture 42 - Derivation of Fokker-Planck equation

Lecture 43 - Generalized transition probability functions for Fokker-Planck equation

Lecture 44 - Solution to 1-D Fokker-Planck equation for free particle: Method of Fourier

Lecture 45 - General non-gaussian solution to translationally invariant Chapman-Kolmogorov

Lecture 46 - Cauchy distribution, power-law and other non-gaussian solutions

Lecture 47 - Wiener process and solution to absorbing barrier problems from Fokker-Planck

Lecture 48 - Application of Fourier Sine transform for single absorber problem

Lecture 49 - Setting up Langevin equation for velocity fluctuations of Brownian particles

Lecture 50 - Understanding the origin of systematic and random parts of force from kinetic

Lecture 51 - Kinetic derivation of a formula for delta-correlated random force

Lecture 52 - Mean square velocity, thermal equilibrium and relationship between relaxation

Lecture 53 - Velocity autocorrelation in Brownian motion

Lecture 54 - Derivation of Stokes-Einstein relationship between diffusion coefficient and

Lecture 55 - Alternative derivation of Stokes-Einstein relationship and Brownian motion with

Lecture 56 - Numerical simulation of the Langevin equation

Lecture 57 - Derivation of Klein-Kramers equation from Langevin equation for joint

Lecture 58 - Illustrative solutions to the Klein-Kramers equation

Lecture 59 - Numerical simulation: Sampling from general distributions and Central

Lecture 60 - Numerical simulation of Random walk trajectories and method of solving Fokker

NPTEL : Heterogeneous Catalysis and Catalytic Processes (Chemical Engineering)

Co-ordinators : Dr. K.K. Pant

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Interfacial Engineering (Chemical Engineering)

Co-ordinators : Prof. A.N. Bhaskarwar

Lecture 1 - General Introduction Definitions

Lecture 2 - General Introduction, Definitions, Surface Tension

Lecture 3 - Surface Tension Free Energies and Adsorption

Lecture 4 - Properties over Curved Surfaces

Lecture 5 - Total Surface Energy

Lecture 6 - Interfacial Tension Entropy, Cohesion, Adhesion

Lecture 7 - Cohesion, Adhesion and Spreading

Lecture 8 - Spreading from Liquids and Solids

Lecture 9 - Spreading, Interfacial Tensions, Surface Tensions

Lecture 10 - Spreading, Contact Angles Free Energies

Lecture 11 - Spreading/Contact Angles Rough Surfaces, Free Energies

Lecture 12 - Spreading/Contact Angles Work of Adhesion, De-wetting

Lecture 13 - Work of Adhesion, Surface and Interfacial Tensions

Lecture 14 - Surface and Interfacial Tensions: Drop Weight and Wilhelmy Plate Methods

Lecture 15 - Surface and Interfacial Tensions: Wilhelmy Plate, Pendant Drop and Maximum Bubble Pressure Methods

Lecture 16 - Wetting Balance Method Spreading Coefficient Work of Adhesion Sessile Drop Method, Positive S

Lecture 17 - Indirect and Direct Methods for Positive S, Adhesion Energies Interfacial Potentials

Lecture 18 - Surface and Interfacial Potentials Distribution and Contact Potentials

Lecture 19 - Diffusion Potential Surface and Interfacial Potentials Components of Contact Potential

Lecture 20 - Electrically Charged Monolayers Gouy Theory

Lecture 21 - Equations of State, Cohesion Repulsion, Limiting Area

Lecture 22 - Condensed and Liquid Expanded Monolayers Phase Transformations

Lecture 23 - Films of Polymers Molecular Weight, Surface Viscosity Drag, Canal Method

Lecture 24 - Canal Method Joly's Semi-Empirical Correction Rotational Torsional Surface Viscometer Compressional Moduli

Lecture 25 - Magnitudes of Surface Compressional Moduli Surface Waves and Ripples

Lecture 26 - Surface waves and Ripples, Velocity Effect of Surface Tension and Surface Compressional Modulus Rates of adsorption and absorption Damping

Lecture 27 - Surface waves and ripples,velocity effect of surface tension and surface compressional modulus damping for clean and contaminated,surfaces,fiber from monolayers

Lecture 28 - Shear Elastic Moduli,Yield Stress Fibres from MLs, Surface Reactions

Lecture 29 - Surface Reactions, Comparison with Bulk-Phase Reactions Steric Factors, Inhibition

Lecture 30 - Hydrolyses of Esters by Alkali Acid or Enzyme Photochemical Reactions in Monolayers Polymerization in MLs,

Lactonization

Lecture 31 - Catalytic Effects Reactions in Emulsions Complex Formation

Lecture 32 - Complex Formation Penetration into Monolayers Thermodynamics of Penetration Adsorption from Vapour Phase Mass Transfer

Lecture 33 - Introductory Concepts Resistances and their Magnitudes Evaporation and its Retardation

Lecture 34 - Evaporation and its Retardation Resistances and their Analysis Diffusional Resistance in Gas Phase

Lecture 35 - Resistances in Liquid Phase and Interface and Their Importance Some Effects and Applications, Theory

Lecture 36 - Surface Instability Theories of Mass Transfer Experiments on static and Dynamic Systems

Lecture 37 - Colloida, Aerosols, Emulsions Foams, Coagulation Smoluchowski's Theory

NPTEL : NOC:Fluid Mechanics and its Applications (Chemical Engineering)

Co-ordinators : Prof. Vijay Gupta

Lecture 1 (1)

Lecture 2 (1A)

Lecture 3 (2)

Lecture 4 (2A)

Lecture 5 (3)

Lecture 6 (3A)

Lecture 7 (4)

Lecture 8 (4A)

Lecture 9 (5)

Lecture 10 (5A)

Lecture 11 (6)

Lecture 12 (6A)

Lecture 13 (7)

Lecture 14 (7A)

Lecture 15 (8)

Lecture 16 (8A)

Lecture 17 (8B)

Lecture 18 (9)

Lecture 19 (9A)

Lecture 20 (10)

Lecture 21 (10A)

Lecture 22 (10B)

Lecture 23 (11)

Lecture 24 (12)

Lecture 25 (12A)

Lecture 26 (12B)

Lecture 27 (13)

Lecture 28 (13A)

Lecture 29 (14)

Lecture 30 (14A)

Lecture 31 (15)

Lecture 32 (15A)

Lecture 33 (16)

Lecture 34 (16A)

Lecture 35 (17)

Lecture 36 (17A)

Lecture 37 (18)

Lecture 38 (18A)

Lecture 39 (19)

Lecture 40 (19A)

Lecture 41 (20)

Lecture 42 (20A)

Lecture 43 (20B)

Lecture 44 (21)

Lecture 45 (21A)

Lecture 46 (22)

Lecture 47 (22A)

Lecture 48 (23)

Lecture 49 (23A)

Lecture 50 (24)

Lecture 51 (24A)

Lecture 52 (25)

Lecture 53 (25A)

Lecture 54 (26)

Lecture 55 (26A)

Lecture 56 (25)

Lecture 57 (27)

Lecture 58 (28)

Lecture 59 (28A)

Lecture 60 (29)

Lecture 61 (29A)

Lecture 62 (30)

Lecture 63 (30A)

Lecture 64 (31)

Lecture 65 (31A)

NPTEL : NOC:Computational Process Design (Chemical Engineering)

Co-ordinators : Prof. Manojkumar Ramteke, Prof. Hariprasad Kodamana

Lecture 1 - Flowsheet Synthesis - I

Lecture 2 - Flowsheet Synthesis - II

Lecture 3 - Mass Balance - I

Lecture 4 - Mass Balance - II

Lecture 5 - Mass and Energy Balance of Complete Flowsheet

Lecture 6 - Equipment Sizing and Costing

Lecture 7 - Economic Evaluation

Lecture 8 - Design of Batch Plants

Lecture 9 - Simulations for Process Flowsheet

Lecture 10 - Optimization Methods used for Designing

Lecture 11 - Heat Exchanger Network Design - 1

Lecture 12 - Heat Exchanger Network Design - 2

Lecture 13 - Geometric Methods for Reactor Network Synthesis

Lecture 14 - Optimization Methods for Process Design - 1

Lecture 15 - Optimization Methods for Process Design - 2

Lecture 16 - Quantifying Sustainability for Design

Lecture 17 - Process Network Analysis and Footprint Assessment

Lecture 18 - Energy, Exergy and Emergy

Lecture 19 - Ecosystems in Sustainability Assessment

NPTEL : Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. A.K. Ghoshal

Lecture 1 - Introduction to heat transfer

Lecture 2 - General heat conduction equation

Lecture 3 - One dimensional steady state conduction in rectangular coordinate

Lecture 4 - One dimensional steady state conduction in cylindrical and spherical coordinate

Lecture 5 - Critical and optimum insulation

Lecture 6 - Extended surface heat transfer - 1

Lecture 7 - Extended surface heat transfer - 2

Lecture 8 - Analysis of lumped parameter model

Lecture 9 - Transient heat flow in semi infinite solid

Lecture 10 - Infinite body subjected to sudden convective

Lecture 11 - Graphical solutions of unsteady state heat conduction problem

Lecture 12 - Dimensional analysis for forced convection

Lecture 13 - Dimensional analysis for free convection

Lecture 14 - Heat transfer co-relations for laminar and internal flows

Lecture 15 - Heat transfer co-relations for turbulent and internal flows

Lecture 16 - Co-relation for turbulent and external flows

Lecture 17 - Heat transfer co-relations for flow across tube banks

Lecture 18 - Momentum and heat transfer analogies

Lecture 19 - Boundary layer heat transfer

Lecture 20 - Boundary layer equations

Lecture 21 - Approximate analysis in boundary layer

Lecture 22 - Theoretical concepts of natural / free convention heat transfer

Lecture 23 - Emperical relations for free convention heat transfer

Lecture 24 - Condensation heat transfer over vertical plate

Lecture 25 - Condensation heat transfer for various conditions and geometries

Lecture 26 - Fundamentals of boiling heat transfer

Lecture 27 - Boiling heat transfer co-relations

Lecture 28 - Classification of heat exchangers

Lecture 29 - Various types of shell and tube heat exchangers

Lecture 30 - Various types of compact heat exchangers

Lecture 31 - Effectiveness-NTU, method of heat exchanger analysis

Lecture 32 - Design of double pipe heat exchanger

Lecture 33 - Design of shell and tube heat exchanger

Lecture 34 - Introduction to evaporation and evaporators

Lecture 35 - Evaporation principles and evaporator performance

Lecture 36 - Evaporator calculations

Lecture 37 - Introduction to radiation heat transfer

Lecture 38 - Radiation intensity and radiation view factor

Lecture 39 - Radiation heat exchange

Lecture 40 - Radiation shield and gas radiation

NPTEL : Mass Transfer Operations I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

Lecture 1 - Introduction to Mass Transfer

Lecture 2 - Molecular Diffusion

Lecture 3 - Fickâ€™s Law of Diffusion

Lecture 4 - Steady state molecular diffusion in fluids - Part I

Lecture 5 - Steady state molecular diffusion in fluids - Part II

Lecture 6 - Diffusion coefficient: Measurement and Prediction - Part I

Lecture 7 - Diffusion Coefficient: Measurement and Prediction - Part II

Lecture 8 - Multicomponent Diffusion and Diffusivity in Solids

Lecture 9 - Concept of Mass Transfer Coefficient

Lecture 10 - Dimensionless Groups and Co-relations for Convective

Lecture 11 - Mass Transfer co-efficient in Laminar Flow Condition

Lecture 12 - Boundary Layer Theory and Film Theory in Mass Transfer

Lecture 13 - Mass Transfer Coefficients in Terbulant Flow

Lecture 14 - Interphase Mass Transfer and Mass Transfer Theories - Part I

Lecture 15 - Interphase Mass Transfer and Mass Transfer Theories - Part II

Lecture 16 - Interphase Mass Transfer and Mass Transfer Theories - Part III

Lecture 17 - Agitated and Sparged Vassels

Lecture 18 - Tray Column - Part I

Lecture 19 - Tray Column - Part II

Lecture 20 - Packed Tower

Lecture 21 - Introduction to Absorption and Solvent selection

Lecture 22 - Packed Tower Design - Part I

Lecture 23 - Packed Tower Design - Part II

Lecture 24 - Packed Tower Design - Part III

Lecture 25 - Mass Transfer Coefficients Correlation and HETP Concept

Lecture 26 - Tray Tower Design and Introduction to Multicomponent System

Lecture 27 - Introduction to Distillation and Phas diagrams

Lecture 28 - Azeotropes and Enthalpy Concentration Diagrams

Lecture 29 - Flash Distillation

Lecture 30 - Batch and Steam Distillation

Lecture 31 - Fractional Distillation

Lecture 32 - Fractional Distillation: McCabe Thiele Method

Lecture 33 - Fractional Distillation: Minimum Reflux and Pinch Point

Lecture 34 - Fractional Distillation: Subcooled Reflux ,Tray Efficiency and Use of Open Steam

Lecture 35 - Fractional Distillation: Multiple Feeds and Side Stream

Lecture 36 - Multistage Batch Distillation with Reflux

Lecture 37 - Fractional Distillation: Ponchan and Savarit Method

Lecture 38 - Ponchan and Savarit Method and Packed Tower Distillation

Lecture 39 - Multicomponent Distillation

NPTEL : Process Design Decisions and Project Economics (Chemical Engineering)

Co-ordinators : Dr. Vijay S. Moholkar

Lecture 1 - General Introduction to the Course and Syllabus

Lecture 2 - Hierarchical Approach to Process Design - I

Lecture 3 - Hierarchical Approach to Process Design - Examples

Lecture 4 - Input Information and Design Aspects of Batch vs. Continuous Process

Lecture 5 - Input / Output Structure of Flowsheet - Part I

Lecture 6 - Input / Output Structure of Flowsheet - Part II

Lecture 7 - Input / Output Structure of Flowsheet - Part III and Recycle Structure of Flowsheet - Part I

Lecture 8 - Recycle Structure of Flowsheet - Part II

Lecture 9 - Recycle Structure of Flowsheet - Part III

Lecture 10 - Recycle Structure of Flowsheet - Part IV and Tutorial - Part I

Lecture 11 - Tutorial - Part II

Lecture 12 - Tutorial - Part III

Lecture 13 - Algorithm and Basic Principles of Reactor Design

Lecture 14 - Reactor Non-ideality, Residence Time Distribution (RTD) and Types of Chemical Reactions & Catalysts

Lecture 15 - Types of Reactors and Selection Criteria

Lecture 16 - Tutorial on Reactor Design and Cost Estimation

Lecture 17 - General Introduction (Types of Separation Processes and Criteria for Selection of the Processes)

Lecture 18 - Guidelines for Design of Separation Systems

Lecture 19 - Design of Distillation Columns - Part I (Sequencing of Columns, Energy Integration / Thermal Coupling of the Columns)

Lecture 20 - Design of Distillation Columns - Part II (Plate and Packed Towers, Number of Plates, Diameter and Height of the Column)

Lecture 21 - Tutorial - Part I (Design of Absorption Column)

Lecture 22 - Tutorial - Part II (Design of Distillation Column)

Lecture 23 - Concepts and Basic Principles of Energy (or Heat) Integration - Part 1 (Composite Curves and ?Tmin)

Lecture 24 - Concepts and Basic Principles of Heat Integration - Part 2 (Problem Table Algorithm and Identification of Energy Targets)

Lecture 25 - Identification of Area and Cost Targets

Lecture 26 - Pinch Technology for Heat Exchanger Network Design

Lecture 27 - Tutorial - I (Composite Curves, Problem Table Algorithm and Enthalpy Intervals)

Lecture 28 - Tutorial - II (Heat Exchanger Network Synthesis Using Pinch Technology)

Lecture 29 - Selection of Process, Design of Flowsheet and Materials Balance

Lecture 30 - Energy Balance, Process Alternatives and Design of the Absorber

Lecture 31 - Rules of Thumb & Their Limitations and Tutorial

Lecture 32 - General Concepts & Principles and Cost Allocation Procedure

Lecture 33 - Lumped Cost Diagram and Cost Allocation Diagram (Case Study of Hydro-dealkylation Process)

Lecture 34 - Assessment of Process Alternatives with Cost Allocation Diagram (Case Study of Hydrodealkylation Process)

Lecture 35 - Tutorial on Lumped Cost Diagram and Cost Allocation Diagram

Lecture 36 - Introduction to Chemical Projects and Their Economic Aspects

Lecture 37 - Selection of the Process and Project Site - Part I

Lecture 38 - Selection of the Process and Project Site - Part II

Lecture 39 - Project Cost Estimation - Part I

Lecture 40 - Project Cost Estimation - Part II

Lecture 41 - Simplified Cost Model and Depreciation

Lecture 42 - Time Value of Money

Lecture 43 - Measures of Profitability and Project Evaluation - Part I

Lecture 44 - Measures of Profitability and Project Evaluation - Part II

Lecture 45 - Tutorial on Project Economics - Part I

Lecture 46 - Tutorial on Project Economics - Part II

NPTEL : NOC:Fluidization Engineering (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

Lecture 1 - Introduction

Lecture 2 - Particle properties

Lecture 3 - Particle / Powder Classifications

Lecture 4 - Minimum Fluidization Velocity: Fluid-solid System

Lecture 5 - Minimum Fluidization Velocity: Liquid-solid and gas-liquid-solid System

Lecture 6 - Flow regime and its map: Gas-solid Fluidization

Lecture 7 - Flow regime and its map: Liquid-solid and Gas-liquid-solid Fluidization

Lecture 8 - Frictional pressure drop in fluidized bed-fluid-solid system

Lecture 9 - Frictional pressure drop in fluidized Bed-Gas-liquid-solid system

Lecture 10 - Analysis of Frictional Pressure Drop in Fluidized Bed By Different Models

Lecture 11 - Gas Distribution Through Distributor

Lecture 12 - Calculation of gas pumping power consumption in fluidized bed

Lecture 13 - Bubbling Fluidization Part 1: Bubble Characteristics

Lecture 14 - Bubbling Fluidization Part 2: Bubble Characteristics (Continued...)

Lecture 15 - Bubbling Fluidization Part 3: Bubble coalescence in three-phase fluidization

Lecture 16 - Bubbling Fluidization Part 4: Bubble breakup in three-phase fluidization

Lecture 17 - Bubbling Fluidization Part 5: Gas and solid movements at bubble

Lecture 18 - Bubbling Fluidization Part 6: Slugging Bed

Lecture 19 - Entrainment Characteristics (Part 1) : Entrainment Characteristics

Lecture 20 - Entrainment Characteristics (Part 2) : Fast fluidization condition

Lecture 21 - Entrainment Characteristics (Part 2) : Elutriation Characteristics

Lecture 22 - Entrainment Characteristics (Part 2) : Attrition in Fluidized Bed (Part 1)

Lecture 23 - Attrition in Fluidized Bed (Part 2)

Lecture 24 - Solid movement, mixing: Gas-fluidized Bed

Lecture 25 - Solid segregation: Gas-fluidized bed

Lecture 26 - Solid mixing and segregation: Liquid-solid fluidized bed

Lecture 27 - Gas Dispersion and Interchange

Lecture 28 - Mass transfer in fluidized Bed-Gas-solid system

Lecture 29 - Mass transfer in fluidized Bed-Gas-liquid-solid system (Continued...)

Lecture 30 - Heat transfer Characteristics

Lecture 31 - Fluidized bed reactor design and its performance

NPTEL : NOC:An Introduction to Cardiovascular Fluid Mechanics (Chemical Engineering)

Co-ordinators : Dr. Raghvendra Gupta

Lecture 1 - An Introduction

Lecture 2 - Fluid Mechanics: A Review

Lecture 3 - Solid Mechanics: A Review

Lecture 4 - Rheology of blood

Lecture 5 - Blood morphology

Lecture 6 - Blood flow in a channel

Lecture 7 - Viscometers and Rheometers

Lecture 8 - Viscoelasticity

Lecture 9 - Flow Bifurcation

Lecture 10 - Pulsatile Flow 1

Lecture 11 - Pulsatile Flow 2

Lecture 12 - Flow in Elastic Tubes

NPTEL : NOC:Multiphase Microfluidics (Chemical Engineering)

Co-ordinators : Dr. Raghvendra Gupta

Lecture 1 - An Introduction

Lecture 2 - Interface and Surface Tension

Lecture 3 - Flow Regimes 1

Lecture 4 - Flow Regimes 2

Lecture 5 - Taylor Flow 1

Lecture 6 - Taylor Flow 2

Lecture 7 - Computational Techniques

Lecture 8 - Bubble and Droplet Generation

Lecture 9 - Interface and Surface tension 2

Lecture 10 - Void Fraction and Pressure Drop

Lecture 11 - Liquid-Liquid Flow: Flow Regimes

Lecture 12 - Ideal annular Flow

Lecture 13 - Taylor Flow : Heat transfer 1

Lecture 14 - Taylor Flow : Heat transfer 2

Lecture 15 - Taylor Flow : Meat Transfer 1

Lecture 16 - Taylor Flow : Meat Transfer 2

Lecture 17 - Flow boiling in microchannels

Lecture 18 - Flow boiling in microchannels (Continued...)

Lecture 19 - Flow Measurement Techniques

Lecture 20 - Particle image Velocimetry

Lecture 21 - Inertial Microfluidics

Lecture 22 - Microfluidic applications

Lecture 23 - Microfluidic applications (Continued...)

Lecture 24 - Concluding Remarks

NPTEL : NOC:Measurement Technique in Multiphase Flows (Chemical Engineering)

Co-ordinators : Prof. Rajesh Kumar Upadhyay

Lecture 1 - Introduction to Multiphase flow Measurement Techniques

Lecture 2 - Invasive and Non-invasive Techniques

Lecture 3 - Hot Wire Anemometry

Lecture 4 - Optical Fiber Probe

Lecture 5 - Laser Doppler Anemometry (LDA)

Lecture 6 - LDA Post Processing and Particle Image Velocimetry (PIV)

Lecture 7 - PIV and Positron Emission Particle Tracking

Lecture 8 - Radioactive Particle Tracking - I

Lecture 9 - Radioactive Particle Tracking - II

Lecture 10 - Capacitance Probe, Optical Fiber Probe and ECT

Lecture 11 - Gamma-ray and X-ray Tomography, MRI

Lecture 12 - Summary

NPTEL : NOC:Multiphase Flows (Chemical Engineering)

Co-ordinators : Prof. Rajesh Kumar Upadhyay

Lecture 1 - Multiphase flow introduction

Lecture 2 - Fundamental definitions and terminology used in Multiphase - I

Lecture 3 - Fundamental definitions and terminology used in Multiphase - II

Lecture 4 - Flow Regime Map for Gas-Liquid System

Lecture 5 - Flow Regime Map for Fluid-Solid System

Lecture 6 - Pneumatic Conveying

Lecture 7 - Momentum Equation through Reynolds Transport Theorem

Lecture 8 - Lockhart Martinelli Correlation

Lecture 9 - Pressure Drop Calculation for Homogeneous Flow

Lecture 10 - Pressure Drop Calculation for Separated and Annular Flow Regime

Lecture 11 - Lagrangian Tracking of Single Particle Under Different Forces

Lecture 12 - Multiphase Interactions: Drag Force

Lecture 13 - Multiphase Interactions: Multi-particle Drag, Virtual Mass Force, Basset Force and Lift Force

Lecture 14 - Introduction to Multiphase Flow Modeling

Lecture 15 - Algebraic Slip Method and Euler-Euler Method

Lecture 16 - KTGF and Euler-Lagrangian Model

Lecture 17 - Measurement Techniques: Velocity Measurement

Lecture 18 - Measurement Techniques: Phase Fraction Measurement

Lecture 19 - Bubble Column

Lecture 20 - Packed Bed Reactor

Lecture 21 - Fluidized Bed Reactor

Lecture 22 - Summary

NPTEL : NOC:Introduction to Polymer Physics (IIT-G) (Chemical Engineering)

Co-ordinators : Prof. Amit Kumar

Lecture 1 - Introduction to Polymers

Lecture 2 - Ideal Chain Models

Lecture 3 - Ideal and Real Chains

Lecture 4 - Thermodynamics of Polymer Solutions - I

Lecture 5 - Thermodynamics of Polymer Solutions - II

Lecture 6 - Thermodynamics of Polymer Solutions - III

Lecture 7 - Phase Behaviour of Polymer Solutions and Blends

Lecture 8 - Phase Behaviour of Polymer Blends and Copolymers

Lecture 9 - Determination of Polymer Molar Mass: Osmometry

Lecture 10 - Determination of Polymer Molar Mass: Static Light Scattering - I

Lecture 11 - Determination of Polymer Molar Mass: Static Light Scattering - II

Lecture 12 - Determination of Polymer Molar Mass: Viscometry and GPC

Lecture 13 - Branching: Hyperbranched Polymers

Lecture 14 - Branching, Network Formation and Gelation

Lecture 15 - Gelation and Swelling of Network Polymers

Lecture 16 - Amorphous State of Polymers

Lecture 17 - Crystalline State of Polymers

Lecture 18 - Mechanical Properties of Polymers

Lecture 19 - Viscoelasticity: Mechanical Models

Lecture 20 - Viscoelasticity, Dynamic Mechanical Analysis and Rheology

Lecture 21 - Rubber Elasticity

Lecture 22 - Unentangled Polymer Dynamics

Lecture 23 - Entangled Polymer Dynamics

Lecture 24 - Review

NPTEL : NOC:Natural Gas Engineering (Chemical Engineering)

Co-ordinators : Prof. Pankaj Tiwari

Lecture 1 - Introduction to Natural Gas - I

Lecture 2 - Introduction to Natural Gas - II

Lecture 3 - Introduction to Natural Gas - III

Lecture 4 - Wellbore Performance Relationship (WPR)

Lecture 5 - Choke Performance Relationship (CPR)

Lecture 6 - Nodal Analysis

Lecture 7 - Inflow Performance Relationship (IPR) - I

Lecture 8 - Inflow Performance Relationship (IPR) - II

Lecture 9 - Gas Well Testing

Lecture 10 - Wellbore Performance Relationship (WPR)

Lecture 11 - Choke Performance Relationship (CPR)

Lecture 12 - Nodal Analysis

Lecture 13 - Natural Gas Separation - I

Lecture 14 - Natural Gas Separation - II

Lecture 15 - Dehydration of Natural Gas

Lecture 16 - Sweeting of Natural Gas

Lecture 17 - Compressor Design

Lecture 18 - Measurement of Natural Gas

Lecture 19 - Transportation of Natural Gas - I

Lecture 20 - Transportation of Natural Gas - II

Lecture 21 - Unconventional production of Natural Gas

Lecture 22 - Review: Concluding Remarks

NPTEL : NOC:Chemical Engineering Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Sasidhar Gumma

Lecture 1 - Introduction

Lecture 2 - First law for closed systems

Lecture 3 - First law for open systems

Lecture 4 - Simple processes

Lecture 5 - Processes involving liquids and ideal gases

Lecture 6 - Temperature dependency of Cp in an ideal gas

Lecture 7 - Efficiency of Heat engines and Statement of Second Law

Lecture 8 - Entropy

Lecture 9 - Lost Work

Lecture 10 - Maxwell's Relations

Lecture 11 - Thermodynamic Diagrams

Lecture 12 - Thermodynamic Tables, Residual Properties

Lecture 13 - Virial Equation of State

Lecture 14 - Residual property relations from EoS

Lecture 15 - Cubic Equation of State

Lecture 16 - Cubic Equation of State

Lecture 17 - Thermodynamic Tables

Lecture 18 - Correlations for Liquids

Lecture 19 - Process Involving Phase Changes

Lecture 20 - Chemical potential

Lecture 21 - Partial molar properties

Lecture 22 - Examples

Lecture 23 - Ideal Solutions

Lecture 24 - Excess Properties

Lecture 25 - Fugacity

Lecture 26 - Calculation of Fugacity using EoS - Part 1

Lecture 27 - Calculation of Fugacity using EoS - Part 2

Lecture 28 - Calculation of Fugacity in Mixtures using Cubic EoS

Lecture 29 - Fugacity in Liquids, Activity Coeffcient

Lecture 30 - Models for Excess Gibbs free energy - Part 1

Lecture 31 - Models for Excess Gibbs free energy - Part 2

Lecture 32 - Vapor Liquid Equilibrium - Part 1

Lecture 33 - Vapor Liquid Equilibrium - Part 2

Lecture 34 - Azeotropes

Lecture 35 - Gamma/Phi Formulation

Lecture 36 - LLE

Lecture 37 - VLLE

Lecture 38 - Enthalpy changes upon reaction

Lecture 39 - Reaction coordinate

Lecture 40 - Equilibrium constant

Lecture 41 - Examples

Lecture 42 - Conclusion

NPTEL : NOC:Mass Transfer Operations-I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

Lecture 1 - Introduction and Overview of Mass Transfer Operation

Lecture 2 - Molecular and Eddy Diffusion, Diffusion Velocities and Fluxes

Lecture 3 - Fick's First and Second Law

Lecture 4 - Steady State Molecular Diffusion in fluids under stagnant and laminar flow conditions

Lecture 5 - Diffusion through variable cross-sectional area

Lecture 6 - Gas Phase Diffusion Coefficient measurement

Lecture 7 - Gas Phase Diffusion Coefficient prediction and liquid phase diffusion coefficient measurement and prediction

Lecture 8 - Multicomponent diffusion and diffusivity in solids

Lecture 9 - Mass transfer coefficient concept and classifications

Lecture 10 - Dimensionless groups and correlations for convective mass transfer coefficients

Lecture 11 - Mass transfer coefficient in laminar flow

Lecture 12 - Boundary Layer Theory and mass transfer coefficients in turbulent flow

Lecture 13 - Mass transfer theories

Lecture 14 - Interphase mass transfer

Lecture 15 - Interphase mass transfer and material balance for operating line

Lecture 16 - Number of ideal stages in counter current operation: graphical and algebraic methods

Lecture 17 - Introduction, classification, Sparged and agitated vessels design

Lecture 18 - Gas dispersed: Tray tower

Lecture 19 - Sieve Tray

Lecture 20 - Liquid dispersed: Venture scrubber, wetted wall column, Packed tower

Lecture 21 - Introduction to absorption, Equilibrium in gas-liquid system, and minimum liquid rate

Lecture 22 - Design of packed column absorber based on the Individual Mass Transfer Coefficient

Lecture 23 - Design of packed column absorber based on the Overall Mass Transfer Coefficient

Lecture 24 - Height Equivalent to a Theoretical Plate (HETP), Design of packed column absorber for dilute and concentrated gases

Lecture 25 - Absorption in plate column: Method of McCabe and Thiele-graphical determination of ideal trays and Introduction to multicomponent absorption

Lecture 26 - Introduction to distillation, binary equilibrium diagrams and concept of relative volatility

Lecture 27 - Distillation in non-ideal systems and concept of enthalpy-concentration diagram

Lecture 28 - Flash distillation

Lecture 29 - Batch and steam distillation

Lecture 30 - Continuous multistate fractionation

Lecture 31 - Number of trays by McCabe and Thiele for distillation

Lecture 32 - Pinch Points and minimum reflux

Lecture 33 - Reflux below its bubble point: Sub-cooled reflux and use of open steam

Lecture 34 - Multiple feeds, multiple product withdrawal or side streams

Lecture 35 - Multistage batch distillation with reflux

Lecture 36 - The Ponchon-Savarit method

Lecture 37 - The Ponchon-Savarit method

Lecture 38 - Packed Distillation

Lecture 39 - Introduction to multicomponent distillation and multicomponent flash distillation

Lecture 40 - Minimum stages and minimum reflux in multicomponent distillation

Lecture 41 - Multicomponent batch distillation

NPTEL : NOC:Transport Phenomena of Non-Newtonian Fluids (Chemical Engineering)

Co-ordinators : Prof. N. Kishore

Lecture 1 - Introduction and Basic Concepts

Lecture 2 - Classification of Non-Newtonian Fluids

Lecture 3 - Mathematical Models for Non-Newtonian Fluids

Lecture 4 - Viscoelastic Non-Newtonian Fluids

Lecture 5 - Capillary Viscometers: Sources of Errors and Correction Methods

Lecture 6 - Rotational Viscometers

Lecture 7 - Capillary Viscometers - Errors and Corrections II

Lecture 8 - Equation of Change for Non-Isothermal Systems

Lecture 9 - Rotational Viscometers - II

Lecture 10 - Rotational Viscometers - III

Lecture 11 - Transition from Laminar to Turbulent Flow in Pipes for GNF

Lecture 12 - Equations of Change for Isothermal Systems

Lecture 13 - Equations of Change for Non-Isothermal Systems

Lecture 14 - Power-law Fluids Flow in Concentric Annulus

Lecture 15 - Power-law and Ellis Model Fluids Flow Through Pipes

Lecture 16 - Bingham Plastic Fluids Flow through Pipes

Lecture 17 - Herschel Bulkley Fluids Flow through Pipes

Lecture 18 - Transition and Turbulent Flow of GNF in Pipes - I

Lecture 19 - Transition and Turbulent Flow of GNF in Pipes - II

Lecture 20 - Laminar flow of GNFs between Parallel Plates and along Inclined Surface

Lecture 21 - Laminar flow of GNFs along Inclined Surface and Concentric Annulus

Lecture 22 - Flow of Non-Newtonian Fluids through Packed Beds

Lecture 23 - Dispersion in Packed Beds: Non-Newtonian Effects

Lecture 24 - Liquid-Solid Fluidization by Power-law Liquids

Lecture 25 - Free Convection between Two Vertical Plates

Lecture 26 - Viscous Heat Generation

Lecture 27 - Temperature distribution in fluids confined between co-axial cylinders

Lecture 28 - Temperature distribution for FDF of Newtonian fluids in tubes

Lecture 29 - Heat Transfer Combined with Chemical Reactions

Lecture 30 - Transpiration Cooling

Lecture 31 - Basics of MT; Diffusion Through Stagnant Gas Film

Lecture 32 - Non-Isothermal Diffusive MT and Forced Convective MT

Lecture 33 - Simultaneous Heat and Mass Transfer

Lecture 34 - Mass Transfer Combined with Chemical Reactions

Lecture 35 - Quasi-Steady Analysis of Simultaneous HT, MT and Chemical Reaction

Lecture 36 - Quasi-Steady Analysis of Simultaneous HT and MT - I

Lecture 37 - Quasi-Steady Analysis of Simultaneous HT and MT - II

Lecture 38 - Quasi-Steady Analysis of Simultaneous HT and MT - III

Lecture 39 - Momentum and Thermal Boundary Layer Flows

Lecture 40 - Momentum Boundary Layer Thickness of Non-Newtonian Fluids

Lecture 41 - Thermal and Concentration Boundary Layer Thickness of Non-Newtonian Fluids

NPTEL : NOC:Fluid Flow Operations (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

Lecture 1 - Introduction

Lecture 2 - Characteristics of fluid (Continued...)

Lecture 3 - Fluid Statics

Lecture 4 - Fluid Statics (Continued...)

Lecture 5 - Fundamentals of flow - Part 1

Lecture 6 - Fundamentals of flow - Part 2

Lecture 7 - One dimensional flow - Part 1

Lecture 8 - One dimensional flow - Part 2

Lecture 9 - One dimensional flow - Part 3

Lecture 10 - Flow of Viscous fluid - Introduction

Lecture 11 - Velocity distribution in laminar flow

Lecture 12 - Velocity distribution in turbulent flow

Lecture 13 - Boundary layer theory

Lecture 14 - Theory of lubrication

Lecture 15 - Frictional resistance

Lecture 16 - Losses in gematric change

Lecture 17 - Losses in geometric change (Continued...)

Lecture 18 - Flow Velocity and Optimum Shape

Lecture 19 - Equation of Energy and Discharge of Water Channel

Lecture 20 - Drag

Lecture 21 - Lift and Cavitation

Lecture 22 - Dimensional Analysis

Lecture 23 - Dimensional Analysis: BuckinghamÃ¢â‚¬â„¢s PI Theorem

Lecture 24 - Law of Similarity and Significant Dimensionless Number

Lecture 25 - Compressible Flow - Part 1

Lecture 26 - Compressible Flow - Part 2

Lecture 27 - Measurement of Flow - Part 1

Lecture 28 - Measurement of Flow - Part 2

Lecture 29 - Measurement of Flow - Part 3

Lecture 30 - Introduction to multiphase flow

Lecture 31 - Hydrodynamics in multiphase flow

Lecture 32 - Hydrodynamics in multiphase flow (Continued...)

Lecture 33 - Applications of multiphase flow

NPTEL : NOC:Chemical Process Intensification (Chemical Engineering)

Co-ordinators : Dr. S.K. Majumder

Lecture 1 - History, Philosophy and Concept

Lecture 2 - Principle Features

Lecture 3 - Strategies and domain based techniques

Lecture 4 - Intensification by fluid flow process

Lecture 5 - Mechanism of Intensification by mixing

Lecture 6 - Intensification in Reactive system

Lecture 7 - Problems leading to sustainable development

Lecture 8 - Concept, Issues and Challenges

Lecture 9 - Strategies in process design

Lecture 10 - Scales and stages of process intensification

Lecture 11 - Methods and Tools for Achieving sustainable design

Lecture 12 - Multi-level Computer aided tools

Lecture 13 - Introduction on Stochastic Optimization

Lecture 14 - Optimization Algorithms

Lecture 15 - Applications of Optimization Algorithms

Lecture 16 - Introduction and Mechanism of Cavitation-based PI

Lecture 17 - Cavitational Reactor Configurations and activity

Lecture 18 - Parametric effects on cavitation

Lecture 19 - Introduction of monolith reactor

Lecture 20 - Preparation of monolithic catalyst

Lecture 21 - Application of monolithic catalyst

Lecture 22 - Hydrodynamics, transport of monolithic reactor

Lecture 23 - Overview of interfacial area based processes

Lecture 24 - Ejector induced downflow system for PI

Lecture 25 - Hydrodynamics and transport in downflow system

Lecture 26 - Introduction and Principles

Lecture 27 - Types of Intensified Distillation Units

Lecture 28 - Design of membrane-assisted distillation

Lecture 29 - Introduction and Principles

Lecture 30 - Supercritical extraction for process intensification

Lecture 31 - Introduction to membrane and its principles

Lecture 32 - Membrane engineering in process intensification

Lecture 33 - Introduction to microprocess technology

Lecture 34 - Process Intensification by Microreactors

Lecture 35 - Hydrodynamics and transport in microchannel based microreactor

NPTEL : NOC:Chemical Reaction Engineering-I (Chemical Engineering)

Co-ordinators : Dr. B. Mandal

Lecture 1 - Introduction and Overview on Reaction Engineering

Lecture 2 - Kinetics of Homogeneous Reactions

Lecture 3 - Kinetic Model and Temperature Dependency

Lecture 4 - Introduction and Stoichiometry for the Batch System

Lecture 5 - Stoichiometry for Constant Volume Flow and Variable Volume Batch Systems

Lecture 6 - Stoichiometry for Variable Volume Flow System

Lecture 7 - Analysis of Batch Reactor Kinetic Data

Lecture 8 - Intregal Method of Analysis of Batch Reactor Data - Part 1

Lecture 9 - Intregal Method of Analysis of Batch Reactor Data - Part 2

Lecture 10 - Differential Method of Analysis and Variable Volume Batch Reactor Data

Lecture 11 - Introduction and Ideal Batch Reactor Design

Lecture 12 - Ideal Mixed Flow Reactor Design

Lecture 13 - Ideal Plug Flow Reactor Design

Lecture 14 - Size Comparisn of Single and Multiple Reactors

Lecture 15 - Size Comaprison Multiple Reactors

Lecture 16 - Recycle and Autocatalytic Reactors

Lecture 17 - Design for Parallel Reactions

Lecture 18 - Design for Series Reactions

Lecture 19 - Design for Series-Parallel Reactions

Lecture 20 - Denbigh Reactions and Their Special Cases

Lecture 21 - Heats of Reaction and Equilibrium Conversion from Thermodynamics

Lecture 22 - General Graphical Reactor Design Procedure

Lecture 23 - Material and Energy Balances in Batch Reactor

Lecture 24 - Optimum Temperature Progression in Batch Reactor

Lecture 25 - Material and Energy Balances in Flug Flow and Mixed Flow Reactors

Lecture 26 - Ideal and Non-Ideal Mixed Flow Reactor Design and Multiple Steady States

Lecture 27 - Non-Ideal Reactors and Residence Time Distribution

Lecture 28 - RTD Measurement and Moments of RTD

Lecture 29 - RTD in Ideal Reactors

Lecture 30 - Reactor Modeling using the RTD

NPTEL : NOC:Mass Transfer Operations-II (Chemical Engineering)

Co-ordinators : Dr. Chandan Das

Lecture 1 - Basic concepts, Adiabatic saturation temperature

Lecture 2 - Design calculations of cooling tower

Lecture 3 - Design of cooling tower

Lecture 4 - Design of cooling tower

Lecture 5 - Air conditioning, Example problems on dehumidification

Lecture 6 - Mechanism of drying and drying equilibria, drying rate curve

Lecture 7 - Drying: rate of drying for batch dryers

Lecture 8 - Drying: rate of drying for continuous dryers

Lecture 9 - Drying time calculation from drying rate curve

Lecture 10 - Introduction to liquid-liquid extraction, liquid-liquid equilibria

Lecture 11 - Effect of temperature on LLE and Design of single stage extraction

Lecture 12 - Design Calculation of Multistage Operation

Lecture 13 - Design calculation of multistage cross-current extraction

Lecture 14 - Design calculation of multistage counter-current extraction, Selection of extractors

Lecture 15 - Leaching: single stage operation

Lecture 16 - Leaching: multistage operation

Lecture 17 - Supercritical Fluid Extraction, equipmet for leaching

Lecture 18 - Fundamentals of membrane separation processes

Lecture 19 - Manufacturing of membranes,advantages and limitations

Lecture 20 - Various models and applications: design aspects

Lecture 21 - Various models and applications: design aspects

Lecture 22 - Electric field enhanced membrane separation processes

Lecture 23 - Micellar-enhanced ultrafiltration

Lecture 24 - Adsorption: types and nature, isotherm

Lecture 25 - Stage wise and continuous adsorption

Lecture 26 - Fluidized bed and teeter bed

Lecture 27 - Unsteady state fixed bed adsorbers, ion exchange

Lecture 28 - Crystallization, types of crystal geometry

Lecture 29 - Solid-liquid phase equilibrium, Theory of crystallization

Lecture 30 - Design of crystallizer, crystallization equipment

Lecture 31 - Concluding remarks - Part 1

Lecture 32 - Concluding remarks - Part 2

NPTEL : NOC:Mechanical Unit Operations (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

Lecture 1 - Introduction of Particulate Solids

Lecture 2 - Particle Size

Lecture 3 - Particle Shape and Density

Lecture 4 - Screening

Lecture 5 - Size Analysis by Screening

Lecture 6 - Screening Equipment, Effectiveness and Capacity

Lecture 7 - Methods of Size Reduction

Lecture 8 - Equipment for Size Reduction - Crushers

Lecture 9 - Equipment for Size Reduction - Gridners

Lecture 10 - Equipment for Size Reduction - Ultrafine Grinders and Cutting Machines

Lecture 11 - Storage of Bulk Solids

Lecture 12 - Solids Flow Out and their Flow Patterns

Lecture 13 - Conveying of Bulk Solids

Lecture 14 - Size Enlargement Methods

Lecture 15 - Size Enlargement Equipment - 1

Lecture 16 - Size Enlargement Equipment - 2

Lecture 17 - Flow past Immersed Solid Objects

Lecture 18 - Motion of Particles through Fluids - 1

Lecture 19 - Motion of Particles through Fluids - 2

Lecture 20 - Motion of Particles through Fluids - 3

Lecture 21 - Flow through Beds of Solids - 1

Lecture 22 - Flow through Beds of Solids - 2

Lecture 23 - Flow through Fluidized Beds - 1

Lecture 24 - Flow through Fluidized Beds - 2

Lecture 25 - Filtration

Lecture 26 - Principles of Cake Filtration - 1

Lecture 27 - Principles of Cake Filtration - 2

Lecture 28 - Filtration Equipment

Lecture 29 - Cross Flow Filtration - 1

Lecture 30 - Cross Flow Filtration - 2

Lecture 31 - Gravity Sedimentation - Classifiers

Lecture 32 - Gravity Sedimentation - Design of Thickeners - 1

Lecture 33 - Gravity Sedimentation - Design of Thickeners - 2

Lecture 34 - Centrifugal Separations - 1

Lecture 35 - Centrifugal Separations - 2

Lecture 36 - Floatation - 1

Lecture 37 - Floatation - 2

NPTEL : NOC:Advanced Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

Lecture 1 - Introduction of Phase Equilibrium

Lecture 2 - Classical Thermodynamics of Phase Equilibria - 1

Lecture 3 - Classical Thermodynamics of Phase Equilibria - 2

Lecture 4 - Thermodynamic Properties from Volumetric Data

Lecture 5 - Fugacity from Volumetric Data - 1

Lecture 6 - Fugacity from Volumetric Data - 2

Lecture 7 - Intermolecular Forces and Non-Ideal Behaviour

Lecture 8 - Intermolecular Forces-Potential Energy Functions

Lecture 9 - Molecular Theory of Corresponding States - 1

Lecture 10 - Molecular Theory of Corresponding States - 2

Lecture 11 - Intermolecular Potential and EoS

Lecture 12 - Virial Coefficients from Potential Functions

Lecture 13 - Virial Coefficients from Corresponding States Theory

Lecture 14 - Fugacities in Gaseous Mixtures - 1

Lecture 15 - Fugacities in Gaseous Mixtures - 2

Lecture 16 - Fugacities in Gaseous Mixtures - 3

Lecture 17 - Liquid Mixtures and Excess Functions

Lecture 18 - Excess Functions and Activity Coefficients

Lecture 19 - Activity Coefficients and Thermodynamic Consistency

Lecture 20 - Models for Excess Gibbs Energy - 1

Lecture 21 - Models for Excess Gibbs Energy - 2

Lecture 22 - Models for Excess Gibbs Energy - 3

Lecture 23 - Vapour-Liquid Equilibrium - 1

Lecture 24 - Vapour-Liquid Equilibrium - 2

Lecture 25 - Vapour-Liquid Equilibrium - 3

Lecture 26 - Liquid-Liquid Equilibrium - 1

Lecture 27 - Liquid-Liquid Equilibrium - 2

Lecture 28 - Vapour-Liquid-Liquid Equilibrium - 1

Lecture 29 - Vapour-Liquid-Liquid Equilibrium - 2

Lecture 30 - Solid-Liquid Equilibrium - 1

Lecture 31 - Solid-Liquid Equilibrium - 2

NPTEL : NOC:Membrane Technology (Chemical Engineering)

Co-ordinators : Prof. Kaustubha Mohanty

Lecture 1 - Separation Processes, Historical Development, Definition and Types of Membranes

Lecture 2 - Membrane Processes and Classifications, Advantages, Disadvantages, Applications

Lecture 3 - Polymer Basics, Polymers used in Membrane Preparation and their Properties

Lecture 4 - Inorganic Materials for Membrane Preparation, their Advantages and Disadvantages

Lecture 5 - Membrane Modules and Selection, Flow Types

Lecture 6 - Preparation of Synthetic Membrane, Phase Inversion Membranes

Lecture 7 - Composite membranes: Interfacial polymerization, dip-coating, plasma polymerization

Lecture 8 - Inorganic membranes: Sol-Gel process, ceramic membrane preparation, membrane modification

Lecture 9 - Porous and non-porous membranes, characterization of porous membranes and MF membrane

Lecture 10 - MF membrane characterization: Bubble point,Mercury intrusion, Permeability method

Lecture 11 - UF membrane characterization: Gas adsorption-desorption, Thermoporometry, MWCO method

Lecture 12 - Passive transport, active transport, description of transport process

Lecture 13 - Transport through porous membrane and nonporus membrane

Lecture 14 - Concept of osmosis and reverse osmosis, thermodynamic analysis

Lecture 15 - Revision of concepts and fundaments

Lecture 16 - HP and LP RO, membrane materials, modules, models for RO transport

Lecture 17 - Advantages of RO, fouling, RO applications, Pressure retarded osmosis

Lecture 18 - Nanofiltration basics, transport mechanism, fouling model and applications

Lecture 19 - Basic principles of UF, membranes and modules, UF configurations

Lecture 20 - Models for UF transport, mass transfer coefficient, membrane rejection and sieving coefficient

Lecture 21 - Factors affecting UF performance, fouling and permeate flux enhancement, UF applications1

Lecture 22 - Micellar-enhanced UF, affinity UF, UF based bioseparation

Lecture 23 - Basic principles, advantages of MF, cross-flow and dead-end MF, membranes and modules

Lecture 24 - Models for MF transport, plugging and throughput, fouling in MF, MF applications

Lecture 25 - Problems and solutions based on RO and MF

Lecture 26 - Problems and solutions based on UF

Lecture 27 - Dialysis, membranes and modules, mass transport in dialysis, diffusion analysis, applications

Lecture 28 - Ion-exchange membranes, ED process, energy requirement, applications, reverse ED

Lecture 29 - PV principle, advantages, mass transfer and applications, hybrid distillation/PV

Lecture 30 - Problems and solutions based on ED and PV

Lecture 31 - Concept, types of LM, mechanism of mass transfer in LM, choice of solvent and carrier, applications

Lecture 32 - Basic principle of gas separation, transport mechanism, factors affecting gas separation, applications

Lecture 33 - Basic principle of MD, mechanism, process parameters, membranes, applications

Lecture 34 - Mechanism, coupled transport, carrier agent, active and passive transport, applications

Lecture 35 - Gas-liquid and liquid-liquid contactors, membrane reactors and bioreactors, PEM hydrogen fuel cell

Lecture 36 - Perstraction, membrane chromatography and controlled drug delivery

NPTEL : NOC:Computer Aided Applied Single Objective Optimization (Chemical Engineering)

Co-ordinators : Prof. Prakash Kotecha

Lecture 1 - Introduction to Optimization

Lecture 2 - Linear Regression

Lecture 3 - Multiple, Polynomial and General Linear Least Square Regression

Lecture 4 - Nonlinear Regression

Lecture 5 - Regression : MATLAB Implementation

Lecture 6 - Teaching Learning Based Optimization

Lecture 7 - Implementation of TLBO in MATLAB

Lecture 8 - Supplementary: Preliminary Statistical analysis for metaheuristic techniques

Lecture 9 - Supplementary: Preliminary Statistical analysis - MATLAB implementation

Lecture 10 - Particle Swarm Optimization

Lecture 11 - Implementation of Particle Swarm Optimization using MATLAB

Lecture 12 - Differential Evolution

Lecture 13 - Implementation of Differential Evolution using MATLAB

Lecture 14 - Binary Coded Genetic Algorithm

Lecture 15 - Real Coded Genetic Algorithm

Lecture 16 - Implementation of Real Coded Genetic Algorithm using MATLAB

Lecture 17 - Artificial Bee Colony Algorithm

Lecture 18 - Working of Artificial Bee Colony Algorithm

Lecture 19 - Implementation of Artificial Bee Colony using MATLAB

Lecture 20 - Comparison of Variation Operators and Survival Strategies

Lecture 21 - Black-Box Optimization Problems

Lecture 22 - Constraint-Handling in Metaheuristic Techniques

Lecture 23 - Case Study: Production planning

Lecture 24 - Case Study: Production planning MATLAB Implementation

Lecture 25 - Parallelization and Vectorization of Fitness Function

Lecture 26 - Constraint-Handling using Correction Approach

Lecture 27 - MATLAB inbuilt functions: Linear and Mixed Integer Linear Programming

Lecture 28 - MATLAB inbuilt functions: Nonlinear and Mixed Integer Nonlinear Programming

Lecture 29 - MATLAB Optimization Tool: Options, Output Function, Vectorization, Parallelization

Lecture 30 - MATLAB inbuilt functions: Multi-objective Optimization

Lecture 31 - Simplex Method for LP

Lecture 32 - Branch and Bound Method for MILP

Lecture 33 - MILP formulation of Production Planning Problem

Lecture 34 - Generalized Algebraic Modelling System

Lecture 35 - Solution of Production Planning Problem using GAMS and NEOS, MIRO

Lecture 36 - IBM ILOG CPLEX Optimization Studio

Lecture 37 - Constraint Programming Applications in IBM ILOG CPLEX Optimization Studio

NPTEL : NOC:Basic Principles and Calculations in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Subrata Kumar Majumdar

Lecture 1 - Definition, History, Role of Chemical Engineer

Lecture 2 - Basic Features of Chemical Process

Lecture 3 - Unit systems and dimensions

Lecture 4 - Variables and Properties of Material in System

Lecture 5 - Pressure and Temperature of Flow Process

Lecture 6 - Rate of Process

Lecture 7 - Principles of material balance and calculation

Lecture 8 - Material Balances on Processes with Recycle and Bypass

Lecture 9 - Material balances on reactive processes

Lecture 10 - Material balances on combustion reactions

Lecture 11 - State Equation of Ideal Gas and Calculation

Lecture 12 - State Equation of non-Ideal Gas and Calculation

Lecture 13 - Phase equilibrium

Lecture 14 - Equilibrium Laws, Humidity and Saturation

Lecture 15 - Humidity, Saturation Psychrometric chart

Lecture 16 - Process of phase change: Condensation and vaporization

Lecture 17 - Principles of Energy

Lecture 18 - Laws and properties of thermodynamics

Lecture 19 - Standard Heat of Formation

Lecture 20 - The mechanical energy balance

Lecture 21 - Enthalpy balances without reaction

Lecture 22 - Energy balance with multiplle streams without reaction

Lecture 23 - Energy balance on heat of solution

Lecture 24 - Energy balance with heat of reaction

Lecture 25 - Energy balance with heat of reaction (Continued...)

Lecture 26 - Energy balance with heat of combustion

Lecture 27 - Material balance of transient process

Lecture 28 - Unsteady state energy balance

Lecture 29 - Least Square Method Linear equation fitting

Lecture 30 - Non-linear algebraic equation system

Lecture 31 - Numerical Integration

Lecture 32 - Process Degrees of Freedom

Lecture 33 - Process Flowsheeting and codes

Lecture 34 - Case Study: Cumene Production

Lecture 35 - Case Study: Cumene Production (Continued...)

NPTEL : NOC:Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems (Chemical Engineering)

Co-ordinators : Prof. R. Anandalakshmi, Prof. Vaibhav Vasant Goud

Lecture 1 - Solar Energy: An overview of thermal applications

Lecture 2 - Solar radiation

Lecture 3 - Practice problems - Part I

Lecture 4 - Practice problems - Part II

Lecture 5 - Non-concentrating solar collectors - Part I

Lecture 6 - Non-concentrating solar collectors - Part II

Lecture 7 - Non-concentrating solar collectors - Part III

Lecture 8 - Practice problems - Part I

Lecture 9 - Practice problems - Part II

Lecture 10 - Practice problems - Part III

Lecture 11 - Parabolic solar collectors

Lecture 12 - Practice problems

Lecture 13 - Thermal energy storage systems - Part I

Lecture 14 - Thermal energy storage systems - Part II

Lecture 15 - Solar energy utilization methods

Lecture 16 - Classification of energy resources

Lecture 17 - Broad classification and compositional analysis

Lecture 18 - Characteristics and properties of biomass

Lecture 19 - Properties and structural components of biomass

Lecture 20 - Biomass residues and energy conversion routes

Lecture 21 - Utilisation of biomass through bio-chemical and thermo-chemical routes

Lecture 22 - Conversion mechanism of biomass to biogas and its properties

Lecture 23 - Classification of biogas plants

Lecture 24 - Practice problems - I

Lecture 25 - Practice problems - II

Lecture 26 - Practice problems - III

Lecture 27 - Bioconversion of substrates into alcohol

Lecture 28 - Thermo-chemical conversion, torrefaction and combustion processes

Lecture 29 - Thermo-chemical conversion of biomass to solid, liquid and gaseous fuels

Lecture 30 - Gasification process

Lecture 31 - Thermo-chemical conversion processes: pyrolysis, liquefaction and conversion processes

Lecture 32 - Practice problems - I

Lecture 33 - Practice problems - II

Lecture 34 - Turbine terms, types and theories - Part I

Lecture 35 - Turbine terms, types and theories - Part II

Lecture 36 - Characteristics and Power Generation from Wind Energy - Part I

Lecture 37 - Characteristics and Power Generation from Wind Energy - Part II

Lecture 38 - Practice problems

NPTEL : NOC:Biomass Conversion and Biorefinery (Chemical Engineering)

Co-ordinators : Prof. Kaustubha Mohanty

Lecture 1 - Energy and Environment scenario

Lecture 2 - Need for biomass based industries

Lecture 3 - Biomass basics

Lecture 4 - Dedicated energy crops

Lecture 5 - Oil cropns and microalgae

Lecture 6 - Enhancing biomass properties

Lecture 7 - Basic concepts and types

Lecture 8 - Feedstocks and properties

Lecture 9 - Economics and LCA

Lecture 10 - Barriers and Types

Lecture 11 - Dilute acid, alkali, ozone

Lecture 12 - Hybrid methods

Lecture 13 - Physical Processes

Lecture 14 - Gasification and Pyrolysis

Lecture 15 - Products and Commercial Success Stories

Lecture 16 - Types, fundamentals, equipments, applications

Lecture 17 - Details of various processes

Lecture 18 - Products and Commercial Success Stories

Lecture 19 - Diesel from vegetable oils, microalgae and syngas

Lecture 20 - Transesterification; FT process, catalysts

Lecture 21 - Biodiesel purification, fuel properties

Lecture 22 - Biooil and biochar production, reactors

Lecture 23 - Factors affecting biooil, biochar production, fuel properties characterization

Lecture 24 - Biooil upgradation technologies

Lecture 25 - Microorganisms, current industrial ethanol production technology

Lecture 26 - Cellulase production, SSF and CBP

Lecture 27 - ABE fermentation pathway and kinetics, product recovery technologies

Lecture 28 - Biohydrogen production, metabolics, microorganisms

Lecture 29 - Biogas technology, fermenter designs, biogas purification

Lecture 30 - Methanol production and utilization

Lecture 31 - Biomass as feedstock for synthetic organic chemicals, lactic acid, polylactic acid

Lecture 32 - Succinic acid, propionic acid, acetic acid, butyric acid

Lecture 33 - 1,3-propanediol, 2,3-butanedioil, PHA

Lecture 34 - Concept, lignocellulosic biorefinery

Lecture 35 - Aquaculture and algal biorefinery, waste biorefinery

Lecture 36 - Techno-economic evaluation

Lecture 37 - Life-cycle assessment

NPTEL : NOC:Aspen PlusÂ® Simulation Software - A basic course for beginners (Chemical Engineering)

Co-ordinators : Prof. Prabirkumar Saha

Lecture 1 - Significance of software with example - Simulation on pen and paper vs simulation on Aspen Plus

Lecture 2 - Understanding Resources and My Exchange, Start using Aspen Plus

Lecture 3 - Overview of setting up of property environment

Lecture 4 - Using Model Pallete - Mixers/Splitters, Separators

Lecture 5 - Using Model Pallete - Exchangers

Lecture 6 - Using Model Pallete - Columns

Lecture 7 - Using Model Palette - Reactors

Lecture 8 - Using Model Palette - Pressure Changers

Lecture 9 - Example: Hydrocarbon Treatment - Part 1

Lecture 10 - Example: Hydrocarbon Treatment - Part 2

Lecture 11 - Setup, Components

Lecture 12 - Property Methods

Lecture 13 - Property Methods and Propeety Sets with example

Lecture 14 - Analysis tools (Pure Components and Binary mixtures)

Lecture 15 - Analysis tools (Ternary mixtures), Data and Regression (Part 1)

Lecture 16 - Data and Regression (Part 2), Property Estimation

Lecture 17 - Practice problems on pure components

Lecture 18 - Practice problems on binary mixtures

Lecture 19 - Miscellaneous practice problems and case studies

Lecture 20 - Model Analysis Tools

Lecture 21 - Separation of Hydrocarbon Mixture

Lecture 22 - Synthesis of Acetaldehyde from Ethanol

Lecture 23 - BTX Separation through Distillation

Lecture 24 - Synthesis of Methanol from Syngas

Lecture 25 - Synthesis of Dimethyl Ether from Carbon Dioxide and Hydrogen

Lecture 26 - Synthesis of Ammonia in Cryogenic Process

Lecture 27 - Production of Cumene

Lecture 28 - Design, Rating and Simulation of Heat Exchanger

Lecture 29 - Absorption and Distillation - Part 1

Lecture 30 - Absorption and Distillation - Part 2

Lecture 31 - Hydrodealkylation of Toluene

Lecture 32 - Isobutene Production Plant

Lecture 33 - Nitric Oxide Production Plant

Lecture 34 - Plant Economy and Utilities

Lecture 35 - Plant Dynamics and Control

NPTEL : NOC:Physical and Electrochemical Characterizations in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

Lecture 1 - Introduction of Characterization Techniques - Part 1

Lecture 2 - Introduction to Characterization Techniques - Part 2

Lecture 3 - Infrared Spectroscopy: Fundamentals

Lecture 4 - Infrared Spectroscopy: IR Bands and Applications

Lecture 5 - Infrared Spectrophotometer Instrumentation

Lecture 6 - Raman Spectroscopy

Lecture 7 - NMR: Concepts and Fundamentalsâ€‹

Lecture 8 - Chemical Shifts

Lecture 9 - Factors Affecting Chemical Shift and 2D NMRâ€‹

Lecture 10 - Physisorption: Surface Area and Pore Analysis

Lecture 11 - Physisorption Measurements

Lecture 12 - Chemisorption

Lecture 13 - Surface Tension and its Measurement - Part 1

Lecture 14 - Surface Tension and its Measurement - Part 2

Lecture 15 - Interfacial Tension and its Application

Lecture 16 - Interfacial Tension and Influence of Surface Curvatureâ€‹

Lecture 17 - Rheology: Fundamentals and Principlesâ€‹

Lecture 18 - Complex Fluids and their Propertiesâ€‹

Lecture 19 - Rheology: Case Study on Hydrogel Synthesis

Lecture 20 - Electron Spectroscopy for Surface Analysisâ€‹

Lecture 21 - Quantification in XRF and XPS Spectroscopyâ€‹

Lecture 22 - XPS Instrument and Applicationâ€‹

Lecture 23 - Introduction to Electrochemical Characterization Techniquesâ€‹

Lecture 24 - Electrode Potential, Kinetics and Mass Transfer Resistanceâ€‹

Lecture 25 - Voltammetry and Galvanostatic Charge-Dischargeâ€‹

NPTEL : NOC:Chemical Process Technology (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

Lecture 1 - Important Steps for Process Development

Lecture 2 - Structure of Chemical Industry

Lecture 3 - Safety and Loss Prevention

Lecture 4 - Sulfuric Acid: Reactions and Thermodynamics

Lecture 5 - SO2 Conversion Reactor and Sulfuric Acid Production Process

Lecture 6 - Sulfur Production: Claus Process

Lecture 7 - Synthesis Gas Production

Lecture 8 - Coal Gasification

Lecture 9 - Coal Gasifiers

Lecture 10 - Gasification Technology and Applications

Lecture 11 - Thermodynamics of Ammonia Synthesis

Lecture 12 - Integrated Ammonia Plant and Hydrogen Recovery - I

Lecture 13 - Integrated Ammonia Plant and Hydrogen Recovery - II

Lecture 14 - Urea Production

Lecture 15 - Nitric acid: Reactions and Thermodynamics

Lecture 16 - Production of Phosphoric Acid: Dihydrate Process

Lecture 17 - Production of Phosphoric Acid: Hemihydrate Process

Lecture 18 - Emission Abatement in Phosphoric Acid Plants

Lecture 19 - Chlorine Production

Lecture 20 - Soda Ash Process

Lecture 21 - Heterogeneous Catalysis

Lecture 22 - Catalysis with Zeolites and production of Iso-butene

Lecture 23 - Production of Ethylbenzene

Lecture 24 - Periodic Flow Reversal and Production of Styrene

Lecture 25 - Selective Oxidation Processes and Ethene Production

Lecture 26 - Monolith Reactors for Automotive Emission

Lecture 27 - Methanol Production

Lecture 28 - Methanol and Formaldehyde Production

Lecture 29 - Fischer-Tropsch Synthesis

Lecture 30 - Fischer Tropsch Process: SASOL and SDMS

Lecture 31 - Methanol to Gasoline: Haldor Topsoe and TIGAS

Lecture 32 - Fuel Additives

Lecture 33 - Homogenous Catalysis

Lecture 34 - Methanol Carbonylation for Acetic Acid Production

Lecture 35 - Hydroformylation Reactions

Lecture 36 - Hydroformylation of Propene and Higher Alkenes

Lecture 37 - Ethene Oligomerization

Lecture 38 - Dimethyl Terephthalate and Terephthalic Acid Production

Lecture 39 - Bio-refinery products and Process Design

Lecture 40 - Optimal Synthesis of Sustainable Bio-refineries

Lecture 41 - Bio-based Fuels

Lecture 42 - Bio-based Chemicals

Lecture 43 - Bio-refinery Feedstock: Food Waste as a Renewable Raw Material

NPTEL : NOC:Inorganic Chemical Technology (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

Lecture 1 - Introduction and Unit Processes

Lecture 2 - Introduction of Unit Operations

Lecture 3 - Unit Operations and Other General Principles

Lecture 4 - General Principles and Chemical Plant Design

Lecture 5 - Fuel Gases

Lecture 6 - Natural Gas, LPG and Syngas

Lecture 7 - Synthesis gas

Lecture 8 - Industrial Gases

Lecture 9 - Industrial Gases - Carbon Dioxide

Lecture 10 - Industrial Gases - Hydrogen

Lecture 11 - Sulfur Industry

Lecture 12 - Sulfur and sulfuric acid

Lecture 13 - Sulfuric Acid

Lecture 14 - Nitrogen Industries - Ammonia

Lecture 15 - Nitrogen Industries - Nitric Acid

Lecture 16 - Nitrogen Industries - Urea

Lecture 17 - Nitrogen Industries - Ammonium Nitrate

Lecture 18 - Phosphorus Industries - Phosphorus and Phosphoric Acid Production

Lecture 19 - Phosphorus Industries - Phosphoric Acid Production by Wet Processes

Lecture 20 - Phosphorus Industries - Phosphates

Lecture 21 - Potassium Industries - 1

Lecture 22 - Potassium Industries - 2

Lecture 23 - Chlor-Alkali Industry - Soda Ash

Lecture 24 - Chlor-Alkali Industry - Chlorine and Caustic Soda

Lecture 25 - Cement and Lime Industry - Cement

Lecture 26 - Cement and Lime Industry - Lime

Lecture 27 - Glass Industries

Lecture 28 - Surface Coating Industry

Lecture 29 - Paints and Pigments

Lecture 30 - Varnishes, Lacquers and Industrial Coatings

Lecture 31 - Raw Materials and Basic Ceramic Chemistry

Lecture 32 - Whitewares and Structural Clay Products

Lecture 33 - Refractories, Specialized Ceramic Products and Vitreous Enamel

Lecture 34 - Metallurgical Industries - I

Lecture 35 - Metallurgical Industries - II

NPTEL : NOC:Organic Chemical Technology (Chemical Engineering)

Co-ordinators : Prof. Nanda Kishore

Lecture 1 - Introduction to Organic Chemical Technology

Lecture 2 - Basic Unit Processes and Unit Operations of OCT

Lecture 3 - Introduction to Chemical Plant Design

Lecture 4 - Edible and Essential Oils

Lecture 5 - Vegetable Oils and Processing

Lecture 6 - Processing of Oils and Waxes

Lecture 7 - Soaps and Glycerine Manufacture

Lecture 8 - Detergents Manufacture

Lecture 9 - Carbohydrates Industry - Sugar

Lecture 10 - Carbohydrates Industry - Refined Sugar

Lecture 11 - Carbohydrates Industry - Beet Sugar and Starch

Lecture 12 - Fermentation Industry

Lecture 13 - Fermentation Industry â€“ Ethanol

Lecture 14 - Fermentation Industry â€“ Citric Acid and Penicillin

Lecture 15 - Pulp and Paper Industry

Lecture 16 - Pulp and Paper Industry - 2

Lecture 17 - Pulp and Paper Industry - 3

Lecture 18 - Petroleum Industry

Lecture 19 - Petroleum Refinery Products, Characteristics and Processes

Lecture 20 - Petroleum Refinery Processes

Lecture 21 - Petroleum Refinery Processes - 2

Lecture 22 - Chemicals from C1 Compounds: Methanol and Formaldehyde

Lecture 23 - Chemicals from C1 and C2 Compounds

Lecture 24 - Chemicals from C2 Compounds

Lecture 25 - Chemicals from C2 Compounds - 2

Lecture 26 - Chemicals from C3 Compounds

Lecture 27 - Chemicals from C3 Compounds - 2

Lecture 28 - Chemicals from C4 Compounds

Lecture 29 - Chemicals from Aromatic Compounds

Lecture 30 - Chemicals from Aromatic Compounds - Phenol

Lecture 31 - Chemicals from Aromatic Compounds - 3

Lecture 32 - Polymer Industry

Lecture 33 - Polymer Industry - 2

Lecture 34 - Rubber Industry

Lecture 35 - Rubber Industry - 2

NPTEL : NOC:Solid-Fluid Operations (Chemical Engineering)

Co-ordinators : Prof. Subrata Kumar Majumder

Lecture 1 - Introduction to Solid-Fluid Operations

Lecture 2 - Characteristics of Single particle

Lecture 3 - Particle size and Its distribution in mixture

Lecture 4 - Mechanism of Size Reduction

Lecture 5 - General Machines for Size Reduction

Lecture 6 - Laws of Energy for Size Reduction

Lecture 7 - Introduction on Size Enlargement

Lecture 8 - Mechanism of Size Enlargement

Lecture 9 - Equipment for Size Enlargement

Lecture 10 - Flow Past a Cylinder and Spherical Particle

Lecture 11 - Terminal velocity of single particle

Lecture 12 - Multiple particle Interaction/Sedimentation: Hindered settling velocity

Lecture 13 - Basic law and terminology of flow through granular bed

Lecture 14 - General expressions for flow through packed beds-Ergun Equation

Lecture 15 - Two-phase flow through packed bed

Lecture 16 - Mixing of Solids: Introduction

Lecture 17 - Degree of mixing and Its Assessment

Lecture 18 - Mixing and agitation of fluids/slurries

Lecture 19 - Basic understandings and applications of fluidization

Lecture 20 - Minimum Fluidization Velocity

Lecture 21 - Basic understanding of froth flotation

Lecture 22 - Separation of particles by Screening

Lecture 23 - Particulate Matter Separation by Gravity Settling Chamber

Lecture 24 - Particle Separation by Cyclone and Centrifuge

Lecture 25 - Particle Separation by Electrostatic Precipitator

Lecture 26 - Separation by Industrial Fabric (Bag) Filters

Lecture 27 - Wet Scrubber for Particle Removal

Lecture 28 - Filtration

Lecture 29 - Dead-End and Continuous Filtration

Lecture 30 - Reverse Osmosis

Lecture 31 - Introduction to Nanoparticles

Lecture 32 - Synthesis of Nanoparticles - Physical Method

Lecture 33 - Synthesis of Nanoparticles (Chemical Methods)

Lecture 34 - Adsorption: Principle and Applications

Lecture 35 - Analysis of Adsorption by Isotherms

Lecture 36 - Adsorption Kinetics

NPTEL : NOC:Energy Conversion Technologies (Biomass and Coal) (Chemical Engineering)

Co-ordinators : Prof. Vaibhav V. Goud

Lecture 1 - Sources of energy

Lecture 2 - Sources of energy

Lecture 3 - Energy scenario

Lecture 4 - Environmental aspects of energy

Lecture 5 - Environmental aspects of energy

Lecture 6 - Environmental aspects of energy

Lecture 7 - Environmental aspects of energy

Lecture 8 - Solid fuels - Part I

Lecture 9 - Solid fuels - Part II

Lecture 10 - Liquid fuels - Part I

Lecture 11 - Liquid fuels - Part II

Lecture 12 - Practice problems - Part I

Lecture 13 - Practice problems - Part II

Lecture 14 - Energy from Bio-based Feedstock

Lecture 15 - Thermal/Thermochemcial processes

Lecture 16 - Practice problems (Pelletization)

Lecture 17 - Practice problems (Torrefaction Mass and Energy Yield)

Lecture 18 - Pyrolysis and Hydrothermal Liquefaction

Lecture 19 - Gasification

Lecture 20 - Practice examples (Pyrolysis, Gasification)

Lecture 21 - Biochemical conversion processes - Anaerobic Digestion in Landfills

Lecture 22 - Bioethanol Production

Lecture 23 - Practice examples (Biogas and Bio-ethanol production)

Lecture 24 - Chemical Conversion Processes - Types of Feedstock and Pretreatment

Lecture 25 - Mechanism of trans-esterification and biodiesel production

Lecture 26 - Green diesel synthesis from bio-based feedstocks

Lecture 27 - Energy from Coal (Carbonization, Gasification and Liquefaction)

Lecture 28 - Practice Example (Combustion of Biomass and Coal)

Lecture 29 - Combustion Process (Biomass and Coal)

Lecture 30 - Concept of integration of energy system

NPTEL : NOC:Petroleum Reservoir Engineering (Chemical Engineering)

Co-ordinators : Dr. Pankaj Tiwari

Lecture 1 - Introduction to Petroleum Reservoir Engineering

Lecture 2 - Petroleum Reserves

Lecture 3 - Petroleum Geology

Lecture 4 - Well Drilling Methods

Lecture 5 - Thermodynamics of Hydrocarbons

Lecture 6 - Natural Gas Properties

Lecture 7 - Properties of Crude Oil

Lecture 8 - Reservoir Rock Properties

Lecture 9 - Relative Permeability

Lecture 10 - Primary Drive Mechanisms

Lecture 11 - General Material (Volumetric) Balance

Lecture 12 - Volumetric Balance in Oil and Gas Reservoir

Lecture 13 - Fundamentals of Reservoir Fluid Flow

Lecture 14 - General Equations for radial Flow in Reservoir

Lecture 15 - Inflow Performance Relationship for Reservoir Fluids

Lecture 16 - Well Testing and Performance - I

Lecture 17 - Well Testing and Performance - II

Lecture 18 - Secondary Oil Recovery Methods

Lecture 19 - Enhanced Oil Recovery Methods

Lecture 20 - Introduction to Reservoir Simulation

Lecture 21 - Unconventional Natural Gas Production

NPTEL : NOC:Applied Statistical Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Tamal Banerjee

Lecture 1 - Introduction to Statistical Thermodynamics

Lecture 2 - Postulates and Boltzmann Distribution

Lecture 3 - Properties of Canonical Partition Function

Lecture 4 - Canonical Partition Function and Thermodynamic Properties

Lecture 5 - Thermodynamic Properties of Ideal Monoatomic Gases

Lecture 6 - Monoatomic Gases and Gibbs Entropy Equation

Lecture 7 - Energy Fluctuations for Monoatomic Gases

Lecture 8 - Partition Function for Diatomic Gases

Lecture 9 - Vibrational Partition Function

Lecture 10 - Partition Function for Ideal Polyatomic Gas

Lecture 11 - Normal Mode Analysis

Lecture 12 - Illustrations

Lecture 13 - Non-reacting Ideal Gas Mixture

Lecture 14 - Chemically Reacting Gas Mixture

Lecture 15 - Degree of Ionization of Gas Molecules

Lecture 16 - Problems on Ionization of Gas Molecules

Lecture 17 - Microcanonical and Grand Canonical Ensemble

Lecture 18 - Isobaric Isothermal Ensemble

Lecture 19 - Fluctuations in Grand canonical and Isothermal Isobaric Ensembles

Lecture 20 - Semi Grand Canonical Ensemble and Comparison of Ensembles

Lecture 21 - Problems and Adsorbtion Isotherms

Lecture 22 - Virial Equation of State for Polyatomic Molecules

Lecture 23 - Virial Equation of State

Lecture 24 - Virial Equation of State with Higher Order Terms

Lecture 25 - Thermodynamic Properties from Virial Equation of State

Lecture 26 - Interaction Potentials for Spherical Molecules

Lecture 27 - Inferences from Intermolecular Potentials

Lecture 28 - Engineering Application of Virial Equation of State

Lecture 29 - Einstein Model

Lecture 30 - Einstein Model (Continued...)

Lecture 31 - Debye Model

Lecture 32 - Sublimation Pressure and Enthalpy of Crystals

Lecture 33 - Flory Huggin's Model

Lecture 34 - Ising Model

Lecture 35 - Radial Distribution Function

Lecture 36 - Radial Distribution Function

Lecture 37 - Molecular Dynamics Simulations

Lecture 38 - Square well Potential and Barker Henderson Pertubation Theory

NPTEL : Fluid Mechanics (Chemical Engineering)

Co-ordinators : Dr. V. Shankar

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Mass Transfer II (Chemical Engineering)

Co-ordinators : Prof. Nishith Verma

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Plantwide Control of Chemical Processes (Chemical Engineering)

Co-ordinators : Dr. Nitin Kaistha

Lecture 1 - Introduction to the course

Lecture 2 - Process Dynamics and Negative Feedback

Lecture 3 - PID control

Lecture 4 - Common Industrial Control Loops and advanced loops

Lecture 5 - Advanced loops (Continued...) and multivariable systems

Lecture 6 - Systematic Tuning Using Frequency Domain Analysis

Lecture 7 - Frequency Domain Analysis

Lecture 8 - Multivariable Systems

Lecture 9 - RGA and dynamic decoupling

Lecture 10 - Model based control

Lecture 11 - Dynamic Matrix Control

Lecture 12 - Control of Distillation Columns

Lecture 13 - Temperature inferential distillation control

Lecture 14 - Considerations in temperature inferential control

Lecture 15 - Control of Complex Column Configurations

Lecture 16 - Control of Heat Integrated Columns

Lecture 17 - Homogenous extractive distillation

Lecture 18 - More on complex columns and reactive distillation

Lecture 19 - Control of reactors

Lecture 20 - PFR controls (Continued..) & CSTRs

Lecture 21 - CSTR heat management

Lecture 22 - Heat Exchangers and Miscellaneous Systems

Lecture 23 - Degrees of freedom analysis

Lecture 24 - Degrees of freedom (Continued...)

Lecture 25 - Illustration of considerations in control structure synthesis

Lecture 26 - Two column recycle process

Lecture 27 - Throughput manipulator selection

Lecture 28 - Plantwide control structure design

Lecture 29 - Systematizing plantwide control design

Lecture 30 - The Luyben design procedure

Lecture 31 - Role of equipment capacity constraints

Lecture 32 - Recycle process case study

Lecture 33 - Recycle process case study (Continued...)

Lecture 34 - C4 isomerization process case study

Lecture 35 - C4 isomerization process case study (Continued...)

Lecture 36 - C4 isomerization process case study

Lecture 37 - Systematic economic plantwide control design procedure

Lecture 38 - Ethyl benzene process case study

Lecture 39 - C4 isomerization process revisited

Lecture 40 - Contrasting conventional and top-down approach

Lecture 41 - Cumene process plantwide control

NPTEL : NOC:Thermodynamics Of Fluid Phase Equilibria (Chemical Engineering)

Co-ordinators : Dr. Jayant K. Singh

Lecture 1 - Review - 1

Lecture 2 - Review - Temperature and Pressure

Lecture 3 - Review - Energy Conservation

Lecture 4 - Properties - Part 1

Lecture 5 - Properties - Part 2

Lecture 6 - Mass-energy analysis of open system

Lecture 7 - Energy analysis of closed system

Lecture 8 - The Second Law of Thermodynamics

Lecture 9 - Entropy

Lecture 10 - Thermodynamic Calculus - 1

Lecture 11 - Thermodynamic Calculus - 2

Lecture 12 - Thermodynamic Calculus - 3

Lecture 13 - Thermodynamic Calculus - 4

Lecture 14 - Legendre Transformation and Free-energy

Lecture 15 - Criteria for phase equilibria

Lecture 16 - Maxwell Relation

Lecture 17 - Stability Criteria

Lecture 18 - Thermodynamics of phase equilibrium

Lecture 19 - Chemical potential and fugacity

Lecture 20 - General discussion on fugacity

Lecture 21 - Ideal Gas Mixture - Part 1

Lecture 22 - Ideal Gas Mixture - Part 2

Lecture 23 - Partial Molar Properties

Lecture 24 - Partial Molar Properties from experimental data

Lecture 25 - Thermodynamics properties from volumetric data - 1

Lecture 26 - Thermodynamics properties from volumetric data - 2

Lecture 27 - Fugacity of pure liquids and solids

Lecture 28 - Thermodynamics properties from volumetric data: effect of V and T

Lecture 29 - Approaches to phase equilibria calculation

Lecture 30 - Traditional Approaches to phase equilibria calculations

Lecture 31 - Algorithms for vapor-liquid equilibria

Lecture 32 - Probability and Multiplicity

Lecture 33 - Multiplicity and maximising the multiplicity

Lecture 34 - Introduction to statistical mechanics

Lecture 35 - Partition function for independent particles

Lecture 36

Lecture 37 - Models of Molecular Pair Potentials

Lecture 38 - Molecular Theory of Corresponding States

Lecture 39 - Molecular Interactions in Dense Fluid Media

Lecture 40 - Models for Electrolyte Systems

Lecture 41 - Membrane Osmometry

Lecture 42 - Fugacity of liquid mixture - 1

Lecture 43 - Fugacity of liquid mixture - 2

Lecture 44 - Models for fugacity of liquid mixtures - 1

Lecture 45 - Models for fugacity of liquid mixtures - 2

Lecture 46 - Examples of Fugacity of liquids

Lecture 47 - Stability of the Fluid Phases

Lecture 48 - Theories of Solution - I

Lecture 49 - Theories of Solution - II

Lecture 50 - Polymer Solutions

Lecture 51 - Example Problems on Polymer Solutions

NPTEL : NOC:Chemical Engineering Thermodynamics (2019) (Chemical Engineering)

Co-ordinators : Dr. Jayant K. Singh

Lecture 1 - Introduction

Lecture 2 - Measurability and controllability of energy

Lecture 3 - Postulates of thermodynamics - I

Lecture 4 - Postulates of thermodynamics - II

Lecture 5 - Definition of intensive variables and driving forces for temperature and pressure flow

Lecture 6 - Driving force for the matter flow

Lecture 7 - Basic properties, phase diagram, and thermodynamic table

Lecture 8 - Work, and heat

Lecture 9 - First law of thermodynamics for closed system: Ideal gas behavior

Lecture 10 - First law of thermodynamics: Example 1

Lecture 11 - First law of thermodynamics for open system

Lecture 12 - First law of thermodynamics: Example 2

Lecture 13 - The second law of the thermodynamics: Review

Lecture 14 - Carnot cycle and thermodynamic temperature

Lecture 15 - The concept of entropy

Lecture 16 - Maximum work and entropy of ideal gas

Lecture 17 - Power cycles and examples

Lecture 18 - Mathematical properties of fundamental equations

Lecture 19 - Generalized thermodynamic potential - I

Lecture 20 - Generalized thermodynamic potential - II

Lecture 21 - Multivariable Calculus

Lecture 22 - Maxwell's relations and examples

Lecture 23 - Jacobian method and its applications

Lecture 24 - Equilibrium and stability - I

Lecture 25 - Equilibrium and stability - II

Lecture 26 - Stability criteria

Lecture 27 - Intrinsic stability of thermodynamic system

Lecture 28 - Phase transitions

Lecture 29 - Clapeyron Equation and Vapour Pressure Correlations

Lecture 30 - Equation of state

Lecture 31 - Equation of state (Continued...)

Lecture 32 - Repulsive Interaction

Lecture 33 - Fugacity

Lecture 34 - Thermodynamics of mixtures

Lecture 35 - Partial molar properties and examples

Lecture 36 - Examples of partial molar properties for real processes

Lecture 37 - Obtaining the partial molar properties from experimental data

Lecture 38 - Partial molar properties of ideal gas mixtures

Lecture 39 - Chemical potential of ideal gas mixtures

Lecture 40 - Fugacity coefficient in terms of measurable properties

Lecture 41 - Fugacity coefficient for mixtures

Lecture 42 - Fugacity coefficient for ideal mixtures

Lecture 43 - Activity coefficient for mixtures

Lecture 44 - Gibbs - Duhem relations and its impacts on the activity

Lecture 45 - Excess Gibbs free energy model - I

Lecture 46 - Two suffix Margules equation

Lecture 47 - Excess Gibbs free energy model - II

Lecture 48 - Vapor Liquid Equilibria

Lecture 49 - Vapor Liquid Equilibria (examples)

Lecture 50 - Vapor Liquid Equilibria (non-ideal mixtures - I)

Lecture 51 - Vapor Liquid Equilibria (non-ideal mixtures - II)

Lecture 52 - Azeotropes

Lecture 53 - Azeotrope (binary mixture)

Lecture 54 - Liquid-Liquid equilibria - 1

Lecture 55 - liquid-liquid equilibria (Continued...) and solid-liquid equilibria

Lecture 56 - Solid-liquid equilibria (Continued...)

Lecture 57 - Solid-liquid equilibria examples and properties

Lecture 58 - Examples of boiling point elevation

Lecture 59 - Solubility of gases in the liquid

Lecture 60 - Chemical reaction equilibria - I

Lecture 61 - Chemical reaction equilibria - II

Lecture 62 - Chemical reaction equilibria - III

Lecture 63 - Chemical reaction equilibria - IV

NPTEL : Biochemical Engineering (Chemical Engineering)

Co-ordinators : Dr. Saikat Chakraborty, Dr. Rintu Banerjee

Lecture 1 - Fundamentals of Biology & Biotechnology

Lecture 2 - Glimpses of Microbial World - Bacteria

Lecture 3 - Virus and Cell Organelles

Lecture 4 - Carbohydrate

Lecture 5 - Nucleic Acid

Lecture 6 - Lipids

Lecture 7 - Proteins

Lecture 8 - Biochemistry & Thermodynamics of Enzymes

Lecture 9 - Enzyme Kinetics : Michealis-Menten Kinetics

Lecture 10 - Regulation of Enzyme Activity : Inhibition

Lecture 11 - Regulation of Enzyme Activity : Inhibition (Continued...)

Lecture 12 - Effects of Substrate and Inhibition, pH and Temperature on Enzyme Activity

Lecture 13 - Immobilized Enzymes

Lecture 14 - Immobilized Enzymes (Continued...)

Lecture 15 - Interphase Mass Transfer and Reaction in Immobilized Enzymes

Lecture 16 - Interphase Mass Transfer and Reaction in Immobilized Enzymes (Continued...)

Lecture 17 - Effectiveness Factor in Immobilized Enzymes

Lecture 18 - Bioenergetics and Glycolysis

Lecture 19 - TCA Cycle

Lecture 20 - Electron Transport Chain & Oxidative Phosphorylation

Lecture 21 - Pentose Phosphate Pathways Glycogenesis & Glycogenolysis

Lecture 22 - Urea Cycle, Gluconeogenesis and Glyoxalate Cycle

Lecture 23 - Microbial Growth : Phases and Models

Lecture 24 - Effect of Mass Transfer on Microbial & Fungal Growth

Lecture 25 - Effect of Multiple Substrates and Inhibition on Microbial Growth

Lecture 26 - Design of Bioreactors

Lecture 27 - Design of Chemostats

Lecture 28 - Stability of Bioreactors

Lecture 29 - Stability of Bioreactors (Continued...)

Lecture 30 - Introduction to Receptor - Ligand Binding

Lecture 31 - Effects of Ligand Depletion and Multiple Receptors on Binding Kinetics

Lecture 32 - Effects of Ligand Depletion and Multiple Receptors on Binding Kinetics (Continued...)

Lecture 33 - Receptors-Mediated Endocytosis

Lecture 34 - Kinetics of Receptor-Mediated Endocytosis

Lecture 35 - General Model for Receptor-Mediated Endocytosis

Lecture 36 - Multiple Interacting Microbial Population: Prey-Predator Models

Lecture 37 - Manufacture of Biochemicals

Lecture 38 - Manufacture of Biochemicals (Continued...) & Strategies for Biomolecules Separation

Lecture 39 - Strategies for Biomolecules Separation (Continued...)

Lecture 40 - Strategies for Biomolecules Separation (Continued...)

NPTEL : Microscale Transport Processes (Chemical Engineering)

Co-ordinators : Dr. Somnath Ganguly, Prof. S. Dasgupta

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Lab on Chip

Lecture 4 - Lab on Chip (Continued...)

Lecture 5 - Microscale manufacturing practices

Lecture 6 - Photolithography

Lecture 7 - Photolithography (Continued...)

Lecture 8 - Deposition

Lecture 9 - Plastic microfluidic devices

Lecture 10 - Mixing

Lecture 11 - Micro Heat Pipes

Lecture 12 - Mixing (Continued...)

Lecture 13 - Mixing (Continued...)

Lecture 14 - Micro Heat Pipes (Continued...)

Lecture 15 - Mixing (Continued...)

Lecture 16 - Dispersion

Lecture 17 - Dispersion (Continued...)

Lecture 18 - Dispersion (Continued...)

Lecture 19 - Electrowetting

Lecture 20 - Electro osmosis

Lecture 21 - Electrowetting (Continued...)

Lecture 22 - Electro osmosis (Continued...)

Lecture 23 - Dielectrophoresis

Lecture 24 - Dielectrophoresis (Continued...)

Lecture 25 - Dielectrophoresis (Continued...)

Lecture 26 - Scaling dimension and issues

Lecture 27 - Slip flow

Lecture 28 - Microstructured reactor

Lecture 29 - Immiscible flow in microchannel

Lecture 30 - Immiscible flow in microchannel (Continued...)

Lecture 31 - Immiscible flow in microchannel (Continued...)

Lecture 32 - Scaling dimension and issues (Continued...)

Lecture 33 - Immiscible flow in microchannel (Continued...)

Lecture 34 - Plastic device making

Lecture 35 - Transport processes and their descriptions

Lecture 36 - Convective fluid dynamics in microchannels

Lecture 37 - Microfluidic networks

Lecture 38 - Electrohydrodynamic atomization

Lecture 39 - Electrohydrodynamic atomization (Continued...)

Lecture 40 - Interfacial phenomena in thin liquid films

NPTEL : Multiphase Flow (Chemical Engineering)

Co-ordinators : Prof. P.K. Das, Prof. Gargi Das

Lecture 1 - Introduction

Lecture 2 - Estimation of Flow Patterns

Lecture 3 - Estimation of Flow Patterns (Continued...)

Lecture 4 - Flow Pattern Maps Fascinating Taylor Bubbles

Lecture 5 - Definitions and Common Terminologies

Lecture 6 - Definitions and Common Terminologies (Continued...)

Lecture 7 - Simple Analytical Models

Lecture 8 - The Homogeneous Flow Theory

Lecture 9 - The Homogeneous Flow Theory (Continued...)

Lecture 10 - Compressible Flow A Recapitulation

Lecture 11 - Compressible Flow A Recapitulation (Continued...)

Lecture 12 - Choked Flow Condition for Homogeneous Flow

Lecture 13 - Drift Flux Model

Lecture 14 - Drift Flux Model (Continued...)

Lecture 15 - Drift Flux Model (Continued...)

Lecture 16 - Drift Flux Model (Continued...)

Lecture 17 - Separated Flow Model

Lecture 18 - Separated Flow Model (Continued...)

Lecture 19 - Separated Flow Model (Continued...)

Lecture 20 - Separated Flow Model - Condition of Choking

Lecture 21 - Separated Flow Model - Condition of Choking (Continued...)

Lecture 22 - Separated Flow Model - Estimation of Frictional Pressure Drop and Void Fraction

Lecture 23 - Separated Flow Model - Estimation of Frictional Pressure Drop and Void Fraction (Continued...)

Lecture 24 - Separated Flow Model - Estimation of Frictional Pressure Drop and Void Fraction (Continued...)

Lecture 25 - Separated Flow Model - Estimation of Frictional Pressure Drop and Void Fraction (Continued...)

Lecture 26 - Analysis of Specific Flow Regimes

Lecture 27 - Analysis of Specific Flow Regimes (Continued...)

Lecture 28 - Analysis of Specific Flow Regimes - Slug Flow (Continued...)

Lecture 29 - Two Phase Flow with Phase Change - An Introduction to Boiling Heat Transfer

Lecture 30 - Bubble Growth

Lecture 31 - Different Types of Nucleation

Lecture 32 - Ibullition from Hot Surfaces

Lecture 33 - Cycle of Bubble Growth and Departure

Lecture 34 - Heat Transfer in Different Regimes of Boiling

Lecture 35 - Heat Transfer in Different Regimes of Boiling (Continued...)

Lecture 36 - Critical Heat Flux, Film Boiling

Lecture 37 - Measurement Techniques for Two Phase flow Parameters

Lecture 38 - Measurement Techniques for Two Phase flow Parameters - Void Fraction Measurement

Lecture 39 - Measurement Techniques for Two Phase flow Parameters - Void Fraction Measurement (Continued...)

Lecture 40 - Measurement Techniques for Two Phase flow Parameters - Estimation of Flow Patterns

NPTEL : Novel Separation Processes (Chemical Engineering)

Co-ordinators : Prof. S. De

Lecture 1 - Fundamentals of Separation Processes

Lecture 2 - Identification of Novel Separation Processes

Lecture 3 - Membrane Separation Processes

Lecture 4 - Membrane Separation Processes (Continued...1)

Lecture 5 - Membrane Separation Processes (Continued...2)

Lecture 6 - Membrane Separation Processes (Continued...3)

Lecture 7 - Membrane Separation Processes (Continued...4)

Lecture 8 - Membrane Separation Processes (Continued...5)

Lecture 9 - Membrane Separation Processes (Continued...6)

Lecture 10 - Membrane Separation Processes (Continued...7)

Lecture 11 - Membrane Separation Processes (Continued...8)

Lecture 12 - Membrane Separation Processes (Continued...9)

Lecture 13 - Membrane Separation Processes (Continued...10)

Lecture 14 - Membrane Separation Processes (Continued...11)

Lecture 15 - Membrane Separation Processes (Continued...12)

Lecture 16 - Membrane Separation Processes (Continued...13)

Lecture 17 - Membrane Separation Processes (Continued...14)

Lecture 18 - Membrane Separation Processes (Continued...15)

Lecture 19 - Membrane Separation Processes (Continued...16)

Lecture 20 - Membrane Separation Processes (Continued...17)

Lecture 21 - Membrane Separation Processes (Continued...18)

Lecture 22 - External Field Induced Membrane Separation Processes

Lecture 23 - External Field Induced Membrane Separation Processes (Continued...1)

Lecture 24 - External Field Induced Membrane Separation Processes (Continued...2)

Lecture 25 - External Field Induced Membrane Separation Processes (Continued...3)

Lecture 26 - External Field Induced Membrane Separation Processes (Continued...4)

Lecture 27 - Gas Separation

Lecture 28 - Gas Separation (Continued...)

Lecture 29 - Surfactant Based Separation Processes

Lecture 30 - Surfactant Based Separation Processes (Continued...)

Lecture 31 - Micellar Enhanced Ultrafiltration

Lecture 32 - Micellar Enhanced Ultrafiltration (Continued...)

Lecture 33 - Liquid Membranes

Lecture 34 - Liquid Membranes (Continued...)

Lecture 35 - Centrifugal Separation Processes

Lecture 36 - Chromatographic Separation Processes

Lecture 37 - Chromatographic Separation Processes (Continued...)

Lecture 38 - Ion Exchange Processes

Lecture 39 - Electrophoretic Separation Methods

Lecture 40 - Electrophoretic Separation Methods (Continued...)

Lecture 41 - Supercritical Fluid Extraction

NPTEL : Process Control and Instrumentation (Chemical Engineering)

Co-ordinators : Dr. D. Sarkar, Dr. A.K. Jana

Lecture 1 - Introduction to Process Control

Lecture 2 - Introduction to Process Control (Continued...)

Lecture 3 - Mathematical Modeling (Continued...1)

Lecture 4 - Mathematical Modeling (Continued...2)

Lecture 5 - Mathematical Modeling (Continued...3)

Lecture 6 - Dynamic Behavior of Chemical Processes

Lecture 7 - Dynamic Behavior of Chemical Processes (Continued...1)

Lecture 8 - Dynamic Behavior of Chemical Processes (Continued...2)

Lecture 9 - Dynamic Behavior of Chemical Processes (Continued...3)

Lecture 10 - Dynamic Behavior of Chemical Processes (Continued...4)

Lecture 11 - Dynamic Behavior of Chemical Processes (Continued...5)

Lecture 12 - Dynamic Behavior of Chemical Processes (Continued...6)

Lecture 13 - Dynamic Behavior of Chemical Processes (Continued...7)

Lecture 14 - Dynamic Behavior of Chemical Processes (Continued...8)

Lecture 15 - Feedback Control Schemes

Lecture 16 - Feedback Control Schemes (Continued...1)

Lecture 17 - Feedback Control Schemes (Continued...2)

Lecture 18 - Feedback Control Schemes (Continued...3)

Lecture 19 - Feedback Control Schemes (Continued...4)

Lecture 20 - Feedback Control Schemes (Continued...5)

Lecture 21 - Feedback Control Schemes (Continued...6)

Lecture 22 - Feedback Control Schemes (Continued...7)

Lecture 23 - Feedback Control Schemes (Continued...8)

Lecture 24 - Feedback Control Schemes (Continued...9)

Lecture 25 - Feedback Control Schemes (Continued...10)

Lecture 26 - Feedback Control Schemes (Continued...11)

Lecture 27 - Feedback Control Schemes (Continued...12)

Lecture 28 - Feedback Control Schemes (Continued...13)

Lecture 29 - Feedback Control Schemes (Continued...14)

Lecture 30 - Advanced Control Schemes

Lecture 31 - Advanced Control Schemes (Continued...1)

Lecture 32 - Advanced Control Schemes (Continued...2)

Lecture 33 - Advanced Control Schemes (Continued...3)

Lecture 34 - Advanced Control Schemes (Continued...4)

Lecture 35 - Instrumentation: General Principles of Measurement Systems

Lecture 36 - Instrumentation: General Principles of Measurement Systems (Continued...1)

Lecture 37 - Instrumentation: General Principles of Measurement Systems (Continued...2)

Lecture 38 - Instrumentation: General Principles of Measurement Systems (Continued...3)

Lecture 39 - Instrumentation: General Principles of Measurement Systems (Continued...4)

Lecture 40 - Instrumentation: General Principles of Measurement Systems (Continued...5)

Lecture 41 - Transducer Elements

Lecture 42 - Pressure Measurement

Lecture 43 - Pressure Measurement (Continued...1)

Lecture 44 - Pressure Measurement (Continued...2)

NPTEL : Instability and Patterning of Thin Polymer Films (Chemical Engineering)

Co-ordinators : Dr. R. Mukherjee

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Some Fundamental Surface Related Concepts - I

Lecture 4 - Surface Tension (in terms of molecular interactions)

Lecture 5 - Effect Surface Tension : Laplace Pressure

Lecture 6 - Young Laplace Equation

Lecture 7 - Rayleish Instability

Lecture 8 - Meso Scale Fabrication Approaches

Lecture 9 - Photo Lithography - I

Lecture 10 - Photo Lithography - II

Lecture 11 - Photo Lithography - III

Lecture 12 - Photo Lithography - IV

Lecture 13 - Photo Lithography - V

Lecture 14 - Nano Imprint Lithography

Lecture 15 - Nano Imprint Lithography (Continued...)

Lecture 16 - Soft Lithography - I

Lecture 17 - Soft Lithography - II

Lecture 18 - Soft Lithography - III

Lecture 19 - Soft Lithography - IV

Lecture 20 - Soft Lithography - V

Lecture 21 - Soft Lithography - VI

Lecture 22 - Atomic Force Microscope - I

Lecture 23 - Atomic Force Microscope - II

Lecture 24 - Atomic Force Microscope - III

Lecture 25 - Atomic Force Microscope - IV

Lecture 26 - Atomic Force Microscope - V

Lecture 27 - Intermolecular Forces between Particles and Surfaces - I

Lecture 28 - Intermolecular Forces between Particles and Surfaces - II

Lecture 29 - Intermolecular Forces between Particles and Surfaces - III

Lecture 30 - Intermolecular Forces between Particles and Surfaces - IV

Lecture 31 - Spontaneous instability and dwetting of thin polymer film - I

Lecture 32 - Spontaneous instability and dwetting of thin polymer film - II

Lecture 33 - Spontaneous instability and dwetting of thin polymer film - III

Lecture 34 - Spontaneous instability and dwetting of thin polymer film - IV

Lecture 35 - Spontaneous instability and dwetting of thin polymer film - V

Lecture 36 - Spontaneous instability and dwetting of thin polymer film - VI

Lecture 37 - Spontaneous instability and dwetting of thin polymer film - VII

Lecture 38 - Template Guided Dewetting

Lecture 39 - Elastic Contact Instability and Lithography

Lecture 40 - Gradient Surfaces

NPTEL : Advanced Mathematical Techniques in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. S. De

Lecture 1 - Introduction to vector space

Lecture 2 - Introduction to vector space (Continued...)

Lecture 3 - Onto, into, one to one function

Lecture 4 - Vectors

Lecture 5 - Vectors (Continued...)

Lecture 6 - Contraction Mapping

Lecture 7 - Contraction Mapping (Continued...)

Lecture 8 - Matrix, Determinant

Lecture 9 - Eigenvalue Problem in Discrete Domain

Lecture 10 - Eigenvalue Problem in Discrete Domain (Continued...)

Lecture 11 - Eigenvalue Problem in Discrete Domain (Continued...)

Lecture 12 - Eigenvalue Problem in Discrete Domain (Continued...)

Lecture 13 - Stability Analysis

Lecture 14 - Stability Analysis (Continued...)

Lecture 15 - Stability Analysis (Continued...)

Lecture 16 - More Examples

Lecture 17 - Partial Differential Equations

Lecture 18 - Partial Differential Equations (Continued...)

Lecture 19 - Eigenvalue Problem in Continuous Domain

Lecture 20 - Special ODEs

Lecture 21 - Adjoint Operator

Lecture 22 - Theorems of Eigenvalues and Eigenfunction

Lecture 23 - Solution PDE : Separation of Variables Method

Lecture 24 - Solution of Parabolic PDE : Separation of variables method

Lecture 25 - Solution of Parabolic PDE : Separation of Variables Method (Continued...)

Lecture 26 - Solution of Higher Dimensional PDEs

Lecture 27 - Solution of Higher Dimensional PDEs (Continued...)

Lecture 28 - Four Dimensional Parabolic PDE

Lecture 29 - Solution of Elliptic and Hyperbolic PDE

Lecture 30 - Solution of Elliptic and Hyperbolic PDE (Continued...)

Lecture 31 - PDE in Cylindrical and Spherical Coordinate

Lecture 32 - Solution of non-homogeneous PDE

Lecture 33 - Solution of non-homogeneous PDE (Continued...)

Lecture 34 - Solution of non-homogeneous Parabolic PDE

Lecture 35 - Solution of non-homogeneous Elliptic PDE

Lecture 36 - Solution of non-homogeneous Elliptic PDE (Continued...)

Lecture 37 - Similarity Solution

Lecture 38 - Similarity Solution (Continued...)

Lecture 39 - Integral Method

Lecture 40 - Laplace Transform

Lecture 41 - Fourier Transform

NPTEL : NOC:Introduction to Process Modeling in Membrane Separation Process (Chemical Engineering)

Co-ordinators : Prof. S. De

Lecture 1 - Fundamentals of Separation Processes and Introduction of Membrane System

Lecture 2 - Fundamentals of Separation Processes and Introduction of Membrane System (Continued...)

Lecture 3 - Fundamentals of Separation Processes and Introduction of Membrane System (Continued...)

Lecture 4 - Fundamentals of Separation Processes and Introduction of Membrane System (Continued...)

Lecture 5 - Modeling of Reverse Osmosis

Lecture 6 - Concentration Polarization

Lecture 7 - Osmotic Pressure Controlling Filtration

Lecture 8 - Osmotic Pressure Controlling Filtration (Continued...)

Lecture 9 - Osmotic Pressure Controlling Filtration (Continued...)

Lecture 10 - Osmotic Pressure Controlling Filtration (Continued...)

Lecture 11 - Osmotic Pressure Controlling Filtration (Continued...)

Lecture 12 - Osmotic Pressure Controlling Filtration (Continued...)

Lecture 13 - Modeling of Gel Layer Controlling Filtration

Lecture 14 - Modeling of Gel Layer Controlling Filtration (Continued...)

Lecture 15 - Modeling of Gel Layer Controlling Filtration (Continued...) and Resistance in Series Models

Lecture 16 - Design of Membrane Module

Lecture 17 - Design of Membrane Module (Continued...)

Lecture 18 - Design of Membrane Module (Continued...)

Lecture 19 - Modeling of Dialysis

Lecture 20 - Modeling of Dialysis (Continued...)

NPTEL : NOC:Soft Nano Technology (Chemical Engineering)

Co-ordinators : Dr. R. Mukherjee

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Introduction - 3

Lecture 4 - Fundamental Concepts Related to Surface Tension - 1

Lecture 5 - Fundamental Concepts Related to Surface Tension - 2

Lecture 6 - Fundamental Concepts Related to Surface Tension - 3

Lecture 7 - Fundamental Concepts Related to Surface Tension - 4

Lecture 8 - Components of Surface Tension - 1

Lecture 9 - Components of Surface Tension - 2

Lecture 10 - Sell Assembly of Surfactant Molecules

Lecture 11 - Laplace Pressure

Lecture 12 - Photo Lithography - 1

Lecture 13 - Photo Lithography - 2

Lecture 14 - Photo Lithography - 3

Lecture 15 - Photo Lithography - 4

Lecture 16 - Photo Lithography - 5

Lecture 17 - Photo Lithography - 6

Lecture 18 - Soft Lithography - I

Lecture 19 - Soft Lithography - 2

Lecture 20 - Soft Lithography - 3

Lecture 21 - Soft Lithography - 4

Lecture 22 - Soft Lithography - 5

Lecture 23 - Soft Lithography - 6

Lecture 24 - Atomic Force Microscope - 1

Lecture 25 - Atomic Force Microscope - 2

Lecture 26 - Atomic Force Microscope - 3

Lecture 27 - Atomic Force Microscope - 4

Lecture 28 - Atomic Force Microscope - 5

Lecture 29 - Atomic Force Microscope - 6

Lecture 30 - Dewetting - 1

Lecture 31 - Dewetting - 2

Lecture 32 - VdW Interaction Between Two Surfaces

Lecture 33 - Interaction Between Two Surfaces - 2

Lecture 34 - Interaction Between Two Surfaces - 3

Lecture 35 - Dewetting - 3

Lecture 36 - Pattern Directed Dewetting - I

Lecture 37 - Pattern Directed Dewetting - II

Lecture 38 - Spin Dewetting

Lecture 39 - Elastic Contact Instability - I

Lecture 40 - Elastic Contact Instability - II

NPTEL : NOC:Adiabatic Two-Phase Flow & Flow Boiling in Microchannel (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

Lecture 1 - Brief Introduction to Multiphase Flow

Lecture 2 - Brief Introduction to Multiphase Flow (Continued...)

Lecture 3 - Two Phase Flow through Micro Channels

Lecture 4 - Two Phase Flow through Micro Channels (Continued...)

Lecture 5 - Criteria for Confinement for in Case of Two Phase Flow

Lecture 6 - Pertinent Dimensionless Numbers in Two Phase

Lecture 7 - Flow Pattern Maps for Milli and Micro Systems

Lecture 8 - Pattern Transition from Energy Minimisation Principle

Lecture 9 - Experimental Identification of Flow Regimes

Lecture 10 - Experimental Identification of Flow Regimes (Continued...)

Lecture 11 - Flow Regimes and Void Fraction Estimation

Lecture 12 - Influence of Operating Parameter on Flow Patterns

Lecture 13 - Influence of Operating Parameter on Flow Patterns (Continued...)

Lecture 14 - Influence of Operating Parameter on Flow Patterns (Continued...)

Lecture 15 - Influence of Operating Parameter on Flow Patterns (Continued...)

Lecture 16 - Void Fraction Characteristic Mini and Micro Channel

Lecture 17 - Void Fraction and Pressure Drop in Reduced Dimensions - Experimental results

Lecture 18 - Void Fraction and Pressure Drop in Reduced Dimensions - Experimental results (Continued...)

Lecture 19 - Theoretical Analysis of Two Phase Flow in Reduced Dimensions

Lecture 20 - Theoretical Analysis of Two Phase Flow in Reduced Dimensions (Continued...)

Lecture 21 - Flow Pattern based Analysis in Micro Systems - Drift Flux Model

Lecture 22 - Flow Pattern based Modelling - Slug Flow Model

Lecture 23 - Flow Boiling in Microchannels

Lecture 24 - Tutorial - I

Lecture 25 - Tutorial - II

NPTEL : NOC:Phase Equilibrium Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - First Law of Thermodynamics

Lecture 4 - Second Law of Thermodynamics

Lecture 5 - Second Law of Thermodynamics (Continued...)

Lecture 6 - Entropy Change during Spontaneous Processes

Lecture 7 - Criteria of Spontaneity

Lecture 8 - Criteria of Spontaneity (Continued...)

Lecture 9 - Thermodynamic Network

Lecture 10 - Thermodynamic Network (Continued...)

Lecture 11 - Tutorial 1

Lecture 12 - Gibbs free energy as a function of temperature and pressure

Lecture 13 - P-v-T behaviour of gases

Lecture 14 - P-v-T behaviour (Continued...)

Lecture 15 - P-v-T behaviour (Continued...)

Lecture 16 - P-v-T behaviour (Continued...)

Lecture 17 - Tutorial 2

Lecture 18 - Property estimation from P-v-T behaviour

Lecture 19 - Property estimation (Continued...)

Lecture 20 - Concept of chemical potential

Lecture 21 - Chemical potential (Continued...)

Lecture 22 - Homogeneous open systems

Lecture 23 - Homogeneous open systems (Continued...)

Lecture 24 - Heterogeneous Closed Systems

Lecture 25 - Tutorial 3

Lecture 26 - Concept of fugacity

Lecture 27 - Fugacity (Continued...)

Lecture 28 - Estimation of fugacity coefficients

Lecture 29 - Fugacity of condensed phase

Lecture 30 - Mixtures

Lecture 31 - Mixtures (Continued...)

Lecture 32 - Tutorial 4

Lecture 33 - Partial molar properties

Lecture 34 - Partial molar properties (Continued...)

Lecture 35 - Partial molar fugacity

Lecture 36 - Ideal solutions

Lecture 37 - Ideal solutions (Continued...)

Lecture 38 - Ideal solutions (Continued...)

Lecture 39 - Ideal solutions (Continued...)

Lecture 40 - Non-ideal solutions

Lecture 41 - Non-ideal solutions (Continued...)

Lecture 42 - Non-ideal solutions (Continued...)

Lecture 43 - Non-ideal solutions (Continued...)

Lecture 44 - Non-ideal solutions (Continued...)

Lecture 45 - Deviations from ideal dilute solutions

Lecture 46 - Tutorial 5

Lecture 47 - Tutorial 6

Lecture 48 - Thermodynamics Consistency Test of VLE Data

Lecture 49 - Retrograde Condensation

Lecture 50 - Partial and Complete Immiscibility of Liquid Mixtures

Lecture 51 - Partial and Complete Immiscibility of Liquid Mixtures (Continued...)

Lecture 52 - Phase Equilibrium for Mass Transfer Processes

Lecture 53 - Control Mass Analysis of Transient process

Lecture 54 - Control Volume Analysis

Lecture 55 - Throttling and problem

Lecture 56 - Tutorial 7

Lecture 57 - First Law for reacting systems

Lecture 58 - Estimation of standard heat of reaction

Lecture 59 - Effect of operating variables on heat of reaction

Lecture 60 - Chemical Reaction Equilibrium

Lecture 61 - Equilibrium constant and its estimation

Lecture 62 - Relation of Equilibrium constant to composition

Lecture 63 - Effect of operating conditions on equilibrium conversion

Lecture 64 - Relation of Equilibrium constant to composition (Continued...)

Lecture 65 - Miscellaneous concepts on Reaction Equilibrium

NPTEL : NOC:Transport Phenomena (Chemical Engineering)

Co-ordinators : Prof. Sunando Dasgupta

Lecture 1 - Introduction : Newton's Law of Viscosity

Lecture 2 - Fourier and Fick's Laws

Lecture 3 - Shell Momentum Balance

Lecture 4 - Example of Shell Momentum Balance

Lecture 5 - Example of Shell Momentum Balance (Continued...)

Lecture 6 - Example of Shell Momentum Balance (Continued...)

Lecture 7 - Example of Shell Momentum Balance (Continued...)

Lecture 8 - Example of Shell Momentum Balance (Continued...)

Lecture 9 - Equations of Change for Isothermal Systems

Lecture 10 - Equations of Change for Isothermal Systems (Continued...)

Lecture 11 - Equations of Change for Isothermal Systems (Continued...)

Lecture 12 - Equations of Change for Isothermal Systems (Continued...)

Lecture 13 - Equations of Change for Isothermal Systems (Continued...)

Lecture 14 - Equations of Change for Isothermal Systems (Continued...)

Lecture 15 - Unsteady Flow

Lecture 16 - Boundary Layers

Lecture 17 - Boundary Layers (Continued...)

Lecture 18 - Boundary Layers (Continued...)

Lecture 19 - Boundary Layers (Continued...)

Lecture 20 - Boundary Layers (Continued...)

Lecture 21 - Boundary Layers (Continued...)

Lecture 22 - Boundary Layers (Continued...)

Lecture 23 - Boundary Layers (Continued...)

Lecture 24 - Boundary Layers (Continued...)

Lecture 25 - Turbulent Boundary Layers

Lecture 26 - Turbulent Boundary Layers (Continued...)

Lecture 27 - Turbulent Boundary Layers (Continued...)

Lecture 28 - Drag

Lecture 29 - Drag (Continued...)

Lecture 30 - Heat Transfer Basics

Lecture 31 - Heat Transfer Basics (Continued...)

Lecture 32 - 1-D Heat Conduction - Temperature Distributions

Lecture 33 - 1-D Heat Conduction - Shell Heat Balance

Lecture 34 - Shell Heat Balance

Lecture 35 - Viscous Dissipation

Lecture 36 - Transient Conduction

Lecture 37 - Transient Conduction (Continued...)

Lecture 38 - Forced Convection

Lecture 39 - Energy Equation

Lecture 40 - Energy Equation (Continued...)

Lecture 41 - Free Convection

Lecture 42 - Thermal Boundary Layer

Lecture 43 - Mass Transfer

Lecture 44 - Mass Transfer (Continued...)

Lecture 45 - Mass Transfer (Continued...)

Lecture 46 - Mass Transfer (Continued...)

Lecture 47 - Mass Transfer (Continued...)

Lecture 48 - Mass Transfer (Continued...)

Lecture 49 - Mass Transfer (Continued...)

Lecture 50 - Mass Transfer (Continued...)

Lecture 51 - Convection Transfer Equations

Lecture 52 - Boundary Layer Similarity

Lecture 53 - Boundary Layer - Analogy

Lecture 54 - Analogy - Tutorial I

Lecture 55 - Analogy - Tutorial II

Lecture 56 - Analogy - Tutorial III

Lecture 57 - Analogy - Tutorial IV and V

Lecture 58 - Tutorial on Displacement Thickness

Lecture 59 - Tutorial on Momentum Integral Equation

Lecture 60 - Summary of the Course

NPTEL : NOC:Chemical Process Instrumentation (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

Lecture 1 - General Principles and Representation of Instruments

Lecture 2 - General Principles and Representation of Instruments (Continued...)

Lecture 3 - General Principles and Representation of Instruments (Continued...)

Lecture 4 - General Principles and Representation of Instruments (Continued...)

Lecture 5 - General Principles and Representation of Instruments (Continued...)

Lecture 6 - Performance Characteristics of Instruments and Data Analysis - I

Lecture 7 - Performance Characteristics of Instruments and Data Analysis - I (Continued...)

Lecture 8 - Performance Characteristics of Instruments and Data Analysis - I (Continued...)

Lecture 9 - Performance Characteristics of Instruments and Data Analysis - I (Continued...)

Lecture 10 - Performance Characteristics of Instruments and Data Analysis - I (Continued...)

Lecture 11 - Performance Characteristics of Instruments and Data Analysis - II

Lecture 12 - Performance Characteristics of Instruments and Data Analysis - II (Continued...)

Lecture 13 - Performance Characteristics of Instruments and Data Analysis - II (Continued...)

Lecture 14 - Performance Characteristics of Instruments and Data Analysis - II (Continued...)

Lecture 15 - Performance Characteristics of Instruments and Data Analysis - II (Continued...)

Lecture 16 - Transducer Elements

Lecture 17 - Transducer Elements (Continued...)

Lecture 18 - Transducer Elements (Continued...)

Lecture 19 - Transducer Elements (Continued...)

Lecture 20 - Transducer Elements (Continued...)

Lecture 21 - Pressure Measurement: Moderate and High Pressure Measuring Instruments

Lecture 22 - Pressure Measurement: Moderate and High Pressure Measuring Instruments (Continued...)

Lecture 23 - Pressure Measurement: Moderate and High Pressure Measuring Instruments (Continued...)

Lecture 24 - Pressure Measurement: Moderate and High Pressure Measuring Instruments (Continued...)

Lecture 25 - Pressure Measurement: Moderate and High Pressure Measuring Instruments (Continued...)

Lecture 26 - High Vacuum Measurement

Lecture 27 - High Vacuum Measurement (Continued...)

Lecture 28 - High Vacuum Measurement (Continued...)

Lecture 29 - High Vacuum Measurement (Continued...)

Lecture 30 - Pressure Measurement

Lecture 31 - Temperature Measurement

Lecture 32 - Temperature Measurement (Continued...)

Lecture 33 - Temperature Measurement (Continued...)

Lecture 34 - Temperature Measurement (Continued...)

Lecture 35 - Temperature Measurement (Continued...)

Lecture 36 - Temperature Measurement (Continued...)

Lecture 37 - Temperature Measurement (Continued...)

Lecture 38 - Temperature Measurement (Continued...)

Lecture 39 - Temperature Measurement (Continued...)

Lecture 40 - Temperature Measurement (Continued...)

Lecture 41 - Flow Measurement

Lecture 42 - Flow Measurement (Continued...)

Lecture 43 - Flow Measurement (Continued...)

Lecture 44 - Flow Measurement (Continued...)

Lecture 45 - Flow Measurement (Continued...)

Lecture 46 - Level Measurement

Lecture 47 - Level Measurement (Continued...)

Lecture 48 - Level Measurement (Continued...)

Lecture 49 - Level Measurement (Continued...)

Lecture 50 - Level Measurement (Continued...)

Lecture 51 - Miscellaneous Measurements : Composition

Lecture 52 - Miscellaneous Measurements : Composition (Continued...)

Lecture 53 - Miscellaneous Measurements : Composition (Continued...)

Lecture 54 - Miscellaneous Measurements : Composition (Continued...)

Lecture 55 - Miscellaneous Measurements : Composition (Continued...)

Lecture 56 - Pneumatic Control Valve

Lecture 57 - Pneumatic Control Valve (Continued...)

Lecture 58 - Pneumatic Control Valve (Continued...) and P&ID

Lecture 59 - GATE Questions

Lecture 60 - GATE Questions (Continued...)

NPTEL : NOC:Optimization in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

Lecture 1 - Introduction to Optimization

Lecture 2 - Introduction to Optimization (Continued...)

Lecture 3 - Introduction to Optimization (Continued...)

Lecture 4 - Introduction of Optimization (Continued...)

Lecture 5 - Introduction of Optimization (Continued...)

Lecture 6 - Optimization Problem Formulation

Lecture 7 - Optimization Problem Formulation (Continued...)

Lecture 8 - Optimization Problem Formulation (Continued...)

Lecture 9 - Optimization Problem Formulation (Continued...)

Lecture 10 - Optimization Problem Formulation (Continued...)

Lecture 11 - Basic Concepts of Optimization - I

Lecture 12 - Basic Concepts of Optimization - I (Continued...)

Lecture 13 - Basic Concepts of Optimization - I (Continued...)

Lecture 14 - Basic Concepts of Optimization - I (Continued...)

Lecture 15 - Basic Concepts of Optimization - I (Continued...)

Lecture 16 - Basic Concepts of Optimization - II

Lecture 17 - Basic Concepts of Optimization - II (Continued...)

Lecture 18 - Basic Concepts of Optimization - II (Continued...)

Lecture 19 - Basic Concepts of Optimization - II (Continued...)

Lecture 20 - Basic Concepts of Optimization - II (Continued...)

Lecture 21 - Unconstrained Single Variable Optimization: Methods and Applications (Continued...)

Lecture 22 - Unconstrained Single Variable Optimization: Methods and Applications (Continued...)

Lecture 23 - Unconstrained Single Variable Optimization: Methods and Applications (Continued...)

Lecture 24 - Unconstrained Single Variable Optimization: Methods and Applications (Continued...)

Lecture 25 - Unconstrained Single Variable Optimization: Methods and Applications (Continued...)

Lecture 26 - Unconstrained Multivariable Optimization: Direct Search Methods

Lecture 27 - Unconstrained Multivariable Optimization: Direct Search Methods (Continued...)

Lecture 28 - Unconstrained Multivariable Optimization: Direct Search Methods (Continued...)

Lecture 29 - Unconstrained Multivariable Optimization: Direct Search Methods (Continued...)

Lecture 30 - Unconstrained Multivariable Optimization: Direct Search Methods (Continued...)

Lecture 31 - Unconstrained Multivariable Optimization: Gradient Based Methods

Lecture 32 - Unconstrained Multivariable Optimization: Gradient Based Methods (Continued...)

Lecture 33 - Unconstrained Multivariable Optimization: Gradient Based Methods (Continued...)

Lecture 34 - Unconstrained Multivariable Optimization: Gradient Based Methods (Continued...)

Lecture 35 - Unconstrained Multivariable Optimization: Gradient Based Methods (Continued...)

Lecture 36 - Introduction to Linear Programming

Lecture 37 - Introduction to Linear Programming (Continued...)

Lecture 38 - Introduction to Linear Programming (Continued...)

Lecture 39 - Introduction to Linear Programming (Continued...)

Lecture 40 - Introduction to Linear Programming (Continued...)

Lecture 41 - Linear Programming - The Simplex Method

Lecture 42 - Linear Programming - The Simplex Method (Continued...)

Lecture 43 - Linear Programming - The Simplex Method (Continued...)

Lecture 44 - Linear Programming - The Simplex Method (Continued...)

Lecture 45 - Linear Programming - The Simplex Method (Continued...)

Lecture 46 - Constrained Nonlinear Programming

Lecture 47 - Constrained Nonlinear Programming (Continued...)

Lecture 48 - Constrained Nonlinear Programming (Continued...)

Lecture 49 - Constrained Nonlinear Programming (Continued...)

Lecture 50 - Constrained Nonlinear Programming (Continued...)

Lecture 51 - Applications of Optimization

Lecture 52 - Applications of Optimization (Continued...)

Lecture 53 - Applications of Optimization (Continued...)

Lecture 54 - Applications of Optimization (Continued...)

Lecture 55 - Applications of Optimization (Continued...)

Lecture 56 - Software Tools for Optimization

Lecture 57 - Software Tools for Optimization (Continued...)

Lecture 58 - Software Tools for Optimization (Continued...)

Lecture 59 - Software Tools for Optimization (Continued...)

Lecture 60 - Software Tools for Optimization (Continued...)

NPTEL : NOC:Heat Transfer (2018) (Chemical Engineering)

Co-ordinators : Prof. Sunando Dasgupta

Lecture 1 - Introduction to Heat Transfer

Lecture 2 - Introduction to Heat Transfer

Lecture 3 - Heat Diffusion Equation

Lecture 4 - Relevant Boundary Conditions in Conduction

Lecture 5 - One Dimensional Steady State Conduction

Lecture 6 - Temperature Distribution in Radial Systems

Lecture 7 - Tutorial Problem on Critical Insulation Thickness

Lecture 8 - Heat Source Systems

Lecture 9 - Tutorial Problems of Heat Generating Systems

Lecture 10 - Transient Conduction

Lecture 11 - Lumped Capacitance (Continued...) and Tutorial Problem

Lecture 12 - Transient heat Conduction

Lecture 13 - Transient Conduction - Heisler Chart

Lecture 14 - Heat Transfer from Extended Surface

Lecture 15 - Fins and General Conduction Analysis

Lecture 16 - Fundamentals of Convection

Lecture 17 - Equations of Change for Non-isothermal Systems

Lecture 18 - Equations of Change for Non-isothermal Systems (Continued...)

Lecture 19 - Tutorial on the Application of Energy Equation

Lecture 20 - Nusselt Number of a heated sphere in Stagnant Air

Lecture 21 - Momentum and Thermal Boundary Layers

Lecture 22 - The Flat Plate in Parallel Flow - Hydrodynamics and Momentum Transfer

Lecture 23 - The Flat Plate in Parallel Flow - Heat Transfer

Lecture 24 - The Effects of Turbulence

Lecture 25 - Turbulent External Flow

Lecture 26 - Heat and Momentum Transfer Analogy

Lecture 27 - Mixed Boundary Layers

Lecture 28 - Tutorial Problem on External Flow and Behavior of Heat Transfer Coefficient

Lecture 29 - Tutorial Problem in External Flow and Convection

Lecture 30 - Tutorial Problem in External Flow and Convection

Lecture 31 - Tutorial Problem in External Flow and Convection

Lecture 32 - Internal Flow Heat Transfer

Lecture 33 - Internal Flow Heat Transfer (Continued...)

Lecture 34 - Internal Flow Heat Transfer (Continued...)

Lecture 35 - Internal Flow and Heat Transfer (Continued...)

Lecture 36 - Internal Flow and Heat Transfer (Tutorial)

Lecture 37 - Free Convection

Lecture 38 - Heat Exchangers

Lecture 39 - Heat Exchangers

Lecture 40 - Heat Exchangers

Lecture 41 - Tutorial Problems on Heat Exchanger Calculations

Lecture 42 - Tutorial Problem on LMTD and Dirt Factor

Lecture 43 - Epsilon-NTU Method - 1

Lecture 44 - Epsilon-NTU Method - 1 (Continued...)

Lecture 45 - Tutorial Problems on Epsilon - NTU Methods

Lecture 46 - Tutorial Problems on Epsilon - NTU Methods

Lecture 47 - Boiling, Evaporation and Evaporators

Lecture 48 - Radiation - Fundamental Concepts

Lecture 49 - Spectral Blackbody Radiation Intesity and Emissive Power

Lecture 50 - Wein's Law, Stephen Boltzmann Law, Blackbody Radiation Function, Tutorial Problem

Lecture 51 - Kirchhoff's Law

Lecture 52 - Tutorial on Emissivity, Absroptivity and Blackbody Radiation Functions

Lecture 53 - Solar Radiation and the Concept of View Factors

Lecture 54 - Determination of View Factors

Lecture 55 - Radiosity Blackbody Radiation Exchanges, Relevant Problem

Lecture 56 - Network Method for Radiation Exchange in an Enclosure

Lecture 57 - Network Method - Two and Three Zone Enclosures

Lecture 58 - Tutorial Problem on Radiation Exhange using the Network Method

Lecture 59 - Radiation Shields

Lecture 60 - Gaseous Radiation (Participating Medium)

NPTEL : NOC:Flow through Porous Media (Chemical Engineering)

Co-ordinators : Dr. Somnath Ganguly

Lecture 1 - Introduction (Definition Of Porous Media)

Lecture 2 - Introduction (Conceptual Flow Models)

Lecture 3 - Introduction (Applications)

Lecture 4 - Mass Continuity (Introduction)

Lecture 5 - Mass Continuity (Cartesian Coordinates)

Lecture 6 - Mass Continuity (Cylindrical Coordinates)

Lecture 7 - Mass Continuity (Radial Flow)

Lecture 8 - Mass Continuity (Non-Uniform Permeability)

Lecture 9 - Mass Continuity (Continued...)

Lecture 10 - Mass Continuity (Streamlines And Potential Lines)

Lecture 11 - Mass Continuity (Elementary Flow)

Lecture 12 - Mass Continuity (Source/Sink)

Lecture 13 - Mass Continuity (Superposition Of Elementary Flow)

Lecture 14 - Mass Continuity (Superposition Of Elementary Flow) (Continued...)

Lecture 15 - Transport Mechanisms (Introduction)

Lecture 16 - Transport Mechanisms (Combined Mode)

Lecture 17 - Transport Mechanisms (Adsorption/Pore Condensation)

Lecture 18 - Transport Mechanisms (Continued...)

Lecture 19 - Flow Equation (Introduction)

Lecture 20 - Flow Equations (Continued...)

Lecture 21 - Flow Equations (Viscous Flow in Capillary)

Lecture 22 - Flow Equations (Packed Bed)

Lecture 23 - Flow Equations (Fluidized Bed)

Lecture 24 - Miscible Displacement (Uniform Velocity Over Capillary Cross-Section)

Lecture 25 - Miscible Displacement (Laminar Flow in Capillary)

Lecture 26 - Miscible Displacement (Movement of Concentration Pulse)

Lecture 27 - Miscible Displacement (Step Change in Concentration)

Lecture 28 - Miscible Displacement (Continued...)

Lecture 29 - Miscible Displacement (Continued...)

Lecture 30 - Miscible Displacement (Continued...)

Lecture 31 - Miscible Displacement (Continued...)

Lecture 32 - Miscible Displacement (Fractured Porous Media)

Lecture 33 - Miscible Displacement (Viscous Front)

Lecture 34 - Immiscible Flow

Lecture 35 - Immiscible Flow (Continued...)

Lecture 36 - Immiscible Flow (Continued...)

Lecture 37 - Immiscible Flow (Continued...)

Lecture 38 - Immiscible Flow (Continued...)

Lecture 39 - Immiscible Flow (Continued...)

Lecture 40 - Immiscible Flow (Continued...)

Lecture 41 - IMMISCIBLE FLOW (Continued...)

Lecture 42 - Immiscible Flow (Continued...)

Lecture 43 - Immiscible Flow (Continued...)

Lecture 44 - Immiscible Flow (Continued...)

Lecture 45 - Immiscible Flow (Continued...)

Lecture 46 - Immiscible Flow (Continued...)

Lecture 47 - Interception Of Suspended Solids

Lecture 48 - Interception Of Suspended Solids (Continued...)

Lecture 49 - Interception Of Suspended Solids (Continued...)

Lecture 50 - Interception Of Suspended Solids (Continued...)

Lecture 51 - Interception Of Suspended Solids (Continued...)

Lecture 52 - Interception Of Suspended Solids (Continued...)

Lecture 53 - Deformable Porous Media

Lecture 54 - Deformable Porous Media (Continued...)

Lecture 55 - Deformable Porous Media (Continued...)

Lecture 56 - Heat Transfer With Fluid Flow

Lecture 57 - Heat Transfer With Fluid Flow (Continued...)

Lecture 58 - Heat Transfer With Fluid Flow (Continued...)

Lecture 59 - Characterization

Lecture 60 - Characterization (Continued...)

NPTEL : NOC:Fundamentals of Particle and Fluid Solid Processing (Chemical Engineering)

Co-ordinators : Prof. Arnab Atta

Lecture 1 - Solid particle characterization

Lecture 2 - Solid particle characterization (Continued...)

Lecture 3 - Particle size distribution

Lecture 4 - Particle size distribution (Continued...)

Lecture 5 - Particle size distribution (Continued...)

Lecture 6 - Fluid - particle mechanics

Lecture 7 - Fluid - particle mechanics (Continued...)

Lecture 8 - Fluid - particle mechanics (Continued...)

Lecture 9 - Fluid - particle mechanics (Continued...)

Lecture 10 - Fluid - particle mechanics (Continued...)

Lecture 11 - Fluid - particle mechanics (Continued...)

Lecture 12 - Fluid - particle mechanics (Continued...)

Lecture 13 - Fluid - particle mechanics (Continued...)

Lecture 14 - Fluid - particle mechanics (Continued...)

Lecture 15 - Fluid - particle mechanics (Continued...)

Lecture 16 - Flow through packed beds

Lecture 17 - Flow through packed beds (Continued...)

Lecture 18 - Flow through packed beds (Continued...)

Lecture 19 - Flow through packed beds (Continued...)

Lecture 20 - Flow through packed beds (Continued...)

Lecture 21 - Fluidization

Lecture 22 - Fluidization (Continued...)

Lecture 23 - Fluidization (Continued...)

Lecture 24 - Fluidization (Continued...)

Lecture 25 - Fluidization (Continued...)

Lecture 26 - Sedimentation

Lecture 27 - Sedimentation (Continued...)

Lecture 28 - Sedimentation (Continued...)

Lecture 29 - Sedimentation (Continued...)

Lecture 30 - Sedimentation (Continued...)

Lecture 31 - Filtration

Lecture 32 - Filtration (Continued...)

Lecture 33 - Filtration (Continued...)

Lecture 34 - Filtration (Continued...)

Lecture 35 - Filtration (Continued...)

Lecture 36 - Centrifugal Separation

Lecture 37 - Centrifugal Separation (Continued...)

Lecture 38 - Centrifugal Separation (Continued...)

Lecture 39 - Centrifugal Separation (Continued...)

Lecture 40 - Centrifugal Separation (Continued...)

Lecture 41 - Particle size reduction

Lecture 42 - Particle size reduction (Continued...)

Lecture 43 - Particle size reduction (Continued...)

Lecture 44 - Particle size reduction (Continued...)

Lecture 45 - Particle size reduction (Continued...)

Lecture 46 - Particle size reduction (Continued...)

Lecture 47 - Particle size enlargement

Lecture 48 - Particle size enlargement (Continued...)

Lecture 49 - Particle size enlargement (Continued...)

Lecture 50 - Particle size enlargement (Continued...)

Lecture 51 - Fluid - solid transport

Lecture 52 - Fluid - solid transport (Continued...)

Lecture 53 - Fluid - solid transport (Continued...)

Lecture 54 - Fluid - solid transport (Continued...)

Lecture 55 - Fluid - solid transport (Continued...)

Lecture 56 - Colloids and nanoparticles

Lecture 57 - Colloids and nanoparticles (Continued...)

Lecture 58 - Colloids and nanoparticles (Continued...)

Lecture 59 - Colloids and nanoparticles (Continued...)

Lecture 60 - Colloids and nanoparticles (Continued...)

NPTEL : NOC:Plant Design and Economics (Chemical Engineering)

Co-ordinators : Prof. Debasis Sarkar

Lecture 1 - Introduction

Lecture 2 - Typical Design Steps

Lecture 3 - Flow Diagram

Lecture 4 - Flow Diagram - Mass and Energy Balance

Lecture 5 - Piping and Instrumentation Diagram

Lecture 6 - Selection of Process Equipment

Lecture 7 - Process Utilities

Lecture 8 - Plant Location

Lecture 9 - Site and Plant Layout

Lecture 10 - Heuristics in Process Synthesis and Design

Lecture 11 - Capital Investment

Lecture 12 - Capital Cost Estimates

Lecture 13 - Cost Components in Capital Investments

Lecture 14 - Methods of Capital Cost Estimates

Lecture 15 - Estimation of Total Product Cost

Lecture 16 - Different Types of Interest

Lecture 17 - Continuous Interest, Cash Flow Diagram, Time Value of Money

Lecture 18 - Uniform Cash Flows and Continuous Flows

Lecture 19 - Income Tax and Depreciation

Lecture 20 - Depreciation

Lecture 21 - Cumulative Cash Flow and Profitability Standards

Lecture 22 - Profitability Analysis

Lecture 23 - Profitability Analysis (Continued...)

Lecture 24 - Profitability Analysis (Continued...)

Lecture 25 - Alternative Investment, Replacement and Sensitivity Analysis

Lecture 26 - Introduction to Process Synthesis

Lecture 27 - Hierarchical Approach to Process Synthesis - I

Lecture 28 - Hierarchical Approach to Process Synthesis - II

Lecture 29 - Hierarchical Approach to Process Synthesis - III

Lecture 30 - Hierarchical Approach to Process Synthesis - IV

Lecture 31 - Basic Reactor Principles

Lecture 32 - Reactor Synthesis for Complex Reactions by Attainable Region: Fundamentals

Lecture 33 - Reactor Synthesis for Complex Reactions by Attainable Region: Example-1

Lecture 34 - Reactor Synthesis for Complex Reactions by Attainable Region: Example-2

Lecture 35 - General Procedure for Reactor Design and Cost Estimation

Lecture 36 - Introduction to Separation Systems

Lecture 37 - Selection Criteria for Separation Processes

Lecture 38 - Design of Multi-component Distillation Column: Short Cut Method

Lecture 39 - Design of Multi-component Distillation Column: Short Cut Method - Example

Lecture 40 - Introduction to Sequencing of Ordinary Distillation Columns

Lecture 41 - Sequences for Simple Nonintegrated Distillation Columns

Lecture 42 - Distillation Sequencing using Columns with Sidestreams

Lecture 43 - Distillation Sequencing using Thermal Coupling

Lecture 44 - Azeotropic Distillation: Residue Curve Maps

Lecture 45 - Azeotropic Distillation Methods and Cost Estimation

Lecture 46 - Introduction to Pinch Technology

Lecture 47 - Composite Curves

Lecture 48 - The Problem Table Method

Lecture 49 - The Heat Recovery Pinch and The Grand Composite Curve

Lecture 50 - Heat Exchanger Network Design

Lecture 51 - Introduction

Lecture 52 - Fires and Explosions: Flammability Characteristics

Lecture 53 - Fires and Explosions: Prevention

Lecture 54 - Toxic Release, Hazard Identification and MSDS

Lecture 55 - Inherently Safer Design

Lecture 56 - Optimality Criteria for Unconstrained Functions

Lecture 57 - Examples

Lecture 58 - Equality Constrained Problems: Langrange Multipliers

Lecture 59 - Linear Programming Problems

Lecture 60 - Batch Process Scheduling

NPTEL : NOC:Material and Energy Balance Computations (Chemical Engineering)

Co-ordinators : Prof. Arnab Atta

Lecture 1 - Introduction to Engineering Calculations

Lecture 2 - Introduction to Engineering Calculations (Continued...)

Lecture 3 - Introduction to Engineering Calculations (Continued...)

Lecture 4 - Introduction to Processes and Process Variables

Lecture 5 - Introduction to Processes and Process Variables (Continued...)

Lecture 6 - Fundamentals of Material Balance

Lecture 7 - Fundamentals of Material Balance (Continued...)

Lecture 8 - Fundamentals of Material Balance (Continued...)

Lecture 9 - Fundamentals of Material Balance (Continued...)

Lecture 10 - Material Balance of Single-unit

Lecture 11 - Material Balance of Multiple Units

Lecture 12 - Material Balance of Multiple Units (Continued...)

Lecture 13 - Material Balance of Multiple Units (Continued...)

Lecture 14 - Material Balance of Multiple Units (Continued...)

Lecture 15 - Material Balance of Multiple Units - Recycle

Lecture 16 - Material Balance of Recycle and Bypass Units

Lecture 17 - Material Balance of Recycle and Bypass Units (Continued...)

Lecture 18 - Introduction

Lecture 19 - Introduction (Continued...)

Lecture 20 - Introduction (Continued...)

Lecture 21 - Multiple reactions and reactive process balance

Lecture 22 - Reactive process balance

Lecture 23 - Multiple reactions and reactive process balance

Lecture 24 - Reactive process balance (Continued...)

Lecture 25 - Reactive process balance (Continued...)

Lecture 26 - Combustion reactions balance

Lecture 27 - Combustion reactions balance (Continued...)

Lecture 28 - Single-phase systems

Lecture 29 - Single phase systems (Continued...)

Lecture 30 - Single-phase problems and concept of multi-phase system

Lecture 31 - Introduction to Energy Balance - I

Lecture 32 - Introduction to Energy Balance - II

Lecture 33 - Introduction to Energy Balance - III

Lecture 34 - Introduction to Energy Balance - IV

Lecture 35 - Introduction to Energy Balance - V

Lecture 36 - Introduction to Energy Balance - VI

Lecture 37 - Introduction to Energy Balance - VII

Lecture 38 - Introduction to Energy Balance - VIII

Lecture 39 - Introduction to Energy Balance - IX

Lecture 40 - Introduction to Energy Balance - X

Lecture 41 - Introduction to Energy Balance - XI

Lecture 42 - Estimation of Physical Properties - I

Lecture 43 - Estimation of Physical Properties - II

Lecture 44 - Estimation of Physical Properties - III

Lecture 45 - Tutorial - I

Lecture 46 - Tutorial - II

Lecture 47 - Tutorial - III

Lecture 48 - Tutorial - IV

Lecture 49 - Estimation of Physical Parameters - IV

Lecture 50 - Estimation of Physical Parameters - V

Lecture 51 - Energy Balance with Chemical Reactions - I

Lecture 52 - Energy Balance with Chemical Reactions - II

Lecture 53 - Energy Balance with Chemical Reactions - III

Lecture 54 - Energy Balance with Chemical Reactions - IV

Lecture 55 - Energy Balance with Chemical Reactions - V

Lecture 56 - Energy Balance with Chemical Reactions - VI

Lecture 57 - Humidity and Psychrometric Chart - I

Lecture 58 - Humidity and Psychrometric Chart - II

Lecture 59 - Humidity and Psychrometric Chart - III

Lecture 60 - Humidity and Psychrometric Chart - IV

NPTEL : NOC:Principles and Practices of Process Equipment and Plant Design (Chemical Engineering)

Co-ordinators : Prof. Gargi Das

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Optimum design and design documentation

Lecture 4 - Introduction to Mass Transfer Processes

Lecture 5 - Phase Equillibrium

Lecture 6 - Phase Equillibrium (Continued...)

Lecture 7 - Phase Equillibrium (Continued...)

Lecture 8 - Distillation

Lecture 9 - Flash Distillation and Design problem

Lecture 10 - Fractionation

Lecture 11 - Fractionation (Continued...)

Lecture 12 - McCabe-Thiele construction for number of ideal stages

Lecture 13 - Optimum Design

Lecture 14 - Multi-component fractionation design

Lecture 15 - Batch Distillation

Lecture 16 - Practical issues in desigining distillation processes

Lecture 17 - Design of absorbers

Lecture 18 - Design of absorbers (Continued...)

Lecture 19 - Design of absorbers (Continued...)

Lecture 20 - Tower and Tower internals

Lecture 21 - Tower and Tower internals (Continued...)

Lecture 22 - Tower and Tower internals (Continued...)

Lecture 23 - Sieve Tray Design

Lecture 24 - Sieve Tray Design (Continued...)

Lecture 25 - Sieve Tray Design (Continued...)

Lecture 26 - Bubble Cap Tray Design

Lecture 27 - Bubble Cap Tray Design (Continued...)

Lecture 28 - Bubble Cap Tray Design (Continued...)

Lecture 29 - Tower and Tower internals (Packed Tower Design)

Lecture 30 - Tower and Tower internals (Packed Tower Design) (Continued...)

Lecture 31 - Adsorption

Lecture 32 - Packed bed adsorption

Lecture 33 - Packed bed adsorber design

Lecture 34 - Packed bed adsorber design (Continued...)

Lecture 35 - Liquid-liquid extraction (LLE)

Lecture 36 - Liquid-liquid extraction (L2)

Lecture 37 - Liquid-liquid extraction (L3)

Lecture 38 - Liquid-liquid extraction (L4)

Lecture 39 - Liquid-liquid extraction (L5)

Lecture 40 - Design of Mass Transfer Processes (Review)

Lecture 41 - Design of Heat Transfer Processes - Introduction

Lecture 42 - Double Pipe Heat exchanger

Lecture 43 - Double Pipe Heat exchanger (Continued...)

Lecture 44 - Double Pipe Heat exchanger (Continued...)

Lecture 45 - Design of Shell and Tube Heat Exchangers - a general overview

Lecture 46 - Design of Shell and Tube Heat Exchangers - a general overview (Continued...)

Lecture 47 - Shell and Tube Heat Exchanger - Design

Lecture 48 - Shell and Tube Heat Exchanger - Design

Lecture 49 - Heat exchanger Network Analysis

Lecture 50 - Heat exchanger Network Analysis (Continued...)

Lecture 51 - Heat exchanger Network Analysis (Continued...)

Lecture 52 - Heat exchanger Network Analysis (Continued...)

Lecture 53 - Heat exchanger Network Analysis (Continued...)

Lecture 54 - Plant Hydraulics

Lecture 55 - Plant Hydraulics (Continued...)

Lecture 56 - Plant Hydraulics (Continued...)

Lecture 57 - Plant Hydraulics (End)

Lecture 58 - Process Vessels

Lecture 59 - Process Instrumentation and Control

Lecture 60 - Engineered Safety

Lecture 61 - Process Utilities

Lecture 62 - Process Design using Simulators

Lecture 63 - Process Packages

Lecture 64 - Design of a 10 TPD Mono-nitrotoluene plant

NPTEL : NOC:Mathematical Modelling and Simulation of Chemical Engineering Process (Chemical Engineering)

Co-ordinators : Prof. Sourav Mondal

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Constitutive relations

Lecture 4 - Constitutive relations - Mass transfer and thermodynamics

Lecture 5 - Process diagrams

Lecture 6 - Special functions

Lecture 7 - Partial differential equations

Lecture 8 - Partial differential equations - Separation of variables

Lecture 9 - PDE - Separation of variables (Continued...)

Lecture 10 - PDE - Integral transforms

Lecture 11 - Numerical techniques of solving PDE - Discretization

Lecture 12 - Stability of finite difference schemes

Lecture 13 - Numerical solution of PDE - Method of lines

Lecture 14 - Numerical solution of implicit formulation - Tridiagonal matrix

Lecture 15 - Numerical solution of PDE - Finite volume method

Lecture 16 - Perturbation methods

Lecture 17 - Asymptotics

Lecture 18 - Matched Asymptotics

Lecture 19 - Stability of dynamical systems

Lecture 20 - Stability of dynamical systems (Continued...)

Lecture 21 - Modelling transport phenomena problems - Part 1

Lecture 22 - Modelling transport phenomena problems - Part 2

Lecture 23 - Modelling transport phenomena problems - Part 3

Lecture 24 - Modelling transport phenomena problems - Part 4

Lecture 25 - Modelling transport phenomena problems - Part 5

Lecture 26 - Modelling reaction systems - Packed bed catalytic reactor

Lecture 27 - Modelling intraparticle transport and catalysis

Lecture 28 - Modelling pore diffusion and reaction

Lecture 29 - Modelling enzymatic reactions

Lecture 30 - Demonstration of COMSOL Multiphysics

Lecture 31 - Modelling of multistage distillation process

Lecture 32 - FUG method of stage calculations

Lecture 33 - MESH equations and DOF analysis

Lecture 34 - Tearing method

Lecture 35 - Bubble point method stage calculations

Lecture 36 - Simultaneous correction method

Lecture 37 - Block tridiagonal matrix

Lecture 38 - Simple binary batch distillation

Lecture 39 - Multistage batch distillation

Lecture 40 - Heat exchanger network design pinch analysis

Lecture 41 - Pinch point temperature

Lecture 42 - Heat exchanger network synthesis

Lecture 43 - Solving a distillation column using Aspen plus

Lecture 44 - Solving two unit operations using Aspen Plus

Lecture 45 - Solving multiple units using Aspen Plus

Lecture 46 - Dispersed phase modelling - Introduction

Lecture 47 - Population balance equation

Lecture 48 - Dispersed phase modelling - Breakage process

Lecture 49 - Drop size distribution in lean mixtures

Lecture 50 - Mass transfer in lean liquid-liquid dispersion

Lecture 51 - Dispersed phase modelling - Aggregation

Lecture 52 - Dispersed phase modelling - Aerosol dynamics

Lecture 53 - Dispersed phase modelling - Aerosol dynamics (Continued...)

Lecture 54 - Solution of the population balance equation

Lecture 55 - Numerical solution of the population balance equation

Lecture 56 - Kinetic monte carlo simulation

Lecture 57 - Response surface methodology

Lecture 58 - Design of experiments

Lecture 59 - Artificial neural network

Lecture 60 - Supervised training

NPTEL : NOC:Advanced Process Dynamics (Chemical Engineering)

Co-ordinators : Prof. Parag A. Deshpande

Lecture 1 - Introduction and motivation

Lecture 2 - Dynamics of linear first order autonomous systems

Lecture 3 - Dynamics of linear first order autonomous systems (Continued...)

Lecture 4 - Lumped parameter analysis of cooling of a body

Lecture 5 - Lumped parameter analysis of cooling of a body (Continued...)

Lecture 6 - Introduction to higher order systems

Lecture 7 - Phase plane analysis of linear autonomous second order systems

Lecture 8 - Phase plane analysis of linear autonomous second order systems (Continued...)

Lecture 9 - Analysis of a free spring-mass system

Lecture 10 - Analysis of a free spring-mass system (Continued...)

Lecture 11 - Dynamics of non-autonomous systems

Lecture 12 - Similarity solution for non-autonomous higher order dynamics

Lecture 13 - Similarity solution for non-autonomous higher order dynamics (Continued...)

Lecture 14 - Analysis of a forced spring-mass system

Lecture 15 - Analysis of a forced spring-mass system (Continued...)

Lecture 16 - Phase portraits of linear autonomous systems of order three and higher

Lecture 17 - Phase portraits of linear autonomous systems of order three and higher (Continued...)

Lecture 18 - Analysis of complex reaction systems

Lecture 19 - Analysis of complex reaction systems (Continued...)

Lecture 20 - Analysis of complex reaction systems (Continued...)

Lecture 21 - Introduction to non-linear systems

Lecture 22 - Logistic population growth model

Lecture 23 - Logistic population growth model (Continued...)

Lecture 24 - Logistic population growth with harvesting

Lecture 25 - Logistic population growth with harvesting (Continued...)

Lecture 26 - Logistic population growth with threshold population

Lecture 27 - Logistic population growth with threshold population (Continued...)

Lecture 28 - Analysis of population dynamics in discrete domain

Lecture 29 - Analysis of fixed points and bifurcation in discrete domain

Lecture 30 - Analysis of fixed points and bifurcation in discrete domain (Continued...)

Lecture 31 - More on bifurcations in non-linear systems

Lecture 32 - Non-linear systems in higher dimensions

Lecture 33 - Reactor stability analysis

Lecture 34 - Reactor stability analysis (Continued...)

Lecture 35 - Reactor stability analysis (Continued...)

Lecture 36 - Analysis of infectious disease dynamics

Lecture 37 - Analysis of infectious disease dynamics (Continued...)

Lecture 38 - Analysis of infectious disease dynamics (Continued...)

Lecture 39 - Analysis of atmosphere dynamics using Lorenz equations

Lecture 40 - Analysis of atmosphere dynamics using Lorenz equations (Continued...)

Lecture 41 - Analysis of system dynamics in transform domain

Lecture 42 - Analysis of first order system subjected to ideal forcing functions

Lecture 43 - Analysis of first order system subjected to ideal forcing functions (Continued...)

Lecture 44 - Analysis of response of second order systems

Lecture 45 - Analysis of response of second order systems (Continued...)

Lecture 46 - Analysis of (p,q) order systems

Lecture 47 - Analysis of (p,q) order systems (Continued...)

Lecture 48 - Analysis of multiple input - multiple output systems

Lecture 49 - Block diagrams and inter-conversion of state-space and transform domain models

Lecture 50 - Analysis of inverse response systems

Lecture 51 - Analysis of dynamics of discrete-time systems

Lecture 52 - Sampling and reconstruction of continuous signals

Lecture 53 - Conversion of continuous models to discrete-time models

Lecture 54 - Introduction to z-transforms

Lecture 55 - z-transforms Continued

Lecture 56 - Response of discrete-time systems

Lecture 57 - Response of discrete-time systems (Continued...)

Lecture 58 - Response of discrete-time systems (Continued...)

Lecture 59 - Stability analysis in transform domain

Lecture 60 - Review of the course

NPTEL : NOC:Metallocene and Metal-Carbene based Organometallic Compounds as Industrially Important Advanced Polyolefin Catalysts (Chemical Engineering)

Co-ordinators : Prof. Sanjib K. Patra

Lecture 1 - A Brief Introduction to Polymers

Lecture 2 - A Brief Introduction to Polymers (Continued...)

Lecture 3 - Polyethylene and Polypropylene: Chemical structure and properties

Lecture 4 - Polyethylene and Polypropylene: Chemical structure and properties (Continued...)

Lecture 5 - Common polymerization protocol and mechanism

Lecture 6 - Common polymerization protocol and mechanism (Continued...)

Lecture 7 - Common polymerization protocol and mechanism: Controlled Polymerization

Lecture 8 - Anionic living polymerization and Coordination polymerization

Lecture 9 - Transition metal/Organometallic complexes: Unique reactions

Lecture 10 - Metallocene compounds: Structure and Bonding

Lecture 11 - Metallocene compounds: Structure and Bonding (Continued...)

Lecture 12 - Bonding in Metallocene, MOT and Electronic nature

Lecture 13 - Bonding and Electronic nature in Bent Metallocene

Lecture 14 - Bonding and Electronic nature in Bent Metallocene (Continued...)

Lecture 15 - General Synthetic Strategies for Metallocenes (Parallel and Bent)

Lecture 16 - Properties and Unique Reactivities of parallel and bent Metallocenes

Lecture 17 - Unique Reactivities of bent Metallocenes

Lecture 18 - Unique Reactivities of bent Metallocenes (Continued...)

Lecture 19 - Coordination polymerization of olefin and stereoregularity

Lecture 20 - Olefin polymerization by Zeigler Natta Catalyst: Important features

Lecture 21 - Coordination polymerization of olefin by Metallocene Catalysts: A new avenue in polyolefin catalysts

Lecture 22 - Coordination polymerization of olefin by Metallocene Catalysts: A new avenue in polyolefin catalysts (Continued...)

Lecture 23 - Symmetry of metallocene and Stereoregularity in polyolefin

Lecture 24 - Symmetry of metallocene and Stereoregularity in polyolefin (Continued...)

Lecture 25 - Metallocene to Post-metallocene catalysts for olefin polymerization

Lecture 26 - Metallocene to Post-metallocene catalysts for olefin polymerization (Continued...)

Lecture 27 - Polymerization strategy for industrial preparation of LLDPE

Lecture 28 - Polymerization strategy for industrial preparation of LLDPE (Continued...)

Lecture 29 - Metallocene and Post-metallocene Catalysts: Homogeneous to Heterogeneous and Lab to Industry

Lecture 30 - Metallocene and Post-metallocene Catalysts: Homogeneous to Heterogeneous and Lab to Industry (Continued...)

Lecture 31 - Depolymerization of synthetic polymers: Role of organometallic and metallocene based catalysts

Lecture 32 - Depolymerization of synthetic polymers: Role of organometallic and metallocene based catalysts

Lecture 33 - Metal-carbene complexes as versatile catalysts for multiple useful reactions: A short introduction

Lecture 34 - Metal-carbene complexes as versatile catalysts for multiple useful reactions: A short introduction (Continued...)

Lecture 35 - Bonding and Electronic properties in Metal-carbene complexes

Lecture 36 - General synthetic protocol of Metal-carbene complexes

Lecture 37 - N-Heterocyclic carbene (NHC) complex: Bonding and General synthetic protocol

Lecture 38 - Alkene metathesis by metal-carbene catalysts and its mechanism

Lecture 39 - Utility of metal-carbene catalysts in alkene polymerization

Lecture 40 - Industrially important polymers by ROMP: Recent development and scope; Overall summary of this course

NPTEL : NOC:Chemical Engineering Fluid Dynamics and Heat Transfer (Chemical Engineering)

Co-ordinators : Prof. Rabibrata Mukherjee, Prof. Arnab Atta

Lecture 1 - Introduction Basic Concepts and Kinematics - 1

Lecture 2 - Kinematics - 2

Lecture 3 - Kinematics - 3

Lecture 4 - Kinematics - 4

Lecture 5 - Kinematics - 5 - Shear Stress

Lecture 6 - Kinematics - 6 and Conservation Equation - 1

Lecture 7 - Conservation Equation - 2

Lecture 8 - Conservation Equation - 3 - Conservation of Momentum

Lecture 9 - Conservation Equation - 4 - Conservation of Momentum - 2

Lecture 10 - Conservation Equation - 5 - Conservation of Momentum - 3

Lecture 11 - Exact Solution - 1

Lecture 12 - Exact Solution - 2

Lecture 13 - Exact Solution - 3

Lecture 14 - Exact Solution - 4

Lecture 15 - Boundary Layer Analysis - 1

Lecture 16 - Boundary Layer Analysis - 2

Lecture 17 - Boundary Layer Analysis - 3

Lecture 18 - Boundary Layer Analysis - 4: Blasius Solution - 1

Lecture 19 - Boundary Layer Analysis - 4: Blasius Solution - 2

Lecture 20 - Boundary Layer Analysis - 5: Momentum Integral Method - 1

Lecture 21 - Boundary Layer Analysis - 6: Momentum Integral Method - 2

Lecture 22 - Boundary Layer Analysis - 6: Momentum Integral Method - 3

Lecture 23 - Turbulence - 1

Lecture 24 - Turbulence - 2

Lecture 25 - Turbulence - 3

Lecture 26 - Turbulence - 4

Lecture 27 - Turbulence - 5

Lecture 28 - Turbulence - 6

Lecture 29 - Turbulence - 7

Lecture 30 - Turbulence - 8 and Final Wrap-up

Lecture 31 - Fundamentals and Mechanism of Heat Transfer

Lecture 32 - Fundamentals and Mechanism of Heat Transfer (Continued...)

Lecture 33 - Fundamentals and Mechanism of Heat Transfer (Continued...)

Lecture 34 - Fundamentals and Mechanism of Heat Transfer (Continued...)

Lecture 35 - Fundamentals and Mechanism of Heat Transfer (Continued...)

Lecture 36 - One-dimensional Heat Conduction

Lecture 37 - One-dimensional Heat Conduction (Continued...)

Lecture 38 - One-dimensional Heat Conduction (Continued...)

Lecture 39 - One-dimensional Heat Conduction (Continued...)

Lecture 40 - One-dimensional Heat Conduction (Continued...)

Lecture 41 - One-dimensional Heat Conduction (Continued...)

Lecture 42 - One-dimensional Heat Conduction (Continued...)

Lecture 43 - Transient Heat Conduction

Lecture 44 - Transient Heat Conduction (Continued...)

Lecture 45 - Transient Heat Conduction (Continued...)

Lecture 46 - Forced Convection

Lecture 47 - Forced Convection (Continued...)

Lecture 48 - Forced Convection (Continued...)

Lecture 49 - Forced Convection (Continued...)

Lecture 50 - Forced Convection (Continued...)

Lecture 51 - Internal Forced Convection

Lecture 52 - Internal Forced Convection (Continued...)

Lecture 53 - Internal Forced Convection (Continued...)

Lecture 54 - Internal Forced Convection (Continued...)

Lecture 55 - Internal Forced Convection (Continued...)

Lecture 56 - Natural Convection

Lecture 57 - Natural Convection (Continued...)

Lecture 58 - Boiling and Condensation

Lecture 59 - Radiation

Lecture 60 - Radiation (Continued...)

NPTEL : NOC:Characterization of Polymers, Elastomers and Composites (Chemical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 1

Lecture 2 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 1

Lecture 3 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 1

Lecture 4 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 1

Lecture 5 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 1

Lecture 6 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 2

Lecture 7 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 2

Lecture 8 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 2

Lecture 9 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 2

Lecture 10 - Introduction of Structure-Property-Process Correlation of Polymer, Elastomer and Composite - 2

Lecture 11 - Identification by Chemical Techniques, Implication of National and International Standards alongwith Practical Demonstration

Lecture 12 - Identification by Chemical Techniques, Implication of National and International Standards alongwith Practical Demonstration (Continued...)

Lecture 13 - Identification by Chemical Techniques, Implication of National and International Standards alongwith Practical Demonstration (Continued...)

Lecture 14 - Identification by Chemical Techniques, Implication of National and International Standards alongwith Practical Demonstration (Continued...)

Lecture 15 - Identification by Chemical Techniques, Implication of National and International Standards alongwith Practical Demonstration (Continued...)

Lecture 16 - Introduction of UV-Vis and infrared spectroscopy for polymers, elastomers and composites

Lecture 17 - Introduction of UV-Vis and infrared spectroscopy for polymers, elastomers and composites (Continued...)

Lecture 18 - Introduction of UV-Vis and infrared spectroscopy for polymers, elastomers and composites (Continued...)

Lecture 19 - Introduction of UV-Vis and infrared spectroscopy for polymers, elastomers and composites (Continued...)

Lecture 20 - Introduction of UV-Vis and infrared spectroscopy for polymers, elastomers and composites (Continued...)

Lecture 21 - Application of infrared spectroscopy for blends, modification of polymers, compatibilizaion, coupling etc.

Lecture 22 - Application of infrared spectroscopy for blends, modification of polymers, compatibilizaion, coupling etc.

Lecture 23 - Application of infrared spectroscopy for blends, modification of polymers, compatibilizaion, coupling etc.

Lecture 24 - Practical demonstration on UV-Visible spectroscopy

Lecture 25 - Practical demonstration on FTIR spectroscopy and Sulphur analyzer

Lecture 26 - Introduction to Photoacoustic spectroscopy (PA), Raman spectroscopy, Atomic absorption spectroscopy and Electron spin response (ESR) spectroscopy

Lecture 27 - Introduction to Photoacoustic spectroscopy (PA), Raman spectroscopy, Atomic absorption spectroscopy and Electron spin response (ESR) spectroscopy (Continued...)

Lecture 28 - Introduction to Photoacoustic spectroscopy (PA), Raman spectroscopy, Atomic absorption spectroscopy and Electron spin response (ESR) spectroscopy (Continued...)

Lecture 29 - Introduction to Photoacoustic spectroscopy (PA), Raman spectroscopy, Atomic absorption spectroscopy and Electron spin response (ESR) spectroscopy (Continued...)

Lecture 30 - Introduction to Photoacoustic spectroscopy (PA), Raman spectroscopy, Atomic absorption spectroscopy and Electron spin response (ESR) spectroscopy (Continued...)

Lecture 31 - NMR Spectroscopy- principles and fundamentals. Application of NMR in polymer, elastomer and composites

Lecture 32 - NMR Spectroscopy- principles and fundamentals. Application of NMR in polymer, elastomer and composites (Continued...)

Lecture 33 - NMR Spectroscopy- principles and fundamentals. Application of NMR in polymer, elastomer and composites (Continued...)

Lecture 34 - NMR Spectroscopy- principles and fundamentals. Application of NMR in polymer, elastomer and composites (Continued...)

Lecture 35 - NMR Spectroscopy- principles and fundamentals. Application of NMR in polymer, elastomer and composites (Continued...)

Lecture 36 - Thermal analysis techniques and application in polymer, elastomer and composites

Lecture 37 - Thermal analysis techniques and application in polymer, elastomer and composites (Continued...)

Lecture 38 - Thermal analysis techniques and application in polymer, elastomer and composites (Continued...)

Lecture 39 - Practical demostration on TGA, DSC and DMA

Lecture 40 - XRD, XPS and XRF. Principles, Fundamentals and Application in Polymer, Elastomer and Composites

Lecture 41 - XRD, XPS and XRF. Principles, Fundamentals and Application in Polymer, Elastomer and Composites (Continued...)

Lecture 42 - XRD, XPS and XRF. Principles, Fundamentals and Application in Polymer, Elastomer and Composites (Continued...)

Lecture 43 - XRD, XPS and XRF. Principles, Fundamentals and Application in Polymer, Elastomer and Composites (Continued...)

Lecture 44 - XRD, XPS and XRF. Principles, Fundamentals and Application in Polymer, Elastomer and Composites (Continued...)

Lecture 45 - Introduction to microscopy (Optical, AFM) with special reference to electron microscopy (SEM, FESEM and HRTEM)

Lecture 46 - Introduction to microscopy (Optical, AFM) with special reference to electron microscopy (SEM, FESEM and HRTEM) (Continued...)

Lecture 47 - Introduction to microscopy (Optical, AFM) with special reference to electron microscopy (SEM, FESEM and HRTEM) (Continued...)

Lecture 48 - Introduction to microscopy (Optical, AFM) with special reference to electron microscopy (SEM, FESEM and HRTEM) (Continued...)

Lecture 49 - Introduction to microscopy (Optical, AFM) with special reference to electron microscopy (SEM, FESEM and HRTEM) (Continued...)

Lecture 50 - Applications of microscopy in polymers, elastomers and composites

Lecture 51 - Applications of microscopy in polymers, elastomers and composites (Continued...)

Lecture 52 - Practical demonstration on optical microscopy

Lecture 53 - Practical demonstration on atomic force microscopy (AFM)

Lecture 54 - Practical demonstration on image processing using standard software (Image)

Lecture 55 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances

Lecture 56 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances (Continued...)

Lecture 57 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances (Continued...)

Lecture 58 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances (Continued...)

Lecture 59 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances (Continued...)

Lecture 60 - Chromatography, DETA, Quantification from Rate Dependent Methods, Reverse Engineering and Recent Advances (Continued...)

NPTEL : NOC:Matlab-Based Programming Lab in Chemical Engineering (Chemical Engineering)

Co-ordinators : Prof. Parag A. Deshpande

Lecture 1 - Motivation for the Lab Course

Lecture 2 - Analysis of the Need of Computers in Process Industries

Lecture 3 - Analysis of the Need of Computers in Process Industries (Continued...)

Lecture 4 - Discussion on Computational Tools available to Chemical Engineers

Lecture 5 - Analysis and Comparison of different Programming Languages

Lecture 6 - MATLAB Primer - Basic Features

Lecture 7 - MALTAB Primer - Writing Codes

Lecture 8 - MATLAB Primer - Coding (Continued...)

Lecture 9 - MATLAB Primer - Coding (Continued...)

Lecture 10 - MATLAB Primer - Plotting and Presentation of Results

Lecture 11 - LAB 1 - Analysis of Frictional Losses in Pipe Flows Problem Definition and Analysis

Lecture 12 - LAB 1 - Analysis of Frictional Losses in Pipe Flows Theory and Solution Strategy

Lecture 13 - LAB 1 - Analysis of Frictional Losses in Pipe Flows Solution of the Problem under ...

Lecture 14 - LAB 1 - Analysis of Frictional Losses in Pipe Flows Solution of the Problem under ...

Lecture 15 - LAB 1 - Analysis of Frictional Losses in Pipe Flows Presentation and Interpretation ...

Lecture 16 - LAB 2 - Steady-state Operation of a Diabatic CSTR Problem Definition and Analysis

Lecture 17 - LAB 2 - Steady-state Operation of a Diabatic CSTR Theory and Solution Strategy

Lecture 18 - LAB 2 - Steady-state Operation of a Diabatic CSTR Solution of the Problem under ...

Lecture 19 - LAB 2 - Steady-state Operation of a Diabatic CSTR Solution of the Problem under ...

Lecture 20 - LAB 2 - Steady-state Operation of a Diabatic CSTR Analysis and Presentation ...

Lecture 21 - LAB 3 - Analysis of multicomponent distillation Problem definition and analysis

Lecture 22 - LAB 3 - Analysis of Multicomponent Distillation Theory and Solution Strategy

Lecture 23 - LAB 3 - Analysis of Multicomponent Distillation Solution of the Problem under Various ...

Lecture 24 - LAB 3 - Analysis of Multicomponent Distillation Solution of the Problem under Various ...

Lecture 25 - LAB 3 - Analysis of Multicomponent Distillation Presentation and Analysis of Results

Lecture 26 - LAB 4 - Analysis of Cooling of a Solid Body in a Reservoir Problem Definition ...

Lecture 27 - LAB 4 - Analysis of Cooling of a Solid Body in a Reservoir Theory and Solution ...

Lecture 28 - LAB 4 - Analysis of Cooling of a Solid Body in a Reservoir Solution of the Problem ...

Lecture 29 - LAB 4 - Analysis of Cooling of a Solid Body in a Reservoir Solution of the Problem ...

Lecture 30 - LAB 4 - Analysis of cooling of a solid body in a reservoir Presentation ...

Lecture 31 - LAB 5 - Analysis of unsteady-state operation of cascade CSTR's Problem Definition ...

Lecture 32 - LAB 5 - Analysis of unsteady-state operation of cascade CSTR's Theory and Solution ...

Lecture 33 - LAB 5 - Analysis of unsteady-state operation of cascade CSTR's Solution of the Problem

Lecture 34 - LAB 5 - Analysis of unsteady-state operation of cascade CSTR's Solution of the problem

Lecture 35 - LAB 5 - Analysis of unsteady-state operation of cascade CSTR's Presentation ...

Lecture 36 - LAB 6 - Analysis of Steady-state Heat Conduction in a 1-D rod

Lecture 37 - LAB 6 - Analysis of Steady-state Heat Conduction in a 1-D rod

Lecture 38 - LAB 6 - Analysis of steady-state Heat Conduction in a 1-D rod

Lecture 39 - LAB 6 - Analysis of steady-state Heat Conduction in a 1-D rod

Lecture 40 - LAB 6 - Analysis of steady-state Heat Conduction in a 1-D rod

Lecture 41 - LAB 7 - Reaction-diffusion in a spherical catalyst pallet Problem definition and ...

Lecture 42 - LAB 7 - Reaction-diffusion in a spherical catalyst pallet Theory and solution strategy

Lecture 43 - LAB 7 - Reaction-diffusion in a spherical catalyst pallet Solution of the problem ...

Lecture 44 - LAB 7 - Reaction-diffusion in a spherical catalyst pallet Solution of the problem ...

Lecture 45 - LAB 7 - Reaction-diffusion in a spherical catalyst pallet Analysis and interpretation ...

Lecture 46 - LAB 8 - Heat conduction in higher dimensions Problem definition and analysis

Lecture 47 - LAB 8 - Heat conduction in higher dimensions Background theory and solution strategy

Lecture 48 - LAB 8 - Heat conduction in higher dimensions Problem solution

Lecture 49 - LAB 8 - Heat conduction in higher dimensions Problem solution (Continued...)

Lecture 50 - LAB 8 - Heat conduction in higher dimensions Problem solution and analysis

Lecture 51 - LAB 9 - Process economics and optimisation Problem definition and analysis

Lecture 52 - LAB 9 - Process economics and optimisation Theory and solution strategy

Lecture 53 - LAB 9 - Process economics and optimisation Solution of the problem

Lecture 54 - LAB 9 - Process economics and optimisation Solution of the problem (Continued...)

Lecture 55 - LAB 9 - Process economics and optimisation Solution of the problem and analysis of ...

Lecture 56 - LAB 10 - Regression and curve - fitting of data Problem definition and analysis

Lecture 57 - LAB 10 - Regression and curve - fitting of data Background theory and solution strategy

Lecture 58 - LAB 10 - Regression and curve - fitting of data Problem solution

Lecture 59 - LAB 10 - Regression and curve - fitting of data Problem solution (Continued...)

Lecture 60 - Review of the course

NPTEL : NOC:Petroleum Technology (Chemical Engineering)

Co-ordinators : Dr. Sonali Sengupta

Lecture 1 - What is Petroleum How it is stored under the earth Exploration of petroleum underground

Lecture 2 - Concept of Seismic Reflection, Introduction to Drilling

Lecture 3 - Drilling Mud and Mechanisms of Recovery of Petroleum

Lecture 4 - Composition of Crude Petroleum and Evaluation of Oil Stocks

Lecture 5 - Evaluation of Oil Stocks: Vaporization Characteristics

Lecture 6 - Primary Processing of Crude Oil: Desalting

Lecture 7 - Primary Processing of Crude Oil: Atmospheric Distillation Unit (ADU)

Lecture 8 - Primary Processing of Crude Oil: Reflux Systems, Vacuum Distillation Unit (VDU)

Lecture 9 - Products and Process Utilities in Primary Processing, Pipe Still Heater

Lecture 10 - Refinery Units

Lecture 11 - Secondary Processing: Decomposition of Residues: Thermal Cracking

Lecture 12 - Coking, Gasification and Steam Cracking

Lecture 13 - Secondary Processing: Decomposition of Residues: Hydrocracking

Lecture 14 - Secondary Processing: Decomposition of Residues: Catalytic Cracking

Lecture 15 - Secondary Processing: Decomposition of Residues: Process description of FCC

Lecture 16 - Properties and Testing of Petroleum Products

Lecture 17 - Properties and Testing of Petroleum Products (Continued...)

Lecture 18 - Properties and Testing of Petroleum Products (Continued...)

Lecture 19 - Properties and Testing of Petroleum Products (Continued...)

Lecture 20 - Properties and Testing of Petroleum Products (Continued...)

Lecture 21 - Petroleum fractions from distillation units

Lecture 22 - Petroleum fractions from distillation units (Continued...)

Lecture 23 - Petroleum fractions from distillation units (Continued...)

Lecture 24 - Petroleum fractions from distillation units (Continued...)

Lecture 25 - Petroleum fractions from distillation units (Continued...)

Lecture 26 - Upgradation of straight run cuts from atmospheric distillation unit

Lecture 27 - Upgradation of straight run cuts from atmospheric distillation unit (Continued...)

Lecture 28 - Upgradation of straight run cuts from atmospheric distillation unit (Continued...)

Lecture 29 - Upgradation of straight run cuts from atmospheric distillation unit (Continued...)

Lecture 30 - Upgradation of straight run cuts from distillation unit

Lecture 31 - Purification processes

Lecture 32 - Purification processes (Continued...)

Lecture 33 - Bitumen preparation processes

Lecture 34 - Grease: preparation, description and application

Lecture 35 - Emission control and effluent treatment in refinery

Lecture 36 - Fundamentals of thermochemistry: Combustion

Lecture 37 - Fundamentals of thermochemistry: Flame

Lecture 38 - Fundamentals of thermochemistry: Adiabatic flame temperature

Lecture 39 - Fundamentals of thermochemistry: Burner

Lecture 40 - Fundamentals of thermochemistry: Internal Combustion engine

NPTEL : NOC:Rheology and Processing of Paints, Plastic and Elastomer Based Composites (Chemical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Basic Introduction to Polymer

Lecture 2 - Structure Process Correlation

Lecture 3 - Basic Rheology

Lecture 4 - Classification of Fluids

Lecture 5 - Flow of Liquids Through Various Channels - 1

Lecture 6 - Flow of Liquids Through Various Channels - 2

Lecture 7 - Flow of Liquids Through Various Channels - 3

Lecture 8 - Introduction to Viscometers and Rheometers

Lecture 9 - Ostwald Viscometer, Brookfield Viscometer, Falling Piston Viscometers

Lecture 10 - ODR, MDR, RPA, PPR

Lecture 11 - DMA -In-Light of rheology

Lecture 12 - Master Curve and its Implications

Lecture 13 - Capillary Rheometer

Lecture 14 - Introduction to Paints and importance of rheology in paints

Lecture 15 - Rheology of paints - 1

Lecture 16 - Rheology of paints - 2

Lecture 17 - Rheology of Adhesives and Sealants

Lecture 18 - Rheology of Fiber and Plastics

Lecture 19 - Practical demonstration on Brookfield viscometer and Oswald viscometer

Lecture 20 - Practical demonstration on Mooney viscometer, ODR and MDR

Lecture 21 - Practical demonstration on RPA

Lecture 22 - Practical demonstration on PPR and DMA

Lecture 23 - Practical demonstration on Capillary Rheometer

Lecture 24 - Numeriacal Problems related to basic rhelogy

Lecture 25 - Importance of compounding and introduction to various compounding ingredients

Lecture 26 - Properties and role of various compounding ingredients

Lecture 27 - Surface treatment of reinforcing elements

Lecture 28 - Rhelogy of Elastomers

Lecture 29 - Importance of die swell (correlating with normal force differences)

Lecture 30 - Melt Fracture and other ectrudate instabilities

Lecture 31 - Introduction to plastic and rubber mixing and blending

Lecture 32 - Various mixing equipment and their importance

Lecture 33 - Introduction to Two-Roll Mill and Mixing on Two - Roll Mill 1

Lecture 34 - Introduction to Two-Roll Mill and Mixing on Two - Roll Mill 2

Lecture 35 - Introduction to Internel mixture Kneaders and Mixing using Internel mixture and Kneaders

Lecture 36 - Practical demonstration of Rubber mixing on a two roll and using an internal mixer

Lecture 37 - Molding Techniques

Lecture 38 - Calendering

Lecture 39 - Extrusion

Lecture 40 - Rheology of Injection moulding process

Lecture 41 - Plastic and fiber-related processing

Lecture 42 - Numerical problems related to various processing techniques

Lecture 43 - Wire coating, Garvey die, Profile Extrusion

Lecture 44 - Introduction to FEA based computationalfluid mechanics on extrusion - 1

Lecture 45 - Introduction to FEA based computationalfluid mechanics on extrusion - 2

Lecture 46 - Introduction to FEA based computationalfluid mechanics on extrusion - 3

Lecture 47 - Practical demonstartion on FEA

Lecture 48 - Concluding remarks and commentson applied rheology for advanced learners

NPTEL : NOC:Petroleum Formation Evaluation (Chemical Engineering)

Co-ordinators : Dr. Neetish Kumar Maurya, Dr. Sayantan Ghosh

Lecture 1 - Petroleum Formation Evaluation

Lecture 2 - Mud Logging

Lecture 3 - Mud Logging (Continued...)

Lecture 4 - Coring Operations

Lecture 5 - Coring Operations (Continued...)

Lecture 6 - Wireline Logging

Lecture 7 - Resistivity Log

Lecture 8 - Resistivity Log (Continued...)

Lecture 9 - Resistivity Log (Continued...)

Lecture 10 - Resistivity Log (Continued...)

Lecture 11 - Resistivity Log (Continued...)

Lecture 12 - Resistivity Log (Continued...)

Lecture 13 - Resistivity Log (Continued...)

Lecture 14 - Resistivity Log (Continued...)

Lecture 15 - Resistivity Log (Continued...)

Lecture 16 - Spontaneous Potential Log

Lecture 17 - Spontaneous Potential Log (Continued...)

Lecture 18 - Petrophysical Model

Lecture 19 - Petrophysical Model (Continued...)

Lecture 20 - Gamma Ray Log

Lecture 21 - Gamma Ray Log (Continued...)

Lecture 22 - Gamma Ray Log (Continued...)

Lecture 23 - Caliper Log

Lecture 24 - Porosity Logs

Lecture 25 - Density Porosity Log

Lecture 26 - Density Porosity Log (Continued...)

Lecture 27 - Density Porosity Log (Continued...)

Lecture 28 - Density Porosity Log (Continued...)

Lecture 29 - Density Porosity Log (Continued...)

Lecture 30 - Neutron Porosity Log

Lecture 31 - Neutron Porosity Log (Continued...)

Lecture 32 - Neutron Porosity Log (Continued...)

Lecture 33 - Neutron Porosity Log (Continued...)

Lecture 34 - Neutron Porosity Log (Continued...)

Lecture 35 - Sonic (Acoustic) Porosity Log

Lecture 36 - Sonic Porosity Log (Continued...)

Lecture 37 - Sonic Porosity Log (Continued...)

Lecture 38 - Sonic Porosity Log (Continued...)

Lecture 39 - Sonic Porosity Log (Continued...)

Lecture 40 - NMR Log

Lecture 41 - NMR Log (Continued...)

Lecture 42 - Well Log interpretation

Lecture 43 - Well Log interpretation (Continued...)

Lecture 44 - Well Log interpretation (Continued...)

Lecture 45 - Well Log interpretation (Continued...)

Lecture 46 - Well Log Interpretation (Continued...)

Lecture 47 - Well Log Interpretation (Continued...)

Lecture 48 - Well Log Interpretation (Continued...)

Lecture 49 - Well Log Interpretation (Continued...)

Lecture 50 - Well Log Interpretation (Continued...)

Lecture 51 - Formation Evalution (well log analysis) Practical

Lecture 52 - Formation tops and Core Data

Lecture 53 - Formation Temperature and Shaliness

Lecture 54 - Formation porosity and Water Saturation

Lecture 55 - Permeability and Effective Porosity

Lecture 56 - Determination of Archie Equation Parameters

Lecture 57 - Lithology Determination

Lecture 58 - Net Pay and Well Diagram

Lecture 59 - Rock Typing

Lecture 60 - Miscellaneous Topics

NPTEL : NOC:Momentum Transfer in Fluids (Chemical Engineering)

Co-ordinators : Prof. Somenath Ganguly, Prof. Sunando DasGupta

Lecture 1 - Introduction and Basic Concepts

Lecture 2 - Elementary Framework

Lecture 3 - Elementary Framework (Continued...)

Lecture 4 - Elementary Framework (Continued...)

Lecture 5 - Elementary Framework (Continued...)

Lecture 6 - Shell Momentum Balance - 1

Lecture 7 - Shell Momentum Balance - 2

Lecture 8 - Shell Momentum Balance - 3

Lecture 9 - Shell Momentum Balance - 4

Lecture 10 - Limitations and General Approach - Continuity Equation

Lecture 11 - Elements of Inviscid Flow

Lecture 12 - Elements of Inviscid Flow (Continued...)

Lecture 13 - Elements of Inviscid Flow (Continued...)

Lecture 14 - Elements of Inviscid Flow (Continued...)

Lecture 15 - Elements of Inviscid Flow (Continued...)

Lecture 16 - Equations of Motion - Conceptual Derivation of NS Equations

Lecture 17 - Use of NS Equation for Solving Previous Problems

Lecture 18 - Equations of Motion and Applications - 1

Lecture 19 - Equations of Motion and Applications - 2

Lecture 20 - Equations of Motion and Applications - 3

Lecture 21 - Motion of fluid particles

Lecture 22 - Motion of fluid particles (Continued...)

Lecture 23 - Motion of fluid particles (Continued...)

Lecture 24 - Stream Function and Potential Function

Lecture 25 - Stream Function and Potential Function (Continued...)

Lecture 26 - Equations of Motion and Applications - 4

Lecture 27 - Equations of Motion and Applications - 5

Lecture 28 - Basic Equations in Integral Form - 1

Lecture 29 - Basic Equations in Integral Form - 2

Lecture 30 - Basic Equations in Integral Form - 3

Lecture 31 - Complex Potential

Lecture 32 - Complex Potential (Continued...)

Lecture 33 - Complex Potential (Continued...)

Lecture 34 - Complex Potential (Continued...)

Lecture 35 - Complex Potential (Continued...)

Lecture 36 - Basic Equations in Integral Form - 4

Lecture 37 - Basic Equations in Integral Form - 5

Lecture 38 - Basic Equations in Integral Form - 6

Lecture 39 - Bernoulli's Equation Fundamentals - 1

Lecture 40 - Bernoulli's Equation Fundamentals - 2

Lecture 41 - Elements of Fluid Statics and Associated Problems

Lecture 42 - Elements of Fluid Statics and Associated Problems (Continued...)

Lecture 43 - Elements of Fluid Statics and Associated Problems (Continued...)

Lecture 44 - Dimensional Analysis and Similitude

Lecture 45 - Dimensional Analysis and Similitude (Continued...)

Lecture 46 - Bernoulli's Equation Application - 1

Lecture 47 - Bernoulli's Equation Application - 2

Lecture 48 - Bernoulli's Equation Application - 3

Lecture 49 - Bernoulli's Equation Application - 4

Lecture 50 - Bernoulli's Equation Application - 5

Lecture 51 - Bernoulli's Equation Application - 6

Lecture 52 - Flow meters

Lecture 53 - Pumps

Lecture 54 - Recap of Fluid Dynamics

Lecture 55 - Cavitation and Net Positive Suction Head

Lecture 56 - Flow Metaring and Associated Problems

Lecture 57 - Flow Metaring and Associated Problems (Continued...)

Lecture 58 - Flow Metaring and Associated Problems (Continued...)

Lecture 59 - Turbulence

Lecture 60 - Flow Through Porous Media

NPTEL : NOC:Enhanced Oil Recovery Techniques (Chemical Engineering)

Co-ordinators : Prof. Ajay Mandal

Lecture 1 - Principles of Enhanced Oil Recovery (EOR); Difference of Tertiary recovery

Lecture 2 - Pressure maintenance and Well Patterns

Lecture 3 - Need for EOR and Screening Methods

Lecture 4 - Sweep and Displacement Efficiencies

Lecture 5 - Fundamental of immiscible fluid displacement processes

Lecture 6 - Buckley Leverette Theorem for one dimensional immiscible displacement

Lecture 7 - Welge Method for Oil Recovery Calculation

Lecture 8 - Effects of verious parameters on recovery by water flood

Lecture 9 - Chemical Enhanced Oil Recovery Methods

Lecture 10 - Enhanced Oil Recovery by Polymer Flooding - I

Lecture 11 - Enhanced Oil Recovery by Polymer Flooding - II

Lecture 12 - Enhanced Oil Recovery by Polymer Flooding - III

Lecture 13 - Oil Recovery by Polymer Flooding: Lab Study and Recovery Calculations

Lecture 14 - Surfactant Flooding: Properties of Surfactants

Lecture 15 - Surfactant Flooding for Enhanced Oil recovery - I

Lecture 16 - Surfactant Flooding for Enhanced Oil recovery - II

Lecture 17 - Phase Behaviour of Surfactant Stabilized Microemulsions

Lecture 18 - Surfactant Flooding and Screening Criteria

Lecture 19 - Micellar - Polymer Flooding

Lecture 20 - Microemulsion Flooding

Lecture 21 - Nanoemulsion and Pickering Emulsion for EOR

Lecture 22 - Alkali Flooding for EOR and Monitoring of Chemical Flooding

Lecture 23 - Foam Flooding for EOR

Lecture 24 - Introduction to Miscible Flooding, Thermodynamics of miscibility

Lecture 25 - Thermodynamics of miscibility and Mechanisms of Miscible Displacement

Lecture 26 - Minimum Miscibility Pressure (MMP)

Lecture 27 - Mechanisms of Miscible flooding

Lecture 28 - Enriched Gas Injection/Condensing Gas Drive

Lecture 29 - CO_2 Sequestration, utilisation and storage

Lecture 30 - Mechanisms of CO_2 Miscible flooding

Lecture 31 - Immiscible flooding Mechanisms of CO_2

Lecture 32 - Thermal Oil Recovery Methods

Lecture 33 - Mechanisms of Thermal Oil Recovery

Lecture 34 - Thermal Oil Recovery: Hot Water and Steam flooding

Lecture 35 - Steam Flooding for EOR

Lecture 36 - Steam Assisted Gravity Drainage and Hybrid Steam Injection

Lecture 37 - Thermal Oil Recovery-In-Situ Combustion

Lecture 38 - Air Requirement in In-situ Combustion

Lecture 39 - Electromagnetic heating and Ultrasonication for Enhanced Oil Recovery

Lecture 40 - Low salinity water flooding

Lecture 41 - Low salinity water flooding (Continued...)

Lecture 42 - Low salinity water flooding (Continued...)

Lecture 43 - Low salinity water flooding (Continued...)

Lecture 44 - Low salinity water flooding in Carbonate Reservoir - Smart Water Flooding

Lecture 45 - Nanotechnology based EOR

Lecture 46 - Nanotechnology based EOR (Continued...)

Lecture 47 - Microbial Enhanced Oil Recovery

Lecture 48 - Carbonated water injection (CWI) for EOR

Lecture 49 - Plasma pulse technology and Exothermic Chemical Treatment (ECT) in EOR

Lecture 50 - Enhanced Gas Recoveries

Lecture 51 - Water Shutoff and Profile Modification

Lecture 52 - Reservoir Simulation Studies for Enhanced Oil Recovery

Lecture 53 - Introduction to Artificial Intelligence and Machine Learning in EOR

Lecture 54 - Techno-economic feasibility analysis

Lecture 55 - Review of Classes

Lecture 56 - Review of Classes (Continued...)

Lecture 57 - Review of Classes (Continued...)

Lecture 58 - Case Studies of EOR Methods

Lecture 59 - Case Studies of EOR Methods (Continued...)

Lecture 60 - Role of Petroleum Engineering for design and operation of EOR Methods

NPTEL : NOC:Adsorption Science and Technology: Fundamentals and Applications (Chemical Engineering)

Co-ordinators : Prof. Sourav Mondal

Lecture 1 - Background of Adsorption

Lecture 2 - Adsorbents

Lecture 3 - Key Features of Adsorption, Thermodynamic Background

Lecture 4 - Adsorption Isotherm

Lecture 5 - Langmuir Isotherm

Lecture 6 - Multicomponent Langmuir and Other Isotherms

Lecture 7 - Other Important Isotherms (Continued...)

Lecture 8 - Equilibrium Modelling - I

Lecture 9 - Equilibrium Modelling - II

Lecture 10 - Adsorption Kinetics

Lecture 11 - BET Analysis

Lecture 12 - Gas Sorption

Lecture 13 - Surface Area Calculations

Lecture 14 - Pore Size Analysis

Lecture 15 - Limitations of BET Analysis

Lecture 16 - Adsorption and Diffusion Models

Lecture 17 - Film Diffusion

Lecture 18 - Linear Driving Force Model

Lecture 19 - Intraparticle Adsorption Diffusion Model

Lecture 20 - Slurry Adsorption

Lecture 21 - Fixed Bed Adsorption

Lecture 22 - Mass Transfer Zone Modelling

Lecture 23 - Fixed Bed Design: Thomas Model

Lecture 24 - Fixed Bed Design: Adams-Bohart and Other Models

Lecture 25 - Fixed Bed Design: Constant Pattern Behaviour

Lecture 26 - Fixed Bed Design: Multi-Scale Model

Lecture 27 - Fixed Bed Adsorption: Illustrative Problems

Lecture 28 - Introduction to Pressure Swing Adsorption (PSA)

Lecture 29 - Modelling PSA Systems

Lecture 30 - Design of Medical Grade Oxygen Concentrator

Lecture 31 - Introduction to Chromatography

Lecture 32 - Chromatography: Principles

Lecture 33 - Column Chromatography

Lecture 34 - Chromatography: Illustrative Problems 1

Lecture 35 - Chromatography: Illustrative Problems 2

Lecture 36 - Ion Exchange: Principles

Lecture 37 - Ion Exchange Adsorbents

Lecture 38 - Ion Exchange: Illustrative Problem

Lecture 39 - Ion Exchange Cycle

Lecture 40 - Ion Exchange Cycle: Illustrative Problem

NPTEL : Chemical Engineering Thermodynamics (Chemical Engineering)

Co-ordinators : Prof. M.S. Ananth

Lecture 1 - Thermodynamics and the Chemical Industry

Lecture 2 - James Prescot Joule and the first law

Lecture 3 - Sadi Carnot and the second law

Lecture 4 - Equilibrium and Extrema in work

Lecture 5 - Illustrative Calculations - I

Lecture 6 - Properties of pure substances

Lecture 7 - The p-h chart

Lecture 8 - Work calculation

Lecture 9 - Illustrative Calculations - II

Lecture 10 - Heat-Work Interconversion Devices

Lecture 11 - Refrigeration / Thermodynamics of mixtures

Lecture 12 - The Gibbs Duhem equation

Lecture 13 - Models for Excess Gibbs Free Energy

Lecture 14 - Van Laar model

Lecture 15 - Gaseous and liquid mixtures

Lecture 16 - Separation Work / Equations of state

Lecture 17 - Chemical potentials in gas and condensed phases

Lecture 18 - Vapour Liquid Equilibria - I

Lecture 19 - Vapour Liquid Equilibria - II

Lecture 20 - Solvent-Solvent mixtures

Lecture 21 - Solvent-Solute mixtures

Lecture 22 - Liquid-liquid equilibria

Lecture 23 - An industrial example

Lecture 24 - Liquid-liquid equilibria / Reaction Equilibria

Lecture 25 - Reaction Equilibria

Lecture 26 - Illustrative Examples - I

Lecture 27 - Illustrative Examples - II

Lecture 28 - Illustrative Examples - III

Lecture 29 - Simultaneous Relations

Lecture 30 - Thermodynamic Consistency / Reverse Osmosis

Lecture 31 - Miscellaneous topics in phase equilibria

Lecture 32 - Absorption Refrigeration

Lecture 33 - Summary of Classical Thermodynamics

Lecture 34 - Molecular basis of Thermodynamics - I

Lecture 35 - Molecular basis of Thermodynamics - II

NPTEL : Computational Fluid Dynamics (Chemical Engineering)

Co-ordinators : Prof. Sreenivas Jayanti

Lecture 1 - Motivation for CFD and Introduction to the CFD approach

Lecture 2 - Illustration of the CFD approach through a worked out example

Lecture 3 - Eulerian approach, Conservation Equation, Derivation of Mass Conservation Equation and Statement of the momentum conservation equation

Lecture 4 - Forces acting on a control volume; Stress tensor; Derivation of the momentum conservation equation ; Closure problem; Deformation of a fluid element in fluid flow

Lecture 5 - Kinematics of deformation in fluid flow; Stress vs strain rate relation; Derivation of the Navier-Stokes equations

Lecture 6 - Equations governing flow of incompressible flow; Initial and boundary conditions; Wellposedness of a fluid flow problem

Lecture 7 - Equations for some simple cases; Generic scalar transport equation form of the governing equations; Outline of the approach to the solution of the N-S equations.

Lecture 8 - cut out the first 30s; Spatial discretization of a simple flow domain; Taylorâ€™s series expansion and the basis of finite difference approximation of a derivative; Central and one-sided difference approximations; Order of accuracy of finite difference ap

Lecture 9 - Finite difference approximation of pth order of accuracy for qth order derivative; cross -derivatives; Examples of high order accurate formulae for several derivatives

Lecture 10 - One -sided high order accurate approximations; Explicit and implicit formulations for the time derivatives

Lecture 11 - Numerical solution of the unsteady advection equation using different finite difference approximations

Lecture 12 - Need for analysis of a discretization scheme; Concepts of consistency, stability and convergence and the equivalence theorem of Lax ; Analysis for consistency

Lecture 13 - Statement of the stability problem; von Neumann stability analysis of the first order wave equation

Lecture 14 - Consistency and stability analysis of the unsteady diffusion equation; Analysis for two- and three -dimensional cases; Stability of implicit schemes

Lecture 15 - Interpretation of the stability condition; Stability analysis of the generic scalar equation and the concept of upwinding ; Diffusive and dissipative errors in numerical solution; Introduction to the concept of TVD schemes

Lecture 16 - Template for the generic scalar transport equation and its extension to the solution of Navier-Stokes equa tions for a compressible flow.

Lecture 17 - Illustration of application of the template using the MacCormack scheme for a three-dimensional compressible flow

Lecture 18 - Stability limits of MacCormack scheme; Limitations in extending compressible flow schemes to incompre ssible flows ; Difficulty of evaluation of pressure in incompressible flows and listing of various approaches

Lecture 19 - Artificial compressibility method and the streamfunction-vorticity method for the solution of NS equations and their limitations

Lecture 20 - Pressur e equation method for the solution of NS equations

Lecture 21 - Pressure-correction approach to the solution of NS equations on a staggered grid; SIMPLE and its family of methods

Lecture 22 - Need for effici ent solution of linear algebraic equations; Classification of approaches for the solution of linear algebraic equations.

Lecture 23 - Direct methods for linear algebraic equations; Gaussian elimination method

Lecture 24 - Gauss-Jordan method; LU decomposition method; TDMA and Thomas algorithm

Lecture 25 - Basic iterative methods for linear algebraic equations: Description of point -Jacobi, Gauss-Seidel and SOR methods

Lecture 26 - Convergence analysis of basic iterative schemes; Diagonal dominance condition for convergence; Influence of source terms on the diagonal dominance condition; Rate of convergence

Lecture 27 - Application to the Laplace equation

Lecture 28 - Advanced iterative methods: Alternating Direction Implicit Method; Operator splitting

Lecture 29 - Advanced iterative methods; Strongly Implicit Proc edure; Conjugate gradient method; Multigrid method

Lecture 30 - Illustration of the Multigrid method for the Laplace equation

Lecture 31 - Overview of the approach of numerical solution of NS equations for simple domains; Introduction to complexity arising from physics and geometry

Lecture 32 - Derivation of the energy conservation equation

Lecture 33 - Derivation of the species conservation equation; dealing with chemical reactions

Lecture 34 - Turbulence; Characteri stics of turbulent flow; Dealing with fluctuations and the concept of time-averaging

Lecture 35 - Derivation of the Reynolds -averaged Navier -Stokes equations; identification of the closure problem of turbulence; Boussinesq hypothesis and eddy viscosity

Lecture 36 - Reynol ds stresses in turbulent flow; Time and length scales of turbulence; Energy cascade; Mixing length model for eddy viscosity

Lecture 37 - One-equation model for turbulent flow

Lecture 38 - Two -equation model for turbulent flow; Numerical calculation of turbulent reacting flows

Lecture 39 - Calculation of near-wall region in turbulent flow; wall function approach; near-wall turbulence models

Lecture 40 - Need for special methods for dealing with irregular flow geometry; Outline of the Body-fitted grid approach ; Coordinate transformation to a general, 3-D curvilinear system

Lecture 41 - Transformation of the governing equations; Illustration for the Laplace equation; Appearance and significance of cross - derivative terms; Concepts of structured and unstructured grids.

Lecture 42 - Finite vol ume method for complicated flow domain; Illustration for the case of flow through a duct of triangular cross - section.

Lecture 43 - Finite volume method for the general case

Lecture 44 - Generation of a structured grid for irregular flow domain; Algebraic methods; Elliptic grid generation method

Lecture 45 - Unstructured grid generation; Domain nodalization; Advancing front method for triangulation

Lecture 46 - Delaunay triangulation method for unstructured grid generation

Lecture 47 - Co -located grid approach for irregular geometries; Pressure correction equation for a co -located structured grid; Pressure correction equation for a co-located unstructured grid.

NPTEL : Computational Techniques (Chemical Engineering)

Co-ordinators : Dr. Niket S. Kaisare

Lecture 1 - Introduction

Lecture 2 - Computational and Error Analysis

Lecture 3 - Linear Equations - Part 1

Lecture 4 - Linear Equations - Part 2

Lecture 5 - Linear Equations - Part 3

Lecture 6 - Linear Equations - Part 4

Lecture 7 - Linear Equations - Part 5

Lecture 8 - Linear Equations - Part 6

Lecture 9 - Non Linear Algebraic Equations - Part 1

Lecture 10 - Non Linear Algebraic Equations - Part 2

Lecture 11 - Non Linear Algebraic Equations - Part 3

Lecture 12 - Non Linear Algebraic Equations - Part 4

Lecture 13 - Non Linear Algebraic Equations - Part 5

Lecture 14 - Non Linear Algebraic Equations - Part 6

Lecture 15 - Regression and Interpolation - Part 1

Lecture 16 - Regression and Interpolation - Part 2

Lecture 17 - Regression and Interpolation - Part 3

Lecture 18 - Regression and Interpolation - Part 4

Lecture 19 - Regression and Interpolation - Part 5

Lecture 20 - Differentiation and Integration - Part 1

Lecture 21 - Differentiation and Integration - Part 2

Lecture 22 - Differentiation and Integration - Part 3

Lecture 23 - Differentiation and Integration - Part 4

Lecture 24 - Differentiation and Integration - Part 5

Lecture 25 - Ordinary Differential Equations (initial value problems) - Part 1

Lecture 26 - Ordinary Differential Equations (initial value problems) - Part 2

Lecture 27 - Ordinary Differential Equations (initial value problems) - Part 3

Lecture 28 - Ordinary Differential Equations (initial value problems) - Part 4

Lecture 29 - Ordinary Differential Equations (initial value problems) - Part 5

Lecture 30 - Ordinary Differential Equations (initial value problems) - Part 6

Lecture 31 - Ordinary Differential Equations (initial value problems) - Part 7

Lecture 32 - Ordinary Differential Equations (initial value problems) - Part 8

Lecture 33 - Ordinary Differential Equations (initial value problems) - Part 9

Lecture 34 - Ordinary Differential Equations (boundary value problems) - Part 1

Lecture 35 - Ordinary Differential Equations (boundary value problems) - Part 2

Lecture 36 - Ordinary Differential Equations (boundary value problems) - Part 3

Lecture 37 - Partial Differential Equations - Part 1

Lecture 38 - Partial Differential Equations - Part 2

Lecture 39 - Partial Differential Equations - Part 3

Lecture 40 - Partial Differential Equations - Part 4

NPTEL : Particle Characterization (PG) (Chemical Engineering)

Co-ordinators : Dr. R. Nagarajan

Lecture 1 - Introduction: Why study particle characterization?

Lecture 2 - Introduction: Classification of particle characteristics

Lecture 3 - Morphological Characterization: Shape analysis methods

Lecture 4 - Morphological Characterization: Techniques of shape assessment

Lecture 5 - Morphological Characterization: Decision rules

Lecture 6 - Morphological Characterization: Static vs dynamic methods of size analysis

Lecture 7 - Morphological Characterization: Static methods of size analysis

Lecture 8 - Morphological Characterization: Light scattering from spherical particles

Lecture 9 - Morphological Characterization: Particle counters

Lecture 10 - Morphological Characterization: Particle size distributions

Lecture 11 - Morphological Characterization: Acoustic Attenuation Spectroscopy

Lecture 12 - Morphological Characterization: Nano-particle size analysis

Lecture 13 - Structural Characterization

Lecture 14 - Interfacial Characterization

Lecture 15 - Surface Adhesion: Forces

Lecture 16 - Surface Adhesion: Electrostatic & Surface-Tension Forces

Lecture 17 - Surface Adhesion: Adhesion Force Measurement

Lecture 18 - Particle Removal: Methods

Lecture 19 - Particle Removal: Wet Cleaning

Lecture 20 - Particle Cohesion: Forces

Lecture 21 - Particle Cohesion: Flowability Implications

Lecture 22 - Transport Properties: Diffusion & Electrostatic Field Effects

Lecture 23 - Transport Properties: Drag & Inertia

Lecture 24 - Transport Properties: Deposition Fluxes & Rates

Lecture 25 - Transport Properties: Illustrative Application

Lecture 26 - Chemical & Compositional Characterization: Reactivity

Lecture 27 - Chemical & Compositional Characterization: Analytical Methods

Lecture 28 - Chemical & Compositional Characterization: XRD & AFM

Lecture 29 - Nano-particle Characterization: Bottom-Up Synthesis Methods

Lecture 30 - Nano-particle Characterization: Top-Down Synthesis Methods

Lecture 31 - Nano-particle Characterization: Dispersion

Lecture 32 - Nano-particle Characterization: Properties & Techniques

Lecture 33 - Practical Relevance of Particle Characterization: Nano-Fluids

Lecture 34 - Practical Relevance of Particle Characterization: Filtration

Lecture 35 - Practical Relevance of Particle Characterization: Cleanrooms

Lecture 36 - Practical Relevance of Particle Characterization: High-Technology Manufacturing

Lecture 37 - Practical Relevance of Particle Characterization: Explosivity

Lecture 38 - Practical Relevance of Particle Characterization: Environment & Human Health

Lecture 39 - Practical Relevance of Particle Characterization: Other Applications

Lecture 40 - Summary

NPTEL : Statistics for Experimentalists (Chemical Engineering)

Co-ordinators : Dr. A. Kannan

Lecture 1 - Introduction

Lecture 2 - Random Variables

Lecture 3 - Discrete Probability Distributions

Lecture 4 - Example Set - I

Lecture 5 - Continuous probability distributions

Lecture 6 - Normal probability distribution

Lecture 7 - Exploratory Data Analysis - Part A

Lecture 8 - Exploratory Data Analysis - Part B

Lecture 9 - Example Set - II

Lecture 10 - Example Set - III

Lecture 11 - Random samples: Sampling distribution of the mean (Part A)

Lecture 12 - Random samples: Sampling distribution of the mean (Part B)

Lecture 13 - Point Estimation

Lecture 14 - Sampling distributions and the Central Limit Theorem

Lecture 15 - Example Set - IV Part A

Lecture 16 - Estimation of Population Parameters Using Moments

Lecture 17 - Confidence Intervals (Part A)

Lecture 18 - Confidence Intervals (Part B)

Lecture 19 - The T-distribution

Lecture 20 - Chi-square distribution

Lecture 21 - F-Distribution

Lecture 22 - Example Set - V

Lecture 23 - Hypothesis Testing - Part A

Lecture 24 - Hypothesis Testing - Part B

Lecture 25 - Hypothesis Testing - Part C

Lecture 26 - Analysis of Experiments involving Single Factor - Part A

Lecture 27 - Analysis of Experiments involving Single Factor - Part B

Lecture 28 - Blocking and Randomization

Lecture 29 - Example Set - VI - Part A

Lecture 30 - Example Set - VI - Part B

Lecture 31 - Factorial Design of Experiments - Part A

Lecture 32 - Factorial Design of Experiments - Part B: 22 Factorial Design

Lecture 33 - Fractional Factorial Design - Part A

Lecture 34 - Fractional Factorial Design - Part B

Lecture 35 - Factorial Design of Experiments: Example Set (Part A)

Lecture 36 - Factorial Design of Experiments: Example Set (Part B)

Lecture 37 - Factorial Design of Experiments: Example Set (Part C)

Lecture 38 - Regression Analysis: Part A

Lecture 39 - Regression Analysis: Part B

Lecture 40 - Hypothesis Testing in Linear Regression

Lecture 41 - Discussion on Regression Output

Lecture 42 - Regression Analysis: Example Set 8

Lecture 43 - Regression Analysis: Example Set 8 (Continued...)

Lecture 44 - Regression Analysis: Example Set 8 (Continued...)

Lecture 45 - Orthogonal Model Fitting Concepts - Part A

Lecture 46 - Orthogonal Model Fitting Concepts - Part B

Lecture 47 - Experimental Design Strategies - A

Lecture 48 - Experimental Design Strategies - B

Lecture 49 - Experimental Design Strategies - C

Lecture 50 - Response Surface Methodology - A

Lecture 51 - Response Surface Methodology - B

Lecture 52 - Optimal Designs - Part A

Lecture 53 - Optimal Designs - Part B

Lecture 54 - Statistics for Experimentalists - Summary Part A

Lecture 55 - Statistics for Experimentalists - Summary Part B

NPTEL : Multiphase flows:Analytical solutions and Stability Analysis (Chemical Engineering)

Co-ordinators : Prof. S. Pushpavanam

Lecture 1 - Introduction and overview of the course: Multiphase flows

Lecture 2 - Stratified flow in a micro channel: Velocity profiles

Lecture 3 - Stratified flow in a micro channel: Effects of physical parameters

Lecture 4 - Flow regimes in microchannels: Modeling and Experiments

Lecture 5 - Scaling Analysis: Introduction

Lecture 6 - Scaling Analysis: Worked Examples

Lecture 7 - Interfacial tension and its role in Multiphase flows

Lecture 8 - Eulerian and Lagrangian approaches

Lecture 9 - Reynolds Transport Theorem and the Equation of Continuity

Lecture 10 - Derivation of Navier-Stokes equation

Lecture 11 - Vector operations in general orthogonal coordinates: Grad., Div., Lapacian

Lecture 12 - Normal and shear stresses on arbitrary surfaces: Force balance

Lecture 13 - Normal and shear stresses on arbitrary surfaces: Stress Tensor formulation

Lecture 14 - Stresses on deforming surfaces: Introduction to Perturbation Theory

Lecture 15 - Pulsatile flow: Analytical solution

Lecture 16 - Pulsatile flow: Analytical solution and perturbation solution for Rw 1

Lecture 17 - Pulsatile flow: Perturbation solution for Rw 1

Lecture 18 - Viscous heating: Apparent viscosity in a viscometer

Lecture 19 - Domain perturbation methods: Flow between wavy walls

Lecture 20 - Flow between wavy walls: Velocity profile

Lecture 21 - Introduction to stability of dynamical systems: ODEs

Lecture 22 - Stability of distributed systems (PDEs): reaction diffusion example

Lecture 23 - Stability of a reaction-diffusion system (Continued...)

Lecture 24 - Rayleigh-Benard convection: Physics and governing equations

Lecture 25 - Rayleigh-Benard convection: Linear stability analysis - Part 1

Lecture 26 - Rayleigh-Benard convection: Linear stability analysis - Part 2

Lecture 27 - Rayleigh-Benard convection: Linear stability analysis - Part 3

Lecture 28 - Rayleigh Benard convection: Discussion of results

Lecture 29 - Rayleigh-Taylor â€˜heavy over lightâ€™ instability

Lecture 30 - Rayleigh-Taylor instability (Continued...)

Lecture 31 - Capillary jet instability: Problem formulation

Lecture 32 - Capillary jet instability: Linear stability analysis

Lecture 33 - Capillary jet instability: Rayleighâ€™s Work Principle

Lecture 34 - Tutorial Session: Solution of Assignment 4 on linear stability

Lecture 35 - Turing patterns: Instability in reaction-diffusion systems

Lecture 36 - Turing patterns: Results

Lecture 37 - Marangoni convection: Generalised tangential and normal stress boundary conditions

Lecture 38 - Marangoni convection: Stability analysis

Lecture 39 - Flow in a circular curved channel: Governing equations and scaling

Lecture 40 - Flow in a circular curved channel: Solution by regular perturbation

Lecture 41 - Stability of flow through curved channels: Problem formulation

Lecture 42 - Stability of flow through curved channels: Numerical calculation

Lecture 43 - Viscous Fingering: Darcyâ€™s law

Lecture 44 - Viscous Fingering: Stability analysis

Lecture 45 - Shallow Cavity flows

NPTEL : NOC:Introduction to Time-Frequency Analysis and Wavelet Transforms (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 1 - Introduction - Lecture 1.1 A

Lecture 2 - Introduction - Lecture 1.1 B

Lecture 3 - Introduction - Lecture 1.2 A

Lecture 4 - Introduction - Lecture 1.2 B

Lecture 5 - Basic Definitions and concepts - Lecture 2.1 (Basic Definitions and concepts - Part I)

Lecture 6 - Basic Definitions and concepts - Lecture 2.2 (Basic Definitions and concepts - Part II)

Lecture 7 - Basic Definitions and concepts - Lecture 2.3 (Basic Definitions and concepts - Part III)

Lecture 8 - A review of Fourier transforms - Lecture 3.1 (Continuous time Fourier series)

Lecture 9 - A review of Fourier transforms - Lecture 3.2 (Continuous time Fourier transform)

Lecture 10 - A review of Fourier transforms - Lecture 3.3 (Discrete time Fourier series)

Lecture 11 - A review of Fourier transforms - Lecture 3.4 (Discrete time Fourier transform)

Lecture 12 - A review of Fourier transforms - Lecture 3.5 (Properties of Fourier transforms)

Lecture 13 - A review of Fourier transforms - Lecture 3.6 (Discrete Fourier transform)

Lecture 14 - A review of Fourier transforms - MATLAB demo of Fourier transform and periodogram

Lecture 15 - Duration and Bandwidth - Duration and Bandwidth

Lecture 16 - Duration and Bandwidth - Bandwidth equation and Instantaneous frequency

Lecture 17 - Duration and Bandwidth - Instantaneous frequency and analytic signals

Lecture 18 - Duration and Bandwidth - Duration-Bandwidth principle

Lecture 19 - Duration and Bandwidth - Requirements of time-frequency anlysis techniques

Lecture 20 - Duration and Bandwidth - Requirements of time-frequency analysis and techniques

Lecture 21 - Short-time Fourier transform - Short-time Fourier transform

Lecture 22 - Short-time Fourier transform - Auxillary (MATLAB demonstration)

Lecture 23 - Short-time Fourier transform - Properties of STFT

Lecture 24 - Practical aspects of STFT

Lecture 25 - Closing Remarks

Lecture 26 - Wigner-Ville Distributions

Lecture 27 - Properties of WVD

Lecture 28 - Properties of WVD 2

Lecture 29 - Discrete WVD

Lecture 30 - Pseudo and Smoothed WVD

Lecture 31 - Cohens class and smoothed WVD

Lecture 32 - Cohens class and smoothed WVD

Lecture 33 - Cohens class and Ambiguity functions

Lecture 34 - Affine class and closing remarks

Lecture 35 - Continuous Wavelet Transform

Lecture 36 - Continuous Wavelet Transforms

Lecture 37 - Scale to Frequency

Lecture 38 - Computational aspects of CWT

Lecture 39 - Scalogram and MATLAB demonstration

Lecture 40 - Scalogram and MATLAB demonstration

Lecture 41 - Scaling function

Lecture 42 - Scaling Function

Lecture 43 - Wavelets

Lecture 44 - Wavelets

Lecture 45 - Applications of CWT

Lecture 46 - Applications of CWT

Lecture 47 - Discrete Wavelet Transform

Lecture 48 - Discrete Wavelet Transform.

Lecture 49 - Orthogonal scaling function bases and MRA

Lecture 50 - Orthogonal scaling function bases and MRA.

Lecture 51 - Wavelet Filters and Fast DWT Algorithm

Lecture 52 - Wavelet Filters and Fast DWT Algorithm (Continued...)

Lecture 53 - Wavelet Filters and Fast DWT Algorithm (Continued...)

Lecture 54 - Wavelets for DWT

Lecture 55 - Wavelets for DWT (Continued...)

Lecture 56 - Wavelets for DWT (Continued...)

Lecture 57 - DWT computation

Lecture 58 - DWT computation (Continued...)

Lecture 59 - DWT computation (Continued...)

NPTEL : Chemical Engineering Principles of CVD Processes (Chemical Engineering)

Co-ordinators : Dr. R. Nagarajan

Lecture 1 - Introduction

Lecture 2 - CVD Reactor and Process Design Fundamentals

Lecture 3 - Overview of CVD Process Fundamentals

Lecture 4 - Basics of Chemical Equilibrium Calculations and Flow Dynamics

Lecture 5 - Introduction to CVD Films

Lecture 6 - Film Structure and Properties

Lecture 7 - Pressure Effects on CVD Processes

Lecture 8 - CVD of Metals

Lecture 9 - CVD of Coatings

Lecture 10 - CVD Film Property Measurements

Lecture 11 - CVD Film Property Measurements: Qualitative and Quantitative

Lecture 12 - CVD in Tungsten Filament Lamps

Lecture 13 - CVD in Tungsten Filament Lamps: Design Aspects

Lecture 14 - CVD in Hot Corrosion

Lecture 15 - CVD Transport Phenomena: Conservation Equations

Lecture 16 - CVD Transport Phenomena: Constitutive Laws

Lecture 17 - CVD Transport Phenomena: Mass Transfer Mechanisms

Lecture 18 - CVD Transport Phenomena: Mass Transfer Analogy Condition (MTAC)

Lecture 19 - CVD Transport Phenomena: Effect of Homogeneous Reactions on MTAC

Lecture 20 - CVD Applications: Hot Filament CVD (HFCVD)

Lecture 21 - CVD Applications: Aerosol CVD (ACVD)

Lecture 22 - CVD Applications: CVD of Silicon

Lecture 23 - CVD Applications: CVD in Free-Molecular Flow Regime (FMFR)

Lecture 24 - CVD Applications: CVD of nano-Structured Films

Lecture 25 - CVD Overview

Lecture 26 - Review of CVD Basics: Part-I (PDF Lecture)

Lecture 27 - Review of CVD Basics: Part-II (PDF Lecture)

Lecture 28 - CVD Question Bank (PDF Lecture)

Lecture 29 - Basics of Nano-Structured Material Synthesis: Part-I

Lecture 30 - Basics of Nano-Structured Material Synthesis: Part-II

Lecture 31 - Undesirable CVD: Bulb-Blackening (Adobe Presenter)

Lecture 32 - Undesirable CVD: Moolten Salt Deposition in Combustion Systems (Adobe Presenter)

Lecture 33 - Undesirable CVD: Hot Corrosion (Adobe Presenter)

Lecture 34 - Multi-component Transport Fundamentals: Assumptions and Control Volumes (Adobe Presenter)

Lecture 35 - Multi-component Transport Fundamentals: Mass Conservation Equations (Adobe Presenter)

Lecture 36 - Multi-component Transport Fundamentals: Momentum and Energy Conservation (Adobe Presenter)

Lecture 37 - Multi-component Transport Fundamentals: Entropy conservation (Adobe Presenter)

Lecture 38 - Multi-component Transport Fundamentals: Constitutive Laws for Mass and Momentum (Adobe Presenter)

Lecture 39 - Multi-component Transport Fundamentals: Constitutive Laws for Energy and Entropy (Adobe Presenter)

NPTEL : Chemical Reaction Engineering 1 (Homogeneous Reactors) (Chemical Engineering)

Co-ordinators : Prof K. Krishnaiah

Lecture 1 - Motivation and Introduction - Part I

Lecture 2 - Motivation and Introduction - Part II

Lecture 3 - What is Chemical Engineering - Part I

Lecture 4 - What is Chemical Engineering - Part II

Lecture 5 - What is Chemical Reaction Engineering - Part I

Lecture 6 - What is Chemical Reaction Engineering - Part II

Lecture 7 - Homogeneous and Heterogeneous Reactions - Part I

Lecture 8 - Homogeneous and Heterogeneous Reactions - Part II

Lecture 9 - Basics of Kinetics and Contacting

Lecture 10 - Design of Batch reactors - Part I

Lecture 11 - Design of Batch reactors - Part II

Lecture 12 - Basics of Plug Flow Reactor - Part I

Lecture 13 - Basics of Plug Flow Reactor - Part II

Lecture 14 - Design of Plug Flow Reactors - Part I

Lecture 15 - Design of Plug Flow Reactors - Part II

Lecture 16 - Basics of Mixed Flow Reactors

Lecture 17 - Design of Mixed Flow Reactors

Lecture 18 - Basics of Kinetics

Lecture 19 - Kinetics of Heterogeneous reactions - Part I

Lecture 20 - Kinetics of Heterogeneous reactions - Part II

Lecture 21 - Kinetics of Heterogeneous reactions - Part III

Lecture 22 - Kinetics of Homogeneous reactions

Lecture 23 - Reaction rate for Homogeneous reactions

Lecture 24 - Gas Phase Homogeneous reactions

Lecture 25 - (Continued...) And later Reactor Design of PFR

Lecture 26 - Reactor Design for MFR and Combination of reactors

Lecture 27 - PFR and MFR in series.

Lecture 28 - Unsteady state MFR and PFR

Lecture 29 - Recycle Reactors

Lecture 30 - Recycle Reactors (Autocatalytic reactions) - Part I

Lecture 31 - Recycle Reactors (Autocatalytic reactions) - Part II

Lecture 32 - Multiple Reactions - Part I

Lecture 33 - Multiple Reactions - Part II

Lecture 34 - Multiple Reactions - Part III

Lecture 35 - Multiple Reactions - Part IV

Lecture 36 - Multiple Reactions - Part V

Lecture 37 - Multiple Reactions - Part VI

Lecture 38 - Non-Isothermal Reactors - Part I

Lecture 39 - Non-Isothermal Reactors - Part II

Lecture 40 - Non-Isothermal Reactors (Graphical Design)

Lecture 41 - Non-Isothermal Reactors contd. & Adiabatic Reactors

Lecture 42 - Non-Isothermal Reactors (Graphical Design) (Continued...)

Lecture 43 - Non-Isothermal Batch Reactors

Lecture 44 - Non-isothermal Plug Flow Reactors - Part I

Lecture 45 - Non-isothermal Plug Flow Reactors - Part II

Lecture 46 - Adiabatic Plug Flow Reactors

Lecture 47 - Non-isothermal Mixed Flow Reactors

Lecture 48 - Non-isothermal Mixed Flow Reactors (Continued...) (Multiple steady states) - Part I

Lecture 49 - Non-isothermal Mixed Flow Reactors (Continued...) (Multiple steady states) - Part II

Lecture 50 - Non-Ideal Flow and Residence Time Distributions (RTD) basics - Part I

Lecture 51 - Non-Ideal Flow and Residence Time Distributions (RTD) basics - Part II

Lecture 52 - RTD for various reactors (Continued...) Part I

Lecture 53 - RTD for various reactors (Continued...) Part II

Lecture 54 - Diagnosing the ills of equipments and Various RTD Models

Lecture 55 - Dispersion Model

Lecture 56 - Dispersion with reaction Model and Tanks in Series Model

Lecture 57 - Multi-parameter model (MFR with dead space and bypass)

Lecture 58 - Direct use of RTD to predict conversion (Macro and Micro-fluid as well as Macro & Micro-mixing Concept) Part I

Lecture 59 - Direct use of RTD to predict conversion (Macro and Micro-fluid as well as Macro & Micro-mixing Concept) Part II

Lecture 60 - Direct use of RTD to predict conversion (Macro and Micro-fluid as well as Macro & Micro-mixing Concept) Part III

NPTEL : Chemical Reaction Engineering 2 (Heterogeneous Reactors) (Chemical Engineering)

Co-ordinators : Prof K. Krishnaiah

Lecture 1 - Introduction to Kinetics (Gas solid non-catalytic reaction)

Lecture 2 - Intro to Kinetics (Continued...) for catalytic reactions in different reactors

Lecture 3 - Heterogeneous rate of reactions and different types of kinetic models for non-catalytic reactions

Lecture 4 - Basics of Kinetics of type A & B reactions (Shrinking core model & Porous particle homogeneous model)

Lecture 5 - Shrinking Core Model (Continued...)

Lecture 6 - Shrinking Core Model (Continued...)

Lecture 7 - (Continued...) & Proof of Pseudo steady state assumption

Lecture 8 - Shrinking core model (Continued...) for type D reactions

Lecture 9 - Shrinking core model (Continued...) for type D reactions (Continued...)

Lecture 10 - Reactors, Homogeneous reaction model, Design of non-catalytic gas solid reactors

Lecture 11 - Design of non-catalytic gas solid reactors (Continued...)

Lecture 12 - Design of non-catalytic gas solid reactors (Continued...)

Lecture 13 - Design equation for MF of solids, uniform gas composition, const. single particle size, Shrinking core model.

Lecture 14 - Design equation for MF of solids, mixture of particles for different sizes but unchanging size, uniform gas composition, SCM

Lecture 15 - Design equation for MF of solids with elutriation, mixture of particles of different size, uniform gas composition, SCM

Lecture 16 - General Performance equation for non-catalytic gas solid reactions

Lecture 17 - Catalytic reactions (LHHW Kinetic model)

Lecture 18 - LHHW Kinetic model (Continued...) - Part I

Lecture 19 - LHHW Kinetic model (Continued...) - Part II

Lecture 20 - Industrially important catalytic reaction models

Lecture 21 - Inter and Intraphase effectiveness fator

Lecture 22 - Interface effectiveness factor & Generalized nonisothermal effectiveness factor for external mass transfer stepÂ…

Lecture 23 - Generalized nonisothermal effectiveness factor for external mass transfer step (Continued...)

Lecture 24 - Mass transfer correlations for various reactors

Lecture 25 - Isothermal intraphase effectiveness factor - Part I

Lecture 26 - Isothermal intraphase effectiveness factor - Part II

Lecture 27 - Non-isothermal intraphase effectiveness factor

Lecture 28 - Inter and Intraphase effectiveness factor (Continued...)

Lecture 29 - Inter and Intraphase Mass transfer

Lecture 30 - Packed (fixed) bed catalytic reactor design

Lecture 31 - Graphical design of Fixed bed reactors

Lecture 32 - Packed Bed Design (Continued...)

Lecture 33 - Design equations for Packed bed reactor design

Lecture 34 - Conservative Equations for Packed bed Reactor design

Lecture 35 - Problem solving session

Lecture 36 - Fluidized Bed Reactor Design - Part I

Lecture 37 - Fluidized Bed Reactor Design - Part II

Lecture 38 - Fluidized Bed Reactor Design - Part III

Lecture 39 - Fluidized Bed Reactor Design - Part IV

Lecture 40 - Continued... (Fluidized bed reactor Models)

Lecture 41 - Continued... (Davidson Harrison model and Kunii Levenspiel model)

Lecture 42 - Continued... (Kunii Levenspiel Model)

Lecture 43 - Slurry Reactor Design

NPTEL : NOC:MATLAB Programming for Numerical Computation (Chemical Engineering)

Co-ordinators : Dr. Niket S.Kaisare

Lecture 1 - Course Introduction

Lecture 2 - Basics of Programming using MATLAB

Lecture 3 - Array Operations in MATLAB

Lecture 4 - Loops and Execution Control

Lecture 5 - Tutorial: Using Arrays

Lecture 6 - MATLAB Files -- Scripts and Functions

Lecture 7 - Plotting and Output

Lecture 8 - How to submit MATLAB Assignment

Lecture 9 - Errors in Numerical Computation

Lecture 10 - Truncation Errors and Taylors Series

Lecture 11 - Round-Off Errors; and Iterative Methods

Lecture 12 - Step-wise Methods and Error Propagation

Lecture 13 - How to get MATLAB Online access (for all enrolled students of this course)

Lecture 14 - Differentiation in Single Variable

Lecture 15 - Higher Order Differentiation Formulae

Lecture 16 - Partial Differentials (Bonus)

Lecture 17 - Numerical Integration

Lecture 18 - Multiple Applications of Integration Formulae

Lecture 19 - In-Build MATLAB Integration Functions

Lecture 20 - Basics of Linear Algebra

Lecture 21 - Gauss Elimination and Back-Substitution

Lecture 22 - LU Decomposition and Partial Pivoting

Lecture 23 - Gauss Siedel Method

Lecture 24 - (Tutorial)

Lecture 25 - Tri-Diagonal Matrix Algorithm

Lecture 26 - Nonlinear Equations in Single Variable

Lecture 27 - Using MATLAB command fzero

Lecture 28 - Fixed Point Iteration in Single Variable

Lecture 29 - Newton-Raphson (single variable)

Lecture 30 - Using MATLAB command fsolve (multi-variable)

Lecture 31 - Newton-Raphson (multi Variable)

Lecture 32 - Introduction

Lecture 33 - Linear Least Squares Regression

Lecture 34 - Nonlinear and Functional Regression

Lecture 35 - Interpolation Functions in MATLAB

Lecture 36 - Introduction and Euler\'s Method

Lecture 37 - Runge-Kutta (RK-2) method

Lecture 38 - MATLAB ode45 algorithm

Lecture 39 - Higher order Runge-Kutta Methods

Lecture 40 - Error Analysis

Lecture 41 - Multi-Variable ODE

Lecture 42 - Stiff Systems & Solution using ode15s

Lecture 43 - Method of Lines for transient PDEs

Lecture 44 - A Final Example

Lecture 45 - Tutorial: How to do linear and nonlinear regression

NPTEL : NOC:Computational Fluid Dynamics (Chemical Engineering)

Co-ordinators : Prof. Sreenivas Jayanti

Lecture 1 - Motivation

Lecture 2 - Flow in a rectangular duct: Problem formulation

Lecture 3 - Flow in a rectangular duct: Discretiztion of flow domain

Lecture 4 - Tutorial 1: Converting PDE to algebraic equation using FD approximation

Lecture 5 - Tutorial 1 (Continued...) Solution for algebraic equations using Gauss- Seidel Method

Lecture 6 - Flow in a triangular duct: Problem formulation

Lecture 7 - Flow in a triangular duct: Discretiztion of flow domain

Lecture 8 - Tutorial 2: Converting PDE to algebraic equation using Finite Volume method

Lecture 9 - Tutorial 2 (Continued...) Description of FV method and solution using G-S Method

Lecture 10 - Effect of grid spacing & upcoming course outline

Lecture 11 - Mass conservation equations

Lecture 12 - Momentum conservation equations

Lecture 13 - Forces acting on control volume

Lecture 14 - Kinematics of deformation in fluid flow

Lecture 15 - Equations governing fluid flow in incompressible fluid

Lecture 16 - Navier-Stokes equation for simple cases of flow

Lecture 17 - Energy conservation equations

Lecture 18 - Practical cases of fluid flow with heat transfer in CFD point of view

Lecture 19 - Practical cases of fluid flow with mass transfer in CFD point of view

Lecture 20 - Equations governing fluid flow with chemical reactions

Lecture 21 - Concept of wellposedness of mathematical problems

Lecture 22 - Introduction to finite difference methods

Lecture 23 - Finite difference approximation on an uniform mesh

Lecture 24 - Higher order and mixed derivatives

Lecture 25 - Solution of Poisson equation in rectangular duct-Turorial

Lecture 26 - Discretization of time domain

Lecture 27 - FD approx. on a non-uniform mesh and need of analysis of obtained discretization

Lecture 28 - Need for the analysis of discretized equation

Lecture 29 - Properties of Numerical Schemes: Accuracy, Conservation property, Boundedness, Consistency, Stability and Convergence

Lecture 30 - Properties of Numerical Schemes: Stability analysis

Lecture 31 - Tutorial on Stability Analysis

Lecture 32 - Analysis of Generic 1-d scalar transport equation

Lecture 33 - Introduction to the solution of coupled N-S equations

Lecture 34 - N-S equation in compressible flow- Mac Cormack Scheme

Lecture 35 - Stability limits of Mac-Cormack Scheme and the intro to Beam-Warming Scheme

Lecture 36 - Implicit Beam-Warming Scheme

Lecture 37 - Compressible flow to Incompressible flow

Lecture 38 - Solution of coupled equations: Incompressible flow

Lecture 39 - Artificial compressiblity method, Stream function-vorticity method

Lecture 40 - Pressure equation method, Staggered grid system

Lecture 41 - Pressure Correction Method

Lecture 42 - Tutorial on Pressure Correction Method

Lecture 43 - Tutorial on Pressure Correction Method (Continued...)

Lecture 44 - Introduction to the basic numerical methods

Lecture 45 - Direct Methods: solution of the system of algebraic equations

Lecture 46 - Tri-diagonal Matrix Algorithm: Derivation

Lecture 47 - TDMA and other iterative methods

Lecture 48 - Recap of basic iterative methods.

Lecture 49 - Convergence analysis of basic iterative methods

Lecture 50 - Successive Over Relaxation (SOR) method

Lecture 51 - Alternating Direction Implicit (ADI) method

Lecture 52 - Strongly Implicit Procedure (ILU) method

Lecture 53 - Multigrid method

Lecture 54 - Body Fitted Grid Approach

Lecture 55 - Formulation Of Finite Volume Method

Lecture 56 - Methods For Unstructured Grid Generation

Lecture 57 - Triangulation: The Advancing Front Method

Lecture 58 - The Advancing Front Method continuation

Lecture 59 - Time and length scale of turbulance

Lecture 60 - The turbulent closure problem

Lecture 61 - The generic formulation for turbulence

Lecture 62 - More generic formulation and summary

NPTEL : NOC:Introduction to Statistical Hypothesis Testing (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 1 - Motivation

Lecture 2 - Probability and statistics: Review - Part 1

Lecture 3 - Probability and Statistics: Review - Part 2

Lecture 4 - R Tutorial 1

Lecture 5 - Statistics for Hypothesis Testing - Part 1

Lecture 6 - Statistics for Hypothesis Testing - Part 2

Lecture 7 - Statistics for sample mean

Lecture 8 - Statistics for Variance and Proportion

Lecture 9 - Type I and Type II errors

Lecture 10 - p value

Lecture 11 - Hypothesis testing of means

Lecture 12 - Hypothesis testing of variance and proportions

Lecture 13 - Confidence interval construction

Lecture 14 - Hypothesis testing using confidence interval

Lecture 15 - Hypothesis testing of correlation

Lecture 16 - Statistic for linear regression

Lecture 17 - Hypothesis testing in linear regression

Lecture 18 - Power of hypothesis test

Lecture 19 - Factors affecting hypothesis test

NPTEL : NOC:Applied Time-Series Analysis (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 1 - Lecture 1 - Part 1 - Motivation and Overview 1

Lecture 2 - Lecture 1 - Part 2 - Motivation and Overview 2

Lecture 3 - Lecture 2 - Part 1 - Motivation and Overview 3

Lecture 4 - Lecture 2 - Part 2 - Motivation and Overview 4

Lecture 5 - Lecture 3 - Part 1 - Motivation and Overview 5

Lecture 6 - Lecture 3 - Part 2 - Motivation and Overview 6

Lecture 7 - Lecture 4 - Part 1 - Probability and Statistics Review 1A

Lecture 8 - Lecture 4 - Part 2 - Probability and Statistics Review 1B

Lecture 9 - Lecture 5 - Part 1 - Probability and Statistics Review 1C

Lecture 10 - Lecture 5 - Part 2 - Probability and Statistics Review 1D

Lecture 11 - Lecture 6 - Part 1 - Probability and Statistics Review 2A

Lecture 12 - Lecture 6 - Part 2 - Probability and Statistics Review 2B

Lecture 13 - Lecture 6 - Part 3 - Probability and Statistics Review 2C

Lecture 14 - Lecture 7 - Part 1 - Probability and Statistics Review 2D

Lecture 15 - Lecture 7 - Part 2 - Probability and Statistics Review 2E

Lecture 16 - Lecture 7 - Part 3 - Probability and Statistics Review 2F

Lecture 17 - Lecture 8 - Part 1 - Probability and Statistics Review 2G (with R Demonstration)

Lecture 18 - Lecture 8 - Part 2 - Probability and Statistics Review 2H (with R Demonstration)

Lecture 19 - Lecture 9 - Part 1 - Probability and Statistics Review 2I

Lecture 20 - Lecture 9 - Part 2 - Probability and Statistics Review 2J

Lecture 21 - Lecture 9 - Part 3 - Introduction to Random Processes 1

Lecture 22 - Lecture 10 - Part 1 - Introduction to Random Processes 2

Lecture 23 - Lecture 10 - Part 2 - Introduction to Random Processes 3

Lecture 24 - Lecture 11 - Part 1 - Introduction to Random Processes 4

Lecture 25 - Lecture 11 - Part 2 - Introduction to Random Processes 5

Lecture 26 - Lecture 11 - Part 3 - Autocovariance & Autocorrelation Functions 1

Lecture 27 - Lecture 12 - Part 1 - Autocovariance & Autocorrelation Functions 2

Lecture 28 - Lecture 12 - Part 2 - Autocovariance & Autocorrelation Functions 3

Lecture 29 - Lecture 13 - Part 1 - Autocovariance & Autocorrelation Functions 4

Lecture 30 - Lecture 13 - Part 2 - Autocovariance & Autocorrelation Functions 5

Lecture 31 - Lecture 13 - Part 3 - Autocovariance & Autocorrelation Functions 6

Lecture 32 - Lecture 14 - Part 1 - Autocovariance & Autocorrelation Functions 7

Lecture 33 - Lecture 14 - Part 2 - Autocovariance & Autocorrelation Functions 8

Lecture 34 - Lecture 15 - Part 1 - Autocovariance & Autocorrelation Functions 9

Lecture 35 - Lecture 15 - Part 2 - Partial Autocorrelation Functions

Lecture 36 - Lecture 16 - Part 1 - Autocorrelation and Partial-autocorrelation Functions (with R Demonstration)

Lecture 37 - Lecture 16 - Part 2 - Models for Linear Stationary Processes 1

Lecture 38 - Lecture 17 - Part 1 - Models for Linear Stationary Processes 2

Lecture 39 - Lecture 17 - Part 2 - Models for Linear Stationary Processes 3

Lecture 40 - Lecture 18 - Part 1 - Models for Linear Stationary Processes 4

Lecture 41 - Lecture 18 - Part 2 - Models for Linear Stationary Processes 5

Lecture 42 - Lecture 18 - Part 3 - Models for Linear Stationary Processes 6

Lecture 43 - Lecture 19 - Part 1 - Models for Linear Stationary Processes 7

Lecture 44 - Lecture 19 - Part 2 - Models for Linear Stationary Processes 8

Lecture 45 - Lecture 19 - Part 3 - Models for Linear Stationary Processes 9

Lecture 46 - Lecture 20 - Part 1 - Models for Linear Stationary Processes 10

Lecture 47 - Lecture 20 - Part 2 - Models for Linear Stationary Processes 11

Lecture 48 - Lecture 21 - Part 1 - Models for Linear Stationary Processes 12

Lecture 49 - Lecture 21 - Part 2 - Models for Linear Stationary Processes 13

Lecture 50 - Lecture 22 - Part 1 - Models for Linear Stationary Processes 14 (with R Demonstrations)

Lecture 51 - Lecture 22 - Part 2 - Models for Linear Stationary Processes 15 (with R Demonstrations)

Lecture 52 - Lecture 22 - Part 3 - Models for Linear Stationary Processes 16 (with R Demonstrations)

Lecture 53 - Lecture 23 - Part 1 - Models for Linear Non-stationary Processes 1

Lecture 54 - Lecture 23 - Part 2 - Models for Linear Non-stationary Processes 2 (with R Demonstrations)

Lecture 55 - Lecture 24 - Part 1 - Models for Linear Non-stationary Processes 3 (with R Demonstrations)

Lecture 56 - Lecture 24 - Part 2 - Models for Linear Non-stationary Processes 4

Lecture 57 - Lecture 25 - Part 1 - Models for Linear Non-stationary Processes 5

Lecture 58 - Lecture 25 - Part 2 - Models for Linear Non-stationary Processes 6 (with R Demonstrations)

Lecture 59 - Lecture 26 - Part 1 - Fourier Transforms for Deterministic Signals 1

Lecture 60 - Lecture 26 - Part 2 - Fourier Transforms for Deterministic Signals 2

Lecture 61 - Lecture 27 - Part 1 - Fourier Transforms for Deterministic Signals 3

Lecture 62 - Lecture 27 - Part 2 - Fourier Transforms for Deterministic Signals 4

Lecture 63 - Lecture 28 - Part 1 - Fourier Transforms for Deterministic Signals 5

Lecture 64 - Lecture 28 - Part 2 - Fourier Transforms for Deterministic Signals 6

Lecture 65 - Lecture 29 - Part 1 - Fourier Transforms for Deterministic Signals 7

Lecture 66 - Lecture 29 - Part 2 - Fourier Transforms for Deterministic Signals 8

Lecture 67 - Lecture 30 - Part 1 - Fourier Transforms for Deterministic Signals 9

Lecture 68 - Lecture 30 - Part 2 - DFT and Periodogram 1

Lecture 69 - Lecture 31 - Part 1 - DFT and Periodogram 2

Lecture 70 - Lecture 31 - Part 2 - DFT and Periodogram 3 (with R Demonstrations)

Lecture 71 - Lecture 32 - Part 1 - Spectral Representations of Random Processes 1

Lecture 72 - Lecture 32 - Part 2 - Spectral Representations of Random Processes 2

Lecture 73 - Lecture 33 - Part 1 - Spectral Representations of Random Processes 3

Lecture 74 - Lecture 33 - Part 2 - Spectral Representations of Random Processes 4

Lecture 75 - Lecture 33 - Part 3 - Spectral Representations of Random Processes 5

Lecture 76 - Lecture 34 - Part 1 - Spectral Representations of Random Processes 6

Lecture 77 - Lecture 34 - Part 2 - Spectral Representations of Random Processes 7

Lecture 78 - Lecture 35 - Part 1 - Introduction to Estimation Theory 1

Lecture 79 - Lecture 35 - Part 2 - Introduction to Estimation Theory 2

Lecture 80 - Lecture 35 - Part 3 - Introduction to Estimation Theory 3

Lecture 81 - Lecture 36A - Introduction to Estimation Theory -4

Lecture 82 - Lecture 36B - Goodness of Estimators 1 - 1

Lecture 83 - Lecture 37A - Goodness of Estimators 1 - 2

Lecture 84 - Lecture 37B - Goodness of Estimators 1 - 3

Lecture 85 - Lecture 37C - Goodness of Estimators 1 - 4

Lecture 86 - Lecture 38A - Goodness of Estimators 2 - 1

Lecture 87 - Lecture 38B - Goodness of Estimators 2 - 2

Lecture 88 - Lecture 38C - Goodness of Estimators 2 - 3

Lecture 89 - Lecture 39A - Goodness of Estimators 2 - 4

Lecture 90 - Lecture 39B - Goodness of Estimators 2 - 5 (with R demonstrations)

Lecture 91 - Lecture 39C - Goodness of Estimators 2 - 6

Lecture 92 - Lecture 40A - Goodness of Estimators 2 - 7

Lecture 93 - Lecture 40B - Goodness of Estimators 2 - 8

Lecture 94 - Lecture 41A - Estimation Methods 1 - 1

Lecture 95 - Lecture 41B - Estimation Methods 1 - 2

Lecture 96 - Lecture 42A - Estimation Methods 1 - 3

Lecture 97 - Lecture 42B - Estimation Methods 1 - 4

Lecture 98 - Lecture 42C - Estimation Methods 1 - 5

Lecture 99 - Lecture 43A - Estimation Methods 1 - 6 (with R demonstrations)

Lecture 100 - Lecture 43B - Estimation Methods 1 - 7 (with R demonstrations)

Lecture 101 - Lecture 44A - Estimation Methods 1 - 8

Lecture 102 - Lecture 44B - Estimation Methods 1 - 9

Lecture 103 - Lecture 44C - Estimation Methods 2 - 1

Lecture 104 - Lecture 45A - Estimation Methods 2 - 2

Lecture 105 - Lecture 45B - Estimation Methods 2 - 3

Lecture 106 - Lecture 46A - MLE and Bayesian Estimation - 1

Lecture 107 - Lecture 46B - MLE and Bayesian Estimation - 2

Lecture 108 - Lecture 47A - MLE and Bayesian Estimation - 3

Lecture 109 - Lecture 47B - MLE and Bayesian Estimation - 4

Lecture 110 - Lecture 48A - Estimation of Time Domain Statistics - 1

Lecture 111 - Lecture 48B - Estimation of Time Domain Statistics - 2

Lecture 112 - Lecture 49 - Periodogram as PSD Estimator

NPTEL : NOC:Rheology of Complex Materials (Chemical Engineering)

Co-ordinators : Dr. Abhijit P. Deshpande

Lecture 1 - Flow phenomena in complex materials and Microstructure - 1

Lecture 2 - Flow phenomena in complex materials and Microstructure - 2

Lecture 3 - Applications of rheology : mechanisms at the molecular and microscopic scales - 1

Lecture 4 - Applications of rheology : mechanisms at the molecular and microscopic scales - 2

Lecture 5 - Applications of rheology : some example material systems - 1

Lecture 6 - Applications of rheology : some example material systems - 2

Lecture 7 - Stress and strain rate - 1

Lecture 8 - Stress and strain rate - 2

Lecture 9 - Velocity gradient and strain rate - 1

Lecture 10 - Velocity gradient and strain rate 1 Stress and strain rate - 3

Lecture 11 - Kinematics for simple flows - 1

Lecture 12 - Kinematics for simple flows - 2

Lecture 13 - Introduction to tensors

Lecture 14 - Rheometric flows

Lecture 15 - Viscous response - 1

Lecture 16 - Viscous response - 2

Lecture 17 - Viscoelasticity - Relaxation process

Lecture 18 - Viscoelasticity - Maxwell model

Lecture 19 - Linear viscoelasticity - oscillatory shear - 1

Lecture 20 - Linear viscoelasticity - oscillatory shear - 2

Lecture 21 - Introduction to tensors - 2

Lecture 22 - Introduction to tensors - 3

Lecture 23 - Rheometers - 1

Lecture 24 - Rheometers - 2

Lecture 25 - Rheometers - 3

Lecture 26 - Rheometers - 4

Lecture 27 - Rheometers - 5

Lecture 28 - Governing equations for rheology - 1

Lecture 29 - Governing equations for rheology - 2

Lecture 30 - Relaxation time spectrum - 1

Lecture 31 - Relaxation time spectrum - 2

Lecture 32 - Linear viscoelasticity: generalized Maxwell model

Lecture 33 - Time temperature superposition

Lecture 34 - Linear viscoelasticity: solidlike materials

Lecture 35 - General linear viscoelasticity

Lecture 36 - Rotational rheometry

Lecture 37 - Review of material functions - 1

Lecture 38 - Review of material functions - 2

Lecture 39 - Survey of material functions for polymers - 1

Lecture 40 - Survey of material functions for polymers - 2

Lecture 41 - Survey of material functions for polymers - 3

Lecture 42 - Survey of material functions for polymers - 4

Lecture 43 - Survey of material functions for multiphase systems - 1

Lecture 44 - Strain and convected rate - 1

Lecture 45 - Strain and convected rate - 2

Lecture 46 - Strain and convected rate - 3

Lecture 47 - Strain and convected rate - 4

Lecture 48 - Normal stresses - 1

Lecture 49 - Normal stresses - 2

Lecture 50 - Structured materials - yield stress

Lecture 51 - Yield stress and thixotropic materials

Lecture 52 - Normal stresses and stress growth

Lecture 53 - Rheometer demonstration

Lecture 54 - Review of material functions - 3

Lecture 55 - Survey of material functions for multiphase macromolecular systems

Lecture 56 - Problems during rheometry - example of cone and plate - 1

Lecture 57 - Problems during rheometry - example of cone and plate - 2

Lecture 58 - Strain, convected derivatives, non-linear models - 1

Lecture 59 - Strain, convected derivatives, non-linear models - 2

Lecture 60 - Rheometer demonstration

Lecture 61 - Microscopic modeling of rheology - 1

Lecture 62 - Microscopic modeling of rheology - 2

Lecture 63 - Live Session

NPTEL : NOC:Process Control - Design, Analysis and Assessment (Chemical Engineering)

Co-ordinators : Prof. Ragunathan Rengasamy

Lecture 1 - Introduction

Lecture 2 - Introductory Concepts

Lecture 3 - Introduction to Modeling

Lecture 4 - Introduction to Control Structures

Lecture 5 - Process Modelling

Lecture 6 - State Space Modeling

Lecture 7 - State Space Solution

Lecture 8 - Laplace Transforms - Part 1

Lecture 9 - Laplace Transforms - Part 2

Lecture 10 - Analysis of transfer function models - Part 1

Lecture 11 - Analysis of transfer function models - Part 2

Lecture 12 - Stability

Lecture 13 - MATLAB Tutorial 1: Process Modelling

Lecture 14 - MATLAB Tutorial 2: Time domain analysis of first order process

Lecture 15 - Controller Equations

Lecture 16 - Controllers and analysis of closed loop transfer functions

Lecture 17 - P, PI and PID Controllers

Lecture 18 - Stability analysis of closed loop systems

Lecture 19 - Controller design and tuning - Part 1

Lecture 20 - Controller design and tuning - Part 2

Lecture 21 - Traditional Advanced Control - Part 1

Lecture 22 - Traditional Advanced Control - Part 2

Lecture 23 - Frequency Response Analysis - Part 1

Lecture 24 - Frequency Response Analysis - Part 2

Lecture 25 - Traditional Advanced Control - Part 3

Lecture 26 - Traditional Advanced Control - Part 4

Lecture 27 - Traditional Advanced Control - Part 5

Lecture 28 - Understanding PID Gains

Lecture 29 - Nyquist Stability Criterion - Part 1

Lecture 30 - Nyquist Stability Criterion - Part 2

Lecture 31 - Nyquist Stability Criterion - Part 3

Lecture 32 - Controllers for Unstable Systems

Lecture 33 - Traditional Advanced Control - Part 6

Lecture 34 - Traditional Advanced Control - Part 7

Lecture 35 - Multivariable Control - Part 1

Lecture 36 - Multivariable Control - Part 2

Lecture 37 - Model Predictive Control - Part 1

Lecture 38 - Model Predictive Control - Part 2

Lecture 39 - Model Predictive Control-Mathematical Formulation - Part 1

Lecture 40 - Model Predictive Control-Mathematical Formulation - Part 2

Lecture 41 - Model Predictive Control - Discrete Model

Lecture 42 - Model Predictive Control - Putting all these together

Lecture 43 - Stability Analysis-Various methods - Part 1

Lecture 44 - Stability Analysis-Various methods - Part 2

Lecture 45 - Stability Analysis-Various methods - Part 3

Lecture 46 - PID Tuning

Lecture 47 - MATLAB Tutorial-Controller Tuning - Part 1

Lecture 48 - MATLAB Tutorial-Controller Tuning - Part 2

Lecture 49 - MATLAB Tutorial - Controller Design - Part 1

Lecture 50 - MATLAB Tutorial - Controller Design - Part 2

Lecture 51 - MATLAB Tutorial - Controller Design - Part 3

Lecture 52 - Conclusion Lecture

NPTEL : System Identification (Chemical Engineering)

Co-ordinators : Dr. Arun K.Tangirala

Lecture 1 - Motivation and Overview 1

Lecture 2 - Motivation and Overview 2

Lecture 3 - Motivation and Overview 3

Lecture 4 - Motivation and Overview 4

Lecture 5 - Journey into Identification 1

Lecture 6 - Journey into Identification 2

Lecture 7 - Journey into Identification 3

Lecture 8 - Journey into Identification (Case Studies) 4

Lecture 9 - Journey into Identification (Case Studies) 5

Lecture 10 - Journey into Identification (Case Studies) 6

Lecture 11 - Journey into Identification (Case Studies) 7

Lecture 12 - Journey into Identification (Case Studies) 8

Lecture 13 - Journey into Identification (Case Studies) 9

Lecture 14 - Journey into Identification (Case Studies) 10

Lecture 15 - Journey into Identification (Case Studies) 11

Lecture 16 - Journey into Identification (Case Studies) 12

Lecture 17 - Journey into Identification (Case Studies) 13

Lecture 18 - Journey into Identification (Case Studies) 14

Lecture 19 - Journey into Identification (Case Studies) 15

Lecture 20 - Journey into Identification (Case Studies) 16

Lecture 21 - Journey into Identification 17

Lecture 22 - Journey into Identification 18

Lecture 23 - Response-based Description 1

Lecture 24 - Response-based Description 2

Lecture 25 - Response-based Description 3

Lecture 26 - Response-based Description 4

Lecture 27 - Response-based Description 5

Lecture 28 - Response-based Description 6

Lecture 29 - Response-based Description 7

Lecture 30 - Response-based Description 8

Lecture 31 - Response-based Description 9

Lecture 32 - Response-based Description 10

Lecture 33 - Response-based Description 11

Lecture 34 - Response-based Description 12

Lecture 35 - Response-based Description 13

Lecture 36 - Discrete time LTI system 1

Lecture 37 - Discrete time LTI system 2

Lecture 38 - z-Domain Descriptions 1

Lecture 39 - z-Domain Descriptions 2

Lecture 40 - z-Domain Descriptions 3

Lecture 41 - z-Domain Descriptions 4

Lecture 42 - z-Domain Descriptions 5

Lecture 43 - z-Domain Descriptions 6

Lecture 44 - State Space Representation 1

Lecture 45 - State Space Representation 2

Lecture 46 - State Space Representation 3

Lecture 47 - State Space Representation 4

Lecture 48 - Sampled - Data Systems 1

Lecture 49 - Sampled - Data Systems 2

Lecture 50 - Sampled - Data Systems 3

Lecture 51 - Sampled - Data Systems 4

Lecture 52 - Sampled - Data Systems 5

Lecture 53 - Sampled - Data Systems 6

Lecture 54 - Sampled - Data Systems 7

Lecture 55 - Sampled - Data Systems 8

Lecture 56 - Probability_Random variables and moments - Review 1

Lecture 57 - Probability_Random variables and moments - Review 2

Lecture 58 - Probability_Random variables and moments - Review 3

Lecture 59 - Probability_Random variables and moments - Review 4

Lecture 60 - Probability_Random variables and moments - Review 5

Lecture 61 - Probability_Random variables and moments - Review 6

Lecture 62 - Random Processes - Review 1

Lecture 63 - Random Processes - Review 2

Lecture 64 - Random Processes - Review 3

Lecture 65 - Random Processes - Review 4

Lecture 66 - Random Processes - Review 5

Lecture 67 - Random Processes - Review 6 (MATLAB)

Lecture 68 - Random Processes - Review 7

Lecture 69 - Random Processes - Review 8

Lecture 70 - Spectral Representation 1

Lecture 71 - Spectral Representation 2

Lecture 72 - Spectral Representation 3

Lecture 73 - Models for Identification 1

Lecture 74 - Models for Identification 2

Lecture 75 - Models for Identification 3

Lecture 76 - Models for Identification 4

Lecture 77 - One step and multi-step ahead prediction 1

Lecture 78 - One step and multi-step ahead prediction 2

Lecture 79 - One step and multi-step ahead prediction 3

Lecture 80 - One step and multi-step ahead prediction 4

Lecture 81 - One step and multi-step ahead prediction 5

Lecture 82 - Introduction to estimation theory 1

Lecture 83 - Introduction to estimation theory 2

Lecture 84 - Fisher's information and properties of estimators 1

Lecture 85 - Fisher's information and properties of estimators 2

Lecture 86 - Fisher's information and properties of estimators 3

Lecture 87 - Fisher's information and properties of estimators 4

Lecture 88 - Fisher's information and properties of estimators 5

Lecture 89 - Fisher's information and properties of estimators 6

Lecture 90 - Fisher's information and properties of estimators 7

Lecture 91 - Fisher's information and properties of estimators 8

Lecture 92 - Fisher's information and properties of estimators 9

Lecture 93 - Fisher's information and properties of estimators 10

Lecture 94 - Fisher's information and properties of estimators 11

Lecture 95 - Fisher's information and properties of estimators 12

Lecture 96 - Fisher's information and properties of estimators 13

Lecture 97 - Fisher's information and properties of estimators 14

Lecture 98 - Fisher's information and properties of estimators 15

Lecture 99 - Estimation of non-parametric model 1

Lecture 100 - Estimation of non-parametric model 2

Lecture 101 - Estimation of non-parametric model 3

Lecture 102 - Estimation of non-parametric model 4

Lecture 103 - Estimation of non-parametric model 5

Lecture 104 - Estimation of non-parametric model 3

Lecture 105 - Estimation of non-parametric model 4

Lecture 106 - Estimation of non-parametric model 5

Lecture 107 - Estimation of parametric model 1

Lecture 108 - Estimation of parametric model 2

Lecture 109 - Estimation of parametric model 3

Lecture 110 - Estimation of parametric model 4

Lecture 111 - State-Space/Subspace identification 1

Lecture 112 - State-Space/Subspace identification 2

Lecture 113 - State-Space/Subspace identification 3

Lecture 114 - State-Space/Subspace identification 4

Lecture 115 - State-Space/Subspace identification 5

Lecture 116 - State-Space/Subspace identification 6

Lecture 117 - State-Space/Subspace identification 7

Lecture 118 - State-Space/Subspace identification 8

Lecture 119 - Input for Identification

Lecture 120 - Input for Identification

Lecture 121 - Input for Identification

NPTEL : NOC:Fluid and Particle Mechanics (Chemical Engineering)

Co-ordinators : Prof. Basavaraju

Lecture 1 - Introduction

Lecture 2 - Fluid Stattics

Lecture 3 - Newton Law of Viscosity

Lecture 4 - Equation of Continuity Differential

Lecture 5 - Equation of Linear Momentum - 1

Lecture 6 - Equation of Linear Momentum - 2

Lecture 7 - Bernoulli's Equation

Lecture 8 - Solution of Navier Stokes - 1

Lecture 9 - Solution of Navier Stokes - 1

Lecture 10 - Introduction to cylindrical coordinate systems

Lecture 11 - Continuity equation in cylindrical coordinates

Lecture 12 - Solution of Navier Stokes in the Cylindrical co-ordinate system - 1

Lecture 13 - Solution of Navier Stokes in the Cylindrical co-ordinate system - 2

Lecture 14 - Circular poiseuille flow

Lecture 15 - Shear Stress Distribution

Lecture 16 - Flow between two concentric cylinder

Lecture 17 - Taylor couette flow

Lecture 18 - Viscosity and Momentum Transfer

Lecture 19 - Device For Measuring Fluid Viscosity

Lecture 20 - Fluid Properties And its Behaviour

Lecture 21 - Tutorial 4

Lecture 22 - Choice of Scaling Parameter

Lecture 23 - Non Dimensional analysis

Lecture 24 - Non-dimensional analysis - 2

Lecture 25 - Non-dimensional analysis - 3 (Buckingham Pi Theorem)

Lecture 26 - Non-dimensional analysis - 4 (Trinity test)

Lecture 27 - Non-dimensional analysis - 5 (Concept of similarity)

Lecture 28 - Characterization Of Particles - 1

Lecture 29 - Characterization Of Particles - 2

Lecture 30 - Motion of a Particle in a fluid

Lecture 31 - Brownian motion and electophoresis

Lecture 32 - Sedimentation and Seperation

Lecture 33 - Settling velocity - Stoke's regime and Newton's regime

Lecture 34 - Applications of settling - I

Lecture 35 - Applications of settling - II

Lecture 36 - Colloidal aggregates - Introduction

Lecture 37 - Settling of colloidal aggregates

Lecture 38 - Tutorial 5

Lecture 39 - Settling of colloidal aggregates - free settling

Lecture 40 - Settling in Multiple Particles System

Lecture 41 - Flow Through Packed Bed

Lecture 42 - Pressure Drop Through Packed Bed

Lecture 43 - Tutorial 6

Lecture 44 - Pressure Droped Through Packed bed Continue

Lecture 45 - Fluidized Bed - 1

Lecture 46 - Fluidized Bed - 2

Lecture 47 - Filtration - 1

Lecture 48 - Filtration - 2

Lecture 49 - Tutorial 7

Lecture 50 - Laminar and Turbulent Flows - 1

Lecture 51 - Laminar and Turbulent Flows - 2

Lecture 52 - Laminar and Turbulent Flows - 3

Lecture 53 - Turbulent Stress and Turbulent Shear Layer

Lecture 54 - Turbulent Flow near a wall and in a pipe

Lecture 55 - Effect of rough Walls

Lecture 56 - Roughness in Turbulent Pipe Flow

Lecture 57 - Pipes of non-circular cross section

Lecture 58 - Minnor Losses, Sudden Expansion and Contraction

Lecture 59 - Friction Losses in Sudden Expansion

Lecture 60 - Tutorial 8

Lecture 61 - Momentum and Kinetic Energy Correction Factor

Lecture 62 - pressure drop in pipes which connected in series

Lecture 63 - Pressure Drop in Pipes Which Connected in Parallel

Lecture 64 - Pressure Drop in Pipes Which Connected at Junction

Lecture 65 - Boundary Layer

Lecture 66 - Boundary Layer - Momentum Integral Analysis - 1

Lecture 67 - Boundary Layer - Momentum Integral Analysis - 2

Lecture 68 - Boundary Layer - Differential Approach

Lecture 69 - Laminar and Turbulent Boundary Layer

Lecture 70 - Tutorial 9

NPTEL : NOC:Continuum Mechanics and Transport Phenomena (Chemical Engineering)

Co-ordinators : Prof. T. Renganathan

Lecture 1 - Measurement and Prediction - Part 1

Lecture 2 - Measurement and Prediction - Part 2

Lecture 3 - Overview of Transport Phenomena

Lecture 4 - Scope of Course

Lecture 5 - Continuum Hypothesis

Lecture 6 - Lagrangian and Eulerian Descriptions - Part 1

Lecture 7 - Lagrangian and Eulerian Descriptions - Part 2

Lecture 8 - Substantial Derivative - Part 1

Lecture 9 - Substantial Derivative - Part 2

Lecture 10 - Substantial Derivative Example - 1

Lecture 11 - Substantial Derivative Example - 2

Lecture 12 - Visualization of Flow Patterns: Streamline, Pathline

Lecture 13 - Visualization of Flow Patterns: Streakline

Lecture 14 - Streamline, Pathline: Steady Flow Example

Lecture 15 - Streamline, Pathline, Streakline: Unsteady Flow Example

Lecture 16 - System and Control Volume

Lecture 17 - Reynolds transport theorem : Introduction

Lecture 18 - Reynolds transport theorem : Simplified form

Lecture 19 - Reynolds transport theorem : General form - Part 1

Lecture 20 - Reynolds transport theorem : General form - Part 2

Lecture 21 - Integral and differential balances

Lecture 22 - Integral total mass balance

Lecture 23 - Integral total mass balance : Simplification

Lecture 24 - Integral total mass balance : Examples

Lecture 25 - Differential total mass balance - Part 1

Lecture 26 - Differential total mass balance - Part 2

Lecture 27 - Differential total mass balance : Examples - Part 1

Lecture 28 - Differential total mass balance : Examples - Part 2

Lecture 29 - Integral linear momentum balance - Part 1

Lecture 30 - Integral linear momentum balance - Part 2

Lecture 31 - Integral linear momentum balance : Examples - Part 1

Lecture 32 - Integral linear momentum balance : Examples - Part 2

Lecture 33 - Integral linear momentum balance : Examples - Part 3

Lecture 34 - Differential linear momentum balance : Introduction

Lecture 35 - Differential linear momentum balance : Transient, convection and body force terms

Lecture 36 - Stress vector - Part 1

Lecture 37 - Stress vector - Part 2

Lecture 38 - Stress tensor - Part 1

Lecture 39 - Stress tensor - Part 2

Lecture 40 - Cauchy's formula

Lecture 41 - Components of Stress Vector : Example

Lecture 42 - Properties of stress tensor - Part 1

Lecture 43 - Properties of stress tensor - Part 2

Lecture 44 - Total stress tensor for fluids

Lecture 45 - Comparison of solids and fluids

Lecture 46 - Fluids at rest

Lecture 47 - Differential linear momentum balance : Surface force terms

Lecture 48 - Differential linear momentum balance : All terms

Lecture 49 - Convective momentum flux tensor

Lecture 50 - Differential linear momentum balance : Closure problem

Lecture 51 - Normal Strain and Shear Strain - Part 1

Lecture 52 - Normal Strain and Shear Strain - Part 2

Lecture 53 - Displacement Field and Displacement Gradient - Part 1

Lecture 54 - Displacement Field and Displacement Gradient - Part 2

Lecture 55 - Strain Displacement Gradient Relation : Example

Lecture 56 - Strain Displacement Gradient Relation : Normal and shear strain

Lecture 57 - Strain Displacement Gradient Relation : Rotation and volumetric strain

Lecture 58 - Strain Displacement Gradient Relation : Examples

Lecture 59 - Displacement Gradient Tensor

Lecture 60 - Components of Total Displacement - Part 1

Lecture 61 - Components of Total Displacement - Part 2

Lecture 62 - Strain Tensor and Rotation Tensor - Part 1

Lecture 63 - Components of Total Displacement : Example

Lecture 64 - Normal and Shear Strain Rate

Lecture 65 - Strain Rate Velocity Gradient Relation

Lecture 66 - Volumetric Strain Rate

Lecture 67 - Velocity Gradient Tenso

Lecture 68 - Strain Rate : Example 1

Lecture 69 - Strain Rate : Example 2

Lecture 70 - Stress Strain Relation : Introduction

Lecture 71 - Material Properties

Lecture 72 - Hookeâ€™s Law - Strain-stress Relation

Lecture 73 - Relation Between Material Properties

Lecture 74 - Hookeâ€™s Law - Stress-strain Relation

Lecture 75 - Hookeâ€™s Law : Examples

Lecture 76 - Stress Strain Rate Relation : Introduction

Lecture 77 - Newtonâ€™s Law of Viscosity : 1D Form

Lecture 78 - Newtonâ€™s Law of Viscosity : 3D Form

Lecture 79 - Navier Stokes Equation

Lecture 80 - Fluid at Rest : Pressure Distribution

Lecture 81 - Hydrostatic Pressure Distribution in Liquid

Lecture 82 - Hydrostatic Pressure Distribution in Gas

Lecture 83 - Fluid in Rigid Body Motion : Pressure Distribution

Lecture 84 - Flow Regimes : Laminar and Turbulent flow

Lecture 85 - Euler Equation

Lecture 86 - Bernoulli Equation : Inviscid Flow

Lecture 87 - Bernoulli Equation : Example 1

Lecture 88 - Bernoulli Equation : Irrotational Flow

Lecture 89 - Bernoulli Equation : Example 2

Lecture 90 - Planar Couette Flow - Governing Equations

Lecture 91 - Planar Couette Flow - Velocity and Pressure Distribution

Lecture 92 - Planar Couette Flow - Shear Force

Lecture 93 - Planar Poiseuille Flow : Governing Equations

Lecture 94 - Planar Poiseuille Flow : Velocity and Pressure Distribution

Lecture 95 - Planar Poiseuille Flow : Shear force

Lecture 96 - Planar Poiseuille Flow : Shear Stress Distribution

Lecture 97 - Viscous Stress vs. Molecular Momentum Flux - Part 1

Lecture 98 - Viscous Stress vs. Molecular Momentum Flux - Part 2

Lecture 99 - Linear Momentum Balance : Fluid Mechanics vs. Momentum Transport - Part 1

Lecture 100 - Linear Momentum Balance : Fluid Mechanics vs. Momentum Transport - Part 2

Lecture 101 - Viscous Stress vs. Molecular Momentum Flux - Part 3

Lecture 102 - Integral Energy Balance - Part 1

Lecture 103 - Integral Energy Balance - Part 2

Lecture 104 - Simplification of Integral Energy Balance

Lecture 105 - Integral Energy Balance : Examples

Lecture 106 - Differential Energy Balance : Introduction

Lecture 107 - Differential Total Energy Balance - Part 1

Lecture 108 - Differential Total Energy Balance - Part 2

Lecture 109 - Differential Energy Balance - Part 1

Lecture 110 - Differential Energy Balance - Part 2

Lecture 111 - Differential Energy Balance - Part 3

Lecture 112 - Fourierâ€™s Law of Heat Conduction

Lecture 113 - Simplifications of Differential Energy Balance

Lecture 114 - Heat Conduction in Slab

Lecture 115 - Heat Conduction in Furnace Wall

Lecture 116 - Non Isothermal Planar Couette Flow

NPTEL : NOC:Environmental Quality Monitoring and Analysis (Chemical Engineering)

Co-ordinators : Dr. R. Ravi Krishna

Lecture 1 - Introduction

Lecture 2 - Chemicals of Concern

Lecture 3 - Water Quality Screening Parameters

Lecture 4 - Water Quality Parameters

Lecture 5 - Air quality parameters; Sustainability

Lecture 6 - PM - Particulate Matter

Lecture 7 - Physical/Chemical properties of interest

Lecture 8 - Partition Constants

Lecture 9 - Soil-air partition constants

Lecture 10 - Application/Example of Equilibrium Partitioning

Lecture 11 - Introduction to Environmental Monitoring and Sampling

Lecture 12 - Environmental Sampling

Lecture 13 - Environmental Analysis: Quality Control - Part 1

Lecture 14 - Environmental Analysis: Quality Control - Part 2

Lecture 15 - Environmental Analysis of Organics in Water

Lecture 16 - Environmental Analysis: Quality Control - Part 3

Lecture 17 - Tutorial

Lecture 18 - Tutorial (Continued...)

Lecture 19 - Analysis Methods - Introduction and Water Quality Parameters

Lecture 20 - Analysis Methods - Water Quality Parameters

Lecture 21 - Analysis Methods - Review of Standard Methods

Lecture 22 - Analysis Methods - Organics in water

Lecture 23 - Analysis Methods - Overall Methodology for Organics

Lecture 24 - Analysis Methods - Chromatography Fundamentals

Lecture 25 - Analysis Methods - Gas Chromatography

Lecture 26 - Analysis Methods - Gas Chromatography (Mass Spectrometry)

Lecture 27 - Analysis Methods - Liquid Chromatography

Lecture 28 - Monitoring methods for Air - PM - Part 1

Lecture 29 - Monitoring methods for Air - PM - Part 2

Lecture 30 - Monitoring methods for Air - Vapor - Part 1

Lecture 31 - Monitoring methods for Air - Vapor - Part 2

Lecture 32 - Monitoring methods for Air - Vapor - Part 3

Lecture 33 - Monitoring and Measurement of Microorganisms

Lecture 34 - Transport of Pollutants - Introduction

Lecture 35 - Transport of Pollutants - Box Models in Water

Lecture 36 - Transport of Pollutants - Box Models in Air

Lecture 37 - Transport of Pollutants - Dispersion

Lecture 38 - Transport of Pollutants - Gaussian Dispersion Model

Lecture 39 - Dispersion Model - Parameters - Part 1

Lecture 40 - Dispersion Model - Parameters - Part 2

Lecture 41 - Gaussian Dispersion Model

Lecture 42 - Gaussian Dispersion Model - Example, Additional topics

Lecture 43 - Regulatory Models

Lecture 44 - Introduction to Interphase Mass Transfer

Lecture 45 - Interphase mass transfer - Application to Environmental Interfaces

Lecture 46 - Interphase mass transfer - Flux and mass transfer resistance

Lecture 47 - Interphase mass transfer - Boundary Layer and Mass Transfer Coefficient

Lecture 48 - Interphase mass transfer - Individual and Overall Mass Transfer Coefficients

Lecture 49 - Overall Mass Transfer Coefficient

Lecture 50 - Estimation of the Mass Transfer Coefficients

Lecture 51 - Air-Water Exchange

Lecture 52 - Evaporation from different surfaces

Lecture 53 - Sediment-Water exchange

Lecture 54 - Application of Interphase mass transfer

Lecture 55 - Contamination of Sediments

Lecture 56 - Release from Sediments

Lecture 57 - Unsteady state release from sediments

Lecture 58 - Other mechanisms of chemical release from sediments - Part 1

Lecture 59 - Other mechanisms of chemical release from sediments - Part 2

Lecture 60 - Soil - Air Transfer

Lecture 61 - Remediation of contaminated sediments - Application of transport models

NPTEL : Synthetic and Natural Supramolecular Architectures: An Approach Towards Molecular Technology (Chemical Engineering)

Co-ordinators : Prof. ChebroluPulla Rao

Lecture 1 - Impetus

Lecture 2 - Introduction to Supramolecular Science and Technology

Lecture 3 - Introduction to Supramolecular Science and Technology

Lecture 4 - A quickwalk - through the Supramolecular Architectures

Lecture 5 - A quickwalk - through the Supramolecular Architectures

Lecture 6 - A quickwalk - through the Supramolecular Architectures

Lecture 7 - Weak intermolecular forces : What, Where, When and How?

Lecture 8 - Weak intermolecular forces : What, Where, When and How?

Lecture 9 - Weak intermolecular forces : What, Where, When and How?

Lecture 10 - Weak intermolecular forces : What, Where, When and How?

Lecture 11 - Weak intermolecular forces : What, Where, When and How?

Lecture 12 - Weak intermolecular forces : What, Where, When and How?

Lecture 13 - Chemistry concepts of Immediate relevance - Part 1

Lecture 14 - Chemistry concepts of Immediate relevance - Part 2

Lecture 15 - Chemistry concepts of Immediate relevance - Part 3

Lecture 16 - Chemistry concepts of Immediate relevance - Part 4

Lecture 17 - Chemistry concepts of Immediate relevance - Part 5

Lecture 18 - Chemistry concepts of Immediate relevance - Part 6

Lecture 19 - Chemistry concepts of Immediate relevance - Part 7

Lecture 20 - Molecular recognition - Part 1

Lecture 21 - Molecular recognition - Part 2

Lecture 22 - Molecular recognition - Part 3

Lecture 23 - Molecular recognition - Part 4

Lecture 24 - Molecular recognition - Part 5

Lecture 25 - Molecular recognition - Part 6

Lecture 26 - Molecular recognition - Part 7

Lecture 27 - Molecular recognition - Part 8

Lecture 28 - Molecular recognition - Part 9

Lecture 29 - Molecular recognition - Part 10

Lecture 30 - Property driven functions of Supramolecular assembly

Lecture 31

Lecture 32

Lecture 33 - Metal coordinated architectures

Lecture 34 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 1

Lecture 35 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 2

Lecture 36 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 3

Lecture 37 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 4

Lecture 38 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 5

Lecture 39 - Engineering Supramolecular devices : Sensors,Switches,Devices and Molecules - Part 6

Lecture 40 - From molecules to machines : A glimpse at the travel

NPTEL : NOC:Artificial Lift (Chemical Engineering)

Co-ordinators : Prof. Abdus Samad

Lecture 1 - Introduction to oil and gas

Lecture 2 - Drilling and Completion

Lecture 3 - Well completion

Lecture 4 - Oil and gas production systems

Lecture 5 - Pumps, compressors and flow through pipes

Lecture 6 - Reservoir fluid

Lecture 7 - Fluid properties and Phase diagram - Part 1

Lecture 8 - Fluid properties and Phase diagram - Part 2

Lecture 9 - Nodal analysis

Lecture 10 - Reservoir deliverability - Single phase flow

Lecture 11 - Reservoir deliverability - Two phase flow

Lecture 12 - Flow over a flat surface or flow through pipe - Part 1

Lecture 13 - Flow over a flat surface or flow through pipe - Part 2

Lecture 14 - Single-Phase, Multi-Phase-Emulsion

Lecture 15 - Emulsification and demulsification

Lecture 16 - Single and Multi Phase flow-flow regimes

Lecture 17 - Multi phase flow-flow models

Lecture 18 - Choke Performance

Lecture 19 - Pump classifications

Lecture 20 - Classification of artificial lifts - Part 1

Lecture 21 - Classification of artificial lifts - Part 2

Lecture 22 - Sucker rod pump (SRP) - Part 1

Lecture 23 - Sucker rod pump (SRP) - Part 2

Lecture 24 - Sucker rod pump (SRP) - Part 3

Lecture 25 - Sucker rod pump (SRP) - Part 4

Lecture 26 - Sucker rod pump (SRP) - Part 5

Lecture 27 - Sucker rod pump (SRP) - Part 6

Lecture 28 - SRP-Pump performance analysis - Part 1

Lecture 29 - SRP-Pump performance analysis - Part 2

Lecture 30 - SRP-Pump performance analysis - Part 3

Lecture 31 - Introduction to progressive cavity punp

Lecture 32 - Progressive cavity Pump - Part 1

Lecture 33 - Progressive cavity Pump - Part 2

Lecture 34 - Progressive cavity Pump - Part 3

Lecture 35 - Progressive cavity Pump - Part 4

Lecture 36 - Progressive cavity Pump - Part 5

Lecture 37 - Electric submersible pump - Part 1

Lecture 38 - Electric submersible pump - Part 2

Lecture 39 - Electric submersible pump - Part 3

Lecture 40 - ESP- basic electrical systems - Part 1

Lecture 41 - ESP- basic electrical systems - Part 2

Lecture 42 - ESP- basic electrical systems - Part 3

Lecture 43 - ESP- numerical problems - Part 1

Lecture 44 - ESP- numerical problems - Part 2

Lecture 45 - ESP- numerical problems - Part 3

Lecture 46 - ESP- numerical problems - Part 1

Lecture 47 - ESP- numerical problems - Part 2

Lecture 48 - Gas lift basics - Part 1

Lecture 49 - Gas lift basics - Part 2

Lecture 50 - Gas lift valves and installartion - Part 1

Lecture 51 - Gas lift valves and installartion - Part 2

Lecture 52 - Plunger lift and design

Lecture 53 - Hydraulic jet pump fundamentals - Part 1

Lecture 54 - Hydraulic jet pump fundamentals - Part 2

Lecture 55 - Hydraulic engine pumps and design - Part 1

Lecture 56 - Hydraulic engine pumps and design - Part 2

Lecture 57 - Surface pump units for jet pump - Part 1

Lecture 58 - Surface pump units for jet pump - Part 2

Lecture 59 - Surface pump units for jet pump - Part 3

Lecture 60 - Surface compressor for gas lift - Part 1

Lecture 61 - Surface compressor for gas lift - Part 2

Lecture 62 - Surface compressor for gas lift - Part 3

NPTEL : Chemical Technology - I (Chemical Engineering)

Co-ordinators : Dr. I.D. Mall

Lecture 1 - Introduction to Chemical process Industries

Lecture 2 - Raw material for Organic Chemical Industries

Lecture 3 - Unit processes and unit operations in organic chemical Industries

Lecture 4 - Coal and coal as chemicals feed stock

Lecture 5 - Coal carbonization and Coke oven plant

Lecture 6 - Gasification of Coal,Petrocoke and Biomass

Lecture 7 - Introduction to Pulp and paper Industry, Raw material for paper industry and Technological development

Lecture 8 - Pulping and Bleaching

Lecture 9 - Recovery of Chemicals

Lecture 10 - Stock preparation and paper making

Lecture 11 - Introduction to Soap and detergent, Soap making and Recovery of Glycerine

Lecture 12 - Synthetic detergent and Linear alkyl benzene

Lecture 13 - Sugar and Fermentation industry

Lecture 14 - Ethanol as Biofuel and Chemical feed stock

Lecture 15 - Introduction : Staus of Petroleum refinery, Crude oil and Natural gas origin, occurrence, exploration, drilling and processing, Fuel norms

Lecture 16 - Evaluation of Crude oil,Petroleum Products and Apetrochemicals

Lecture 17 - Crude oil Distillation

Lecture 18 - Thermal Cracking: Visbreaking and Delayed Coking

Lecture 19 - Catalytic cracking: Fluid Catalytic cracking and Hydro cracking

Lecture 20 - Catalytic reforming

Lecture 21 - Alkylation, Isomerisation and Polymerisation

Lecture 22 - Desulphurisation Processes and Recovery of Sulphur

Lecture 23 - Profile of petrochemical Industry and its structure

Lecture 24 - Naphtha and gas cracking for production of olefins

Lecture 25 - Recovery of chemicals from FCC and steam cracking

Lecture 26 - Synthesis gas and its derivatives: Hydrogen, CO, Methanol, Formaldehyde

Lecture 27 - Ethylene derivatives: Ethylene Oxide, Ethylene glycol, Ethylene dichloride and Vinyl chloride

Lecture 28 - Propylene, Propylene oxide and Isopropanol

Lecture 29 - Aromatics Production

Lecture 30 - Aromatics product profile, Ethyl benzene & Styrene, Cumene and phenol, Bisphenol, Aniline

Lecture 31 - Introduction to polymer, Elastomer and Synthetic Fibre, Polymerisation

Lecture 32 - Polymers:Polyolefins, Polyethylene, Polypropylene Polystyrene

Lecture 33 - Polyvinylchloride, polycarbonate, thermoset resin: phenolformaldehyde, uriaformaldehyde and melamineformaldehyde

Lecture 34 - Elastomers: Styrene butadiene Rubber(SBR), Poly butadiene, Nitrile rubber

Lecture 35 - Polymides or Nylons(PA)

Lecture 36 - DMT and Terephtalic Acid, Polyester, PET resin, PTB resin

Lecture 37 - Acrylic Fibre, Modified Acrylic Fibre, Acrylonitrile, Acrolein, Propylene Finber, Polyurethane

Lecture 38 - Viscose Rayon and Acetate rayon

Lecture 39 - Pesticide

Lecture 40 - Dye and Intermediates

NPTEL : Process Integration (Chemical Engineering)

Co-ordinators : Dr. B. Mohanty

Lecture 1 - Process integration, methods and area of application

Lecture 2 - Fundamental concepts related to heat integration - Part 1

Lecture 3 - Fundamental concepts related to heat integration - Part 2

Lecture 4 - Data extraction

Lecture 5 - Hot composite curves

Lecture 6 - Cold composite curves

Lecture 7 - Hot and cold composite curves and the pinch

Lecture 8 - Threshold problems

Lecture 9 - Energy targeting procedure

Lecture 10 - Problem Table Algorithm - Part 1

Lecture 11 - Grand composite curve

Lecture 12 - Problem Table Algorithm - Part 2

Lecture 13 - Number of units target

Lecture 14 - Shell targeting - Part 1

Lecture 15 - Area targeting - Part 1

Lecture 16 - Area targeting - Part 2

Lecture 17 - Coast targeting - Part 1

Lecture 18 - Coast targeting - Part 2

Lecture 19 - Supertargeting- optimization of Î” t min

Lecture 20 - Global & stream specific Î”t min and its relevance

Lecture 21 - Topology Trap

Lecture 22 - Rules for Pinch Design Method (PDM) - Part 1

Lecture 23 - Rules for Pinch Design Method (PDM) - Part 2

Lecture 24 - Application of PDM for MER Hen Synthesis

Lecture 25 - Design for threshold problems

Lecture 26 - Design for single pinch problems

Lecture 27 - Design for multi pinch problems

Lecture 28 - HEN optimization

Lecture 29 - Remaining problem analysis

Lecture 30 - Driving Force Plot

Lecture 31 - Low Temperature process Design - Part 1

Lecture 32 - Low Temperature process Design - Part 2

Lecture 33 - Integration of Gas turbine with process - Part 1

Lecture 34 - Integration of Gas turbine with process - Part 2

Lecture 35 - Placement and Integration of Distillation Column

Lecture 36 - Heat Integration of evaporators

Lecture 37 - Integration of heat pump

Lecture 38 - Placement of Heat Engine, Heat pump and Reactors

Lecture 39 - Integration of Furnace

Lecture 40 - Problem solving using HINT Software - Part 1

Lecture 41 - Problem solving using HINT Software - Part 2

Lecture 42 - Problem solving using HINT Software - Part 3

Lecture 43 - Problem solving using HINT Software - Part 4

NPTEL : Mechanical Operations (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

Lecture 1 - Introduction

Lecture 2 - Characterization of a single particle - 1

Lecture 3 - Characterization of a single particle - 2

Lecture 4 - Characterization of collection of particles - 1

Lecture 5 - Characterization of collection of particles - 2

Lecture 6 - Fine grain size distribution

Lecture 7 - Effectiveness of screen - 1

Lecture 8 - Effectiveness of screen - 2

Lecture 9 - Industrial screening equipment

Lecture 10 - Size reduction

Lecture 11 - Laws of comminution

Lecture 12 - Examples of Laws of comminution - 1

Lecture 13 - Examples of Laws of comminution - 2

Lecture 14 - Size reduction equipment - 1

Lecture 15 - Size reduction equipment - 2

Lecture 16 - Particle dynamics - 1

Lecture 17 - Particle dynamics - 2

Lecture 18 - Particle dynamics-Examples

Lecture 19 - Classification and Jigging - 1

Lecture 20 - Classification and Jigging - 2

NPTEL : NOC:Waste to Energy Conversion (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Characterization of wastes - 1

Lecture 4 - Characterization of wastes - 2

Lecture 5 - Characterization of wastes - 3

Lecture 6 - Tutorial on Chatacterization of wastes

Lecture 7 - Energy production from wastes through incineration - 1

Lecture 8 - Energy production from wastes through incineration - 2

Lecture 9 - Tutorial on incineration

Lecture 10 - Energy production from wastes through gasification - 1

Lecture 11 - Energy production from wastes through gasification - 2

Lecture 12 - Syngas utilization - 1

Lecture 13 - Syngas utilization - 2

Lecture 14 - Energy production from wastes through pyrolysis - 1

Lecture 15 - Energy production from wastes through pyrolysis - 2

Lecture 16 - Tutorial on gasification

Lecture 17 - Tutorial on Pyrolysis

Lecture 18 - Densification of solids - 1

Lecture 19 - Densification of solids - 2

Lecture 20 - Efficiency improvement of power plant - 1

Lecture 21 - Efficiency improvement of power plant - 2

Lecture 22 - Energy production from waste plastics - 1

Lecture 23 - Energy production from waste plastics - 2

Lecture 24 - Gas clean up - 1

Lecture 25 - Gas clean up - 2

Lecture 26 - Energy production from organic wastes through anaerobic digestion - 1

Lecture 27 - Energy production from organic wastes through anaerobic digestion - 2

Lecture 28 - Design of anaerobic digester

Lecture 29 - Introduction to Microbial fuel cells

Lecture 30 - Energy production from organic wastes through fermentation - 1

Lecture 31 - Energy production from organic wastes through fermentation - 2

Lecture 32 - Tutorial on anaerobic digestion

Lecture 33 - Tutorial on fermentation

Lecture 34 - Energy production from wastes through transesterification - 1

Lecture 35 - Energy production from wastes through transesterification - 2

Lecture 36 - Tutorial on transesterification

Lecture 37 - Cultivation of algal biomass and treatment of waste water - 1

Lecture 38 - Cultivation of algal biomass and treatment of waste water - 2

Lecture 39 - Energy production form algal biomass - 1

Lecture 40 - Energy production form algal biomass - 2

NPTEL : NOC:Unit Operations of Particulate Matter (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

Lecture 1 - Introduction

Lecture 2 - Sedimentation and Batch Sedimentation Test - 1

Lecture 3 - Sedimentation and Batch Sedimentation Test - 2

Lecture 4 - Centrifugal Sedimentation and Equipment - 1

Lecture 5 - Centrifugal Sedimentation and Equipment - 2

Lecture 6 - Filtration - 1

Lecture 7 - Filtration - 2

Lecture 8 - Filtration - 3

Lecture 9 - Continuous Filtration - 1

Lecture 10 - Continuous Filtration - 2

Lecture 11 - Fluidisation - 1

Lecture 12 - Fluidisation - 2

Lecture 13 - Liquid Fluidisation

Lecture 14 - Gas Fluidisation - 1

Lecture 15 - Gas Fluidisation - 2

Lecture 16 - Flotation - 1

Lecture 17 - Flotation - 2

Lecture 18 - Transportaion of solids - 1

Lecture 19 - Transportaion of solids - 2

Lecture 20 - Transportaion of solids - 3

NPTEL : NOC:Introduction to Polymer Physics (IIT-R) (Chemical Engineering)

Co-ordinators : Prof. Prateek Kumar Jha

Lecture 1 - Introduction to the course, Macromolecules and Life, Molecular flexibility

Lecture 2 - Classification of polymers, Types of polymerization, Average molecular weights and polydispersity

Lecture 3 - Motivation to study polymer physics

Lecture 4 - Random Walk Models of Single Chain I: end-to-end distance of a polymer chain, freely jointed chain, drunkard walk

Lecture 5 - Random Walk Models of Single Chain II: general random walk on a lattice

Lecture 6 - Random Walk Models of Single Chain III: Freely rotating chain, definition of persistence length

Lecture 7 - Models of semiflexible chains (Kratky Porod Model) - Part I

Lecture 8 - Models of semiflexible chains (Kratky Porod Model) - Part II

Lecture 9 - Probability density of an ideal chain - Part I

Lecture 10 - Probability density of an ideal chain - Part II

Lecture 11 - Entropic Elasticity, Bead-Spring Model, Simulations of random walk models

Lecture 12 - Derivation of Diffusion equation, Einstein notation

Lecture 13 - Definition of Radius of gyration

Lecture 14 - Radius of gyration for an ideal chain, concept of ideality

Lecture 15 - Nonbonded interactions, hydrophobic and hydrophilic behaviour

Lecture 16 - Definition of excluded volume; good, bad, and theta solvent

Lecture 17 - Virial expansion, Flory theory for good solvent

Lecture 18 - Flory theory for bad solvent, self-similarity and fractal nature of polymers

Lecture 19 - Derivation of fractal dimension, concentration regimes and overlap concentration

Lecture 20 - Size, shape, and structure. Gyration tensor and measures of asphericity.

Lecture 21 - Order-disorder transition

Lecture 22 - Scattering experiments, Pair correlation function

Lecture 23 - Structure of polymer chain, Introduction to Monte Carlo simulations of polymer chains

Lecture 24 - Monte Carlo algorithm: Detailed Balance, Metropolis algorithm

Lecture 25 - Practical aspects of Monte Carlo simulation

Lecture 26 - Molecular Dynamics Simulations, Review of Thermodynamics

Lecture 27 - Solution Thermodynamics - I

Lecture 28 - Solution Thermodynamics - II

Lecture 29 - Solution Thermodynamics - III

Lecture 30 - Solution Thermodynamics - IV

Lecture 31 - Phase separation regime, Introduction to lattice model of solutions

Lecture 32 - Lattice Model of Solutions - I

Lecture 33 - Lattice Model of Solutions - II

Lecture 34 - Phase behaviour of liquid solutions

Lecture 35 - Lattice models of polymeric systems

Lecture 36 - Brownian motion - I

Lecture 37 - Brownian motion - II

Lecture 38 - Brownian motion - III

Lecture 39 - Brownian motion - IV

Lecture 40 - Brownian motion - V

Lecture 41 - Rouse Model - I

Lecture 42 - Rouse Model - II

Lecture 43 - Rouse Model - III

Lecture 44 - Rouse Model - IV

Lecture 45 - Problems in Rouse Model, Hydrodynamic Interactions

Lecture 46 - Zimm Model - I

Lecture 47 - Zimm Model - II

Lecture 48 - Continuum Mechanics - I

Lecture 49 - Continuum Mechanics - II

Lecture 50 - Kuhnâ€™s Theory of Rubber Elasticity

Lecture 51 - Elasticity of polymer network

Lecture 52 - Microscopic definition of stress tensor - I

Lecture 53 - Microscopic definition of stress tensor - II, Dumbbell model, introduction to Rouse model

Lecture 54 - Models for entangled polymeric systems - I

Lecture 55 - Models for entangled polymeric systems - II

Lecture 56 - Rheology of complex fluids

Lecture 57 - Rheometers and rheological tests - I

Lecture 58 - Rheometers and rheological tests - II

Lecture 59 - Maxwell model - I

Lecture 60 - Maxwell model - II, Closing notes

NPTEL : NOC:Equipment Design: Mechanical Aspects (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

Lecture 1 - Introduction

Lecture 2 - Stress and Strain Relationship - 1

Lecture 3 - Stress and Strain Relationship - 2

Lecture 4 - Terminologies

Lecture 5 - Design of shell

Lecture 6 - Design of heads - 1

Lecture 7 - Design of heads - 2

Lecture 8 - Design of heads - 3

Lecture 9 - Compensation for Opening - 1

Lecture 10 - Compensation for Opening - 2

Lecture 11 - L D ratio

Lecture 12 - Design of Flanges - 1.1

Lecture 13 - Design of Flanges - 1.2

Lecture 14 - Design of Flanges - 2.1

Lecture 15 - Design of Flanges - 2.2

Lecture 16 - Design of support - 1

Lecture 17 - Design of support - 2

Lecture 18 - Vessel under external pressure - 1

Lecture 19 - Vessel under external pressure - 2

Lecture 20 - Vessel under very high pressure

NPTEL : NOC:Chemical Process Safety (Chemical Engineering)

Co-ordinators : Dr. Shishir Sinha

Lecture 1 - Safety and Accident Loss Statistics

Lecture 2 - Risk Management and Hazardous Substance Rules

Lecture 3 - Nature of Accident and major disasters

Lecture 4 - Fundamental Principles: Scale up and Runaway Reactions

Lecture 5 - Problems related to Safety and Accident Loss Statistics

Lecture 6 - Toxicology: Introduction, Routes and Exposure

Lecture 7 - Toxicology: Elimination, Responses, Treatment

Lecture 8 - Dose Response Relationship

Lecture 9 - Dose Response and Threshold Dose: Predictive models and Extrapolation

Lecture 10 - Industrial Hygiene: Regulations and Identification

Lecture 11 - Material Safety Data Sheet - I

Lecture 12 - Material Safety Data Sheet - II

Lecture 13 - Industrial Hygiene: Evaluation

Lecture 14 - Noise, vibration and Radiation

Lecture 15 - Industrial Hygiene: Control

Lecture 16 - Problems related to Industrial Hygiene

Lecture 17 - Introduction to Source Models

Lecture 18 - Source Models for Gas

Lecture 19 - Source Models for Pool Boiling

Lecture 20 - Source Model Problems

Lecture 21 - Fire and Explosions: Introduction

Lecture 22 - Fire and Explosions: Flammability Characteristics

Lecture 23 - Explosion and its Classification - I

Lecture 24 - Explosion and its Classification - II

Lecture 25 - Fire Extinguishers - I

Lecture 26 - Fire Extinguishers - II

Lecture 27 - Problems related to Fire and Explosion

Lecture 28 - Designs to prevent Fire and Explosion: Inerting and Purging

Lecture 29 - Designs to prevent Fire and Explosion: Static Electricity

Lecture 30 - General Design Methods to prevent Fire

Lecture 31 - Sprinklers - I

Lecture 32 - Sprinklers - II

Lecture 33 - Introduction to Reliefs

Lecture 34 - Type of Reliefs

Lecture 35 - Relief Scenario

Lecture 36 - Relief Sizing

Lecture 37 - Hazard and Hazard Identification: Introduction

Lecture 38 - Hazard Identification Methods and HAZOP

Lecture 39 - Safety Reviews and Risk Assessment - I

Lecture 40 - Risk Assessment - II

Lecture 41 - Review of Probability Theory

Lecture 42 - Event Trees: Quantitative Risk Analysis

Lecture 43 - Fault Trees: Quantitative Risk Analysis

Lecture 44 - Cause Consequence Analysis and Layer of Protection Analysis

Lecture 45 - Bow-Tie Analysis

Lecture 46 - Accident Research: Introduction

Lecture 47 - Accident Causation Theories

Lecture 48 - Accident Investigation Procedure - I

Lecture 49 - Accident Investigation Procedure - II

Lecture 50 - Jaipur Terminal Fire, India: October 29, 2009

Lecture 51 - The Flixborough UK, Cyclohexane Disaster: June 01, 1974

Lecture 52 - Seveso Accident: July 10, 1976

Lecture 53 - The Chernobyl Nuclear Disaster: April 26, 1986

Lecture 54 - Bhopal Gas Tragedy: December 03, 1984

Lecture 55 - Bhopal Gas Tragedy: Investigation

Lecture 56 - Nuclear Radiation

Lecture 57 - Process Safety Management

Lecture 58 - Personal Protective Equipments

Lecture 59 - Safety: Laws and Regulations

Lecture 60 - Nuclear Disaster: Earthquake

NPTEL : NOC:Technologies for Clean and Renewable Energy Production (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

Lecture 1 - Introduction

Lecture 2 - Coal as a Source of Energy

Lecture 3 - Characterization of Coal

Lecture 4 - Conventional Route for Energy Production from Coal

Lecture 5 - Tutorial 1

Lecture 6 - Cleaner Route for Energy Production from Coal

Lecture 7 - Gasification of Coal - 1

Lecture 8 - Gasification of Coal - 2

Lecture 9 - Direct Liquefaction of Coal

Lecture 10 - Tutorial 2

Lecture 11 - Petroleum as a Source of Energy

Lecture 12 - Characteristics of Crude Oil and Petroleum Products

Lecture 13 - Refining of Crude Oil for Liquid Fuels Production

Lecture 14 - Conversion of Intermediate Products

Lecture 15 - Tutorial 3

Lecture 16 - Impurities Removal from Liquid Fuels

Lecture 17 - Residue Upgradation - 1

Lecture 18 - Residue Upgradation - 2

Lecture 19 - Heavy Crude Oil Processing

Lecture 20 - Tutorial 4

Lecture 21 - Properties and Routes for Energy Production

Lecture 22 - Syn Gas Production from Natural Gas

Lecture 23 - Syn Gas to Liquid Fuel Production

Lecture 24 - Hydrogen Production from Natural Gas

Lecture 25 - Tutorial 5

Lecture 26 - Solar Energy - 1

Lecture 27 - Solar Energy - 2

Lecture 28 - Wind Energy - 1

Lecture 29 - Wind Energy - 2

Lecture 30 - Tutorial 6

Lecture 31 - Hydro Energy - 1

Lecture 32 - Hydro Energy - 2

Lecture 33 - Geothermal Energy

Lecture 34 - Tidal Energy

Lecture 35 - Tutorial 7

Lecture 36 - Energy from Biomass and Wastes 1 (Biological Route)

Lecture 37 - Energy from Biomass and Wastes 2 (Chemical Route)

Lecture 38 - Energy from Biomass and Wastes 3 (Physical Route)

Lecture 39 - Energy Conversations

Lecture 40 - Tutorial 8

NPTEL : NOC:Polymer Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

Lecture 1 - Introduction to Polymerization Process - I

Lecture 2 - Introduction to polymerization process - II

Lecture 3 - A Short History of polymerization process, monomers and its distribution

Lecture 4 - Gradient and graft copolymer, polymer and its compositions, isomerism in polymers - I

Lecture 5 - Gradient and graft copolymer, polymer and its compositions, isomerism in polymers - II

Lecture 6 - Bonding forces in polymers

Lecture 7 - Molecular weight and its distribution

Lecture 8 - Control on Polymer Synthesis - I

Lecture 9 - Control on Polymer Synthesis - II

Lecture 10 - Control on Polymer Synthesis - III

Lecture 11 - Morphology of polymers

Lecture 12 - Introduction to reactor design - I

Lecture 13 - Introduction to reactor design - II

Lecture 14 - Temperature dependent term and Interpretation of batch reactor data - I

Lecture 15 - Temperature dependent term and Interpretation of batch reactor data - II

Lecture 16 - Interpretation of batch reactor data - III

Lecture 17 - Interpretation of batch reactor data - IV

Lecture 18 - Design equation for ideal reactors

Lecture 19 - Design Equation for Single Reaction System

Lecture 20 - Multiple reactor system

Lecture 21 - Recycle reactor and autocatalytic reaction

Lecture 22 - Multiple reactions system - I

Lecture 23 - Multiple reactions system - II

Lecture 24 - Multiple reactions system - III

Lecture 25 - Problem Solving - I

Lecture 26 - Problem Solving - II

Lecture 27 - Problem Solving - III

Lecture 28 - Step-growth polymerization - I

Lecture 29 - Step Growth Polymerization - II

Lecture 30 - Step Growth Polymerization - III

Lecture 31 - Step Growth Polymerization - IV

Lecture 32 - Radical Chain Polymerization Introduction

Lecture 33 - Radical Chain Polymerization Comparison with Ionic Chain Polymerization

Lecture 34 - Radical Chain Polymerization Mode of Propagation

Lecture 35 - Radical Chain Polymerization Rate of Polymerization

Lecture 36 - Radical Chain Polymerization Rate Expression

Lecture 37 - Radical Chain Polymerization Process Analysis - I

Lecture 38 - Radical Chain Polymerization Process Analysis - II

Lecture 39 - Radical Chain Polymerization Half-life, Propagation and Termination - I

Lecture 40 - Radical Chain Polymerization Half-life, Propagation and Termination - II

Lecture 41 - Radical Chain Polymerization Redox Initiation

Lecture 42 - Radical Chain Polymerization Photochemical and Ionization Initiation

Lecture 43 - Radical Chain Polymerization Other Initiation Techniques - I

Lecture 44 - Radical Chain Polymerization Other Initiation Techniques - II

Lecture 45 - Heterogeneous Polymerization Introduction - I

Lecture 46 - Heterogeneous Polymerization Introduction - II

Lecture 47 - Population Balance Modeling Other Techniques - I

Lecture 48 - Population Balance Modeling Other Techniques - II

Lecture 49 - Emulsion Polymerization Batch Polymerization

Lecture 50 - Emulsion Polymerization Semi-continuous polymerization

Lecture 51 - Emulsion Polymerization Nucleation, Morphology and Reactor Types - I

Lecture 52 - Emulsion Polymerization Nucleation, Morphology and Reactor Types - II

Lecture 53 - Emulsion Polymerization PSD and Implementation of the Process - I

Lecture 54 - Emulsion Polymerization PSD and Implementation of the Process - II

Lecture 55 - Living and dormant Polymerization

Lecture 56 - Ionic Polymerization - I

Lecture 57 - Ionic Polymerization - II

Lecture 58 - Ionic Polymerization - III

Lecture 59 - Ionic Polymerization - IV

Lecture 60 - Ionic Polymerization - V

NPTEL : NOC:Process Equipment Design (Chemical Engineering)

Co-ordinators : Prof. Shabina Khanam

Lecture 1 - Introduction

Lecture 2 - Classification of exchangers - 1

Lecture 3 - Classification of exchangers - 2

Lecture 4 - Basic Design Parameters - 1

Lecture 5 - Basic Design Parameters - 2

Lecture 6 - Double Pipe Heat Exchanger - 1

Lecture 7 - Double Pipe Heat Exchanger - 2

Lecture 8 - Double Pipe Heat Exchanger - 3

Lecture 9 - Types of Shell and Tube exchangers

Lecture 10 - Exchanger Tubes

Lecture 11 - Exchanger Shell

Lecture 12 - STE design - Kernâ€™s method - 1

Lecture 13 - STE design - Kernâ€™s method - 2

Lecture 14 - STE design - Kernâ€™s method - 3

Lecture 15 - STE design - Kernâ€™s method: Example - 4

Lecture 16 - STE design - Kernâ€™s method: Example - 5

Lecture 17 - STE design - Bellâ€™s method - 1

Lecture 18 - STE design - Bellâ€™s method - 2

Lecture 19 - STE design - Bellâ€™s method - 3

Lecture 20 - STE design - Bellâ€™s method: Example - 4

Lecture 21 - STE design - Bellâ€™s method: Example - 5

Lecture 22 - Design of Condenser - 1

Lecture 23 - Design of Condenser - 2

Lecture 24 - Design of Condenser - 3

Lecture 25 - Design of Condenser - 4

Lecture 26 - Design of Condenser - 5

Lecture 27 - Design of Reboiler - 1

Lecture 28 - Design of Reboiler - 2

Lecture 29 - Design of Reboiler - 3

Lecture 30 - Design of Reboiler - 4

Lecture 31 - Design of Reboiler - 5

Lecture 32 - Design of Reboiler - 6

Lecture 33 - Design of Reboiler - 7

Lecture 34 - Design of Evaporator - 1

Lecture 35 - Design of Evaporator - 2

Lecture 36 - Design of Evaporator - 3

Lecture 37 - Design of Evaporator - 4

Lecture 38 - Design of Evaporator - 5

Lecture 39 - Design of Crystallizer - 1

Lecture 40 - Design of Crystallizer - 2

Lecture 41 - Design of Crystallizer - Examples

Lecture 42 - Design of Crystallizer - Types

Lecture 43 - Design of Packed Column - 1

Lecture 44 - Design of Packed Column - 2

Lecture 45 - Design of Packed Column - 3

Lecture 46 - Design of Packed Column - 4

Lecture 47 - Design of Packed Column - 5

Lecture 48 - Distillation Column - 1

Lecture 49 - Distillation Column - 2

Lecture 50 - Distillation Column - 3

Lecture 51 - Distillation Column - 4

Lecture 52 - Distillation Column - 5

Lecture 53 - Distillation Column - 6

Lecture 54 - Distillation Column - 7

Lecture 55 - Distillation Column - 8

Lecture 56 - Distillation Column - Mechanical Design - 1

Lecture 57 - Distillation Column - Mechanical Design - 2

Lecture 58 - Distillation Column - Mechanical Design - 3

Lecture 59 - Distillation Column - Mechanical Design - 4

Lecture 60 - Distillation Column - Mechanical Design - 5

NPTEL : NOC:Advanced Thermodynamics and Molecular Simulations (Chemical Engineering)

Co-ordinators : Prof. Prateek Kumar Jha

Lecture 1 - Introduction to the course

Lecture 2 - Molecular basis of energy and entropy

Lecture 3 - Probability and probability distributions

Lecture 4 - Probability distributions and thermodynamic equilibrium

Lecture 5 - Energy distribution in molecular systems

Lecture 6 - First and second law of thermodynamics

Lecture 7 - Reversible and irreversible processes; third law of thermodynamics; legendre transformation; thermodynamic functions for one component system

Lecture 8 - Thermodynamic functions for multi-component systems; chemical potential; why do we minimize thermodynamic functions?

Lecture 9 - Extensive and intensive variables; gibbs duhem relation; euler theorem; maxwell relations

Lecture 10 - Discrete and continuous probabilities; stirling approximation

Lecture 11 - Binomial distribution approaches Gaussian distribution for large n; definition of drunkard walk

Lecture 12 - Solution of drunkard walk; Lagrange multipliers

Lecture 13 - Energy distribution in molecular system revisited; introduction to thermodynamic ensembles

Lecture 14 - Canonical ensemble: most probable distribution, partition function

Lecture 15 - Definition of temperature; third law of thermodynamics

Lecture 16 - Canonical ensemble: Helmholtz free energy, averages and fluctuations, specific heat, deriving ideal gas law

Lecture 17 - Partition function of a dense gas; grand canonical ensemble: partition function, most probable distribution

Lecture 18 - Computing properties in grand canonical ensemble

Lecture 19 - Isothermal isobaric ensemble

Lecture 20 - Summary of thermodynamic ensembles; partition function of an ideal gas

Lecture 21 - Mixing and phase separation, phase equilibrium of a multiphase multicomponent system, Gibbs phase rule

Lecture 22 - Pure component phase diagram; solution thermodynamics: Helmholtz free energy density

Lecture 23 - Characterizing mixing and phase separation using Helmholtz free energy density

Lecture 24 - Common tangent construction, definition of binodal, spinodal, and critical point

Lecture 25 - Osmotic pressure and chemical potential

Lecture 26 - Lattice model of liquid solutions - I

Lecture 27 - Lattice model of liquid solutions - II

Lecture 28 - Lattice model of liquid solutions - III

Lecture 29 - Critical review of Lattice model, theoretical basis of molecular dynamics simulation

Lecture 30 - Theoretical basis of molecular dynamics simulation

Lecture 31 - Interaction energy and force field

Lecture 32 - Liouiville theorem; theoretical basis of Monte Carlo simulation

Lecture 33 - Introduction to Monte Carlo simulation method

Lecture 34 - Markov chain algorithm, condition for equilibrium and detailed balance

Lecture 35 - Metropolis algorithm, periodic boundary condition

Lecture 36 - Numerical implementation of Monte Carlo simulation: Python Examples - I

Lecture 37 - Numerical implementation of Monte Carlo simulation: Python Examples - II

Lecture 38 - Numerical implementation of Monte Carlo simulation: Python Examples - III

Lecture 39 - Numerical implementation of Monte Carlo simulation: Python Examples - IV

Lecture 40 - Numerical implementation of Monte Carlo simulation: Python Examples - V

Lecture 41 - Particle simulations: comparison with quantum chemical and continuum simulations; bridging length and time scales

Lecture 42 - Pair potentials

Lecture 43 - Saving CPU time: short range and long range interactions

Lecture 44 - Bonded and non-bonded interactions, force fields

Lecture 45 - Practical aspects of molecular simulations

Lecture 46 - Numerical implementation of MD; thermostat and barostat

Lecture 47 - MD simulations - efficiency and parallelization, sampling and averaging, analysis of simulation trajectories

Lecture 48 - MD simulations - analysis of simulation trajectories (continued), Case Studies - I

Lecture 49 - MD simulations - Case Studies - II

Lecture 50 - MD simulations - Case Studies - III

Lecture 51 - Free energies and phase behavior; extension of canonical ensemble Monte Carlo to other ensembles

Lecture 52 - Extension of canonical ensemble Monte Carlo to other ensembles (Continued...)

Lecture 53 - Monte Carlo in Gibbs ensemble and semi-grand canonical ensemble, thermodynamic integration

Lecture 54 - Thermodynamic integration (continued); Widom's particle insertion; overlapping distribution method

Lecture 55 - Multiple histogram method; umbrella sampling; thermodynamic cycle; potential of mean force; pulling simulations; metadynamics; tackling time scale issues

Lecture 56 - Tackling time scale issues (continued); nonequilibrium molecular dynamics; mesoscale simulations: Langevin dynamics and Brownian dynamics, kinetic Monte Carlo simulations; dissipative particle dynamics

Lecture 57 - Multiparticle collision dynamics; lattice Boltzmann method; coarse-graining

Lecture 58 - Case studies

Lecture 59 - Simulations of chemical reactions using Kinetic Monte Carlo simulations

Lecture 60 - Reactive force fields; Ab initio molecular dynamics and other advanced methods; molecular simulations in chemical engineering; concluding remarks

NPTEL : NOC:Chemical Process Utilities (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

Lecture 1 - Introduction to Chemical Process Utilities

Lecture 2 - Energy Perspective to the Utilities

Lecture 3 - Power Cycle

Lecture 4 - Fuel Analysis

Lecture 5 - Practice problems related to power cycle and fuel analysis

Lecture 6 - Heat Transfer Utilities - I

Lecture 7 - Heat Transfer Utilities - II

Lecture 8 - Plate and Frame Heat Exchangers Types

Lecture 9 - Solar Energy - I

Lecture 10 - Solar Energy - II

Lecture 11 - Heat Transfer Media and Solar energy

Lecture 12 - Water

Lecture 13 - Water Chemistry

Lecture 14 - Inhibition and Water Treatment

Lecture 15 - Boiler Water treatment

Lecture 16 - Water Governance

Lecture 17 - Water Quality standards - I

Lecture 18 - Water Quality Standards - II

Lecture 19 - Steam

Lecture 20 - Boilers

Lecture 21 - Industrial Boiler Types

Lecture 22 - Boilers

Lecture 23 - Boilers- Question Practice

Lecture 24 - Steam Generation Unit

Lecture 25 - Steam Generation Unit-Heaters

Lecture 26 - Attemperator and Steam Drum

Lecture 27 - Steam Traps, Centralization, and Fuel Selection

Lecture 28 - Economizer, Super heaters, and Safety devices

Lecture 29

Lecture 30 - Insulation of Steam Generators

Lecture 31 - Air

Lecture 32 - Air Filtration and Pneumatic Conveying

Lecture 33 - Introduction to Pneumatic Conveying System

Lecture 34 - Conveying System Types

Lecture 35 - Material Properties and Pipeline Feeding Devices

Lecture 36 - Feeding devices

Lecture 37 - Gas-solid flows

Lecture 38 - Design of Pipelines Elements of Pipeline Design

Lecture 39 - Natural Gas Transmission - I

Lecture 40 - Natural Gas Transmission - II

Lecture 41 - Natural Gas Transmission - III

Lecture 42 - Pipeline Mechanical design - Natural Gas Transmission - IV

Lecture 43 - Cooling Tower; Theory and Some Basic Calculations

Lecture 44 - Concept of Heat Transfer in Cooling Tower and itâ€™s Components

Lecture 45 - Types and Components of Cooling Tower

Lecture 46 - Components and Materials of Construction and Applications of Cooling Tower

Lecture 47 - Control and Maintenance in cooling towers

Lecture 48 - Pressure Levels and Terminology - I

Lecture 49 - Pressure Levels and Terminology - II

Lecture 50 - Gauges for Pressure Measurement

Lecture 51 - Refrigerants and Refrigeration

Lecture 52 - Introduction to Refrigeration

Lecture 53 - Refrigeration System Components

Lecture 54 - Refrigeration System Components and Refrigeration Cycle

Lecture 55 - Refrigeration Systems

Lecture 56 - Refractories

Lecture 57 - Thermodynamic Principles and Corrosion in Refractories

Lecture 58 - Slag Attack and Kinds of Refractories in Uses

Lecture 59 - Brief history of Insulations and itâ€™s fundamental principles

Lecture 60 - Heat transfer in Insulations materials

NPTEL : NOC:Physico-Chemical Processes for Waste Water Treatment (Chemical Engineering)

Co-ordinators : Prof. Vimal Chandra Srivastava

Lecture 1 - Introduction to Water Pollution and Control

Lecture 2 - Environmental Acts and Standards

Lecture 3 - Water Quality Monitoring: Physical Parameters

Lecture 4 - Water Quality Monitoring: Physical and Chemical Parameters

Lecture 5 - Water Quality Monitoring: Chemical Parameters - I

Lecture 6 - Water Quality Monitoring: Chemical Parameters - II

Lecture 7 - Water Quality Monitoring: Biological/Biochemical Parameters - I

Lecture 8 - Water Quality Monitoring: Biological/Biochemical Parameters - II

Lecture 9 - Water Quality Monitoring: Bacteriological Parameters

Lecture 10 - Treatment of Water and Wastewater

Lecture 11 - Flow Equalization

Lecture 12 - Aeration - I

Lecture 13 - Aeration - II

Lecture 14 - Aeration - III

Lecture 15 - Aeration - IV

Lecture 16 - Aeration - V

Lecture 17 - Aeration - VI

Lecture 18 - Coagulation and Flocculation - I

Lecture 19 - Coagulation and Flocculation - II

Lecture 20 - Coagulation and Flocculation - III

Lecture 21 - Coagulation and Flocculation - IV

Lecture 22 - Settling and Sedimentation - I

Lecture 23 - Settling and Sedimentation - II

Lecture 24 - Settling and Sedimentation - III

Lecture 25 - Settling and Sedimentation - IV

Lecture 26 - Settling and Sedimentation - V

Lecture 27 - Settling and Sedimentation - VI

Lecture 28 - Filtration - I

Lecture 29 - Filtration - II

Lecture 30 - Filtration - III

Lecture 31 - Adsorption - I

Lecture 32 - Adsorption - II

Lecture 33 - Adsorption - III

Lecture 34 - Adsorption - IV

Lecture 35 - Adsorption - V

Lecture 36 - Adsorption - VI

Lecture 37 - Ion-exchange - I

Lecture 38 - Ion-exchange - II

Lecture 39 - Ion-exchange - III

Lecture 40 - Ion-exchange - IV

Lecture 41 - Wastewater treatment by membrane processes - I

Lecture 42 - Wastewater treatment by membrane processes - II

Lecture 43 - Wastewater treatment by membrane processes - III

Lecture 44 - Wastewater treatment by membrane processes - IV

Lecture 45 - Wastewater treatment by membrane processes - V

Lecture 46 - Advanced Oxidation Processes (AOP) - Introduction

Lecture 47 - AOP - Photocatalytic wastewater treatment

Lecture 48 - AOP - Fenton, ozone and catalytic treatment

Lecture 49 - AOP - Electrochemical wastewater treatment - I

Lecture 50 - AOP - Electrochemical wastewater treatment - II

Lecture 51 - AOP - Sono-hybrid wastewater treatment

Lecture 52 - Disinfection - I

Lecture 53 - Disinfection - II

Lecture 54 - Disinfection - III

Lecture 55 - Case Study - Wastewater treatment in sugar industry

Lecture 56 - Case Study - Wastewater treatment in distillery

Lecture 57 - Case Study - Wastewater treatment in fertilizer industry

Lecture 58 - Case Study - Wastewater treatment in petroleum refining industry

Lecture 59 - Case Study - Common effluent treatment plant (CETP)

Lecture 60 - Choice of technology and summary

NPTEL : NOC:Basic Environmental Engineering and Pollution Abatement (Chemical Engineering)

Co-ordinators : Prof. P. Mondal

Lecture 1 - Introduction

Lecture 2 - Ecology, Environment and Biodiversity

Lecture 3 - Ecosystem services and its risks - 1

Lecture 4 - Ecosystem services and its risks - 2

Lecture 5 - Tutorial-1

Lecture 6 - Pollution types and sources

Lecture 7 - Pollution: Impacts/Consequences

Lecture 8 - Transmission of pollutants in environment - 1

Lecture 9 - Transmission of pollutants in environment - 2

Lecture 10 - Tutorial-2

Lecture 11 - Environmental quality and standards - 1

Lecture 12 - Environmental quality and standards - 2

Lecture 13 - Instrumental techniques of environmental analysis - 1

Lecture 14 - Instrumental techniques of environmental analysis - 2

Lecture 15 - Tutorial-3

Lecture 16 - Sampling and characterization - 1 (Gas, air ,emission)

Lecture 17 - Sampling and characterization - 2 (water, wastewater, effluents)

Lecture 18 - Sampling and characterization - 3 (solid waste and soil)

Lecture 19 - Environmental laws and regulatory framework

Lecture 20 - Tutorial-4

Lecture 21 - Air pollution control - 1

Lecture 22 - Air pollution control - 2

Lecture 23 - Air pollution control - 3

Lecture 24 - Air pollution control - 4

Lecture 25 - Tutorial-5

Lecture 26 - Treatment of surface and ground water for drinking water generation

Lecture 27 - Treatment of domestic and industrial wastewater: Schemes

Lecture 28 - Primary treatment equipment

Lecture 29 - Secondary treatment processes

Lecture 30 - Tutorial-6

Lecture 31 - Secondary treatment equipment - 1

Lecture 32 - Secondary treatment equipment - 2

Lecture 33 - Advanced secondary processes - 1

Lecture 34 - Advanced secondary processes - 2

Lecture 35 - Tutorial-7

Lecture 36 - Advanced secondary processes - 3

Lecture 37 - Tertiary treatment - 1

Lecture 38 - Tertiary treatment - 2

Lecture 39 - Tertiary treatment - 3

Lecture 40 - Tutorial-8

Lecture 41 - Sludge management - 1

Lecture 42 - Sludge management - 2

Lecture 43 - Sludge management - 3

Lecture 44 - Industrial Pollution Control in GPI - 1 (General aspect and pollution control in sugar industry)

Lecture 45 - Tutorial-9

Lecture 46 - Industrial Pollution Control in GPI - 2 (Pollution control in Distillery)

Lecture 47 - Industrial Pollution Control in GPI - 3 (Pollution control in Tannery)

Lecture 48 - Pollution control in Petroleum refinery and petrochemicals industry

Lecture 49 - Industrial Pollution Control in GPI - 4

Lecture 50 - Tutorial 10

Lecture 51 - Solid waste and hazardous waste management - 1

Lecture 52 - Solid waste and hazardous waste management - 2

Lecture 53 - Solid waste and hazardous waste management - 3

Lecture 54 - Solid waste and hazardous waste management - 4

Lecture 55 - Tutorial-11

Lecture 56 - Air Pollution Management, Air quality survey, NAAQI - 1

Lecture 57 - Air Pollution Management, Air quality survey, NAAQI - 2

Lecture 58 - Management of special category wastes - 1

Lecture 59 - Management of special category wastes - 2

Lecture 60 - Tutorial-12

NPTEL : NOC:Biological Process Design for Wastewater Treatment (Chemical Engineering)

Co-ordinators : Prof. Vimal Chandra Srivastava

Lecture 1 - Introduction to Biological Process Design for Wastewater Treatment

Lecture 2 - Microorganisms in Biological Wastewater Treatment

Lecture 3 - Fundamentals of Biochemical Operations

Lecture 4 - Wastewater Characterization - I

Lecture 5 - Wastewater Characterization - II

Lecture 6 - Wastewater Characterization - III

Lecture 7 - Wastewater Characterization - IV

Lecture 8 - Wastewater Characterization - V

Lecture 9 - Stoichiometry of Microbial Growth - I

Lecture 10 - Stoichiometry of Microbial Growth - II

Lecture 11 - Stoichiometry of Microbial Growth - III

Lecture 12 - Reaction Kinetics

Lecture 13 - Bacterial Growth Kinetics - I

Lecture 14 - Bacterial Growth Kinetics - II

Lecture 15 - Reactor Hydraulics - I

Lecture 16 - Reactor Hydraulics - II

Lecture 17 - Treatment of Water and Wastewater - I

Lecture 18 - Treatment of Water and Wastewater - II

Lecture 19 - Coagulation, Flocculation, and Sedimentation - I

Lecture 20 - Coagulation, Flocculation, and Sedimentation - II

Lecture 21 - Lagoon

Lecture 22 - Activated Sludge Process

Lecture 23 - Sequential Batch Reactor

Lecture 24 - Trickling Filter

Lecture 25 - Rotating Disc Reactor

Lecture 26 - Up-flow Anaerobic Sludge Blanket (UASB) reactor

Lecture 27 - UASB and Biotower

Lecture 28 - Advanced Biological Wastewater Treatment: Fluidized Bed Bioreactors

Lecture 29 - Advanced Biological Wastewater Treatment: Membrane Bioreactors

Lecture 30 - Advanced Biological Wastewater Treatment: Moving Bed Biofilm Reactor (MBBR)

Lecture 31 - Sludge Management - I

Lecture 32 - Sludge Management - II

Lecture 33 - Sludge Management - III

Lecture 34 - Sludge Management - IV

Lecture 35 - Sludge Management - V

Lecture 36 - Sludge Management - VI

Lecture 37 - Sustainable Development and Environmental Impact Assessment

Lecture 38 - Management of Wastewater from Dairy Industry

Lecture 39 - Management of Wastewater from Slaughterhouse

Lecture 40 - Common Effluent Treatment Plant (CETP)

NPTEL : NOC:Advanced Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Taraknath Das

Lecture 1 - Introduction

Lecture 2 - Introduction_Various Reactors_BR

Lecture 3 - Design Equation_Continuous reactor (CSTR_PFR_PBR)

Lecture 4 - Design Equation_Continuous reactor (CSTR_PFR_PBR)_Sizing

Lecture 5 - Reaction Rate with Conversion, Temperature, and pressure (Batch/Flow system)

Lecture 6 - Space time Space velocity and CSTRs in series/parallel

Lecture 7 - Effect of Pressure Drop on reactor design (PBR)_(X vs W) and (P vs W)

Lecture 8 - Effect of Pressure Drop on Reactor design (PBR)_(X vs W)_ (P vs W)

Lecture 9 - Effect of Pressure Drop in PBR reactor_Analytical solution of Differential equation

Lecture 10 - Effect of Pressure Drop in PBR reactor_Analytical solution for Reaction With Pressure drop

Lecture 11 - Effect of Pressure Drop in PBR reactor_Example

Lecture 12 - Differential Reactor_rate of reaction_catalyst deactivation

Lecture 13 - Catalyst deactivation

Lecture 14 - Catalyst Deactivation_Temperature (T) - Time (t) trajectories

Lecture 15 - Moving Bed Reactor_Catalyst deactivation

Lecture 16 - STTR_Catalyst deactivation

Lecture 17 - Multi phase reactors-1: Slurry reactor - 1

Lecture 18 - Multi phase reactors-1: Slurry reactor - 2

Lecture 19 - Multi phase reactors-1: Slurry reactor - 3

Lecture 20 - Multi phase reactors-2: Trickle bed reactor - 1

Lecture 21 - Multi phase reactors-2: Trickle bed reactor - 2

Lecture 22 - Multi phase reactors-2: Trickle bed reactor - 3

Lecture 23 - Bioreactor_Cell Growth and Rate laws

Lecture 24 - Bioreactors_Stoichiometry_Yield coefficients_rate of substrate consumption

Lecture 25 - Bioreactors_Example_Yield coefficients and rate law parameters estimation

Lecture 26 - Bioreactors_Mass Balances (Cell, Substrate, Product)

Lecture 27 - Bioreactors_Chemostats

Lecture 28 - Steady State Non Isothermal reactor design_EB equation

Lecture 29 - Steady State Non Isothermal reactor design_Example

Lecture 30 - SS Non Isothermal reactor design_Reaction with Heat Exchange

Lecture 31 - SS Non Isothermal reactor design_Heat Exchange_ T-profile for a few cases

Lecture 32 - SS Non Isothermal reactor design_Equilibrium conversion

Lecture 33 - SS Non Isothermal reactor design_Optimum feed temperature

Lecture 34 - SS Non Isothermal reactor design_Multiple Steady States

Lecture 35 - SS Non Isothermal reactor design_Ignition Extinction Curves

Lecture 36 - SS Non Isothermal reactor design_Runaway reaction in a CSTR

Lecture 37 - SS Non Isothermal reactor design_Energy Balance:Multiple rxn in a CSTR/PFR (Examples)

Lecture 38 - Non-ideal flow - 1

Lecture 39 - Basics of Non-ideal flow - 2

Lecture 40 - Basics of Non-ideal flow - 3

Lecture 41 - Non-ideal flow-Segregation model

Lecture 42 - One parameter Model-Tank in Series model (TIS)

Lecture 43 - Non-ideal flow-Dispersion model - Part 1

Lecture 44 - Non-ideal flow-Dispersion model - Part 2

Lecture 45 - Non-ideal flow-Dispersion model - Part 3

Lecture 46 - Two parameter Models-Modeling real reactors with Combinations of Ideal Reactors

Lecture 47 - Solid Catalyzed Reaction: Reaction and Diffusion - Part 1

Lecture 48 - Solid Catalyzed Reaction: Reaction and Diffusion - Part 2

Lecture 49 - Solid Catalyzed Reaction: Reaction and Diffusion - Part 3

Lecture 50 - Catalysis and Catalytic Reactors - Part 1

Lecture 51 - Catalysis and Catalytic Reactors - Part 2

Lecture 52 - Catalysis and Catalytic Reactors - Part 3

Lecture 53 - Collection and Analysis of Rate - Part 1

Lecture 54 - Collection and Analysis of Rate - Part 2

Lecture 55 - Collection and Analysis of Rate - Part 3

Lecture 56 - Polymath and ODE solver

Lecture 57 - Catalyst Synthesis - Part 1

Lecture 58 - Catalyst Synthesis - Part 2

Lecture 59 - Catalyst Characterization Techniques: BET, Pore size, Pore volume

Lecture 60 - Catalyst Characterization Techniques

NPTEL : NOC:Polymer Process Engineering (Chemical Engineering)

Co-ordinators : Prof. Shishir Sinha

Lecture 1 - Introduction to Polymers

Lecture 2 - Polymers and Polymerization Techniques

Lecture 3 - Characteristics of Polymers - I

Lecture 4 - Characteristics of Polymers - II

Lecture 5 - Applications of Polymers

Lecture 6 - Thermodynamics of Polymer Systems - I

Lecture 7 - Thermodynamics of Polymer Systems - II

Lecture 8 - Thermodynamics of Polymer Systems - III

Lecture 9 - Thermodynamics of Polymer Systems - IV

Lecture 10 - Thermodynamics of Polymer Systems - V

Lecture 11 - Applied polymer rheology: Fluid behavior

Lecture 12 - Applied polymer rheology: Structure and properties of deforming polymer

Lecture 13 - Applied polymer rheology: Flow of polymers with supermolecular structure

Lecture 14 - Applied polymer rheology: Transport phenomena

Lecture 15 - Applied polymer rheology: Rheometry

Lecture 16 - Heat Transfer Phenomenon in polymer systems: Introduction

Lecture 17 - Heat Transfer Phenomenon in polymer systems: Thermal properties

Lecture 18 - Heat Transfer Phenomenon in polymer systems: Thermal properties and conduction

Lecture 19 - Heat Transfer Phenomenon in polymer systems: Conduction and Convection

Lecture 20 - Heat Transfer Phenomenon in polymer systems: Convection and Radiation

Lecture 21 - Mass Transfer Phenomenon in Polymers: Introduction

Lecture 22 - Steady State Diffusion in Polymers

Lecture 23 - Mass transfer coefficient and dimensionless numbers

Lecture 24 - Mass transfer phenomenon in polymers: Laminar flow and boundary layer conditions

Lecture 25 - Mass transfer phenomenon in polymers: Diffusivity and solubility of gases

Lecture 26 - Chemical reaction engineering in polymers: Introduction

Lecture 27 - Chemical reaction engineering in polymers: Condensation (Step-growth) polymerization

Lecture 28 - Chemical reaction engineering in polymers: Addition (Chain-Growth) Polymerization - I

Lecture 29 - Chemical reaction engineering in polymers: Addition (Chain-Growth) Polymerization - II

Lecture 30 - Chemical reaction engineering in polymers: Addition (Chain-Growth) Polymerization - III

Lecture 31 - Injection Moulding - 1

Lecture 32 - Injection Moulding - 2

Lecture 33 - Extrusion

Lecture 34 - Blow moulding

Lecture 35 - Calendaring and Fiber spinning

Lecture 36 - Polymer Testing - 1

Lecture 37 - Polymer testing - 2 (Standardization, Sample preparation)

Lecture 38 - Polymer testing - 3

Lecture 39 - Polymer testing - 4 (Measuring of rheological properties)

Lecture 40 - Polymer testing - 5 (Mechanical properties; Hardness, tensile and compression)

Lecture 41 - Polymer testing - 6

Lecture 42 - Polymer Testing - 7

Lecture 43 - Polymer Testing - 8

Lecture 44 - Polymer Testing - 9

Lecture 45 - Polymer Testing - 10

Lecture 46 - Polymeric Materials Used in Electronics

Lecture 47 - Polymers in Electronics: Epoxies

Lecture 48 - Epoxies, Phenoxies, and Silicones

Lecture 49 - Polyimides

Lecture 50 - Fluorocarbons, Polyxylyenes, and Polyesters

Lecture 51 - Polymer Materials in Electronics

Lecture 52 - Functions of Coatings - I

Lecture 53 - Functions of Coatings - II

Lecture 54 - Natural fibers reinforced composites - I

Lecture 55 - Natural fibers reinforced composites - II

Lecture 56 - NFRCs and Polymer Applications

Lecture 57 - Polymer Applications in Building Materials

Lecture 58 - Polymer applications in different fields: Polymer in textile

Lecture 59 - Polymer applications in different fields: Polymer in cosmetics

Lecture 60 - Polymer applications in different fields: Polymer and food packaging

NPTEL : Chemical Reaction Engineering (Chemical Engineering)

Co-ordinators : Prof. Jayant M Modak

Lecture 1 - Introduction & Overview

Lecture 2 - Basic concepts : Representation of Chemical Reactions

Lecture 3 - Thermodynamics of Chemical Reactions - Part I

Lecture 4 - Thermodynamics of Chemical Reactions - Part II

Lecture 5 - Chemical Reaction Kinetics - Overview

Lecture 6 - Chemical Reaction Kinetics & Reactor Design

Lecture 7 - Chemical Reactor Design

Lecture 8 - Problem Solving: Thermodynamics & Kinetics

Lecture 9 - Complec Reactions - Introduction

Lecture 10 - Complex Reactions - Yield & Selectivity

Lecture 11 - Complex Reactions - Quasi Steady State and Quasi Equilibrium Approximations

Lecture 12 - Complex Reactions - Kinetics of Chain Reactions & polymerization

Lecture 13 - Catalytic reactions - Introduction

Lecture 14 - Catalytic reactions - Adsorption & Desorption

Lecture 15 - Catalytic reactions - Kinetics

Lecture 16 - Monomolecular Reaction Network & Lumping Analysis

Lecture 17 - Problem solving: Complex reactions

Lecture 18 - Gas-solid Catalytic Reactions - External diffusion

Lecture 19 - Gas-solid Catalytic Reactions - Transport in Catalyst Pellet

Lecture 20 - Gas-solid Catalytic Reactions - Diffusion & Reaction - I

Lecture 21 - Gas-solid Catalytic Reactions - Diffusion & Reaction - II

Lecture 22 - Gas-solid Catalytic Reactions - Diffusion & Reaction - III

Lecture 23 - Gas-solid Catalytic Reactions - Nonisothermal effects

Lecture 24 - Gas-solid Noncatalytic Reactions

Lecture 25 - Gas-Liquid Reactions

Lecture 26 - Problem solving: Heterogenous reactions

Lecture 27 - Chemical Reactor Design: Mass & Energy Balances

Lecture 28 - Chemical Reactor Design: Mass & Energy Balances for Heterogenous Reactions

Lecture 29 - Nonisothermal Reactor Operation

Lecture 30 - Case Study - Ethane dehyrogenation

Lecture 31 - Case Study - Hydrogenation of Oil

Lecture 32 - Case Study - Ammonia Synthesis

Lecture 33 - Autothermal reactors

Lecture 34 - Parametric Sensitivity

Lecture 35 - CSTR - multiple steady states

Lecture 36 - Stability Analysis - Basics

Lecture 37 - Stability Analysis - Examples

Lecture 38 - Nonideal flow and reactor performance - I

Lecture 39 - Nonideal flow and reactor performance - II

Lecture 40 - Problem solving: Reactor Design

NPTEL : Fundamentals of Transport Processes (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

Lecture 1 - Introduction

Lecture 2 - Dimensional Analysis

Lecture 3 - Dimensional Analysis (Continued...)

Lecture 4 - Dimensionless Groups

Lecture 5 - Continuum description

Lecture 6 - Mechanisms of diffusion - I

Lecture 7 - Mechanisms of diffusion - II

Lecture 8 - Unidirectional Transport Cartesian Coordinates - I

Lecture 9 - Unidirectional Transport Cartesian Coordinates - II Similarity Solutions

Lecture 10 - Unidirectional Transport Cartesian Coordinates - III Similarity Solutions

Lecture 11 - Unidirectional Transport Cartesian Coordinates - IV Seperation of Variables

Lecture 12 - Unidirectional Transport Cartesian Coordinates - V Seperation of Variables

Lecture 13 - Unidirectional Transport Cartesian Coordinates - VI Oscillatory Flows

Lecture 14 - Unidirectional Transport Cartesian Coordinates - VII Momentum Source in the Flow

Lecture 15 - Unidirectional Transport Cartesian Coordinates - VIII Heat & Mass Sources

Lecture 16 - Unidirectional Transport Cylindrical Coordinates - I Conservation Equations

Lecture 17 - Unidirectional Transport Cylindrical Coordinates - II Similarity Solutions

Lecture 18 - Unidirectional Transport Cylindrical Coordinates - III Seperation of Variables

Lecture 19 - Unidirectional Transport Cylindrical Coordinates - IV Steady flow in a pipe

Lecture 20 - Unidirectional Transport Cylindrical Coordinates - V Oscillatory flow in a pipe

Lecture 21 - Unidirectional Transport Cylindrical Coordinates - VI Oscillatory flow in a pipe Regular Perturbation Expansion

Lecture 22 - Unidirectional Transport Cylindrical Coordinates - VII Oscillatory flow in a pipe Singular Perturbation Expansion

Lecture 23 - Unidirectional Transport Spherical Coordinates - I Balance Equation

Lecture 24 - Unidirectional Transport Spherical Coordinates - II Seperation of Variables

Lecture 25 - Mass & Energy Conservation Cartesian Coordinates

Lecture 26 - Mass & Energy Conservation Cartesian Coordinates Heat Conduction in a Cube

Lecture 27 - Mass & Energy Conservation Spherical Coordinates Balance Laws

Lecture 28 - Mass & Energy Conservation Cylindrical Coordinates

Lecture 29 - Diffusion Equation Spherical Co-ordinates Seperation of Variables

Lecture 30 - Diffusion Equation Spherical Co-ordinates Seperation of Variables (Continued...)

Lecture 31 - Diffusion Equation Spherical Co-ordinates Effective Conductivity of a Composite

Lecture 32 - Diffusion Equation Spherical Harmonics

Lecture 33 - Diffusion Equation Delta Functions

Lecture 34 - Diffusion Equation Multipole Expansions

Lecture 35 - Diffusion Equation Greens Function Formulations

Lecture 36 - High Peclet Number Transport Flow Past a Flat Plate

Lecture 37 - High Peclet Number Transport Heat Transfer from a Spherical Particle - I

Lecture 38 - High Peclet Number Transport Heat Transfer from a Spherical Particle - II

Lecture 39 - High Peclet Number Transport Heat Transfer from a Gas Bubble

Lecture 40 - Summary

NPTEL : Fundamentals of Transport Processes - II (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

Lecture 1 - Review of Fundamentals of Transport Processors I

Lecture 2 - Introduction

Lecture 3 - Vectors and Tensors

Lecture 4 - Vector calculus

Lecture 5 - Vector calculus

Lecture 6 - Curvilinear co-ordinates

Lecture 7 - Kinematics

Lecture 8 - Rate of deformation tensor

Lecture 9 - Mass conservation equation

Lecture 10 - Momentum conservation equation

Lecture 11 - Angular momentum conservation equation

Lecture 12 - Boundary conditions

Lecture 13 - Mechanical energy conservation

Lecture 14 - Unidirectional flow

Lecture 15 - Viscous flows

Lecture 16 - Viscous flows

Lecture 17 - Flow around a sphere

Lecture 18 - Force on moving sphere

Lecture 19 - Torque on rotating sphere

Lecture 20 - Effective viscosity of a suspension

Lecture 21 - Flow in a corner

Lecture 22 - Lubrication flow

Lecture 23 - Lubrication flow

Lecture 24 - Inertia of a low Reynolds number

Lecture 25 - Potential flow

Lecture 26 - Potential flow around a sphere

Lecture 27 - Two-dimensional potential flow

Lecture 28 - Two-dimensional potential flow

Lecture 29 - Flow around a cylinder

Lecture 30 - Conformal transforms in potential flow

Lecture 31 - Boundary layer theory

Lecture 32 - Boundary layer past a flat plate

Lecture 33 - Stagnation point flow

Lecture 34 - Falkner-Skan Boundary Layer Solutions

Lecture 35 - Falkner-Skan Boundary Layer Solutions

Lecture 36 - Vorticity Dynamics

Lecture 37 - Vorticity Dynamics

Lecture 38 - Turbulence

Lecture 39 - Turbulence

Lecture 40 - Turbulent flow in a channel

NPTEL : Modern Instrumental Methods of Analysis (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

Lecture 1 - Introduction to the Modern Instrumental Methods of Analysis

Lecture 2 - Atomic Structure

Lecture 3 - Physical Properties of Electromagnetic Radiation

Lecture 4 - Interaction of Matter with Radiation

Lecture 5 - Ultraviolet and Visible Spectrophotometry-1 (i. Theoretical Aspects)

Lecture 6 - Ultraviolet and Visible Spectrophotometry-2 (ii. Theoretical Aspects)

Lecture 7 - Ultraviolet and Visible Spectrophotometry-3 (iii. Theoretical Aspects)

Lecture 8 - Ultraviolet and Visible Spectrophotometry-4 (iv. Instrumentation)

Lecture 9 - Ultraviolet and Visible Spectrophotometry-5 (v. Instrumentation)

Lecture 10 - Ultraviolet and Visible Spectrophotometry-6 (vi. Applications)

Lecture 11 - Fluorescence and Phosphorescence Spectrophotometry-1 (i. Theoretical Aspects)

Lecture 12 - Fluorescence and Phosphorescence Spectrophotometry-2 (ii. Instrumentation)

Lecture 13 - Fluorescence and Phosphorescence Spectrophotometry-3 (iii. Application)

Lecture 14 - Atomic Fluorescence (i. Theoretical aspects)

Lecture 15 - X- Ray Analytical Techniques-1 (ii. Instrumentation)

Lecture 16 - X- Ray Analytical Techniques-2 (iii. Applications)

Lecture 17 - Atomic Absorption Spectrometry-1 (i. Theoretical Aspects)

Lecture 18 - Atomic Absorption Spectrometry-2 (ii.Theoretical Aspects)

Lecture 19 - Atomic Absorption Spectrometry-3 (iii. Instrumentation)

Lecture 20 - Atomic Absorption Spectrometry-4 (iv. Instrumentation)

Lecture 21 - Atomic Absorption Spectrometry-5 (v. Instrumentation)

Lecture 22 - Atomic Absorption Spectrometry-6 (vi. Signal handling)

Lecture 23 - Atomic Absorption Spectrometry-7 (vii. Interferences)

Lecture 24 - Atomic Absorption Spectrometry-8 (viii. Hydride Generation AAS)

Lecture 25 - Atomic Absorption Spectrometry-9 (ix.Cold Vapour Mercury AAS)

Lecture 26 - Electrothermal Atomic Absorption Spectrometry-10 (x. Electrothermal Aspects)

Lecture 27 - Electrothermal Atomic Absorption Spectrometry-11 (xi. Practical Aspects)

Lecture 28 - Inductively Coupled Plasma Atomic Emission Spectrometry-1 (i. Theoretical Aspects)

Lecture 29 - Inductively Coupled Plasma Atomic Emission Spectrometry-2 (ii. Instrumentation)

Lecture 30 - Inductively Coupled Plasma Atomic Emission Spectrometry-3 (iii. Comparison of ICP & AAS)

Lecture 31 - Infrared Spectroscopy-1 (i. Theoretical Aspects)

Lecture 32 - Infrared Spectroscopy-2 (ii. Practical Aspects)

Lecture 33 - Infrared Spectroscopy-3 (iii. Nondispensive IR, Mass spectrometer)

Lecture 34 - Introduction to Mass Spectrometry

Lecture 35 - Introduction to Nuclear Magnetic Resonance Spectroscopy

Lecture 36 - Fundamentals of Electrochemical Techniques-1 (i. Introduction)

Lecture 37 - Fundamentals of Electrochemical Techniques-2 (ii. Introduction) (Continued...)

Lecture 38 - Polarography-1 (i. Introduction)

Lecture 39 - Polarography-2 (ii. Applications)

Lecture 40 - Chromatography-1 (i. Introduction)

Lecture 41 - Gas chromatography-1 (i. Instrumentation)

Lecture 42 - Gas chromatography-2 (ii. Applications)

Lecture 43 - Gas chromatography-3 (iii. Applications)

NPTEL : NOC:Transport Processes I: Heat and Mass Transfer (Chemical Engineering)

Co-ordinators : Prof. V. Kumaran

Lecture 1 - Transport by convection and diffusion

Lecture 2 - Non-dimensional analysis of beams

Lecture 3 - Dimensional analysis: Force on a particle settling in a fluid

Lecture 4 - Dimensional analysis: Heat transfer in a heat exchanger

Lecture 5 - Dimensional analysis: Mass transfer from a particle suspended in a fluid

Lecture 6 - Dimensional analysis: Power of an impeller

Lecture 7 - Dimensional analysis: Scaling up of an impeller

Lecture 8 - Dimensional analysis: Convection and diffusion

Lecture 9 - Dimensional analysis: Physical interpretation of dimensionless groups

Lecture 10 - Dimensional analysis: Correlations for dimensionless groups

Lecture 11 - Dimensional analysis: Natural and forced convection

Lecture 12 - Continuum description of fluids

Lecture 13 - Conservation equations and constitutive relations

Lecture 14 - Diffusion: Mechanism of mass diffusion in gases

Lecture 15 - Diffusion: Estimation of mass diffusion coefficient

Lecture 16 - Diffusion: Momentum diffusion coefficient

Lecture 17 - Diffusion: Thermal diffusion coefficient

Lecture 18 - Unidirectional transport: Conservation equation for heat and mass transfer

Lecture 19 - Unidirectional transport: Conservation equation for momentum transfer

Lecture 20 - Unidirectional transport: Similarity solution for infinite domain

Lecture 21 - Unidirectional transport: Similarity solution for infinite domain (Continued...)

Lecture 22 - Unidirectional transport: Similarity solution for mass transfer into a falling film

Lecture 23 - Unidirectional transport: Similarity solution for decay of a pulse

Lecture 24 - Unidirectional transport: Similarity solution for decay of a pulse (Continued...)

Lecture 25 - Unidirectional transport: Separation of variables for transport in a finite domain

Lecture 26 - Unidirectional transport: Separation of variables for transport in a finite domain (Continued...)

Lecture 27 - Unidirectional transport: Separation of variables for transport in a finite domain (Continued...)

Lecture 28 - Unidirectional transport: Separation of variables for transport in a finite domain (Continued...)

Lecture 29 - Unidirectional transport: Balance laws in cylindrical co-ordinates. Heat transfer across the wall of a pipe

Lecture 30 - Unidirectional transport: Balance laws in cylindrical co-ordinates. Unsteady heat conduction from a cylinder

Lecture 31 - Unidirectional transport: Balance laws in cylindrical co-ordinates. Unsteady heat conduction from a cylinder (Continued...)

Lecture 32 - Unidirectional transport: Balance laws in cylindrical co-ordinates. Unsteady heat conduction from a cylinder (Continued...)

Lecture 33 - Unidirectional transport: Balance laws in cylindrical co-ordinates. Similarity solution for heat conduction from a wire

Lecture 34 - Unidirectional transport: Effect of body force in momentum transfer. Falling film

Lecture 35 - Unidirectional transport: Effect of pressure in momentum transfer. Flow in a pipe

Lecture 36 - Unidirectional transport: Friction factor for flow in a pipe

Lecture 37 - Unidirectional transport: Laminar and turbulent flow in a pipe

Lecture 38 - Unidirectional transport: Laminar and turbulent flow in a pipe

Lecture 39 - Unidirectional transport: Oscillatory flow in a pipe. Solution using complex variables

Lecture 40 - Unidirectional transport: Oscillatory flow in a pipe. Solution using complex variables

Lecture 41 - Unidirectional transport: Oscillatory flow in a pipe. Solution using complex variables (Continued...)

Lecture 42 - Unidirectional transport: Oscillatory flow in a pipe. Low and high Reynolds number solutions

Lecture 43 - Unidirectional transport: Spherical co-ordiantes. Heat conduction from a sphere

Lecture 44 - Mass and energy balance equations in Cartesian co-ordinates

Lecture 45 - Mass and energy balance equations in Cartesian co-ordinates

Lecture 46 - Mass and energy balance equations in spherical co-ordinates

Lecture 47 - Mass and energy balance equations in spherical co-ordinates

Lecture 48 - Momentum balance: Incompressible Navier-Stokes equations

Lecture 49 - Balance equation: Convection and diffusion dominated regimes

Lecture 50 - Diffusion equation: Heat conduction in a rectangular solid

Lecture 51 - Diffusion equation: Heat conduction in a rectangular solid (Continued...)

Lecture 52 - Diffusion equation: Heat conduction around a sphereical inclusion

Lecture 53 - Diffusion equation: Heat conduction around a spherial inclusion

Lecture 54 - Diffusion equation: Effective conductivity of a composite

Lecture 55 - Diffusion equation: Spherical harmonic solutions

Lecture 56 - Diffusion equation: Conduction from a point source

Lecture 57 - Diffusion equation: Method of Greens functions

Lecture 58 - Diffusion equation: Method of images

Lecture 59 - Diffusion equation: Equivalence of spherical harmonics and multipole expansion

Lecture 60 - High Peclet number forced convection: Boundary layer in flow past a heated plate

Lecture 61 - High Peclet number forced convection: Boundary layer in flow past a heated plate (Continued...)

Lecture 62 - High Peclet number forced convection: Flow past a heated sphere

Lecture 63 - High Peclet number forced convection: Flow past a heated sphere (Continued...)

Lecture 64 - High Peclet number forced convection: Transport to a falling film

Lecture 65 - High Peclet number forced convection: Transport to a spherical bubble

Lecture 66 - High Peclet number forced convection: Solutions for an arbitrary geometry

Lecture 67 - High Peclet number forced convection: Taylor dispersion

Lecture 68 - Natural convection: Boussinesq equations for heat transfer

Lecture 69 - Natural convection: Boundary layer equations

Lecture 70 - Natural convection: Boundary layer equations convection

Lecture 71 - Natural convection: Heat transfer correlations

NPTEL : NOC:Atomic and Molecular Absorption Spectrometry for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

Lecture 1 - Course Introduction

Lecture 2 - Atomic structure

Lecture 3 - Interaction of EM radiation with matter

Lecture 4 - Atomic and molecular orbitals

Lecture 5 - Interaction of EM radiation with matter - I

Lecture 6 - Interaction of EM radiation with matter - II

Lecture 7 - Interaction of interaction of EM radiation with matter - III

Lecture 8 - Emission and absorption spectra

Lecture 9 - MO theory

Lecture 10 - Structure Â– property relationship of organic compounds

Lecture 11 - Woodword Fieser rules, structure Â– property relationship

Lecture 12 - Beer-Lamberts law

Lecture 13 - Deviations from Beer-Lamberts law, relative concentration error, instrumentation - I

Lecture 14 - UV-Visible spectrophotometry, instrumentation - II

Lecture 15 - UV-Visible spectrophotometry, instrumentation - III

Lecture 16 - UV-Visible spectrophotometry, instrumentation - IV

Lecture 17 - Quantitative analysis Â– I

Lecture 18 - Quantitative analysis Â– II

Lecture 19 - Quantitative analysis Â– III

Lecture 20 - Quantitative analysis Â– IV

Lecture 21 - Fluorescence spectrophotometry Â– I

Lecture 22 - Fluorescence spectrophotometry - II

Lecture 23 - Fluorescence spectrophotometry - III

Lecture 24 - Instrumentation

Lecture 25 - Chemical analysis, applications

Lecture 26 - Chemiluminiscence, principles

Lecture 27 - Status of spectrophotometry vis a vis environment

Lecture 28 - Separations methods

Lecture 29 - Method development

Lecture 30 - Boron, chloride

Lecture 31 - Fluoride

Lecture 32 - Phenols

Lecture 33 - Arsenic, Free chlorine

Lecture 34 - Magnesium

Lecture 35 - Nonionic surfactants, iron, phosphate

Lecture 36 - Nitrite , manganese

Lecture 37 - Cadmium, copper, lead

Lecture 38 - Total hardness, zinc

Lecture 39 - Nitrate, chromium

Lecture 40 - Determination of aluminum, cyanide, sulphate

Lecture 41 - Sulphate, ammonia, Conclusions

NPTEL : NOC:Trace and Ultra-trace Analysis of Metals using Atomic Absorption Spectrometry (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

Lecture 1 - Course Introduction

Lecture 2 - Atomic structure - I

Lecture 3 - Atomic structure - II

Lecture 4 - Electronic arrangement in the Elements - I

Lecture 5 - Electronic arrangement in the Elements - II

Lecture 6 - Interaction of EM radiation with matter - I

Lecture 7 - Interaction of EM radiation with matter - II

Lecture 8 - Interaction of EM radiation with matter - III

Lecture 9 - Interaction of EM radiation with matter - IV

Lecture 10 - Theoretical basis of AAS - I

Lecture 11 - Theoretical basis of AAS - II

Lecture 12 - Theoretical basis of AAS - III

Lecture 13 - Theoretical basis of AAS - IV

Lecture 14 - Instrumentation in AAS - I

Lecture 15 - Instrumentation in AAS - I (Continued...) Radiation Sources

Lecture 16 - Instrumentation in AAS Radiation Sources: Sample introduction

Lecture 17 - Instrumentation in AAS - III : Burners

Lecture 18 - Instrumentation in AAS - IV : Flame Processes

Lecture 19 - Instrumentation in AAS - V : Atomization Processes

Lecture 20 - Instrumentation in AAS - VI : Optics

Lecture 21 - Instrumentation in AAS - VII : Optics and Detectors

Lecture 22 - Interferences in AAS

Lecture 23 - Background correction on flame AAS - I

Lecture 24 - Interferences in AAS - II

Lecture 25 - Interferences in AAS - III

Lecture 26 - Hydride Generation AAS - I

Lecture 27 - Hydride Generation AAS and Cold Vapour Hg AAS

Lecture 28 - Cold vapor Hg AAS Flame Emission

Lecture 29 - Mercury cold vapour technique, FAES and Electrothermal AAS

Lecture 30 - Electrothermal AAS - II

Lecture 31 - GF AAS Interferences - I

Lecture 32 - GF AAS Interferences - II

Lecture 33 - Interference in ETAAS GF AAS : Individual elements

Lecture 34 - Individual Elements AAS

Lecture 35 - Methods, Nomenclature and techniques : Individual Elements

Lecture 36 - Technology and Applications - I

Lecture 37 - Technology and Applications - II

Lecture 38 - Conclusions

NPTEL : NOC:Inductive Couple Plasma Atomic Emmission Spectrometry for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

Lecture 1 - Course introduction and atomic structure - I

Lecture 2 - Course introduction and atomic structure - II

Lecture 3 - Course introduction and atomic structure - III

Lecture 4 - Course introduction and atomic structure - IV

Lecture 5 - Course introduction and atomic structure - V

Lecture 6 - Course introduction and atomic structure - VI

Lecture 7 - Nature of electromagnetic radiation

Lecture 8 - Interaction of EM radiation with matter - I

Lecture 9 - Interaction of EM radiation with matter - II

Lecture 10 - Instrumentation for ICP AES - I

Lecture 11 - Instrumentation for ICP AES - II

Lecture 12 - Instrumentation for ICP AES - III

Lecture 13 - Instrumentation for ICP AES - IV - Optical mountings

Lecture 14 - Instrumentation for ICP AES - V - Detectors

Lecture 15 - Instrumentation for ICP AES - VI - ICP Torches

Lecture 16 - Instrumentation for ICP AES - VII - Plasma characteristics

Lecture 17 - Instrumentation for ICP AES - VIII - Instruments

Lecture 18 - Practice and Applications of ICP AES - I - Nebulizers

Lecture 19 - Practice and Applications of ICP AES - II - Sample handling

Lecture 20 - Practice and Applications of ICP AES - III - Chemical analysis

Lecture 21 - Practice and Applications of ICP AES - IV - Chemical analysis

Lecture 22 - Practice and Applications of ICP AES - V - Chemical analysis

NPTEL : NOC:Infrared Spectroscopy for Pollution Monitoring (Chemical Engineering)

Co-ordinators : Dr. J.R. Mudakavi

Lecture 1 - Introduction to Analytical Science and Infrared Spectroscopy

Lecture 2 - Environmental Analytical Science

Lecture 3 - Techniques of Elemental Analysis

Lecture 4 - Atomic Structure - I

Lecture 5 - Atomic Structure - II

Lecture 6 - Atomic Structure - III

Lecture 7 - Atomic Structure - IV

Lecture 8 - Interaction of electromagnetic radiation with matter - I

Lecture 9 - Interaction of electromagnetic radiation with matter - II

Lecture 10 - Interaction of electromagnetic radiation with matter - III

Lecture 11 - Interaction of electromagnetic radiation with matter - IV

Lecture 12 - Interaction of electromagnetic radiation with matter - V

Lecture 13 - Interaction of electromagnetic radiation with matter - VI

Lecture 14 - Infrared spectroscopy - Introduction

Lecture 15 - Infra Red Instrumentation

Lecture 16 - Fourier Transform Infrared Spectroscopy

Lecture 17 - Sample Handling in IR

Lecture 18 - Instrumentation in IR

Lecture 19 - Applications of IR

Lecture 20 - IR Spectra Interpretation

Lecture 21 - IR Gas Analysers

NPTEL : NOC:Electrochemical Technology in Pollution Control (Chemical Engineering)

Co-ordinators : Prof. J. R. Mudakavi

Lecture 1 - Introduction to Electrochemical technology in Pollution Control

Lecture 2 - Atomic structure - 1

Lecture 3 - Atomic structure - 2

Lecture 4 - Properties of solution - 1

Lecture 5 - Properties of solution - 2

Lecture 6 - Properties of solution - 3

Lecture 7 - Electrogravimetry

Lecture 8 - Conductometry - 1

Lecture 9 - Conductometry - 2

Lecture 10 - Potentiometry - Electrolytic cells - 1

Lecture 11 - Potentiometry - Types of electrode - 2

Lecture 12 - Potentiometry - 3

Lecture 13 - Potentiometry - 4

Lecture 14 - Potentiometry - 5

Lecture 15 - Potentiometry - 6

Lecture 16 - Voltametry and Polarography - 1

Lecture 17 - Voltametry and Polarography - 2

Lecture 18 - Voltametry and Polarography - 3

Lecture 19 - Voltametry and Polarography - 4

Lecture 20 - Karl-Fisher titration - 1, Ion selective electrodes - 1

Lecture 21 - Ion selective electrodes - 2

Lecture 22 - Ion selective electrodes - 3

Lecture 23 - Electrochemical sensors - 1

Lecture 24 - Electrochemical sensors - 2

Lecture 25 - Process waste handling - 1

Lecture 26 - Process waste handling - 2

Lecture 27 - Process waste handling - 3

Lecture 28 - Electroplating - 1

Lecture 29 - Electroplating - 2

Lecture 30 - Electroplating - 3

Lecture 31 - Electroplating - 4

Lecture 32 - Batteries and fuel cells - 1

Lecture 33 - Batteries and fuel cells - 2

Lecture 34 - Batteries and fuel cells - 3

Lecture 35 - Zero liquid discharge

NPTEL : NOC:Transport Processes (Chemical Engineering)

Co-ordinators : Prof. V Kumaran

Lecture 1 - Dimensions and units

Lecture 2 - Dimensions and units, dimension of an equation

Lecture 3 - Dimensional analysis, settling sphere

Lecture 4 - Dimensional analysis, Brownian diffusivity, torque on a particle

Lecture 5 - Mass transfer to suspended particles

Lecture 6 - Heat transfer in a heat exchanger

Lecture 7 - Momentum transfer, flow in a pipe, friction factor

Lecture 8 - Dimensionless groups - ratio of convection and diffusion

Lecture 9 - Dimensionless fluxes, other dimensionless groups

Lecture 10 - Laminar and turbulent flow in a pipe

Lecture 11 - Flow past flat plate

Lecture 12 - Correlations for drag coefficient

Lecture 13 - Correlations for drag coefficient

Lecture 14 - Flow through packed column

Lecture 15 - Unit operations for mixing

Lecture 16 - Droplet breakup

Lecture 17 - Heat and mass transfer, Colburn and Reynolds analogy

Lecture 18 - Low Peclet number heat/mass transfer, high Peclet number laminar flow

Lecture 19 - High Peclet number laminar/turbulent flows. Flow in pipe, flow past flat plate

Lecture 20 - High Peclet number laminar/turbulent flows. Flow past particle

Lecture 21 - Flow past mobile interfaces, flow in packed column

Lecture 22 - Natural convection

Lecture 23 - Mass diffusion in gases

Lecture 24 - Mass diffusion in gases

Lecture 25 - Mass diffusion in liquids

Lecture 26 - Thermal diffusion

Lecture 27 - Momentum diffusion

Lecture 28 - Dispersion

Lecture 29 - Turbulent dispersion, dispersion in packed column, Taylor dispersion

Lecture 30 - Unidirectional transport. Shell balance

Lecture 31 - Unidirectional transport. Common form of transport equations

Lecture 32 - Steady solutions, constant diffusivity, parallel and series conduction

Lecture 33 - Steady solutions, internal source, viscous heating

Lecture 34 - Steady solutions, flow down inclined plane

Lecture 35 - Steady solutions, internal source, electrokinetic flow

Lecture 36 - Steady solutions, internal source, electrokinetic flow

Lecture 37 - Steady solutions, internal source, diffusion-reaction

Lecture 38 - Binary diffusion

Lecture 39 - Binary diffusion

Lecture 40 - Correlations in balance equations. Transport by diffusion

Lecture 41 - Correlations in balance equations. Transport by diffusion

Lecture 42 - Correlations in balance equations. Forced convection

Lecture 43 - Correlations in balance equations. Forced convection

Lecture 44 - Correlations in balance equations. Natural convection

Lecture 45 - Correlations in balance equations. Packed column

Lecture 46 - Cylindrical co-ordinates. Balance equation

Lecture 47 - Cylindrical co-ordinates. Steady conduction

Lecture 48 - Cylindrical co-ordinates. Heat transfer resistance

Lecture 49 - Cylindrical co-ordinates. Examples

Lecture 50 - Spherical co-ordinates. Balance equation

Lecture 51 - Spherical co-ordinates. Heat transfer resistance

Lecture 52 - Laminar flow in a pipe. Momentum balance

Lecture 53 - Laminar flow in a pipe. Velocity profile. Friction factor

Lecture 54 - Laminar flow in a pipe. Friction factor correlation

Lecture 55 - Laminar flow in a pipe. Examples

Lecture 56 - Laminar flow in a pipe. Examples

Lecture 57 - Turbulence. Instability and transition

Lecture 58 - Turbulent flow in a pipe. Dissipation rate, turbulence scales

Lecture 59 - Turbulent flow in a pipe. Turbulence cascade

Lecture 60 - Turbulent flow in a pipe. Structure of turbulence

NPTEL : NOC:Organo Metallic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof.Debabrata Maiti

Lecture 1 - Introduction of Organometallic Chemistry

Lecture 2 - Counting of Electrons

Lecture 3 - Ligand Substitution Reactions

Lecture 4 - Oxidative Addition [1.Concerted Mechanism]

Lecture 5 - Oxidative Addition [2.SN2 Mechanism]

Lecture 6 - Oxidative Addition [3. Radical Mechanism]

Lecture 7 - Reductive Elimination

Lecture 8 - Migratory Insertion and Elimination Reactions

Lecture 9 - Migration and Insertion Reactions

Lecture 10 - Alpha-Migratory Insertion and alpha-Elimination Reactions

Lecture 11 - Beta-Migratory Insertion

Lecture 12 - Beta-Elimination Reaction

Lecture 13 - Alpha-Abstraction and beta-Abstraction

Lecture 14 - 4-Center Reactions; [2+2] Reactions

Lecture 15 - External Attack by a Ligand and Reductive Coupling

Lecture 16 - Hydrogenation Reaction

Lecture 17 - Hydrogenation Reaction [Dihydride Catalyst]

Lecture 18 - Stereoselective Hydrogenation Reaction

Lecture 19 - Carbonylation Reaction [1. Monsanto Acetic Acid Process 2. Hydroformylation 3. Hydrocarboxylation]

Lecture 20 - Carbonylation Reaction [1. Hydroformylation 2. Hydrocarboxylation 3. Hydrocyanation]

NPTEL : NOC:Chemical and Biological Thermodynamics - Principles to Applications (Chemistry and Biochemistry)

Co-ordinators : Prof. Nand Kishore

Lecture 1 - Fundamentals of Chemical thermodynamics

Lecture 2 - Work

Lecture 3 - Tutorial-1

Lecture 4 - First Law of Thermodynamics

Lecture 5 - Tutorial-2

Lecture 6 - Adiabatic processes

Lecture 7 - Entropy

Lecture 8 - Entropy and Second Law: Basics

Lecture 9 - Entropy and Second Law: Applications

Lecture 10 - Third Law of Thermodynamics

Lecture 11 - Discussion on Helmholtz energy

Lecture 12 - Discussion on Gibbs Energy

Lecture 13 - Maxwell relations, Properties of Gibbs energy

Lecture 14 - Further discussion on properties of Gibbs energy

Lecture 15 - Fugacity

Lecture 16 - Tutorial session

Lecture 17 - Tutorial session

Lecture 18 - Chemical potential of a substance in mixture

Lecture 19 - Chemical potential of Liquids, Raoultâ€™s Law, Henryâ€™s Law

Lecture 20 - Thermodynamics of mixing, Excess functions

Lecture 21 - Partial molar volume

Lecture 22 - Activities (Accounting for deviations from Ideal behaviour)

Lecture 23 - Tutorial on thermodynamics of mixing and deviations from ideality

Lecture 24 - Further discussion on relation between C p and C v

Lecture 25 - Chemical Equilibrium

Lecture 26 - Perfect gas equilibria

Lecture 27 - Equilibrium constant

Lecture 28 - Effect of pressure on equilibrium constant and equilibrium composition

Lecture 29 - Effect of temperature on equilibria

Lecture 30 - Biological standard states and pH

Lecture 31 - Tutorial 1 - Equilibrium constant

Lecture 32 - Tutorial 2 - Equilibrium constant

Lecture 33 - Acids and bases and Equilibrium concepts

Lecture 34 - pH Scale Strong and weak acids and bases

Lecture 35 - Strong and weak acids and bases

Lecture 36 - Acid-base titrations

Lecture 37 - pH curve for titration of weak acid with strong base Buffers and indicators

Lecture 38 - Thermodynamics in systems of biological interest

Lecture 39 - Calorimetry

Lecture 40 - Differential scanning calorimetry (DSC)

Lecture 41 - Further discussion on Differential Scanning Calorimetry (DSC)

Lecture 42 - Explaining Differential Scanning Calorimetric Profiles (DSC Profiles)

Lecture 43 - Applications of DSC in thermal unfolding of proteins and protein-solvent interactions

Lecture 44 - Further discussion on applications of DSC in thermal unfolding of proteins and protein-solvent interactions

Lecture 45 - Isothermal Titration calorimetry (ITC)

Lecture 46 - Further discussion on Isothermal Titration calorimetry (ITC)

Lecture 47 - ITC Experimental Design and Isothermal Titration Calorimetry (ITC) in Drug Design

Lecture 48 - Isothermal Titration Calorimetry (ITC) in Drug Design

Lecture 49 - Isothermal Titration Calorimetry (ITC) in Engineering Binding Affinity

Lecture 50 - Calorimetry in identifying partially folded states of proteins (Molten Globule State)

Lecture 51 - Thermodynamic Characterization of Partially Folded States of Proteins

Lecture 52 - Quantitative Thermodynamic Characterization of Partially Folded States of Proteins

Lecture 53 - ITC in Drug-Protein Interactions

Lecture 54 - Identifying sites for Drug-Protein Interactions by ITC

Lecture 55 - Identifying sites for Drug-Protein Interactions, DSC of Protein-Ligand Complexes. Enthalpy-Entropy Compensation

Lecture 56 - Estimation of Binding Constants in Strong to Ultratight Protein-Ligand, Interactions Using Differential Scanning Calorimetry

Lecture 57 - Continuation of discussion on... Estimation of Binding Constants in Strong to UltratightProtein-Ligand Interactions Using Differential Scanning Calorimetry

Lecture 58 - Thermal unfolding of protein by non-calorimetric methods, Addressing thermodynamics of the process

Lecture 59 - Titration Calorimetry as a tool to determine thermodynamic and Kinetic parameters of enzymes

Lecture 60 - Summary of the course

NPTEL : NOC:Chemistry of Main Group Elements (Chemistry and Biochemistry)

Co-ordinators : Prof. M. S. Balakrishna

Lecture 1 - Classification of Elements and Periodic Properties

Lecture 2 - Periodic Properties, Periodic Trends and Classification of Main Group Compounds

Lecture 3 - Classification of Main Group Compounds

Lecture 4 - Effective Nuclear Charge

Lecture 5 - Structure and Bonding Aspects: Lewis Structures and VSEPR Theory

Lecture 6 - Structure and Bonding Aspects: VSEPR Theory

Lecture 7 - Structure and Bonding Aspects: Valence Bond Theory

Lecture 8 - Structure and Bonding Aspects: Valence Bond Theory

Lecture 9 - Structure and Bonding Aspects: MO Theory

Lecture 10 - Structure and Bonding Aspects: MO Theory

Lecture 11 - Structure and Bonding Aspects: MO Theory

Lecture 12 - Structure and Bonding Aspects: MO Theory

Lecture 13 - Chemistry of Hydrogen

Lecture 14 - Chemistry of Hydrogen

Lecture 15 - Chemistry of Hydrogen, Hydrides and Hydrogen Bonding

Lecture 16 - Chemistry of Group 1 Elements

Lecture 17 - Chemistry of Group 1 Elements

Lecture 18 - Chemistry of Group 1 Elements

Lecture 19 - Chemistry of Group 1 Elements

Lecture 20 - Chemistry of Group 2 Elements

Lecture 21 - Chemistry of Group 2 Elements

Lecture 22 - Chemistry of Group 2 Elements

Lecture 23 - Chemistry of Group 2 Elements

Lecture 24 - Chemistry of Group 2 Elements

Lecture 25 - Chemistry of Group 13 Elements

Lecture 26 - Chemistry of Group 13 Elements

Lecture 27 - Chemistry of Group 13 Elements

Lecture 28 - Chemistry of Group 13 Elements

Lecture 29 - Chemistry of Group 13 Elements

Lecture 30 - Wades Rules

Lecture 31 - Chemistry of Group 13 Elements

Lecture 32 - Chemistry of Group 14 Elements

Lecture 33 - Chemistry of Group 14 Elements

Lecture 34 - Chemistry of Group 14 Elements

Lecture 35 - Chemistry of Group 14 Elements

Lecture 36 - Chemistry of Group 14 Elements

Lecture 37 - Chemistry of Group 14 Elements

Lecture 38 - Chemistry of Group 14 Elements

Lecture 39 - Chemistry of Group 15 Elements

Lecture 40 - Chemistry of Group 15 Elements

Lecture 41 - Chemistry of Group 15 Elements

Lecture 42 - Chemistry of Group 15 Elements

Lecture 43 - Chemistry of Group 15 Elements

Lecture 44 - Chemistry of Group 15 Elements

Lecture 45 - Chemistry of Group 15 Elements

Lecture 46 - Chemistry of Group 15 Elements

Lecture 47 - Chemistry of Group 16 Elements

Lecture 48 - Chemistry of Group 16 Elements

Lecture 49 - Chemistry of Group 16 Elements

Lecture 50 - Chemistry of Group 16 Elements

Lecture 51 - Chemistry of Group 16 Elements

Lecture 52 - Chemistry of Group 17 Elements

Lecture 53 - Chemistry of Group 17 Elements

Lecture 54 - Chemistry of Group 18 Elements

Lecture 55 - Chemistry of Group 12 Elements

Lecture 56 - Organometallic Compounds of Main Group Elements

Lecture 57 - Organometallic Compounds of Main Group Elements

Lecture 58 - Organometallic Compounds of Main Group Elements

Lecture 59 - Organometallic Compounds of Main Group Elements

Lecture 60 - Overall Summary

NPTEL : NOC:Transition Metal Organometallic Chemistry - Principles to Applications (Chemistry and Biochemistry)

Co-ordinators : Prof. P. Ghosh

Lecture 1 - History of Organometallic Compounds

Lecture 2 - Polarity and Reactivity of Mâˆ’C bonds

Lecture 3 - Reactivity of Organometallic Compounds

Lecture 4 - Reactivity of Organometallic Compounds

Lecture 5 - 18 Valence Electron Rule and Classification

Lecture 6 - 18 Valence Electron Rule and Classification

Lecture 7 - Reactivity and types of Organometallic compounds

Lecture 8 - Sigma-Donor Ligands

Lecture 9 - Preparation of Sigma-Alkyl Compounds

Lecture 10 - Preparation and Properties of Sigma-Alkyl Compounds

Lecture 11 - Properties of Sigma-Alkyl Compounds

Lecture 12 - Î²âˆ’elimination in Sigma-Alkyl Compounds

Lecture 13 - Î²âˆ’elimination in Detail

Lecture 14 - TM Sigma-Alkyl Complexes and its Application

Lecture 15 - TM Sigma-Alkyl Complexes and its Application

Lecture 16 - Câˆ’H Activation

Lecture 17 - Câˆ’H Activation in Details

Lecture 18 - Câˆ’H Activation in Details

Lecture 19 - Characterization of Câˆ’H Activation

Lecture 20 - Bonding in Câˆ’H Activation

Lecture 21 - Câˆ’C Bond Activation

Lecture 22 - Câˆ’C Bond Activation

Lecture 23 - Câˆ’C Bond Activation in Details

Lecture 24 - Transition Metal Perfluoroalkyl (RFâˆ’TM) Complexes

Lecture 25 - Preparation of Transition Metal Perfluoroalkyl (RFâˆ’TM) Complexes

Lecture 26 - Câˆ’F Activation

Lecture 27 - Transition Metal Alkenyl/Aryl Complexes

Lecture 28 - Transition Metal Aryl Complexes

Lecture 29 - Transition Metal Aryl/Alkyne Complexes

Lecture 30 - Transition Metal Alkyne/Carbene Complexes

Lecture 31 - Transition Metal Carbene Complexes: Preparations

Lecture 32 - Transition Metal Carbene Complexes: Properties

Lecture 33 - Transition Metal Carbene Complexes: Reactivities

Lecture 34 - Transition Metal Carbene Complexes: Reactivities

Lecture 35 - Transition Metal Carbene Complexes: Reactivities

Lecture 36 - Transition Metal Carbene Complexes: Reactivities

Lecture 37 - Reactivity of Schrock type Carbene Complexes and Transition Metal Carbynes

Lecture 38 - Transition Metal Carbynes: Preparation

Lecture 39 - Transition Metal Carbynes: Properties

Lecture 40 - Transition Metal Carbynes: Properties

Lecture 41 - Properties of Transition Metal Carbynes And Transition Metal Carbonyls

Lecture 42 - Transition Metal Carbonyls

Lecture 43 - Transition Metal Carbonyls

Lecture 44 - Transition Metal Carbonyls: Bonding Properties

Lecture 45 - Transition Metal Carbonyls: Bonding properties

Lecture 46 - Transition Metal Carbonyls: Reactivities

Lecture 47 - Transition Metal Carbonyls: Reactivity and Carbonyl Metallates

Lecture 48 - Transition Metal Carbonyl Hydrides

Lecture 49 - Application of Carbonyl Metallates and Metal Halides

Lecture 50 - Application of Metal Halides and Metal Alkenes

Lecture 51 - Transition Metal Olefin Complexes

Lecture 52 - Transition Metal Olefin Complexes

Lecture 53 - Transition Metal Olefin Complexes: Reactivity

Lecture 54 - Bonding Properties in Olefin Complexes

Lecture 55 - Transition Metal Diolefin Complexes

Lecture 56 - Transition Metal Diolefin and Alkyne Complexes

Lecture 57 - Transition Metal Alkyne Complexes

Lecture 58 - Transition Metal Alkyne Complexes: Reactivity

Lecture 59 - Transition Metal Alkyne Complexes: Reactivity

Lecture 60 - Summary: Transition Metal Organometallic Chemistry: Principles to Applications

NPTEL : NOC:Metal Mediated Synthesis-I (Chemistry and Biochemistry)

Co-ordinators : Prof.Debabrata Maiti

Lecture 1 - Assymetric Hydrogenation

Lecture 2 - Transition Metal Carbenes Fischerand Schrock Carbenes

Lecture 3 - Olefin Metathesis

Lecture 4 - Alkyne Metathesis

Lecture 5 - Cyclopropanation Reaction

Lecture 6 - Catalytic Cyclopropanation Reaction and Introduction to Cross Coupling Reaction

Lecture 7 - Kumada Coupling Reaction

Lecture 8 - Suzuki Coupling Reaction

Lecture 9 - Stille Coupling Reaction

Lecture 10 - Assymetric Suzuki Coupling Reaction

Lecture 11 - Sonogashira Coupling Reaction

Lecture 12 - Heck Coupling Reaction

Lecture 13 - Assymetric Heck Reaction Introduction to Buchwald-Hartwig Coupling Reaction

Lecture 14 - Buchwald-Hartwig Coupling Reaction

Lecture 15 - Role of Ligands its Influence in Buchwald-Hartwig Coupling Reaction

Lecture 16 - Oxidative Cyclization Process

Lecture 17 - Application of Oxidative Cyclization in Natural Product Synthesis

Lecture 18 - Synthesis of Reactive Metallacycle Intermediate Via-Beta-Abstraction and their Applications

Lecture 19 - Kulinkovich Reaction and its Mechanism

Lecture 20 - Pausonâ€“Khand Reaction

NPTEL : NOC:Inorganic Chemistry of Life: Principles and Perspectives (Chemistry and Biochemistry)

Co-ordinators : Prof. C.P. Rao

Lecture 1 - Overview of inorganic chemistry of life

Lecture 2 - Elements in biology and or life

Lecture 3 - Selection and criteria for elements

Lecture 4 - Biomolecules

Lecture 5 - Coordination in enzymes

Lecture 6 - Amino acids, peptides and proteins - An introduction

Lecture 7 - Nucleoside, nucleotide and nucleic acids and DNA: An introduction

Lecture 8 - General introduction of metalloproteins

Lecture 9 - Coordination chemistry aspects - An introduction

Lecture 10 - Stability and lability

Lecture 11 - Techniques used inorganic chemistry life

Lecture 12 - Techniques used inorganic chemistry life (Continued...)

Lecture 13 - Techniques used inorganic chemistry life (Continued...)

Lecture 14 - Techniques used inorganic chemistry life (Continued...)

Lecture 15 - Recap on metalloenzymes

Lecture 16 - Role of Alkali, Alkaline earth elements in life

Lecture 17 - Role of Alkali, Alkaline earth elements in life (Continued...)

Lecture 18 - Role of Alkali, Alkaline earth elements in life (Continued...) Ion transport and ionophores

Lecture 19 - Role of Alkali, Alkaline earth elements in life (Continued...) Ion transport and ionophores

Lecture 20 - Functioning of ATPases and nucleases [Na,K]ATPase

Lecture 21 - Role of vanadium in life - General perspectives

Lecture 22 - Role of vanadium in life - Haloperoxidases

Lecture 23 - Enzymes based on manganese in life

Lecture 24 - Role of Iron in life - General perspectives

Lecture 25 - Role of Iron in life - Transport systems

Lecture 26 - Role of Iron in life - Transport and Storage systems

Lecture 27 - Role of Iron in life - Electron transfer

Lecture 28 - Role of Iron in life - Perspectives of electron transfer proteins

Lecture 29 - Role of Iron in life - Monooxygenases: Cytochrome P450

Lecture 30 - Role of Iron in life - Mono-and di-oxygenases

Lecture 31 - Role of Iron in life - Reductases

Lecture 32 - Role of Iron in life - Reductases and Phosphatases

Lecture 33 - Role of Iron in life - Reductases and Phosphatases (Continued...)

Lecture 34 - Role of Cobalt in life

Lecture 35 - Role of Nickel in life - General perspectives

Lecture 36 - Role of Nickel in life - Hydrolase, hydrogenase and SOD

Lecture 37 - Role of Nickel in life - Carbonmonoxide dehydrogenase (CODH)

Lecture 38 - Role of Copper in life - General perspectives

Lecture 39 - Role of Copper in life - Type I and Type 2 copper enzymes

Lecture 40 - Role of Copper in life - Multicenter copper oxidases and SOD

Lecture 41 - Role of Zinc in life - General perspectives including oxidoreductases and hydrolases

Lecture 42 - Role of Zinc in life - Carbonic anhydrase and carboxypeptidase

Lecture 43 - Role of Zinc in life - Transferases, ligages and isomerases

Lecture 44 - Role of Molybdenum in life - Introductory aspects

Lecture 45 - Role of Molybdenum in life - Nitrogenase

Lecture 46 - Role of Molybdenum in life - Oxidoreductases

Lecture 47 - Role of Mercury in the environment - Mercury reductase

Lecture 48 - Role of Selenium in life - Glutathione perioxidase

Lecture 49 - Inorganics in medicine - Introductory aspects and cis-platin

Lecture 50 - Inorganics in medicine - Apoptosis

Lecture 51 - Inorganics in medicine - PDT, MRI and Barium tests

Lecture 52 - Inorganics in medicine - Titanium in biomedical

Lecture 53 - Highlights of the course - Part I

Lecture 54 - Highlights of the course - Part II

Lecture 55 - Highlights of the course - Part III

Lecture 56 - Highlights of the course - Part IV

Lecture 57 - Tutorials - Part I

Lecture 58 - Tutorials - Part II

Lecture 59 - Tutorials - Part III

Lecture 60 - Tutorials - Part IV and overall

NPTEL : NOC:Symmetry and Group Theory (Chemistry and Biochemistry)

Co-ordinators : Prof. Anindya Datta

Lecture 1 - Symmetry point group: Introduction

Lecture 2 - Symmetry point group: Examples - Part I

Lecture 3 - Symmetry point group: Examples - Part II

Lecture 4 - Symmetry point group: Examples - Part III

Lecture 5 - Symmetry point group: Examples - Part IV

Lecture 6 - Transformation matrices and Matrix representation

Lecture 7 - More on Matrix representation: Cartesian coordinates in C2v point group

Lecture 8 - Matrix representation: the way ahead

Lecture 9 - Introduction to Group Theory

Lecture 10 - Group Multiplication Tables

Lecture 11 - Groups and subgroups

Lecture 12 - Classes, Similarity transformations

Lecture 13 - Introduction to Matrices

Lecture 14 - Application of matrices in solution of simultaneous equations

Lecture 15 - Matrix eigenvalue equation

Lecture 16 - Matrix eigenvalue equation: an example

Lecture 17 - Similarity Transformations

Lecture 18 - Back to transformation matrices

Lecture 19 - Matrix representation revisited

Lecture 20 - Function space and Transformation Operators

Lecture 21 - Transformation Operators form the same group as transformation matrices

Lecture 22 - Transformation Operators form a unitary representation for orthonormal basis

Lecture 23 - Transformation Operators: Switching Bases

Lecture 24 - Equivalent representations

Lecture 25 - Unitary Transformation

Lecture 26 - Unitary Transformations (Continued...)

Lecture 27 - Reducible and Irreducible Representations

Lecture 28 - Irreducible Representations and Great Orthogonality Theorem

Lecture 29 - Character Tables: C2v

Lecture 30 - Character Tables: C2v and C3v

Lecture 31 - Practice Session: Review of Some Questions and Solutions

Lecture 32 - Reducible to Irreducible Representations

Lecture 33 - Character Tables of Cyclic Groups

Lecture 34 - Symmetry of Normal Modes: D3h

Lecture 35 - Symmetry of Normal Modes: D3h (Continued...)

Lecture 36 - Symmetry of Normal Modes: a shortcut

Lecture 37 - Recap: Reducible Representation for Normal Modes

Lecture 38 - Contribution of internal motion to normal modes

Lecture 39 - Normal mode analysis: some examples

Lecture 40 - Infrared and Raman spectroscopy

Lecture 41 - IR and Raman activity

Lecture 42 - IR and Raman activity: examples

Lecture 43 - Symmetry Adapted Linear Combinations (SALC)

Lecture 44 - SALC:BeH2

Lecture 45 - SALC:CH4 Introduction

Lecture 46 - SALC:CH4

Lecture 47 - Projection Operators

Lecture 48 - Projection Operators (Continued...)

Lecture 49 - Generating SALCâ€™s using Projection Operators

Lecture 50 - Generating SALCâ€™s using Projection Operators (Continued...)

Lecture 51 - Oh complex and Group-subgroup relation

Lecture 52 - Group-Subgroup Relation

Lecture 53 - SALCs as Pi-MO andCyclopropenyl group

Lecture 54 - SALCs as Pi-MO, Cyclopropenyl group

Lecture 55 - SALCs as Pi-MO, Benzene

Lecture 56 - LCAO Huckel approximation

Lecture 57 - Huckel approximation: Naphthalene

Lecture 58 - Stationary states, Multiplicity, Ethylene

Lecture 59 - Napthalene - I

Lecture 60 - Napthalene - II

Lecture 61 - Napthalene - III

Lecture 62 - Transition Metal Complexes: CFT and LFT

Lecture 63 - Jahn-Teller Theorem, Tetragonal Distortion MOT:ML6, Sigma and Pi Bonds

Lecture 64 - MOT approach of bonding,H2O,Ferrocene

Lecture 65 - MOT approach of bonding,H2O,Ferrocene

Lecture 66 - Derivation: Great Orthogonality Theorem - I (Schurrs Lemma 1)

Lecture 67 - Derivation: Great Orthogonality Theorem - II (Schurrs Lemma 2)

Lecture 68 - Derivation: Great Orthogonality Theorem - III

NPTEL : NOC:Computational Chemistry and Classical Molecular Dynamics (Chemistry and Biochemistry)

Co-ordinators : Prof. B.L. Tembe

Lecture 1 - Introduction to Computational Chemistry

Lecture 2 - Writing Simple Programs: Compilation and Execution

Lecture 3 - Programming Techniques 1 - Evaluating the sine function

Lecture 4 - Programming Techniques 2 - Do loops and if statements

Lecture 5 - Programming Techniques 3 - Roots of a quadratic equation and arrays

Lecture 6 - Programming Techniques 4 - Arrays and matrices

Lecture 7 - Practical Session of Programming 1

Lecture 8 - Programming Techniques 5 - Formats, Functions and Subroutines

Lecture 9 - Programming Techniques 6 - Functions and Subroutines, arranging numbers in as ascending order

Lecture 10 - Programming Techniques 7 - Functions and Subroutines, and the common statement

Lecture 11 - Numerical Methods. Analysis of errors

Lecture 12 - Practical Session on Programming 2 - The exponential function

Lecture 13 - Practical Session on Programming 3 - Functions and Subroutines

Lecture 14 - Interpolation Methods-1

Lecture 15 - Interpolation Methods-2: Newtonâ€™s and Lagrange Interpolation

Lecture 16 - Errors in interpolation, Matrix operations

Lecture 17 - Gauss elimination method for matrix inversion

Lecture 18 - Matrix diagonalization, Similarity transformations

Lecture 19 - Matrix inversion, Matrix diagonalization

Lecture 20 - Curve fitting, Newton Raphson method

Lecture 21 - Random numbers, Numerical integration using Simpsonâ€™s rule

Lecture 22 - Numerical Integration and Differential Equations

Lecture 23 - Practical Session on Programming 3: Random numbers, Simpsonâ€™s rule; Introduction to Scilab

Lecture 24 - Scilab-2: Matrix equations and Roots of Polynomials

Lecture 25 - Scilab-3: Functions, Integrals, Differential Equations and graphs

Lecture 26 - Scilab-4: Curve Fitting and Execution of Scilab programs

Lecture 27 - Scilab-5: Legendre polynomials, Multiple plots and Curve fitting

Lecture 28 - Scilab-6: Integral Transforms; Introduction to Molecular Dynamics (MD)

Lecture 29 - Classical Molecular Dynamics-2, Force Fields and Equations of Motion

Lecture 30 - Classical Molecular Dynamics-3, Force Fields and MD Algorithms

Lecture 31 - Classical MD-4 Thermodynamic Properties and Distribution Functions.

Lecture 32 - Classical MD-5, Execution of programs on liquid argon

Lecture 33 - Molecular Dynamics using Gromacs-1

Lecture 34 - Molecular Dynamics using Gromacs-2: Simulating Liquid Argon

Lecture 35 - Molecular Dynamics using Gromacs-3: Installing Gromacs

Lecture 36 - Molecular Dynamics using Gromacs-4: Liquid Water: Input Files

Lecture 37 - Molecular Dynamics using Gromacs-5: Liquid Water: Analysis of Results

Lecture 38 - Molecular Dynamics using Gromacs-6: Mixture of Water and Methanol

Lecture 39 - Molecular Dynamics using Gromacs-7: Gromacs Installation

Lecture 40 - Molecular Dynamics using Gromacs-8: Simulation of s-peptide

Lecture 41 - Molecular Dynamics using Gromacs-9: Free Energy of Solvation of Methane, Concluding remarks

NPTEL : NOC:Molecular Spectroscopy: A Physical Chemists Perspective (Chemistry and Biochemistry)

Co-ordinators : Prof. Anindya Datta

Lecture 1 - Frequency Domain Spectroscopy: An Introduction

Lecture 2 - Schematics of Instrumentation for FD Spectroscopy

Lecture 3 - Sensitivity Light Collection and Signal to Noise Ratio

Lecture 4 - Time Domain Spectroscopy

Lecture 5 - Frequency Modulation for Fourier Transform Spectroscopy

Lecture 6 - Rigid Rotor Model for Diatomic Molecules

Lecture 7 - Recapitulation of Quantum Mechanics

Lecture 8 - Conditions for Microwave Activity - I

Lecture 9 - Conditions for Microwave Activity - II

Lecture 10 - Microwave Spectra: Diatomic Molecules

Lecture 11 - Simple Harmonic Oscillator

Lecture 12 - Selection Rule

Lecture 13 - High Resolution IR Spectra

Lecture 14 - Anharmonic Oscillator and Raman Effect

Lecture 15 - Semi Classical Treatment: Radiation-Matter

Lecture 16 - Time Dependent Perturbation Theory

Lecture 17 - Transition Moment Integral

Lecture 18 - Transition Probability and Natural Linewidth

Lecture 19 - Einstein Treatment

Lecture 20 - Relationship Between Theoretical and Experimental Quantities

Lecture 21 - Level System: Concluding Remark - I

Lecture 22 - Level System: Concluding Remark - II

Lecture 23 - Laser Basic

Lecture 24 - Applications of Laser in Spectroscopy

Lecture 25 - Laser in Spectroscopy : Ultrafast Dynamics

Lecture 26 - Snapshot of Bond Breaking

Lecture 27 - Raman Effect

Lecture 28 - Raman Spectroscopy: Quantum Theory of Raman Effect

Lecture 29 - Raman Spectroscopy and Beyond Dipole Approximation

Lecture 30 - Symmetry in Chemistry : An Introduction

Lecture 31 - Symmetry Operations : Transformation Matrices

Lecture 32 - Representations Reducible and Irreducible

Lecture 33 - Matrix Representation of Symmetry Point Group

Lecture 34 - Group Theory : Character Table

Lecture 35 - Character Table : Compendium of Irreducible Representations

Lecture 36 - Mulliken Nomenclature, 2D Irreducible Representations and Bases

Lecture 37 - Character Tables for Different Symmetry Point Groups

Lecture 38 - Wave Functions as Basis

Lecture 39 - Symmetry of Atomic and Molecular Orbitals

Lecture 40 - Polyatomic Molecules : Normal Modes of Vibration

Lecture 41 - Determination of Symmetries of Normal Modes of Vibration - I

Lecture 42 - Determination of Symmetries of Normal Modes of Vibration - II

Lecture 43 - A Shortcut to Symmetry of Normal Modes

Lecture 44 - Normal Modes : Internal Motion IR and Raman Activity

Lecture 45 - IR and Raman Activity - I

Lecture 46 - IR and Raman Activity - II

Lecture 47 - Electronic Spectroscopy : Introduction

Lecture 48 - Electronic Spectra

Lecture 49 - Rotational Fine Structure

Lecture 50 - Symmetry of Electronic States

Lecture 51 - Electronic States of Oxygen

Lecture 52 - Electronic States and Transitions of Benzene

Lecture 53 - Vibronic Coupling

Lecture 54 - Electronic Spectrum of Benzene

Lecture 55 - Basics of NMR Spectroscopy - I

Lecture 56 - Basics of NMR Spectroscopy - II

Lecture 57 - Spin Spin Coupling- AX systems

Lecture 58 - Coupling in A2 systems

Lecture 59 - Coupling in A2 systems (Continued...)

Lecture 60 - NMR: Spectra and Measurement, FT NMR 900 Pulses

Lecture 61 - FT NMR 1800 Pulses and Relaxation Phenomenon

Lecture 62 - Relaxation Phenomenon: Inversion Recovery

NPTEL : NOC:Advanced Transition Metal Organometallic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. P. Ghosh

Lecture 1 - Transition Metal Allyl and Enyl Complexes

Lecture 2 - Transition Metal Allyl and Enyl complexes: Preparation

Lecture 3 - Transition Metal Allyl and Enyl complexes: Preparation

Lecture 4 - Transition Metal Allyl and Enyl Complexes: Reactivity and Transition Metal Sandwich Complexes

Lecture 5 - Types of Transition Metal Sandwich Complexes

Lecture 6 - Transition Metal Cyclobutadiene Complexes

Lecture 7 - Transition Metal Cyclobutadiene Complexes: Preparations

Lecture 8 - Transition Metal Cyclobutadiene Complexes: Reactivity

Lecture 9 - Transition Metal Cyclopentadiene Complexes

Lecture 10 - Transition Metal Cyclopentadiene Complexes: Preparation and Properties

Lecture 11 - Transition Metal Cyclopentadiene Complexes: Bonding Properties

Lecture 12 - Transition Metal Cyclopentadiene Complexes: Molecular Orbital Diagram

Lecture 13 - Transition Metal Cyclopentadiene Complexes: Reactivity of Metallocene

Lecture 14 - Transition Metal Cyclopentadiene Complexes: Reactivity of Ferrocene

Lecture 15 - Transition Metal Cyclopentadienyl Carbonyl Complexes: Preparation

Lecture 16 - Transition Metal Cyclopentadienyl Carbonyl Complexes: Reactivity

Lecture 17 - Transition Metal Cyclopentadienyl Nitrosyl Complexes

Lecture 18 - Transition Metal Cyclopentadienyl Hydride Complexes

Lecture 19 - Transition Metal Cyclopentadienyl Hydride and Halide Complexes

Lecture 20 - Transition Metal Cyclopentadienyl Halide Complexes

Lecture 21 - Transition Metal Cyclopentadienyl Halide and Transition Metal Arene Complexes

Lecture 22 - Transition Metal Arene Complexes: Preparation, Structure and Bonding

Lecture 23 - Transition Metal Arene Complexes: Structure and Bonding

Lecture 24 - Transition Metal Arene Complexes: Reactivity

Lecture 25 - Transition Metal Arene Complexes: Reactivity

Lecture 26 - Transition Metal Arene Carbonyl Complexes: Reactivity

Lecture 27 - Transition Metal Arene Carbonyl Complexes: Reactivity

Lecture 28 - Transition Metal Arene Cyclopentadienyl Complexes

Lecture 29 - Transition Metal Arene Cyclopentadienyl and C7H7 Complexes

Lecture 30 - Transition Metal C7H7 Complexes: Preparation

Lecture 31 - Transition Metal C7H7 Complexes: Reactivity

Lecture 32 - Transition Metal C8H8 and C7H7 Complexes

Lecture 33 - Transition Metal C8H8 Complexes: Properties

Lecture 34 - Transition Metal Ãâ,¬- complexes of heterocycles

Lecture 35 - CÃ¢â,¬â€œC Cross Coupling Reactions

Lecture 36 - CÃ¢â,¬â€œC Cross Coupling Reactions: Allylic Alkylation

Lecture 37 - CÃ¢â,¬â€œC Cross Coupling Reactions: Heck Reaction

Lecture 38 - CÃ¢â,¬â€œC Cross Coupling Reactions: Suzuki Reaction

Lecture 39 - CÃ¢â,¬â€œC Cross Coupling Reactions: Suzuki Reaction

Lecture 40 - CÃ¢â,¬â€œC Cross Coupling Reactions: Stille Reaction

Lecture 41 - CÃ¢â,¬â€œC Cross Coupling Reactions: Stille Coupling

Lecture 42 - CÃ¢â,¬â€œC Cross Coupling Reactions: Sonogashira Coupling

Lecture 43 - Hydrocyanation Reactions

Lecture 44 - CÃ¢Ë†â€™heteroatom Coupling

Lecture 45 - CÃ¢Ë†â€™heteroatom Coupling: Arylamination

Lecture 46 - CÃ¢Ë†â€™Heteroatom Coupling: Hydroamination

Lecture 47 - CÃ¢Ë†â€™Heteroatom Coupling: Hydroboration

Lecture 48 - CÃ¢Ë†â€™Heteroatom Coupling: Hydrosilation

Lecture 49 - Organometallic Catalysis Reactions: Olefin oxidation

Lecture 50 - Organometallic Catalysis Reactions: Olefin oxidation

Lecture 51 - Organometallic Catalysis Reactions: Enantioselective Sharpless Epoxidation

Lecture 52 - Organometallic Catalysis Reactions: Water Gas Shift Reaction

Lecture 53 - Organometallic Catalysis Reactions: Fisher Tropsch Synthesis

Lecture 54 - Organometallic Catalysis Reactions: Fisher Tropsch Mechanism

Lecture 55 - Organometallic Catalysis Reactions: Carbonylation of alcohols

Lecture 56 - Organometallic Catalysis Reactions: Hydrogenation of Alkenes

Lecture 57 - Organometallic Catalysis Reactions: Asymmetric Hydrogenation of Alkenes

Lecture 58 - Organometallic Catalysis Reactions: Asymmetric Hydrogenation of Alkenes

Lecture 59 - Organometallic Catalysis Reactions: Hydroformylation

Lecture 60 - Summary of Advanced Transition Metal Organometallic Chemistry

NPTEL : NOC:Mechanisms in Organic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Nandita Madhavan

Lecture 1 - Introduction to Reaction Mechanisms

Lecture 2 - Writing Reaction Mechanisms: Arrow pushing

Lecture 3 - Types of Polar Reactions

Lecture 4 - The Radical Reactions

Lecture 5 - Reaction Co-ordinate Diagrams

Lecture 6 - The Hammond Postulate

Lecture 7 - Kinetic versus Thermodynamic Control

Lecture 8 - Curtin-Hammett Principle

Lecture 9 - An Introduction to Reaction Kinetics

Lecture 10 - Deriving the Rate Laws

Lecture 11 - Distinguishing Reaction Mechanisms Using Rate Laws

Lecture 12 - Methods to Monitor a Reaction

Lecture 13 - The Hammett Equation

Lecture 14 - Linear Free Energy Relationships (LFER)

Lecture 15 - Hammett Plots for Electronic Effects

Lecture 16 - Scales used in Hammett Plots

Lecture 17 - Deviation from Linear Free Energy Relationships

Lecture 18 - LFER for Sterics: The Taft Parameters

Lecture 19 - Solvent Effects - Part A

Lecture 20 - Solvent Effects - Part B

Lecture 21 - Kinetic Isotope Effect

Lecture 22 - Primary Kinetic Isotope Effect

Lecture 23 - Secondary Kinetic Isotope Effect - Part A

Lecture 24 - Secondary Kinetic Isotope Effect - Part B

Lecture 25 - Heavy Atom Isotope Effects

Lecture 26 - Equilibrium Isotope Effects

Lecture 27 - Isotope Labelling

Lecture 28 - Trapping Intermediates - Part A

Lecture 29 - Trapping Intermediates - Part B

Lecture 30 - Trapping Intermediates - Part C

Lecture 31 - Checking for Common Intermediates

Lecture 32 - Catalysis - Part A

Lecture 33 - Catalysis - Part B

Lecture 34 - Specific Catalysis

Lecture 35 - General Catalysis - Part A

Lecture 36 - General Catalysis - Part B

Lecture 37 - Enzyme Catalysis

Lecture 38 - Electrophilic Catalysis

Lecture 39 - Other Types of Catalysis

Lecture 40 - Course Summary

NPTEL : NOC:Metals in Biology (Chemistry and Biochemistry)

Co-ordinators : Prof.Debabrata Maiti

Lecture 1 - Importance of metals in biology

Lecture 2 - Choice, uptake and assembly of metal ions in cells

Lecture 3 - Control and use of metal ions concentration in biological systems

Lecture 4 - Metal mediated folding of biopolymers

Lecture 5 - Study of binding mode of calcium and zinc in proteins

Lecture 6 - Electron transfer (ET) in living systems

Lecture 7 - Oxygen transport and activation

Lecture 8 - Hydrolytic Enzymes - Part I - Carbonic anhydrase and Liver alcohol dehydrogenase

Lecture 9 - Hydrolytic Enzymes - Part II - Carbopeptidase

Lecture 10 - Hydrolytic Enzymes - Part III - Arginase and Urease

Lecture 11 - Hemerythrin and azidomethemerythrin

Lecture 12 - Dioxygen reactivity in copper

Lecture 13 - Cu-O2 intermediates

Lecture 14 - Copper-Oxygen chemistry - Part I - Mononuclear copper-oxygen

Lecture 15 - Copper-Oxygen chemistry - Part II - Cu-O2 complexes

Lecture 16 - Copper-Oxygen chemistry - Part III - Reactivity summary

Lecture 17 - Iron Catalyzed oxidation of unactivated sp3 C-H bonds - Part I

Lecture 18 - Iron catalyzed oxidation of unactivated sp3 C-H bonds - Part II

Lecture 19 - Iron catalyzed oxidation of unactivated sp3 C-H bonds - Part III

Lecture 20 - Nitrous oxide reductase and its model complex

Lecture 21 - Cytochrome C-oxidase

Lecture 22 - Systematic variations in O-O stretch in Iron-oxo-copper ligand complex

Lecture 23 - Mononuclear nonheme iron (NHI) enzymes

Lecture 24 - Alpha-Keto Glutarate dependent Halogenases

Lecture 25 - Cytochrome P450 - Part I - Introduction

Lecture 26 - Cytochrome P450 - Part II - Reactions

Lecture 27 - Cytochrome P450 - Part III - Mechanism

Lecture 28 - Cytochrome P450 - Part IV - Role of Cystine ligand and distal charge relay

Lecture 29 - Methane monooxygenase

Lecture 30 - Dinuclear Iron active sites for CH4 to CH4OH conversion and its Mechanism

Lecture 31 - Concerted Vs radical pathway for CH4 to CH4OH conversion

Lecture 32 - Photosynthesis - Part I

Lecture 33 - Photosynthesis - Part II

Lecture 34 - Pumps and channels

Lecture 35 - Quick summary on O2 transport

Lecture 36 - Summary of Dioxygen reactivity in copper

Lecture 37 - Summary of Dioxygen reactivity in iron

Lecture 38 - Summary of Fe-O2 chemistry

NPTEL : NOC:NMR Spectroscopy for Chemists and Biologists (Chemistry and Biochemistry)

Co-ordinators : Prof. Ashutosh Kumar

Lecture 1 - Basic concepts

Lecture 2 - Resonance absorption

Lecture 3 - Bloch Equations

Lecture 4 - Relaxation

Lecture 5 - Introduction to Chemical Shift

Lecture 6 - Factors affecting Isotropic Chemical Shifts

Lecture 7 - Spin-Spin Coupling

Lecture 8 - Interpretation of multiplet structure using first order analysis

Lecture 9 - Analysis of NMR spectra of molecules

Lecture 10 - Quantum Mechanical Analysis - Part I

Lecture 11 - Quantum Mechanical Analysis - Part II

Lecture 12 - Dynamic effects in the NMR Spectra

Lecture 13 - Fourier Transform NMR

Lecture 14 - Theorems on Fourier Transform

Lecture 15 - Practical aspects of Fourier Transform NMR spectra

Lecture 16 - Data Processing in Fourier Transform NMR

Lecture 17 - Dynamic range in Fourier Transform NMR

Lecture 18 - Spin Echo and Solvent Suppression

Lecture 19 - Spin Decoupling in FT NMR and Relaxation Measurements

Lecture 20 - Polarization Transfer

Lecture 21 - Nuclear Overhauser Effect

Lecture 22 - Steady state NOE and Transient NOE

Lecture 23 - Distance and NOE

Lecture 24 - Selective Population Inversion

Lecture 25 - INEPT and Sensitivity Enhancement

Lecture 26 - Rotating Frame Experiments

Lecture 27 - Density matrix description of NMR - I

Lecture 28 - Density matrix description of NMR - II

Lecture 29 - Density matrix description of NMR - III

Lecture 30 - Time evolution of density operator

Lecture 31 - Density matrix description of NMR - IV

Lecture 32 - Evolution of density operator in the presence of RF

Lecture 33 - Product operator formalism

Lecture 34 - Product operator formalism (Continued...)

Lecture 35 - Product operator formalism (Continued...)

Lecture 36 - Time evolution of basis operators

Lecture 37 - Observable and Non-observable basis operators, Spin echo

Lecture 38 - Spin echo (Continued...)

Lecture 39 - INEPT

Lecture 40 - Multidimensional NMR Spectroscopy

Lecture 41 - Two Dimensional NMR - Part I

Lecture 42 - Two Dimensional NMR - Part II

Lecture 43 - Types of 2D NMR Spectra

Lecture 44 - Two Dimensional Separation of Interaction in NMR

Lecture 45 - Two Dimensional Correlation Experiments - I

Lecture 46 - Two Dimensional Correlation Experiments - II

Lecture 47 - Two Dimensional Correlation Experiments - III

Lecture 48 - Double Quantum Filtered COSY (DQF-COSY)

Lecture 49 - Two Dimensional Nuclear Overhauser Effect Spectroscopy (2D- NOESY)

Lecture 50 - Constant-time COSY

Lecture 51 - Scaling in 2D NMR

Lecture 52 - Total Correlation Spectroscopy

Lecture 53 - 2D Heteronuclear Experiment - I

Lecture 54 - 2D Heteronuclear Experiment - II

Lecture 55 - Multidimensional NMR

Lecture 56 - Structure Determination of Peptides by NMR - I

Lecture 57 - Structure Determination of Peptides by NMR - II

Lecture 58 - Protein-Ligand Interaction - I

Lecture 59 - Protein-Ligand Interaction - II

Lecture 60 - Diffusion Ordered Spectroscopy

NPTEL : NOC:Basics in Inorganic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof.Debabrata Maiti

Lecture 1 - Concept of Effective Nuclear Charge

Lecture 2 - Electronic Configuration of Elements

Lecture 3 - Properties of Elements (Size, IE, EA and EN)

Lecture 4 - Extraction of Metals

Lecture 5 - Ellingham Diagram

Lecture 6 - Thermit Process and Zone Refining

Lecture 7 - Coordination Chemistry: 18 electron rule and VBT

Lecture 8 - Crystal Field Theory: Octahedral Complex

Lecture 9 - Crystal Field Theory: Tetrahedral Complex

Lecture 10 - Crystal Field Theory: Octahedral vs. Tetrahedral Complex

Lecture 11 - Application of CFSE: Spinel and J-T Distortion

Lecture 12 - Introduction to Molecular Magnetism

Lecture 13 - Problem Solving Approach

Lecture 14 - Magnetism

Lecture 15 - Spectroscopic Term Symbol

Lecture 16 - Magnetic States of Matter: Paramagnetic, Ferro and Antiferromagnetic

Lecture 17 - Introduction to Bio-Inorganic Chemistry

Lecture 18 - Metalloprotein (Hb, Mb, Transferrin) and Metalloenzyme (Plastocyanin)

Lecture 19 - Oxygen Transportation Mechanism

NPTEL : NOC:Ultrafast Laser Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Anindya Datta

Lecture 1 - Introduction

Lecture 2 - Steady State Spectra

Lecture 3 - Spectro Photometer

Lecture 4 - How to record Absorption and Emission Spectra

Lecture 5 - Excited state processes

Lecture 6 - TCSPC for picosecond- Nanosecond Time Domain

Lecture 7 - TCSPC for picosecond- Nanosecond Time Domain (Continued...)

Lecture 8 - TCSPC Lab

Lecture 9 - Data Fitting 1

Lecture 10 - Data Fitting 2

Lecture 11 - Femtosecond Fluorescence Upconversion - 1

Lecture 12 - Femtosecond Fluorescence Upconversion - 2

Lecture 13 - Femtosecond Fluorescence Upconversion - 3

Lecture 14 - FOG Lab

Lecture 15 - Gate Detectors and Streak Camera - Part 1

Lecture 16 - Gate Detectors and Streak Camera - Part 2

Lecture 17 - Stimulated Emission

Lecture 18 - Two Level System

Lecture 19 - 3 and 4 level system

Lecture 20 - From CW to Pulsed Laser

Lecture 21 - Longitudinal modes

Lecture 22 - Modelocking for short pulses

Lecture 23 - Modelocking for short pulses (Continued...)

Lecture 24 - Kerr lens Modelocking for femtosecond pulses

Lecture 25 - Titanium Sapphire lasers

Lecture 26 - Active and Passive Modelocking

Lecture 27 - Modelocking and cavity damping

Lecture 28 - Ti:Sapphire laser (Lab visit)

Lecture 29 - Cavity Dumping

Lecture 30 - Cavity dumping (Continued...)

Lecture 31 - Q switching

Lecture 32 - Stretching and compressing ultrafast laser pulses

Lecture 33 - Pulse stretcher/Compressor: Single Grating

Lecture 34 - Chirped pulsed amplification

Lecture 35 - Oscillators and Amplifier: Design and materials

Lecture 36 - Alexandrite and fibril lasers

Lecture 37 - Regenerative amplifier in our lab

Lecture 38 - Brief overview of nonlinear optical phenomena

Lecture 39 - Brief overview of nonlinear optical phenomena (Continued...)

Lecture 40 - Brief overview of nonlinear optical phenomena (Continued...)

Lecture 41 - SFG and SHG with ultrafast pulses

Lecture 42 - SFG and SHG with ultrafast pulses (Continued...)

Lecture 43 - Optical parametric generation and amplification

Lecture 44 - OPA in our lab TOPAS C - Part 1

Lecture 45 - OPA in our lab TOPAS C - Part 2

Lecture 46 - OPA in our lab TOPAS C - Part 3

Lecture 47 - Snapshots of bond breaking

Lecture 48 - Twisted Intramolecular Charge Transfer - Part 1

Lecture 49 - Twisted Intramolecular Charge Transfer - Part 2

Lecture 50 - Solvation dynamics - Part 1

Lecture 51 - Solvation dynamics - Part 2

Lecture 52 - Vibrational energy transfer in water

Lecture 53 - Excited state proton transfer: Introduction

Lecture 54 - Excited state double proton transfer of 7-Azaindole dimer - 1

Lecture 55 - Excited state double proton transfer of 7-Azaindole dimer - 2

Lecture 56 - Excited state double proton transfer of 7-Azaindole dimer - 3

Lecture 57 - Plasmonic nanoparticles - 1

Lecture 58 - Plasmonic nanoparticles - 2

Lecture 59 - Nanoclusters

Lecture 60 - Semiconductor Nanocrystals - Part 1

Lecture 61 - Semiconductor nanocrystals - Part 2

Lecture 62 - Radiative and Nonradiative Relaxation Pathways in CdSe Nanocrystals - Part 1

Lecture 63 - Radiative and Nonradiative Relaxation Pathways in CdSe Nanocrystals - Part 2

Lecture 64 - Multiexciton in semiconductor nanocrystals - Part 1

Lecture 65 - Multiexciton in semiconductor nanocrystals - Part 2

Lecture 66 - Two dimensional Infrared spectroscopy: Introduction

Lecture 67 - 2DIR: Techniques

NPTEL : NOC:Transition Metal Organometallics in Catalysis and Biology (Chemistry and Biochemistry)

Co-ordinators : Prof. Prasenjit Ghosh

Lecture 1 - Introduction

Lecture 2 - Reppe Synthesis (Introduction)

Lecture 3 - Reppe Reactions - Part 1

Lecture 4 - Reppe Reactions - Part 2

Lecture 5 - Reppe Reactions - Part 3

Lecture 6 - Metallative and Conventional Reppeand Metathesis Reaction (Introduction)

Lecture 7 - Origin of Olefin Metathesis

Lecture 8 - Mechanistic approaches of Metathesis Reaction - Part 1

Lecture 9 - Mechanistic approaches of Metathesis Reaction - Part 2

Lecture 10 - Mechanistic approaches of Metathesis Reaction - Part 3

Lecture 11 - Mechanistic approaches of Metathesis Reaction - Part 4

Lecture 12 - Types of Carbenes

Lecture 13 - Types of Metathesis Reactions

Lecture 14 - Alkyne Metathesis

Lecture 15 - Catalysis Development Aspect of Olefin Metathesis - Part 1

Lecture 16 - Catalysis Development Aspect of Olefin Metathesis - Part 2

Lecture 17 - Catalysis Development Aspect of Olefin Metathesis - Part 3

Lecture 18 - Catalysis Development Aspect of Olefin Metathesis - Part 4

Lecture 19 - Cross Metathesis - Part 1

Lecture 20 - Cross Metathesis - Part 2

Lecture 21 - Cross Metathesis - Part 3

Lecture 22 - Ring Opening Metathesis - Part 1

Lecture 23 - Ring Opening Metathesis - Part 2

Lecture 24 - Ring Opening Metathesis - Part 3

Lecture 25 - Ring Closing Metathesis - Part 1

Lecture 26 - Ring Closing Metathesis - Part 2

Lecture 27 - Ring Closing Metathesis - Part 3

Lecture 28 - Alkyne Metathesis

Lecture 29 - Alkene Alkyne Metathesis - Part 1

Lecture 30 - Alkene Alkyne Metathesis - Part 2

Lecture 31 - Alkene Alkyne Metathesis - Part 3

Lecture 32 - Ring Closing Eneyne Metathesis (RCEYM) - Part 1

Lecture 33 - Ring Closing Eneyne Metathesis (RCEYM) - Part 2

Lecture 34 - Ring Closing Eneyne Metathesis (RCEYM) and Alkenes and Alkynes oligomerization reactions

Lecture 35 - Oligomerization of alkenes and alkynes - Part 1

Lecture 36 - Oligomerization of alkenes and alkynes - Part 2

Lecture 37 - Oligomerization of alkenes and alkynes - Part 3

Lecture 38 - Oligomerization of alkenes and alkynes - Part 4

Lecture 39 - Alkene oligomerization and Polymerization.

Lecture 40 - Olefin Polymerization - Part 1

Lecture 41 - Olefin Polymerization - Part 2

Lecture 42 - Olefin Polymerization - Part 3

Lecture 43 - Olefin Polymerization - Part 4

Lecture 44 - Olefin Polymerization - Part 5

Lecture 45 - Olefin Polymerization - Part 6

Lecture 46 - Olefin Polymerization - Part 7

Lecture 47 - Olefin Polymerization - Part 8

Lecture 48 - Olefin Polymerization - Part 9

Lecture 49 - Olefin Polymerization - Part 10

Lecture 50 - Olefin Polymerization - Part 11

Lecture 51 - Olefin Polymerization - Part 12

Lecture 52 - Olefin Polymerization - Part 13

Lecture 53 - Olefin Polymerization - Part 14

Lecture 54 - Olefin Polymerization - Part 15

Lecture 55 - Olefin Polymerization - Part 16

Lecture 56 - Homo and Copolymerization; Functionalized olefins, Cycloolefins and Diolefins

Lecture 57 - Non- Group IV Metal based olefin polymerization catalysts

Lecture 58 - Non- Group IV Metal based olefin polymerization catalysts

Lecture 59 - Bioorganometallic Chemistry

Lecture 60 - Overall summary of Transition metal organometallics in catalysis and biology

NPTEL : NOC:Quantum Chemistry of Atoms and Molecules (Chemistry and Biochemistry)

Co-ordinators : Prof. Anindya Datta

Lecture 1 - Basic Introduction

Lecture 2 - Bohr Model and Beyond

Lecture 3 - The wave nature of matter

Lecture 4 - Ground Rules: Postulates of Quantum mechanics - Part I

Lecture 5 - Ground Rules: Postulates of Quantum mechanics - Part II

Lecture 6 - Particle in a box - Part I

Lecture 7 - Particle in a box - Part II

Lecture 8 - Particle in a box - Part III

Lecture 9 - Particle in a box - Uncertainity Priciple

Lecture 10 - Particle in a box - Uncertainity Priciple (Continued...)

Lecture 11 - Quantum Mechanical Tunneling

Lecture 12 - Harmonic Oscillator - Part 1

Lecture 13 - Harmonic Oscillator - Part 2

Lecture 14 - Harmonic Oscillator - Part 3

Lecture 15 - Harmonic Oscillators - Wave Functions and Recursion formulae

Lecture 16 - Harmonic Oscillators - Wave Functions and Recursion formulae (Continued...)

Lecture 17 - Harmonic Oscillators: Conclusions

Lecture 18 - Rigid Rotor - Part 1

Lecture 19 - Rigid Rotor - Part 2

Lecture 20 - Rigid Rotor - Part 3

Lecture 21 - Polar Plots of Spherical Harmonics

Lecture 22 - Angular Momentum

Lecture 23 - Angular Momentum (Continued...)

Lecture 24 - Hydrogen Atom: Schrodinger Equation

Lecture 25 - Hydrogen Atom: Schrodinger Equation (Continued...)

Lecture 26 - Hydrogen atom: Quantum numbers

Lecture 27 - Radial Probability distribution functions

Lecture 28 - Hydrogen atom wavefunctions: s orbitals

Lecture 29 - 2s orbital

Lecture 30 - 2p orbitals

Lecture 31 - 3pz and 3d orbitals

Lecture 32 - Atomic orbitals and orbital approximation

Lecture 33 - Multi electron atoms

Lecture 34 - He atom wavefunction

Lecture 35 - Excited states of many electron atoms

Lecture 36 - Introduction to Perturbation theory

Lecture 37 - Scope of Perturbation theory

Lecture 38 - Application of Perturbation theory: Anharmonic oscillator

Lecture 39 - Higher order perturbations

Lecture 40 - Perturbation theory for non-degenerate states

Lecture 41 - Perturbation Theory for degenerate states

Lecture 42 - Application of Perturbation Theory for degenerate States

Lecture 43 - Variation Method

Lecture 44 - Variational Method (Continued...)

Lecture 45 - Variational calculations for Harmonic Oscillator and Particle in a Box

Lecture 46 - Secular equations in Variational calculations

Lecture 47 - Secular equations for particle in a box

Lecture 48 - Variational calculation for particle in a box (Continued...)

Lecture 49 - Perturbation theory for many electron atoms

Lecture 50 - Variational method for many electron atoms

Lecture 51 - Hartree-Fock Equations and Self Consistent Fields

Lecture 52 - Hartree-Fock Equations for He - Part 1

Lecture 53 - Hartree-Fock Equations for He - Part 2

Lecture 54 - Electronic Wavefunctions of He atom

Lecture 55 - Valance Bond Theory and homonuclear diatomics - Part 1

Lecture 56 - Valance Bond Theory and homonuclear diatomics - Part 2

Lecture 57 - Molecular shape and hybrid orbitals

Lecture 58 - sp2 hybridization

Lecture 59 - sp3 hybridization

Lecture 60 - Non-equivalent hybrid orbitals

Lecture 61 - Molecular Orbital Theory for H2+

Lecture 62 - Molecular orbital theory for homonuclear diatomic molecules

Lecture 63 - Beyond Homonuclear diatomic molecules

Lecture 64 - MOT for polyatomic molecules

Lecture 65 - Huckel MOT-1

Lecture 66 - Huckel MOT-2

Lecture 67 - The last word

NPTEL : NOC:Basic Statistical Mechanics (Chemistry and Biochemistry)

Co-ordinators : Prof. Biman Bagchi

Lecture 1 - Why Study Statistical Mechanics?

Lecture 2 - Thermodynamics

Lecture 3 - Probability Theory - Part 1

Lecture 4 - Probability Theory - Part 2

Lecture 5 - Fundamental concepts and Postulates of Statistical Mechanics - Part 1

Lecture 6 - Fundamental concepts and Postulates of Statistical Mechanics - Part 2

Lecture 7 - From Postulates to Formulation

Lecture 8 - Microcanonical Ensemble

Lecture 9 - Relation with Thermodynamics in Microcanonical Ensemble - Part 1

Lecture 10 - Relation with Thermodynamics in Microcanonical Ensemble - Part 2

Lecture 11 - Canonical Ensemble - Part 1

Lecture 12 - Canonical Ensemble - Part 2

Lecture 13 - Thermodynamic Potential for Canonical ensemble

Lecture 14 - Grand Canonical Ensemble

Lecture 15 - Thermodynamic Potentials for Grand Canonical and Isothermal-Isobaric ensembles

Lecture 16 - Fluctuations and Response Function - Part 1

Lecture 17 - Fluctuations and Response Function - Part 2

Lecture 18 - Ideal Monatomic Gas: Microscopic Expression of Translational Entropy - Part 1

Lecture 19 - Ideal Monatomic Gas: Microscopic Expression of Translational Entropy - Part 2

Lecture 20 - Ideal Monatomic Gas: Microscopic Expression of Translational Entropy - Part 3

Lecture 21 - Ideal Monatomic Gas: Microscopic Expression of Translational Entropy - Part 4

Lecture 22 - Ideal Monatomic Gas: Microscopic Expression of Translational Entropy - Part 5

Lecture 23 - Ideal Gas of Diatomic Molecules: Microscopic Expression for Rotational and Vibrational Entropy and Specific Heat - Part 1

Lecture 24 - Ideal Gas of Diatomic Molecules: Microscopic Expression for Rotational and Vibrational Entropy and Specific Heat - Part 2

Lecture 25 - Ideal Gas of Diatomic Molecules: Microscopic Expression for Rotational and Vibrational Entropy and Specific Heat - Part 3

Lecture 26 - Ideal Gas of Diatomic Molecules: Microscopic Expression for Rotational and Vibrational Entropy and Specific Heat - Part 4

Lecture 27 - Ideal Gas of Polyatomic molecules

Lecture 28 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 1

Lecture 29 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 2

Lecture 30 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 3

Lecture 31 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 4

Lecture 32 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 5

Lecture 33 - Cluster Expansion and Mayerâ€™s Theory of Condensation - Part 6

Lecture 34 - Phase Transition and Landau Theory - Part 1

Lecture 35 - Phase Transition and Landau Theory - Part 2

Lecture 36 - Phase Transition and Landau Theory - Part 3

Lecture 37 - Comments on some important Concepts of Statistical Mechanics

Lecture 38 - Nucleation Part 1: Introduction, Thermodynamics of Nucleation

Lecture 39 - Nucleation Part 2: Kinetics of Nucleation

Lecture 40 - Nucleation Part 3: Kinetics of Nucleation, Classical Nucleation Theory, Heterogeneous Nucleation

Lecture 41 - Nucleation Part 4: Ostwald Step Rule

Lecture 42 - Spinodal Decomposition and Pattern Formation: Evolution of Structure through Dynamics - Part 1

Lecture 43 - Spinodal Decomposition and Pattern Formation: Evolution of Structure through Dynamics - Part 2

Lecture 44 - Ising Model and Other Lattice Models - Part 1

Lecture 45 - Ising Model and Other Lattice Models - Part 2

Lecture 46 - Ising Model and Other Lattice Models - Part 3

Lecture 47 - Ising Model and Other Lattice Models - Part 4

Lecture 48 - Ising Model and Other Lattice Models - Part 5

Lecture 49 - Binary Mixtures: Towards Understanding Non-Ideality and Osmotic Pressure - Part 1

Lecture 50 - Binary Mixtures: Towards Understanding Non-Ideality and Osmotic Pressure - Part 2

Lecture 51 - Theory of Liquids - Part 1

Lecture 52 - Theory of Liquids - Part 2

Lecture 53 - Theory of Liquids - Part 3

Lecture 54 - Theory of Liquids - Part 4

Lecture 55 - Polymers in Solution and Polymer Collapse - Part 1

Lecture 56 - Polymers in Solution and Polymer Collapse - Part 2

Lecture 57 - Polymers in Solution and Polymer Collapse - Part 3

Lecture 58 - Polymers in Solution and Polymer Collapse - Part 4

Lecture 59 - Computer Simulation Methods in Statistical Mechanics - Part 1

Lecture 60 - Computer Simulation Methods in Statistical Mechanics - Part 2

Lecture 61 - Conclusion

NPTEL : NOC:Quantum Mechanics and Molecular Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Naresh Patwari

Lecture 1 - Introduction to quantum Mechanics - Part 1

Lecture 2 - Introduction to quantum Mechanics - Part 2

Lecture 3 - Introduction to quantum Mechanics - Part 3

Lecture 4 - Time Dependant Perturbation Theory of Two states - Part 1

Lecture 5 - Time Dependent Perturbation Theory of Two States - Part 2

Lecture 6 - Time Dependent Perturbation Theory of Two States - Part 3

Lecture 7 - Time Dependent Perturbation Theory of Many States - Part 1

Lecture 8 - Time Dependent Perturbation Theory of Many States - Part 2

Lecture 9 - First-Order Correction to Time- Dependent Perturbation Theory

Lecture 10 - Properties of Light (Classical Treatment)

Lecture 11 - Interaction Hamiltonian - Part 1

Lecture 12 - Interaction Hamiltonian - Part 2

Lecture 13 - Interaction Hamiltonian - Part 3

Lecture 14 - Transition Moment Integral

Lecture 15 - Absorption Probability - Part 1

Lecture 16 - Absorption Probability - Part 2

Lecture 17 - Transition to Continuum States: Fermiâ€™s Golden Rule

Lecture 18 - Einsteinâ€™s Coefficient - Part 1

Lecture 19 - Einsteinâ€™s Coefficient - Part 2

Lecture 20 - Einsteinâ€™s Coefficient - Part 3

Lecture 21 - Spontaneous Emission Lifetime

Lecture 22 - Relationship between Transition Dipole and Extinction Coefficient

Lecture 23 - Spectral Lineshapes

Lecture 24 - Selection Rules

Lecture 25 - Molecular Rotations - Part 1

Lecture 26 - Molecular Rotations - Part 2

Lecture 27 - Molecular Rotations - Part 3

Lecture 28 - Rotational Selection Rules

Lecture 29 - Rotational Spectrum

Lecture 30 - Molecular Vibrations - Part 1

Lecture 31 - Molecular Vibrations - Part 2

Lecture 32 - Vibrational Selection rules

Lecture 33 - Electronic Transition

Lecture 34 - Rotations of Polyatomic Molecules - Part 1

Lecture 35 - Rotations of Polyatomic Molecules - Part 2

Lecture 36 - Selection Rules for particle in a box

Lecture 37 - Interpretation of Rotational Spectra

Lecture 38 - Features of vibrational and electronic spectroscopy

NPTEL : NOC:Essentials of Oxidation, Reduction and C_C Bond Formation. Application in Organic Synthesis (Chemistry and Biochemistry)

Co-ordinators : Prof. Yashwant D Vankar

Lecture 1 - Introduction to organic synthesis-Importance of selectivity, stereochemistry and Mechanism

Lecture 2 - Sulfur based oxidations of alcohols

Lecture 3 - Sulfur based oxidations and Pummerer rearrangement

Lecture 4 - Further aspects of sulfur and selenium based oxidations

Lecture 5 - Organoselenium chemistry and SeO2 based oxidations

Lecture 6 - SeO2 based oxidation of ketones and Sulfoxide- Sulfenate rearrangement (Mislow-Evans rearrangement)

Lecture 7 - Mechanistic and stereochemical aspects of Mislow-Evans rearrangement and synthetic applications

Lecture 8 - Further synthetic applications of Mislow-Evans rearrangement and Saegusa-Ito oxidation

Lecture 9 - 1,2-Ketone transpositions, Shapiro reaction and Dauben-Michno rearrangement (a case of 1,3-enone transposition)

Lecture 10 - Dess-Martin periodinane oxidation

Lecture 11 - Iodoxybenzoic acid (IBX) based oxidations

Lecture 12 - Silver based oxidations: Prevost reaction and use of Fetizonâ€™s reagent

Lecture 13 - Further aspects of oxidations using Fetizonâ€™s reagent: Mechanism and Stereochemistry

Lecture 14 - Ruthenium tetroxide (and RuCl3/NaIO4) mediated oxidations

Lecture 15 - Tetra-n-propylammonium perruthenate (TPAP) based oxidations, and Tamao-Fleming oxidation

Lecture 16 - Further synthetic and mechanistic aspects of Tamao-Fleming oxidations

Lecture 17 - Oxidations with dimethyl dioxirane (DMDO)

Lecture 18 - Mechanistic aspects of DMDO based oxidations and oxaziridine mediated alpha-hydroxylations of ketones

Lecture 19 - Asymmetric alpha-hydroxylations using oxaziridine based reactions

Lecture 20 - Barton and related reactions (oxidation at unfunctionalised carbons) and synthetic applications

Lecture 21 - beta-Cleavage in Barton and related reactions and miscellaneous oxidations such as TEMPO based oxidations, Pinnick oxidation and pseudomonas putida mediated oxidations

Lecture 22 - Reductions in organic chemistry: Metal hydride (NaBH4 and LiAlH4) mediated reduction

Lecture 23 - Reductions using diisobutylaluminum hydride (DIBAL-H)

Lecture 24 - Further aspects of DIBAL-H based reductions and comparison with mixed chloride hydrides

Lecture 25 - Reductions with Red-Al, and Luche Reductions

Lecture 26 - Further aspects of Luche reduction, stereochemistry in reductions and reduction with LiBH4

Lecture 27 - Reductions with Zn(BH4)2, LiBHEt3 (superhydride) and L and K-selectrides

Lecture 28 - Reductions with LS/KS selectrides and NaCNBH3

Lecture 29 - Dissolving metal reductions (Na, K, Mg) and McMurry coupling using Ti(0)

Lecture 30 - Stereochemistry and mechanistic aspects of McMurry coupling and metal mediated reductions of alpha, beta-unsaturated

ketones

Lecture 31 - Silanes [R3SiH, including polymethylhydrosiloxanes (PMHS)] as reducing agents

Lecture 32 - Further aspects of silanes as reducing agents and Barton-McCombie deoxygenation

Lecture 33 - Tributyltinhydride (n-Bu3SnH) based radical based reductions and C-C bond formations

Lecture 34 - Asymmetric synthesis: An introduction

Lecture 35 - Sharpless asymmetric epoxidation: Mechanism, stereochemistry and kinetic resolution

Lecture 36 - Synthetic utility of chiral 2,3-epoxy alcohols obtained from Sharpless epoxidation

Lecture 37 - Katsuki-Jacobsen epoxidation: Mechanism and stereochemistry

Lecture 38 - Further aspects of Katsuki-Jacobsen epoxidation, and Introduction to Sharpless Asymmetric Dihydroxylation

Lecture 39 - Mechanism, stereochemical aspects and synthetic applications of Sharpless Asymmetric Dihydroxylation

Lecture 40 - Asymmetric hydrogenations and reductions using rhodium and ruthenium derived chiral catalysts

Lecture 41 - Asymmetric reduction with oxazaborilidines

Lecture 42 - C-C bond formations: Introduction to enolate, enamine and enol silyl ether based chemistry

Lecture 43 - C-C bond formations using enol silyl ether and imine based chemistry including SAMP and RAMP based asymmetric alkylations

Lecture 44 - Asymmetric C-C bond formations using Oppolzerâ€™s camphorsultams and introduction to directed Aldol reactions

Lecture 45 - Further aspects of Aldol chemistry including the use of boron and silicon enolates

Lecture 46 - C-C bond formations using Evansâ€™ oxazolidinone based chemistry

Lecture 47 - Ireland-Claisen rearrangement: Emphasis of enolate geometry on the stereochemical outcome, and Claisen rearrangements

Lecture 48 - Aromatic Claisen rearrangement, Johnson-Claisen rearrangement and Eschenmoser-Claisen rearrangement and synthetic

Lecture 49 - Bellus-Claisen rearrangement, Aza-Claisen rearrangement, Thia-Claisen rearrangement, Chen-Mapp rearrangement and their synthetic applications

Lecture 50 - Zwitterionic-Claisen rearrangement, Overmann rearrangement, Bamford- Stevens and Shapiro reactions and synthetic applications

Lecture 51 - Introduction to allyl metal additions for C-C bond formation

Lecture 52 - Allylindium chemistry: Mechanism, stereochemistry and synthetic applications

Lecture 53 - Allyltin chemistry: Mechanism, stereochemistry and synthetic applications

Lecture 54 - Chemistry of allylsilanes: Mechanism, stereochemistry and synthetic applications - Part 1

Lecture 55 - Further synthetic aspects of the chemistry of allylsilanes - Part 2

Lecture 56 - Further synthetic aspects of the chemistry of allylsilanes - Part 3

Lecture 57 - Chemistry of Vinylsilanes: Mechanism, Stereochemistry and Synthetic Applications

Lecture 58 - Peterson olefination and further synthetic aspects of vinylsilane chemistry

Lecture 59 - Simmons Smith cyclopropanation: Mechanism, stereochemistry and synthetic applications

Lecture 60 - Course Summary and Conclusion

NPTEL : NOC:Chemical Kinetics and Transition State Theory (Chemistry and Biochemistry)

Co-ordinators : Prof. Amber Jain

Lecture 1 - Rate: the reaction velocity

Lecture 2 - Its elementary - rate law equations

Lecture 3 - Arrhenius equation: what's the fuss about?

Lecture 4 - Dance of atoms: from Newton to Hamilton

Lecture 5 - Boltzmann distribution: a story of Hamilton, Liouville and Boltzmann

Lecture 6 - Maxwell Boltzmann distribution: how fast are molecules moving?

Lecture 7 - Kinetic theory of collisions: initial estimate

Lecture 8 - Boltzmann distribution and kinetic theory of collisions

Lecture 9 - Kinetic theory of collisions: a discussion

Lecture 10 - Kinetic theory of collisions: reactive cross section

Lecture 11 - Problem solving session - 1

Lecture 12 - Problem solving session - 2

Lecture 13 - Kinetic theory of collision and equilibrium constant

Lecture 14 - Critique of kinetic theory of collisions

Lecture 15 - Transition state theory and partition functions

Lecture 16 - Partitioning the partition function

Lecture 17 - Translating, rotating and vibrating quantum mechanically

Lecture 18 - Partition function and equilibrium constant

Lecture 19 - What is a transition state?

Lecture 20 - A puzzle: cars on highway

Lecture 21 - Transition state theory: derivation 1

Lecture 22 - Practical calculation of TST rate

Lecture 23 - Calculating TST rate for the reaction H+HBr

Lecture 24 - Collision theory as a special case of TST

Lecture 25 - TST: an intuitive proof in one dimension

Lecture 26 - Rate as a flux across a dividing surface

Lecture 27 - Transition state theory: derivation 2 from dynamical perspective

Lecture 28 - Discussion of the assumptions of TST

Lecture 29 - Thermodynamic formulation of TST

Lecture 30 - Problem solving session - 3

Lecture 31 - Problem solving session - 4

Lecture 32 - Hills and valleys of potential energy surfaces

Lecture 33 - Molecular dynamics: rolling spheres on potential energy surfaces

Lecture 34 - Predictions from potential energy surfaces - rotational vs vibrational energies

Lecture 35 - Free energy and potential of mean force

Lecture 36 - Transmission coefficient and molecualr dynamics

Lecture 37 - Problem solving session - 5

Lecture 38 - Microcanonical rate constant: putting balls in jars

Lecture 39 - Microcanonical rate constant: RRK model

Lecture 40 - Microcanonical rate constant: magic of Marcus - RRKM model

Lecture 41 - Canonical TST from micrononical RRKM model

Lecture 42 - Sum and density of states

Lecture 43 - Unimolecular decay - revisited

Lecture 44 - Unimolecular decay: RRK's approach

Lecture 45 - Unimolecular decay: RRKM's approach

Lecture 46 - Problem solving session - 6

NPTEL : NOC:Concepts of Chemistry for Engineering (Chemistry and Biochemistry)

Co-ordinators : Prof. Anindya Datta

Lecture 1 - Introduction to quantum theory

Lecture 2 - Schrodinger's theory

Lecture 3 - Laws of quantum mechanics

Lecture 4 - Wave functions

Lecture 5 - Quantum mechanics of a free particle

Lecture 6 - Particle in 1D box

Lecture 7 - Particle in 2D box

Lecture 8 - Spherical polar coordinates and angular momentum

Lecture 9 - Developing Hydrogen atom orbitals - 1

Lecture 10 - Developing Hydrogen atom orbitals - 2

Lecture 11 - Developing Hydrogen atom orbitals - 3

Lecture 12 - Visualizing molecular orbitals

Lecture 13 - Molecular orbital theory 1: Introduction

Lecture 14 - Molecular orbital theory 2: Diatomic molecules

Lecture 15 - Molecular orbital theory 3: Homo-diatomic molecules - I

Lecture 16 - Molecular orbital theory 4: Homo-diatomic molecules - II

Lecture 17 - Molecular orbital theory 5: Hetero-diatomic molecules

Lecture 18 - Molecular orbital theory 6: Polyatomic molecules

Lecture 19 - Molecular orbital theory 7: Ethylene (Introduction to Huckel's theory) - I

Lecture 20 - Molecular orbital theory 8: Ethylene (Introduction to Huckel's theory) - II

Lecture 21 - Molecular orbital theory 9: Butadiene - I

Lecture 22 - Molecular orbital theory 9: Butadiene - II

Lecture 23 - Concept of effective nuclear charge

Lecture 24 - Electronic configuration of elements

Lecture 25 - Properties of Elements (Size, IE, EA and EN)

Lecture 26 - Polarizability

Lecture 27 - Hard soft acid base

Lecture 28 - Predicting molecular structures: VSEPR theory

Lecture 29 - Coordination Chemistry: 18 electron rule and VBT

Lecture 30 - Crystal Field Theory: Octahedral Complex

Lecture 31 - Crystal Field Theory: Tetrahedral Complex

Lecture 32 - Crystal Field Theory: Octahedral vs. Tetrahedral Complex

Lecture 33 - Application of CFSE: Spinel and J-T Distortion

Lecture 34 - Introduction to Molecular Magnetism

Lecture 35 - Problem Solving Approach

Lecture 36 - Magnetism

Lecture 37 - Spectroscopic Term Symbol

Lecture 38 - Magnetic States of Matter: Paramagnetic, Ferro and Antiferromagnetic

Lecture 39 - Band structures of solid materials

Lecture 40 - Density of states and doping in semiconductors

Lecture 41 - Introduction to molecular spectroscopy

Lecture 42 - Rotational spectroscopy

Lecture 43 - Vibrational spectroscopy

Lecture 44 - Electronic Spectroscopy - I

Lecture 45 - Electronic Spectroscopy - II

Lecture 46 - Electronic Spectroscopy - III

Lecture 47 - Fluorescence Spectroscopy

Lecture 48 - Fundamentals of NMR spectroscopy and MRI

Lecture 49 - Surface characterization techniques

Lecture 50 - Introduction to thermodynamics: Work, heat and energy

Lecture 51 - First law of thermodynamics: Diathermic and adiabatic systems,exothermic and endothermic processes

Lecture 52 - Enthalpy, Hess's law

Lecture 53 - Second law of thermodynamics: Entropy and third law of thermodynamics

Lecture 54 - Helmholtz and Gibbs free energies, Concept of spontaneity

Lecture 55 - Electrochemical equilibrium, Nernst equation

Lecture 56 - Acid base and solubility equilibria

Lecture 57 - Corrosion

Lecture 58 - Extraction of metals

Lecture 59 - Ellingham Diagram

Lecture 60 - Problems From Thermodynamics

Lecture 61 - Intermolecular forces: Electrostatic and Ion-Dipole Interaction

Lecture 62 - Intermolecular forces: Dipole-dipole, hydrogen bonding

Lecture 63 - Real gases - Part 1

Lecture 64 - Real gases - Part 2

Lecture 65 - Introduction to Potential Energy Surfaces

Lecture 66 - Potential energy surface of H3 system

Lecture 67 - Salient features of H3 potential energy surface

Lecture 68 - Potential Energy Surfaces of HCN and H2F system

Lecture 69 - Representation of three dimensional structures

Lecture 70 - Structural isomers and stereoisomers

Lecture 71 - Configurations, Symmetry and Chirality

Lecture 72 - Enantiomers and Diastereomers

Lecture 73 - Optical activity, Conformational analysis, and absolute configuration

Lecture 74 - Substitution reactions

Lecture 75 - Elimination reactions

Lecture 76 - Addition, Oxidation and Reduction reactions

Lecture 77 - Synthesis of a drug molecule

NPTEL : NOC:Classics in Total Synthesis-I (Chemistry and Biochemistry)

Co-ordinators : Prof. Krishna P Kaliappan

Lecture 1 - Overview - 1

Lecture 2 - Overview - 2

Lecture 3 - Overview - 3

Lecture 4 - Illudin M (Kinder) Illudin C (Funk)

Lecture 5 - Total Synthesis of FR900848 (Barrett)

Lecture 6 - Total Synthesis of Cubane

Lecture 7 - Total Synthesis of Endiandric acids

Lecture 8 - Total Synthesis of Penicilin

Lecture 9 - Total Synthesis of Thienamycin

Lecture 10 - Total Synthesis of Prostaglandin (Corey)

Lecture 11 - Total Synthesis of Prostaglandin (Johnson and Stork)

Lecture 12 - Total Synthesis of Biotin and Lactacystin (i) Corey, (ii) Baldwin

Lecture 13 - Total Synthesis of Triquinanes: Isocomene 1) M. Pirrung 2) Fitjer

Lecture 14 - Total Synthesis of Triquinanes: Isocomene and Silphipherfol-6-en-5-one (Rawal)

Lecture 15 - Total synthesis of Triquinanes by radical cyclisation - I (Curran)

Lecture 16 - Total synthesis of Triquinanes by radical cyclisation - II

Lecture 17 - Total synthesis of Triquinanes by photochemical reaction - I

Lecture 18 - Total synthesis of Triquinanes by photochemical reaction - II

Lecture 19 - Total synthesis of Triquinanes by Thermal Metathesis (Mehta)

Lecture 20 - Total synthesis of Triquinanes by other reactions

Lecture 21 - Total synthesis of Longifolene (Corey and Oppolzer)

Lecture 22 - Total synthesis of Carpanone (Chapman)

Lecture 23 - Total synthesis of Mevinolin (Clive)

Lecture 24 - Total synthesis of Gibberellic Acid (Corey)

Lecture 25 - Total synthesis of Gibberellic Acid (Yamada)

Lecture 26 - Total synthesis of Perhydrohistrionicotoxin (Corey)

Lecture 27 - Total synthesis of Strychnine (Woodward)

Lecture 28 - Total synthesis of Strychnine (Rawal and Overman)

Lecture 29 - Total synthesis of Strychnine (Kuehne)

Lecture 30 - Total synthesis of Reserpine (Woodward)

Lecture 31 - Total synthesis of Yohimbine (Tamelen and Momose)

Lecture 32 - Total synthesis of Quinine (Woodward and Stork)

Lecture 33 - Total synthesis of Dendrobine (Livinghouse)

Lecture 34 - Total synthesis of Morphine (Gates and Overman)

Lecture 35 - Total synthesis of Morphine (Parker and White)

Lecture 36 - Total synthesis of Methylhomosecodaphniphyllate (Heathcock)

Lecture 37 - Total synthesis of Lysergic acid (Woodward and Oppolzer)

Lecture 38 - Total synthesis of Galanthamine (Barton and Kirby)

Lecture 39 - Total synthesis of Epibatidine (Trost and Evans)

Lecture 40 - Total synthesis of Swainsonine (Hashimoto)

Lecture 41 - Total synthesis of Staurosporine (Danishefsky and Wood)

Lecture 42 - Total synthesis of Manzamine A (Winkler)

Lecture 43 - Total synthesis of Progesterone (Johnson)

Lecture 44 - Total synthesis of Progesterone from Diosgenin (Marker)

Lecture 45 - Total synthesis of Estrone (Torgov)

Lecture 46 - Total synthesis of Taxol (Nicolaou)

Lecture 47 - Total synthesis of Taxol (Holton)

Lecture 48 - Total synthesis of Taxol (Danishefsky)

Lecture 49 - Total synthesis of Taxol (Wender)

Lecture 50 - Total synthesis of Eleutherobin (Nicolaou)

Lecture 51 - Total synthesis of Eleutherobin (Danishefsky)

Lecture 52 - Total synthesis of Phorbol (Wender)

Lecture 53 - Total synthesis of Periplanone (Still and Schreiber)

Lecture 54 - Total synthesis of Discodermolide (Schreiber)

Lecture 55 - Total synthesis of Epothilones I (Nicolaou)

Lecture 56 - Total synthesis of Epothilones II (Schinzer and Danishefsky)

Lecture 57 - Total synthesis of Vineomycinone B2 (Tius and Danishefsky)

Lecture 58 - Total synthesis of Zaragozic acid C (Carreira)

NPTEL : NOC:Circular Dichroism (CD) and Mossbauer Spectroscopy for Chemists (Chemistry and Biochemistry)

Co-ordinators : Prof. Arnab Dutta

Lecture 1 - CD Spectroscopy: Introduction

Lecture 2 - Symmetry and Molecular properties

Lecture 3 - Symmetry elements - I

Lecture 4 - Symmetry elements - II

Lecture 5 - Symmetry and point groups - I

Lecture 6 - Symmetry and point groups - II

Lecture 7 - Point group determination tutorial

Lecture 8 - Chirality and point group - I

Lecture 9 - Chirality and point group - II

Lecture 10 - Chirality and point group - III tutorial

Lecture 11 - Chirality and biology - I

Lecture 12 - Chirality and biology - II

Lecture 13 - Chirality and biology - III

Lecture 14 - Chirality and biology - IV

Lecture 15 - Chirality and biology - V

Lecture 16 - Origin of chirality

Lecture 17 - The physical background of chiral response - I

Lecture 18 - The physical background of chiral response - II

Lecture 19 - The physical background of chiral response - III

Lecture 20 - The physical background of chiral response - IV

Lecture 21 - The physical background of chiral response - IV

Lecture 22 - The physical background of chiral response - V

Lecture 23 - The physical background of chiral response - VI

Lecture 24 - Circular Dichroism Spectra

Lecture 25 - Examples of Circular Dichroism - I

Lecture 26 - Examples of Circular Dichroism - II

Lecture 27 - Examples of Circular Dichroism - III

Lecture 28 - Examples of Circular Dichroism - IV

Lecture 29 - Applications of CD spectroscopy - I

Lecture 30 - Applications of CD spectroscopy - II

Lecture 31 - Applications of CD spectroscopy - III

Lecture 32 - Applications of CD spectroscopy - IV

Lecture 33 - Applications of CD spectroscopy - V

Lecture 34 - Applications of CD spectroscopy - VI

Lecture 35 - CD spectroscopy: Conclusion

Lecture 36 - MÃƒÂ¶ssbauer Spectroscopy: Introduction

Lecture 37 - MÃƒÂ¶ssbauer Spectroscopy Fundamentals - I

Lecture 38 - MÃƒÂ¶ssbauer Spectroscopy

Lecture 39 - MÃƒÂ¶ssbauer Spectroscopy Fundamentals - II

Lecture 40 - MÃƒÂ¶ssbauer Spectroscopy Fundamentals - III

Lecture 41 - MÃƒÂ¶ssbauer Spectroscopy Fundamentals - IV

Lecture 42 - MÃƒÂ¶ssbauer Spectroscopy: Isomer shift - I

Lecture 43 - MÃƒÂ¶ssbauer Spectroscopy: Isomer shift - II

Lecture 44 - MÃƒÂ¶ssbauer Spectroscopy: Isomer shift - III

Lecture 45 - MÃƒÂ¶ssbauer Spectroscopy: Quadrupolar splitting - I

Lecture 46 - MÃƒÂ¶ssbauer Spectroscopy: Quadrupolar splitting - II

Lecture 47 - MÃƒÂ¶ssbauer Spectroscopy: Applications - I

Lecture 48 - MÃƒÂ¶ssbauer Spectroscopy: Applications - II

Lecture 49 - MÃƒÂ¶ssbauer Spectroscopy: Applications - III

Lecture 50 - MÃƒÂ¶ssbauer Spectroscopy: Data measurement

Lecture 51 - MÃƒÂ¶ssbauer Spectroscopy: Applications - IV

Lecture 52 - MÃƒÂ¶ssbauer Spectroscopy: Effect of ligands - I

Lecture 53 - MÃƒÂ¶ssbauer Spectroscopy: Effect of ligands - II

Lecture 54 - MÃƒÂ¶ssbauer Spectroscopy: Applications - V

Lecture 55 - MÃƒÂ¶ssbauer Spectroscopy: Probing ferrocenes - I

Lecture 56 - MÃƒÂ¶ssbauer Spectroscopy: Probing ferrocenes - II

Lecture 57 - MÃƒÂ¶ssbauer Spectroscopy: Probing ferrocenes - III

Lecture 58 - MÃƒÂ¶ssbauer Spectroscopy: Mixed valent complexes - I

Lecture 59 - MÃƒÂ¶ssbauer Spectroscopy: Mixed valent complexes - II

Lecture 60 - MÃƒÂ¶ssbauer Spectroscopy: Mixed valent complexes - III

Lecture 61 - Conclusion section: CD spectroscopy

Lecture 62 - Conclusion section: MÃƒÂ¶ssbauer Spectroscopy

NPTEL : NOC:NMR Spectroscopy for Structural Biology (Chemistry and Biochemistry)

Co-ordinators : Prof. Ashutosh Kumar, Prof. R. V Hosur

Lecture 1 - NMR Basic Concepts - I

Lecture 2 - NMR Basic Concepts - II

Lecture 3 - NMR Basic Concepts - III

Lecture 4 - NMR Basic Concepts - IV

Lecture 5 - NMR Spectra of Molecules

Lecture 6 - Chemical Shifts and Coupling constant

Lecture 7 - Fine Structures in NMR Spectra

Lecture 8 - Pulse Excitation and FT-NMR

Lecture 9 - Practical Aspects of FT-NMR - 1

Lecture 10 - Practical Aspects of FT-NMR - 2

Lecture 11 - Practical Aspects of FT-NMR - 3

Lecture 12 - Practical Aspects of FT-NMR - 4

Lecture 13 - Polarization Transfer Technique - 1

Lecture 14 - Polarization Transfer Technique - 2

Lecture 15 - General Concept of Multidimensional NMR - 1

Lecture 16 - General Concept of Multidimensional NMR - 2

Lecture 17 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 1

Lecture 18 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 2

Lecture 19 - 2-D NMR or 2-D Co-relation spectroscopy : General concept - 3

Lecture 20 - Introduction to NOESY and HSQC - 1

Lecture 21 - Introduction to NOESY and HSQC - 2

Lecture 22 - Introduction to NOESY and HSQC - 3

Lecture 23 - Introduction to NOESY and HSQC - 4

Lecture 24 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 1

Lecture 25 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 2

Lecture 26 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 3

Lecture 27 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 4

Lecture 28 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 5

Lecture 29 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 6

Lecture 30 - Application of NMR in the area of structural Biology: Structure of DNA and RNA - 7

Lecture 31 - Determination of Structure and Dynamics of Proteins - 1

Lecture 32 - Determination of Structure and Dynamics of Proteins - 2

Lecture 33 - Determination of Structure and Dynamics of Proteins - 3

Lecture 34 - Determination of Structure and Dynamics of Proteins - 4

Lecture 35 - Determination of Structure and Dynamics of Proteins - 5

Lecture 36 - Determination of Structure and Dynamics of Proteins - 6

Lecture 37 - NMR Analysis of Protein Dynamics - I

Lecture 38 - NMR Analysis of Protein Dynamics - II

Lecture 39 - NMR Analysis of Protein Dynamics - III

Lecture 40 - NMR Analysis of Protein Dynamics - IV

Lecture 41 - Protein-Ligand and Protein-Protein Interaction

Lecture 42 - NMR Analysis of Ligand specific parameters in a Protein-Ligand Interaction - I

Lecture 43 - NMR Analysis of Ligand specific parameters in a Protein-Ligand Interaction - II

Lecture 44 - NMR Analysis of Protein Specific Parameters in a Protein-Ligand Interaction - I

Lecture 45 - NMR Analysis of Protein Specific Parameters in a Protein-Ligand Interaction - II

Lecture 46 - NMR in Drug Design

Lecture 47 - NMR in Drug Discovery

Lecture 48 - NMR in Drug metabolism - I

Lecture 49 - NMR in Drug metabolism - II

Lecture 50 - NMR in Drug metabolism - III

Lecture 51 - Probing Protein Dynamics by NMR Spectroscopy - I

Lecture 52 - Probing Protein Dynamics by NMR Spectroscopy - II

Lecture 53 - Probing Protein Dynamics by NMR Spectroscopy - III

Lecture 54 - Probing Protein Dynamics by NMR Spectroscopy - IV

Lecture 55 - Probing Protein Dynamics by NMR Spectroscopy - V

Lecture 56 - Basics of solid state NMR spectroscopy - I

Lecture 57 - Basics of solid state NMR spectroscopy - II

Lecture 58 - Basics of solid state NMR spectroscopy - III

Lecture 59 - Basics of solid state NMR spectroscopy - IV

Lecture 60 - Basics of solid state NMR spectroscopy - V

NPTEL : NOC:Transition Metal Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. M S Balakrishna

Lecture 1 - History of Periodic Table - 1

Lecture 2 - History of Periodic Table - 2

Lecture 3 - History of Periodic Table - 3

Lecture 4 - Introduction to Transition elements - 1

Lecture 5 - Introduction to Transition elements - 2

Lecture 6 - Introduction to Transition elements - 3

Lecture 7 - Introduction to Transition elements - 4

Lecture 8 - Coordination Theory

Lecture 9 - WernerÃ¢s Coordination Theory

Lecture 10 - Early Bonding Concepts

Lecture 11 - Valence Bond Theory (VBT) - 1

Lecture 12 - Valence Bond Theory (VBT) - 2

Lecture 13 - Background To Crystal Field Theory (CFT)

Lecture 14 - Crystal Field Theory (CFT) Jahn-Teller Theorem

Lecture 15 - Crystal Field Theory (CFT) - 1

Lecture 16 - Crystal Field Theory (CFT) - 2

Lecture 17 - Ligand Field Theory (LFT) - 1

Lecture 18 - Ligand Field Theory (LFT) - 2

Lecture 19 - Ligand Field Theory (LFT) - 3

Lecture 20 - Ligand Field Theory (LFT) - 4

Lecture 21 - 18 Electron Rule

Lecture 22 - 18 Electron Rule

Lecture 23 - MetalÃ¢ Metal Multiple Bonds

Lecture 24 - MetalÃ¢ Metal Multiple Bonds [Quadruple and Quintuple Bonding]

Lecture 25 - Preparation of metal Complexes

Lecture 26 - Preparation of metal Complexes

Lecture 27 - Classification of ligands by donor atoms

Lecture 28 - Classification of ligands by donor atoms - Hydrogen

Lecture 29 - Classification of ligands by donor atoms - Carbon - 1

Lecture 30 - Classification of ligands by donor atoms - Carbon - 2

Lecture 31 - Classification of ligands by donor atoms - Carbon - 3

Lecture 32 - Classification of ligands by donor atoms - Carbon - 4

Lecture 33 - Classification of ligands by donor atoms - Nitrogen - 1

Lecture 34 - Classification of ligands by donor atoms - Nitrogen - 2

Lecture 35 - Classification of ligands by donor atoms - Nitrogen - 3

Lecture 36 - Classification of ligands by donor atoms - Oxygen, Phosphorus

Lecture 37 - Classification of ligands by donor atoms - Phosphorus - 1

Lecture 38 - Classification of ligands by donor atoms - Phosphorus - 2

Lecture 39 - Classification of ligands by donor atoms - Phosphorus - 3

Lecture 40 - Classification of ligands by donor atoms - Halogens

Lecture 41 - Oxidative addition and reductive elimination reactions - 1

Lecture 42 - Oxidative addition and reductive elimination reactions - 2

Lecture 43 - Oxidative addition and reductive elimination reactions - 3

Lecture 44 - Oxidative addition and reductive elimination reactions - 4

Lecture 45 - Inorganic Reaction Mechanisms

Lecture 46 - Inorganic Reaction Mechanisms Square planar complexes

Lecture 47 - Trans-Effect

Lecture 48 - Substitution Reactions in Square Planar Complexes, Trans-Effect

Lecture 49 - Substitution Reactions in Octahedral Complexes

Lecture 50 - Substitution Reactions in Octahedral Complexes; Stereochemistry of Products

Lecture 51 - Electron-Transfer Processes

Lecture 52 - Electron-Transfer Processes

Lecture 53 - Methods of Characterization UV-Visible Spectroscopy

Lecture 54 - Methods of Characterization UV-Visible Spectroscopy

Lecture 55 - UV-Visible Spectroscopy

Lecture 56 - UV-Visible Spectroscopy

Lecture 57 - NMR Spectroscopy

Lecture 58 - NMR Spectroscopy

Lecture 59 - NMR and IR Spectroscopy

Lecture 60 - Summary and Conclusion

NPTEL : NOC:Nuclear and Radiochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. B.S.Tomar, Prof. P.K.Mohapatra

Lecture 1 - Radioactivity

Lecture 2 - Radioactive decay

Lecture 3 - Radioactive decay chain

Lecture 4 - Radioactive equilibria

Lecture 5 - Nuclear structure and stability

Lecture 6 - Nuclear force and nuclear properties

Lecture 7 - Liquid drop model

Lecture 8 - Applications of Liquid drop model

Lecture 9 - Nuclear Shell model

Lecture 10

Lecture 11 - Alpha decay

Lecture 12 - Beta decay

Lecture 13 - Gamma decay

Lecture 14 - Interaction of radiations with matter

Lecture 15 - Interaction of fast electrons with matter

Lecture 16 - Interaction of electromegnetic radiations with matter

Lecture 17 - Principles of radiation detectors

Lecture 18 - Gas filled detectors

Lecture 19 - Scintillator detectors

Lecture 20 - Semiconductor detectors

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26 - Compound nucleus reactions

Lecture 27 - Nuclear fission

Lecture 28 - Nuclear fusion

Lecture 29 - Production of radioisotopes using neutrons

Lecture 30 - Radioisotope production using charged particles

Lecture 31 - Radiochemical practices

Lecture 32 - Radioanalytical techniques and applications

Lecture 33 - Nuclear analytical techniques

Lecture 34 - Applications of neutron activation analysis

Lecture 35 - Ion beam analysis

Lecture 36 - Nuclear reaction analysis and particle induced gamma emission

Lecture 37 - Nuclear Probes: Positron annihilation spectroscopy

Lecture 38 - Perturbed angular corelation

Lecture 39 - Radioisotope applications in healthcare

Lecture 40 - Radioisotope applications in Industry, agriculture and food technology

Lecture 41 - History of actinides

Lecture 42 - Actinide concept

Lecture 43 - Actinide ionic species in water

Lecture 44 - Actinide hydration and Hydrolysis

Lecture 45 - pH-pE concept

Lecture 46 - Ln/An absorption spectroscopy - I

Lecture 47 - Ln/An absorption spectroscopy - II

Lecture 48 - Ln/An emission spectroscopy - I

Lecture 49 - Ln/An emission spectroscopy - II

Lecture 50 - Solution chemistry Actinides

Lecture 51 - Complexation of actinides - I

Lecture 52 - Complexation of actinides - II

Lecture 53 - Solvent extraction of actinides - I

Lecture 54 - Solvent extraction of actinides - II

Lecture 55 - Actinide partitioning

Lecture 56 - Analytical chemistry of actinides

Lecture 57 - Transactinides

Lecture 58 - Fast radiochemical separations

Lecture 59 - Actinides in the environment

Lecture 60 - Actinides sorption and migration

NPTEL : NOC:Fundamentals of Statistical Thermodynamics (Chemistry and Biochemistry)

Co-ordinators : Prof. Nand Kishore

Lecture 1 - General introduction to Statistical Thermodynamics

Lecture 2 - Configuration and Weights

Lecture 3 - Configuration and Weights (Continued...)

Lecture 4 - Boltzmann Distribution

Lecture 5 - The Molecular Partition Function

Lecture 6 - The Molecular Partition Function of a uniform ladder of energy levels

Lecture 7 - The partition function for a particle of mass m free to move in a 1D container

Lecture 8 - The partition function for a particle of mass m free to move in a 3D container

Lecture 9 - Numerical Problems Set-I (based on partition function)

Lecture 10 - Numerical Problems Set-II

Lecture 11 - The Internal Energy

Lecture 12 - Obtaining expression for beta

Lecture 13 - The Statistical Entropy

Lecture 14 - Connecting partition function with entropy

Lecture 15 - Solving numerical problems based on Internal energy and Entropy

Lecture 16 - Solving numerical problems based on Internal energy and Entropy

Lecture 17 - Negative Temperature

Lecture 18 - Further discussion on q (Partition function), U (Internal energy) and S (Entropy)

Lecture 19 - The Canonical Partition Function

Lecture 20 - Relating Canonical Partition Function Internal Energy and Entropy

Lecture 21 - Recovering molecular partition function q from canonical partition function Q

Lecture 22 - Entropy of a monatomic gas

Lecture 23 - Further discussion on entropy of a monatomic gas - I

Lecture 24 - Further discussion on entropy of a monatomic gas - II

Lecture 25 - The Thermodynamic Functions (Pressure)

Lecture 26 - The Thermodynamic Functions (Enthalpy)

Lecture 27 - The Thermodynamic Functions (The Gibbs Energy)

Lecture 28 - The Thermodynamic Functions (The Molecular Partition Function)

Lecture 29 - The Rotational Contribution to Molecular Partition Function

Lecture 30 - The Rotational Contribution to Molecular Partition Function (Nonlinear Rotor)

Lecture 31 - The Rotational Contribution to Molecular Partition Function

Lecture 32 - Rotational Partition Function

Lecture 33 - Vibrational Partition Function - I

Lecture 34 - Vibrational Partition Function - II

Lecture 35 - Vibrational Partition Function - Applications

Lecture 36 - Electronic Partition Function

Lecture 37 - Mean Energies

Lecture 38 - Mean Energies (Continued...)

Lecture 39 - Heat Capacity

Lecture 40 - Heat Capacity (Continued...)

Lecture 41 - Mean Energies (Applications)

Lecture 42 - Problem Solving

Lecture 43 - Residual Entropy

Lecture 44 - Residual Entropy (Continued...)

Lecture 45 - Relation between equilibrium constant K and partition function q

Lecture 46 - Relation between equilibrium constant K and partition function q (Continued...)

Lecture 47 - Relation between equilibrium constant K and partition function q (Applications-1)

Lecture 48 - Relation between equilibrium constant K and partition function q (Applications-2)

Lecture 49 - Contributions to equilibrium constant

Lecture 50 - Contributions to equilibrium constant (Continued...)

Lecture 51 - Contributions to equilibrium constant (Continued...) and Problems Solving

Lecture 52 - Problem Solving

Lecture 53 - Problem Solving (Continued...)

Lecture 54 - Equations of state

Lecture 55 - Bose-Einstein Statistics

Lecture 56 - Problem Solving

Lecture 57 - FERMI-DIRAC Statistics

Lecture 58 - Radial Distribution Function

Lecture 59 - Recap - 1

Lecture 60 - Recap - 2

NPTEL : NOC:Interpretative Molecular Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. M. S. Balakrishna

Lecture 1 - Various Analytical Techniques and their applications

Lecture 2 - Introduction to 1H NMR Spectroscopy

Lecture 3 - NMR signals and magnetic shielding

Lecture 4 - Introduction to the concept of Chemical Shifts in NMR spectra

Lecture 5 - Chemical Shifts for different type of protons

Lecture 6 - N+1 Rule and Pascal's Triangle

Lecture 7 - Coupling constants for different types of molecules

Lecture 8 - Second Order Coupling

Lecture 9 - Introduction to 13C NMR Spectroscopy

Lecture 10 - Introduction to 31P NMR Spectroscopy

Lecture 11 - Chemical Shift Range in 31P NMR Spectroscopy

Lecture 12 - Examples explaining Multinuclear NMR Spectroscopy - 1

Lecture 13 - Examples explaining Multinuclear NMR Spectroscopy - 2

Lecture 14 - Examples explaining Multinuclear NMR Spectroscopy - 3

Lecture 15 - Examples explaining Multinuclear NMR Spectroscopy - 4

Lecture 16 - Examples explaining Multinuclear NMR Spectroscopy - 5

Lecture 17 - Monitoring reaction through 31P NMR Spectroscopy

Lecture 18 - 19F, 14N and 15N NMR Spectroscopy

Lecture 19 - 6Li and 7Li NMR Spectroscopy

Lecture 20 - 11B, 10B and 199Hg NMR Spectroscopy

Lecture 21 - Introduction to UV Spectroscopy

Lecture 22 - Types of Electronic Transitions and Woodward-Fieser Rules

Lecture 23 - Spin Orbit Coupling and Term Symbols

Lecture 24 - Ground State Term Symbol

Lecture 25 - Calculating microstates for different electronic configuration

Lecture 26 - Selection Rule of Electronic Transition

Lecture 27 - Orgel Level Diagrams

Lecture 28 - Racah Parameters and Tanabe-Sugano Diagrams

Lecture 29 - Introduction to IR Spectroscopy - 1

Lecture 30 - Introduction to IR Spectroscopy - 2

Lecture 31 - Interpretation of IR Spectra

Lecture 32 - IR stretching frequencies for various functional groups

Lecture 33 - Hook's Law - Numericals

Lecture 34 - IR Spectra of carbonyl compounds - 1

Lecture 35 - IR Spectra of carbonyl compounds - 2

Lecture 36 - Numerical Problems related to IR Spectroscopy - 1

Lecture 37 - Numerical Problems related to IR Spectroscopy - 2

Lecture 38 - Introduction to Mass Spectrometry

Lecture 39 - Isotope Peaks in Mass Spectrometry

Lecture 40 - Hydrogen deficiency Index

Lecture 41 - EI Mass Spectra of various molecules - 1

Lecture 42 - EI Mass Spectra of various molecules - 2

Lecture 43 - EI Mass Spectra of various molecules - 3

Lecture 44 - Types of Mass Spectrometry

Lecture 45 - Introduction to EPR Spectroscopy - 1

Lecture 46 - Introduction to EPR Spectroscopy - 2

Lecture 47 - Hyperfine Interactions

Lecture 48 - Examples of Hyperfine Interactions

Lecture 49 - Introduction to MÃƒÂ¶ssbauer Spectroscopy (MÃƒÂ¶s)

Lecture 50 - More discussion, problems and solutions (MÃƒÂ¶s)

Lecture 51 - Problems and Solutions - 1

Lecture 52 - Problems and Solutions - 2

Lecture 53 - Problems and Solutions - 3

Lecture 54 - Problems and Solutions - 4

Lecture 55 - Problems and Solutions - 5

Lecture 56 - Rule of Thirteen and Nitrogen Rule

Lecture 57 - Problems and Solutions - 6

Lecture 58 - Problems and Solutions - 7

Lecture 59 - Problems and Solutions - 8

Lecture 60 - Summary and conclusion

NPTEL : NOC:Many Body Methods in Quantum Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Sourav Pal, Prof. Achintya Kumar Dutta

Lecture 1 - Failure of classical mechanics

Lecture 2 - Postulates of quantum mechanics

Lecture 3 - Postulate 5 and 6

Lecture 4 - Overview of exactly solvable system

Lecture 5 - Introduction to many electron problem

Lecture 6 - Non-interacting and interacting quantum particles

Lecture 7 - Spin orbital concept

Lecture 8 - Slater determinant introduction

Lecture 9 - Form of exact wave function for interacting particles

Lecture 10 - A brief introduction to Configuration Interaction (CI)

Lecture 11 - Variational method and Rayleigh-Ritz variation

Lecture 12 - Linear variation method

Lecture 13 - Hartree-Fock theory introduction

Lecture 14 - Slater rules for matrix elements

Lecture 15 - Spin integrated for closed shell determinant

Lecture 16 - Examples of spin integrated determinants

Lecture 17 - Introduction to Lagrange variation

Lecture 18 - General lagrange variation

Lecture 19 - Lagrange variation to minimize the the Hartree-Fock energy

Lecture 20 - Non-canonical HF equation

Lecture 21 - Interpretation of coulomb and exchange terms

Lecture 22 - Unitary transformation of non-canonical HF equation

Lecture 23 - Canonical Hartree-Fock equation

Lecture 24 - Koopmans' approximation for IP

Lecture 25 - Koopmans' approximation for EA

Lecture 26 - Spin integrated Hartree-Fock for closed shell system (RHF)

Lecture 27 - Molecular Hartree-Fock introduction

Lecture 28 - Hartree-Fock Rothaan Hall equation

Lecture 29 - Symmetry of two electron integrals

Lecture 30 - HF Roothan equation in terms of atomic orbitals

Lecture 31 - Koopmans' IP for molecules

Lecture 32 - Koopmans' EA for molecules

Lecture 33 - Roothaan equation in orthonormalized basis

Lecture 34 - Review of Hartree-Fock theory

Lecture 35 - Charge density, Bond order and Population analysis

Lecture 36 - Dipole Moment

Lecture 37 - Introduction to basis set

Lecture 38 - Dunning and Pople basis set

Lecture 39 - Polarization and diffuse function

Lecture 40 - Brillouin's theorem and Slater's rule type-2

Lecture 41 - Slater rule type-2

Lecture 42 - Spin adapted determinant

Lecture 43 - Dissociation of Hydrogen molecule problem

Lecture 44 - Inadequacies of restricted Hartree-Fock theory

Lecture 45 - Hartree-Fock perturbation theory and correlation correction

Lecture 46 - Hartree-Fock perturbation theory (Continued...)

Lecture 47 - Introduction of 2nd order perturbation theory

Lecture 48 - Intermediate normalization and an expression for the Correlation energy

Lecture 49 - Slater rule -3 and derivation of 2-nd order perturbation energy

Lecture 50 - Physical insight of pair correlation theory

Lecture 51 - Introduction to configuration intercation (CI)

Lecture 52 - Determine the parameter of CI

Lecture 53 - Construction of CIS hamiltonian matrix

Lecture 54 - Importance of doubly excited determinants in correlation contribution

Lecture 55 - Intermediate normalization and an expression for the Correlation energy

Lecture 56 - CI equation in terms of Normal-Ordered hamiltonian

Lecture 57 - Doubly excited CI function (D-CI)

Lecture 58 - Matrix structure of CISD (singly and doubly excited CI)

Lecture 59 - Some illustrative example

Lecture 60 - Effects of singly excited determinant in the calculation

Lecture 61 - D-CI for non-interacting hydrogen molecules

Lecture 62 - Size consistency problem in truncated CI

Lecture 63 - N-dependence of D-CI correlation energy

Lecture 64 - problem of truncating CI

Lecture 65 - Introduction of second quantization operator in quantum mechanics

Lecture 66 - Creation and annihilation operator and their properties

Lecture 67 - Operators in second quantization

Lecture 68 - Some basic examples related with second quantization operator

Lecture 69 - Hole-Particle formalism

Lecture 70 - Hugenholtz rule for diagrammatic construction of MP perturbation theory

Lecture 71 - Linked cluster diagram

Lecture 72 - Energy expression for higher order Moller-Plasset perturbation theory

Lecture 73 - Diagrammatic representation of MP3 energy and some practice problem

Lecture 74 - Overview of the some other correlation calculation method

Lecture 75 - A brief introduction to Coupled cluster theory

NPTEL : Bio-Physical Chemistry (Chemistry and Biochemistry)

Co-ordinators : Dr. P.K. Chowdhury

Lecture 1 - A Course on Bio-physical Chemistry

Lecture 2 - Protein Structure

Lecture 3 - Secondary Structure of Proteins

Lecture 4 - Secondary Structure of Proteins (Continued...)

Lecture 5 - Tertiary Structure

Lecture 6 - Forces in Protein Folding

Lecture 7 - Forces in Protein Folding (Continued...)

Lecture 8 - Electrostatics (Continued...)

Lecture 9 - Intermolecular Interactions

Lecture 10 - Dipole-Dipole Interaction

Lecture 11 - Electrostatics (Continued...)

Lecture 12 - Hydrophobic Effect

Lecture 13 - Hydrophobic Effect (Continued...)

Lecture 14 - Hydrogen Bonding

Lecture 15 - Protein Stability Curves

Lecture 16 - Thermodynamics of Protein Unfolding

Lecture 17 - Thermodynamics of Protein Unfolding (Continued...)

Lecture 18 - Mechanism of Chemical Denaturation

Lecture 19 - Pressure Induced Denaturation (The P-T Diagram)

Lecture 20 - Protein Folding Pathways and Energy Landscapes

Lecture 21 - Diffusion

Lecture 22 - Diffusion (Continued...)

Lecture 23 - Diffusion (Continued...)

Lecture 24 - Langevin Equation and Brownian Motion

Lecture 25 - Langevin Equation and Brownian Motion (Continued...)

Lecture 26 - Langevin Equation and Brownian Motion (Continued...)

Lecture 27 - Protein Folding : Mechanisms and Kinetics

Lecture 28 - Protein Folding : Mechanisms and Kinetics (Continued...)

Lecture 29 - Protein Folding : Mechanisms and Kinetics (Continued...)

Lecture 30 - Protein Folding : The Chevron-Plot

Lecture 31 - Protein Folding Kinetics : Rapid Mixing and Relaxation Techniques

Lecture 32 - Protein Folding Kinetics : Rapid Mixing and Relaxation Techniques (Continued...)

Lecture 33 - Protein Folding Kinetics : Rapid Mixing and Relaxation Techniques (Continued...)

Lecture 34 - Protein Folding Kinetics : Rapid Mixing and Relaxation Techniques (Continued...)

Lecture 35 - Experimental Tools

Lecture 36 - Spectroscopy : The Franck Condon Principle

Lecture 37 - Spectroscopy : The Franck Condon Principle (Continued...)

Lecture 38 - Electronic Spectroscopy Absorption and Fluorescence

Lecture 39 - Fluorescence

Lecture 40 - Fluorescence Quenching

Lecture 41 - Infrared Spectroscopy of Proteins

Lecture 42 - Infrared Spectroscopy of Proteins (Continued...)

NPTEL : NOC:Spectroscopic Techniques for Pharmaceutical and Biopharmaceutical Industries (Chemistry and Biochemistry)

Co-ordinators : Dr. Shashank Deep

Lecture 1 - Introduction to Spectroscopy - I

Lecture 2 - Introduction to Spectroscopy - II

Lecture 3 - Introduction to Spectroscopy - III

Lecture 4 - Introduction to Spectroscopy - IV

Lecture 5 - Introduction to Spectroscopy - V

Lecture 6 - Introduction to Spectroscopy - VI

Lecture 7 - Rotational, rotational Raman Spectroscopy theory and Application - I

Lecture 8 - Rotational, rotational Raman Spectroscopy theory and Application - II

Lecture 9 - Vibrational Spectroscopy Theory and Application - I

Lecture 10 - Vibrational, Rotational-Vibrational, Raman Spectroscopy - II

Lecture 11 - Vibrational, Rotational-Vibrational, Raman Spectroscopy - III

Lecture 12 - Problems on Rotational, Vibrational and Raman Spectroscopy

Lecture 13 - Atomic Spectroscopy - I

Lecture 14 - Atomic Spectroscopy - II

Lecture 15 - Atomic Spectroscopy - III

Lecture 16 - Atomic Spectroscopy - IV

Lecture 17 - Atomic and Molecular Spectroscopy

Lecture 18 - Electronic Spectra of Diatomic Molecules and UV-Vis Spectroscopy

Lecture 19 - UV-Visible Spectroscopy of Conjugated Molecules

Lecture 20 - UV-Vis Spectroscopy and its Applications - I

Lecture 21 - UV-Vis Spectroscopy and its Applications - II

Lecture 22 - UV-Vis and Fluorescence Spectroscopy

Lecture 23 - Fluorescence Spectroscopy (Continued...)

Lecture 24 - Application of Fluorescence Spectroscopy

Lecture 25 - Application of Steady-State Fluorescence

Lecture 26 - Time- resolved Fluorescence Spectroscopy

Lecture 27 - Microscopy

Lecture 28 - Contrast in Microscopy, Fluorescence Microscopy

Lecture 29 - Fluorescence Microscopy and Application

Lecture 30 - Principle of NMR

Lecture 31 - NMR data processing and Chemical shift

Lecture 32 - Structure Informations from NMR

Lecture 33 - Structure Calculation and 2D-NMR Spectroscopy

Lecture 34 - Mass Spectroscopy

NPTEL : NOC:Introductory Non-Linear Dynamics (Chemistry and Biochemistry)

Co-ordinators : Prof. Ramakrishna Ramaswamy

Lecture 1 - Introduction, Stability, Phase Space and Invariant Sets - 1

Lecture 2 - Introduction, Stability, Phase Space and Invariant Sets - 2

Lecture 3 - Introduction, Stability, Phase Space and Invariant Sets - 3

Lecture 4 - Maps and Flows. Simple Examples of Dynamics Systems - 1

Lecture 5 - Maps and Flows. Simple Examples of Dynamics Systems - 2

Lecture 6 - Logistic map. Simple Examples of Bifurcations

Lecture 7 - Bifurcation Diagrams. Period 3 Implies Chaos. Characterizing Chaos

Lecture 8 - Characterizing The Period-Doubling Route to Chaos

Lecture 9 - Lyapunov Exponents; Invariant measures

Lecture 10 - Intermittency. Crises

Lecture 11 - Fractals

Lecture 12 - Chaos in Flows. The Lorenz and Rossler Systems

Lecture 13 - The Baker and Horseshoe Maps

Lecture 14 - Hamiltonian Chaos - 1

Lecture 15 - Hamiltonian Chaos - 2

NPTEL : NOC:Principles of Organic Synthesis (Chemistry and Biochemistry)

Co-ordinators : Prof. T. Punniyamurthy

Lecture 1 - Aldol Reaction

Lecture 2 - Perkin, Claisen and Thorpe Reactions

Lecture 3 - Reaction of Enolates

Lecture 4 - Mannich Reaction

Lecture 5 - Reaction of Alkenes and Carbonyl Compounds

Lecture 6 - Friedel-Crafts and Prins Reactions

Lecture 7 - Grignard Reagents

Lecture 8 - Organolithium Reagents

Lecture 9 - Organocopper, Organozinc and Organomercury Reagents

Lecture 10 - Ritter Reaction and Gabriel Synthesis

Lecture 11 - Reactions of imines and enamines, synthesis of alkaloids and amino acids

Lecture 12 - Reactions of electrophilic and nucleophilic nitrogens, synthesis of amino acids and peptides

Lecture 13 - Principles, effect of substituents and carbon-carbon bond formation

Lecture 14 - Formylation/acylation and related reactions

Lecture 15 - Nitration, Sulfonation and other reactions

Lecture 16 - Principle, Substitution mechanism and reactions of Benzyne

Lecture 17 - Schiemann Reaction, Ullmann reaction and Stephens-Castro coupling

Lecture 18 - Ziegler Alkylation, Chichibabin Reaction, Von Richter Rearrangement, Smiles Rearrangement, Bamberger Rearrangement and Bucherer Reaction

Lecture 19 - Preparation, properties and reactions

Lecture 20 - Coupling reactions, Japp-Klingemann reaction and Tiffeneau-Demjanov rearrangement

Lecture 21 - Applications of diazonium salts

Lecture 22 - Wagner-Meerwein rearrangment, Pinacol rearrangment, Benzilic acid rearrangment and Arndt-Eistert synthesis

Lecture 23 - Rearrangement of halogen, oxygen, sulfur and nitrogen containing centre

Lecture 24 - Rearrangement to electron-Rich carbon

Lecture 25 - Reactivity and several reactions

Lecture 26 - Reactions of sulfur and silicon containing reagents

Lecture 27 - Preparation and reactions of organoborane and organotin reagents

Lecture 28 - Formation of carbon-carbon and carbon-halogen bonds

Lecture 29 - Cu, Mn, Sm, and Sn Based Reactions, Acyloin Condensation

Lecture 30 - C-N, C-O bond formation and decarboxylation

NPTEL : NOC:Reagents in Organic Synthesis (Chemistry and Biochemistry)

Co-ordinators : Prof.Subhas Chandra

Lecture 1 - Chromium Based Reagents for Oxidation

Lecture 2 - Non-metal based Reagents for Oxidation

Lecture 3 - Organic Peroxides

Lecture 4 - Oxidation Mediated by DDQ, CAN and SeO2

Lecture 5 - Oxidation Mediated by Mn and Ag

Lecture 6 - Oxidation by Ru, Hypervalent Iodine, Al and Na based Reagents

Lecture 7 - Na and Li Metal based Reduction

Lecture 8 - Hydride based Reduction

Lecture 9 - Hydrogenation

Lecture 10 - Al, Zn and Li Based Reagents for Reduction

Lecture 11 - Reduction With Boranes, Diimide and Trialkylsilanes

Lecture 12 - Li Based Reagents in Organic Synthesis

Lecture 13 - Mg and Na Based Reagents in Organic Synthesis

Lecture 14 - B Based Reagents in Organic Synthesis

Lecture 15 - B and Al Based Reagents in Organic Synthesis

Lecture 16 - S Based Reagents in Organic Synthesis

Lecture 17 - P Based Reagents in Organic Synthesis

Lecture 18 - Si and Pb Based Reagents in Organic Synthesis

Lecture 19 - Sn and Bi Based Reagents in Organic Synthesis

Lecture 20 - Ti Based Reagents in Organic Synthesis

Lecture 21 - Ru Based Reagents in Organic Synthesis

Lecture 22 - Pd Based Reagents in Organic Synthesis

Lecture 23 - Cu Based Reagents in Organic Synthesis

Lecture 24 - Cr and Mn Based Reagents in Organic Synthesis

Lecture 25 - Zn and Hg Based Reagents in Organic Synthesis

Lecture 26 - Au Based Reagents in Organic Synthesis

Lecture 27 - Fe and Co Based Reagents in Organic Synthesis

Lecture 28 - Ag and Rh Based Reagents in Organic Synthesis

Lecture 29 - Ni, Pt and Ir Based Reagents in Organic Synthesis

Lecture 30 - Introduction to Lanthanides and Sm Based Reagents

Lecture 31 - Samarium(Ii) Iodide Based Reagents in Organic Synthesis

Lecture 32 - Sm and Yb Based Reagents in Organic Synthesis

NPTEL : NOC:Thermodynamics: Classical to Statistical (Chemistry and Biochemistry)

Co-ordinators : Prof. Sandip Paul

Lecture 1 - Cocepts of heat and work; First Law of Thermodynamics

Lecture 2 - Concepts of enthalpy and heat capacity

Lecture 3 - Introduction to entropy

Lecture 4 - Calculation of entropy for various processes

Lecture 5 - Gibbs and Helmholtz free energy

Lecture 6 - Introduction to chemical potential

Lecture 7 - Clapeyron equation and phase transition; concept of fugacity

Lecture 8 - Calculation of fugacity; free energy of mixing

Lecture 9 - Partial molar quantities; excess thermodynamic quantities

Lecture 10 - Concept of activity and activity coefficients; Debye-Huckel limiting law

Lecture 11 - Phase Diagram of one component systems

Lecture 12 - Phase Diagram of two component systems

Lecture 13 - Phase Diagram of three component system; one dimensional random walk

Lecture 14 - Macroscopic and microscopic states; Boltzmann distribution; Canonical partition function

Lecture 15 - Calculation of different thermodynamical quantities using canonical partition function

Lecture 16 - Introduction to molecular partition function

Lecture 17 - Translational, electronic and nuclear partition function

Lecture 18 - Rotational partition function

Lecture 19 - Vibrational partitition function; Introduction to grand canonical ensemble

Lecture 20 - Grand canonical distribution; Introduction to microcanonical ensemble

Lecture 21 - Problems on classical thermodynamics - 1

Lecture 22 - Problems on classical thermodynamics - 2

Lecture 23 - Problems on statistical thermodynamics - 1

Lecture 24 - Problems on statistical thermodynamics - 2

Lecture 25 - Problems on statistical thermodynamics - 3

Lecture 26 - Fermi-Dirac and Bose-Einstein statistics

Lecture 27 - Ideal Fermi gas

Lecture 28 - Ideal Bose gas;Introduction to Bose-Einstein condensation

Lecture 29 - Bose-Einstein condensations

Lecture 30 - Nuclear spin statistics; Ortho- and para-hydrogens

Lecture 31 - Specific Heats of solids

Lecture 32 - Problems on statistical thermodynamics - 4

Lecture 33 - Advance problems - 1

Lecture 34 - Advance Problems - 2

Lecture 35 - Advance Problems - 3

Lecture 36 - Advance Problems - 4

Lecture 37 - Advance Problems - 5

NPTEL : NOC:Essentials of Biomolecules: Nucleic Acids and Peptides (Chemistry and Biochemistry)

Co-ordinators : Prof. Lal Mohan Kundu

Lecture 1 - Importance of Biomolecules

Lecture 2 - DNA double helix: Chemical parameters

Lecture 3 - DNA and Proteins

Lecture 4 - Amino acids and Proteins

Lecture 5 - Protein 3D structures, folding and denaturation

Lecture 6 - Chemical synthesis pyrimidine nucleobases

Lecture 7 - Chemical synthesis purine nucleobases, Prebiotic chemistry

Lecture 8 - Synthesis of nucleosides

Lecture 9 - Solid phase DNA synthesis

Lecture 10 - Chemistry and Biology of DNA Replication

Lecture 11 - Chemistry of Polymerase Chain Reaction

Lecture 12 - Major components and steps involved in Polymerase chain reaction

Lecture 13 - DNA sequencing: Sanger's di-deoxy method

Lecture 14 - DNA sequencing: Maxam- Gilbert method

Lecture 15 - Numerical Problem-1

Lecture 16 - Sugar Chemistry

Lecture 17 - Chemistry behind DNA damage and mutation

Lecture 18 - Chemistry behind DNA damage and mutation

Lecture 19 - DNA repair

Lecture 20 - Transcription - The transfer of genetic information from DNA to mRNA

Lecture 21 - Translation - The transfer of genetic information from mRNA to protein I

Lecture 22 - Translation - The transfer of genetic information from mRNA to protein II

Lecture 23 - Role of Ribosome in protein synthesis and the concept of codon

Lecture 24 - Protein sequencing using Sanger's and Edman's degradation methods

Lecture 25 - Mass spectroscopy and other sequencing methods for large proteins

Lecture 26 - Solution phase peptide synthesis: mechanism and end protection

Lecture 27 - Peptide coupling agents, Solid phase synthesis, peptide based therapeutics

Lecture 28 - Spectroscopic techniques

Lecture 29 - Spectrospic techniques - II and Purification technique-I of biomolecules

Lecture 30 - Purification techniques - II and Characteriation techniques of biomolecules

Lecture 31 - Molecular probes: PNA and LNA-I

Lecture 32 - Molecular Probes: PNA and LNA-II

Lecture 33 - Carbohydrate chemistry - I: Introduction and Synthesis

Lecture 34 - Carbohydrate chemistry - II: Polysaccharides and its nanoparticles

Lecture 35 - Carbohydrate chemistry - III: Synthesis of nanoparticles; Recap of all modules

NPTEL : Chemistry of Materials (Chemistry and Biochemistry)

Co-ordinators : Prof. S. Sundar Manoharan

Lecture 1 - Introduction to Materials Chemistry

Lecture 2 - Preparative routes: Conventional - Precursor technique - I

Lecture 3 - Preparative routes: Conventional - Precursor technique - II

Lecture 4 - Preparative routes: Un Conventional - Soncochemistry technique - II

Lecture 5 - Preparative routes: Un Conventional - Soncochemistry technique - II

Lecture 6 - Preparative routes: Un Conventional - Combustion technique

Lecture 7 - Preparative routes: Un Conventional - Microwave technique

Lecture 8 - Preparative routes: High Pressure - Hydrothermal Technique

Lecture 9 - Preparative routes: Coventional Solid State Technique

Lecture 10 - Molecular Beam Epitaxy: Monolayers to Multilayers

Lecture 11 - Pulsed Laser Deposition: Oxide thin films

Lecture 12 - Pulsed Electron Deposition: From oxides to polymeric films and devices

Lecture 13 - Sputtering deposited thin films and applications

Lecture 14 - Crystal growth-Single crystals.

Lecture 15 - Applications of X-ray diffraction

Lecture 16 - Applications of X-ray Photoelectron spectroscopy

Lecture 17 - Applications of X-ray Absorption spectroscopy

Lecture 18 - Applications of Thermal analysis techniques

Lecture 19 - Applications of Scanning Tunneling microscopy

Lecture 20 - Applications of Electron Microscopy

Lecture 21 - Case Study of ZnO

Lecture 22 - Magnetic materials - I

Lecture 23 - Magnetic Materials - II

Lecture 24 - Magnetic Materials - III & Related Phenomena

Lecture 25 - Shape Memory Materials

Lecture 26 - Spintronic Materials - I Colossal Magentoresistive Oxides

Lecture 27 - Spintronic Materials - II Giant Magnetoresistive Materials

Lecture 28 - Spintronic Materials - III Tunelling Magnetoresistive Materials

Lecture 29 - Spintronic Materials - IV Dilute Magnetic Semicondcutors

Lecture 30 - High Tc Superconductors

Lecture 31 - The New Carbon family - I - Fullerenes and Nanotubes

Lecture 32 - The New Carbon family - II - Graphene

Lecture 33 - Optoelectronic Materials - I - OLEDS

Lecture 34 - Optoelectronic Materials - II - OLEDS

Lecture 35 - Inorganic Phosphors - I

Lecture 36 - Inorganic Phosphors - II

Lecture 37 - Phosphor Materials

Lecture 38 - Solar Cells

Lecture 39 - Interview with C N R Rao and Interview with E C Subba Rao

Lecture 40 - Perceptions & Projections

NPTEL : Mathematics for Chemistry (Chemistry and Biochemistry)

Co-ordinators : Dr. Madhav Ranganathan, Dr. P.P. Thankachan

Lecture 1 - Mathematics for Chemistry

Lecture 2 - Mathematics for Chemistry

Lecture 3 - Mathematics for Chemistry

Lecture 4 - Mathematics for Chemistry

Lecture 5 - Mathematics for Chemistry

Lecture 6 - Mathematics for Chemistry

Lecture 7 - Mathematics for Chemistry

Lecture 8 - Mathematics for Chemistry

Lecture 9 - Mathematics for Chemistry

Lecture 10 - Mathematics for Chemistry

Lecture 11 - Mathematics for Chemistry

Lecture 12 - Mathematics for Chemistry

Lecture 13 - Mathematics for Chemistry

Lecture 14 - Mathematics for Chemistry

Lecture 15 - Mathematics for Chemistry

Lecture 16 - Mathematics for Chemistry

Lecture 17 - Mathematics for Chemistry

Lecture 18 - Mathematics for Chemistry

Lecture 19 - Mathematics for Chemistry

Lecture 20 - Mathematics for Chemistry

Lecture 21 - Mathematics for Chemistry

Lecture 22 - Mathematics for Chemistry

Lecture 23 - Mathematics for Chemistry

Lecture 24 - Mathematics for Chemistry

Lecture 25 - Mathematics for Chemistry

Lecture 26 - Mathematics for Chemistry

Lecture 27 - Mathematics for Chemistry

Lecture 28 - Mathematics for Chemistry

Lecture 29 - Mathematics for Chemistry

Lecture 30 - Mathematics for Chemistry

Lecture 31 - Mathematics for Chemistry

Lecture 32 - Mathematics for Chemistry

Lecture 33 - Mathematics for Chemistry

Lecture 34 - Mathematics for Chemistry

Lecture 35 - Mathematics for Chemistry

Lecture 36 - Mathematics for Chemistry

Lecture 37 - Mathematics for Chemistry

Lecture 38 - Mathematics for Chemistry

Lecture 39 - Mathematics for Chemistry

Lecture 40 - Mathematics for Chemistry

NPTEL : Advance Analytical Course (Chemistry and Biochemistry)

Co-ordinators : Dr. Padma S Vankar

Lecture 1 - Advance Analytical Course

Lecture 2 - Advance Analytical Course

Lecture 3 - Advance Analytical Course

Lecture 4 - Advance Analytical Course

Lecture 5 - Advance Analytical Course

Lecture 6 - Advance Analytical Course

Lecture 7 - Advance Analytical Course

Lecture 8 - Advance Analytical Course

Lecture 9 - Advance Analytical Course

Lecture 10 - Advance Analytical Course

Lecture 11 - Advance Analytical Course

Lecture 12 - Advance Analytical Course

Lecture 13 - Advance Analytical Course

Lecture 14 - Advance Analytical Course

Lecture 15 - Advance Analytical Course

Lecture 16 - Advance Analytical Course

Lecture 17 - Advance Analytical Course

Lecture 18 - Advance Analytical Course

Lecture 19 - Advance Analytical Course

Lecture 20 - Advance Analytical Course

Lecture 21 - Advance Analytical Course

Lecture 22 - Advance Analytical Course

Lecture 23 - Advance Analytical Course

Lecture 24 - Advance Analytical Course

Lecture 25 - Advance Analytical Course

Lecture 26 - Advance Analytical Course

Lecture 27 - Advance Analytical Course

Lecture 28 - Advance Analytical Course

Lecture 29 - Advance Analytical Course

Lecture 30 - Advance Analytical Course

Lecture 31 - Advance Analytical Course

Lecture 32 - Advance Analytical Course

Lecture 33 - Advance Analytical Course

Lecture 34 - Advance Analytical Course

Lecture 35 - Advance Analytical Course

Lecture 36 - Advance Analytical Course

Lecture 37 - Advance Analytical Course

Lecture 38 - Advance Analytical Course

Lecture 39 - Advance Analytical Course

Lecture 40 - Advance Analytical Course

NPTEL : NOC:Chemical Applications of Symmetry and Group Theory (Chemistry and Biochemistry)

Co-ordinators : Prof. Manabendra Chandra

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Mathematics for Chemistry (Chemistry and Biochemistry)

Co-ordinators : Dr. Madhav Ranganathan

Lecture 1 - Errors, precision and accuracy

Lecture 2 - Probability and distributions

Lecture 3 - Gaussian distribution and integrals

Lecture 4 - Gaussian distribution, integrals, averages

Lecture 5 - Practice problems 1

Lecture 6 - Vectors and Vector Spaces

Lecture 7 - Linear Independence

Lecture 8 - Scalar and vector fields

Lecture 9 - Gradient, divergence and curl

Lecture 10 - Practice problems 2

Lecture 11 - Line integrals, Potential Theory

Lecture 12 - Surface and Volume Integrals

Lecture 13 - Matrices

Lecture 14 - Linear Systems, Cramer's Rule

Lecture 15 - Practice Problems 3

Lecture 16 - Rank and Inverse of a Matrix

Lecture 17 - Eigenvalues and Eigenvectors

Lecture 18 - Special matrices

Lecture 19 - Spectral decomposition and Normal modes

Lecture 20 - Practice Problems 4

Lecture 21 - Differential equations, Order

Lecture 22 - Exact and Inexact differentials

Lecture 23 - Integrating Factors

Lecture 24 - System of 1st order ODEs, matrix methods

Lecture 25 - Practice Problems 5

Lecture 26 - Types of 2nd order ODEs, nature of solutions

Lecture 27 - Homogeneous 2nd order ODEs

Lecture 28 - Homogeneous and nonhomogeneous equations

Lecture 29 - Nonhomogeneous equations Â– Variation of parameters

Lecture 30 - Practice Problems 6

Lecture 31 - Power series method for solving Legendre DE

Lecture 32 - Properties of Legendre Polynomials

Lecture 33 - Associated Legendre Polynomials, Spherical Harmonics

Lecture 34 - Hermite Polynomials, Solution of Quantum Harmonic Oscillator

Lecture 35 - Practice Problems 7

Lecture 36 - Conditions for power series solution

Lecture 37 - Frobenius Method, Bessel Functions

Lecture 38 - Properties of Bessel Functions, circular boundary problems

Lecture 39 - Leguerre Polynomials, solution to radial part of H-atom

Lecture 40 - Practice Problems 8

NPTEL : NOC:Quantum Computing (Chemistry and Biochemistry)

Co-ordinators : Prof. Debabrata Goswami

Lecture 1 - Introduction - Motivation and Overview

Lecture 2 - Introduction - Technical Details

Lecture 3 - Introduction - Basic tools

Lecture 4 - Computational Tools

Lecture 5 - Quantum Measurement and Teleportation

Lecture 6 - Quantum Teleportation and Cryptography

Lecture 7 - DJ Algorithm and Implementation Aspects

Lecture 8 - Grover's Algorithm

Lecture 9 - Basics of Shor's Algorithm

Lecture 10 - Shor's Algorithm and Quantum Fourier Transform (QFT)

Lecture 11 - Basics of Quantum Mechanics

Lecture 12 - Modern look at Quantum Mechanics

Lecture 13 - Basics of NMR

Lecture 14 - Concepts in NMR Quantum Computing

Lecture 15 - Laser Basics

Lecture 16 - Continuous Wave Lasers

Lecture 17 - Pulsed Lasers

Lecture 18 : Optical Implementation 'Linear Approach

Lecture 19 : Various Aspects of Linear Optical Quantum Computing

Lecture 20 : Laser Experimental Implementation for Grover's Algorithm

Lecture 21 - Optical Implementation

Lecture 22 - Solutions to problem set - 1

Lecture 23 - Basics of Ion Traps

Lecture 24 - Applications of Ion Traps in QIQC

Lecture 25 - Reviewing Concepts and clarifying problems - 1

Lecture 26 - Reviewing Concepts and clarifying problems - 2

Lecture 27 - Qubits used in Commercial Quantum Computing

Lecture 28 - Spintronics Quantum Computing

Lecture 29 - Back to Basics - I

Lecture 30 - Back to Basics - II

Lecture 31 - Understanding Implementation Issues from the Basics - I

Lecture 32 - Understanding Implementation Issues from the Basics - II

Lecture 33 - Implementation with Solid-State Super conducting Qubits

Lecture 34 - Concept of Density Matrix for Quantum Computing

Lecture 35 - Understanding the ensemble of Qubits from Density Matrix

Lecture 36 - Understanding Quantum Measurement, Entanglement etc. in Quantum Computing using Density Matrix

Lecture 37 - Principles: Quantum Mechanics and Computers

Lecture 38 - Measurements: Single vs Ensemble Averaged

Lecture 39 - Working of Quantum Computers: NMR QC

Lecture 40 - Academic Development in Quantum Computing - I

Lecture 41 - Academic Development in Quantum Computing - II

Lecture 42 - Commercial Development in Quantum Computing Implementation

Lecture 43 - Use of Atomic Quibts in Quantum Computing

Lecture 44 - Futuristic Aspects in Implementing Quantum Computing - I

Lecture 45 - Futuristic Aspects in Implementing Quantum Computing - II

NPTEL : NOC:Basics of Fluroscence Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Pratik Sen

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Laser - Fundamentals and Applications (Chemistry and Biochemistry)

Co-ordinators : Prof. Manabendra Chandra

Lecture 1 - Unique properties of LASERs and their applications

Lecture 2 - LASER and its history

Lecture 3 - Interaction of Light with matter

Lecture 4 - Einsteins Concept of stimulated emission

Lecture 5 - Calculation of Einsteins coefficient

Lecture 6 - Population inversion, 2-level system and 3-level system

Lecture 7 - 3-level System and 4-level system

Lecture 8 - Components of LASERs

Lecture 9 - Modes of LASER cavity and standing waves

Lecture 10 - Transverse Modes of LASER cavity

Lecture 11 - Threshold Condition

Lecture 12 - Properties of Laser: Directionality and Intensity

Lecture 13 - Properties of Laser: Coherence and Monochromaticity

Lecture 14 - Continuous and Pulsed Lasers

Lecture 15 - Some Numerical problem

Lecture 16 - Cavity Dumping

Lecture 17 - Q-switching

Lecture 18 - Q-switching and Pockels effect

Lecture 19 - Passive Q-switching, Mode-Locking

Lecture 20 - Mode Locking

Lecture 21 - Mode - locking

Lecture 22 - Mode - locking (Continued...)

Lecture 23 - Passive Mode - locking and Types of LASERs

Lecture 24 - Solid state LASERs

Lecture 25 - Semiconductor LASERs and Gas LASERs

Lecture 26 - Gas LASERs

Lecture 27 - Chemical and Dye LASERs

Lecture 28 - Introduction to Non Linear Optics

Lecture 29 - Non Linear Optics

Lecture 30 - 2nd order Nonlinear optics

Lecture 31 - Non-linear optical processes

Lecture 32 - Aspects of SHG and Application of non-linear optics

Lecture 33 - Application of LASER: LIDAR

Lecture 34 - Application of Laser: Laser Spectroscopy

Lecture 35 - Application of Laser: Enrichment of Isotope

Lecture 36 - Laser Induced Chemistry

Lecture 37 - Laser Induced Chemistry and Ultrafast chemical Dynamics

Lecture 38 - Lasers in Medical Sciences

Lecture 39 - Lasers in Material sciences and engineering and Optical Communications

Lecture 40 - Laser safety and summary

NPTEL : NOC:Advanced Mathematical Methods for Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Madhav Ranganathan

Lecture 1 - Vectors, Vector Operations and Linear Independence

Lecture 2 - Vector Operations, Generalization of Vectors

Lecture 3 - Vector Differentiation, Vector Transformations

Lecture 4 - Vector Integration, Line, Surface and Volume Integrals

Lecture 5 - Practice Problems

Lecture 6 - Matrix as a vector transformation, linear system

Lecture 7 - Special Matrices: Symmetric, Orthogonal, Complex

Lecture 8 - Rotational Matrices, Eigenvalues and Eigenvectors

Lecture 9 - Determinants, Matrix Inverse

Lecture 10 - Practice Problems

Lecture 11 - Step Function, Delta Function

Lecture 12 - Gamma Function, Error Function

Lecture 13 - Spherical Polar Coordinates

Lecture 14 - Cylindrical Polar Coordinates, Integrals

Lecture 15 - Recap of Module 3, Practice Problems

Lecture 16 - ODEs and PDEs, First order ODEs, system of 1st order ODEs

Lecture 17 - First order ODEs, exact integrals, integrating factors

Lecture 18 - System of first order ODEs, Linear first order ODEs

Lecture 19 - General solution of a system of linear first order ODEs with constant coefficients

Lecture 20 - Recap of Module 4, Practice problems

Lecture 21 - Homogeneous 2nd Order ODE, Basis Functions

Lecture 22 - Nonhomogeneous 2nd Order ODE

Lecture 23 - Power Series Method of Solving ODEs

Lecture 24 - Frobenius Method / Power Series Method

Lecture 25 - Time-independent Schrodinger Equation for H-atom

Lecture 26 - Maxima and Minima, Taylor Series

Lecture 27 - Taylor Series for functions of several variables

Lecture 28 - Critical Points of Functions

Lecture 29 - Lagranges Method of Undetermined Multipliers

Lecture 30 - Recap of Module 6, Practice Problems

Lecture 31 - Nonlinear Differential Equations

Lecture 32 - Phase Plane of A Pendulum

Lecture 33 - Stability of Critical Points

Lecture 34 - Population Dynamics Models

Lecture 35 - Recap of Module 7, Practice Problems

Lecture 36 - Fourier Series, Fourier Expansion of Periodic Functions

Lecture 37 - (Part A): Fourier Expansions and Differential Equations

Lecture 38 - (Part B): Fourier Expansions and Differential Equations

Lecture 39 - Orthogonal Eigenfunctions, Sturm-Liouville Theory

Lecture 40 - Recap of Module 8, Practice Problems

Lecture 41 - Fourier Transforms

Lecture 42 - Properties of Fourier Transforms

Lecture 43 - Fourier Transforms and Partial Differential Equations

Lecture 44 - Laplace Transforms

Lecture 45 - Recap of Module 9, Practice Problems

Lecture 46 - Partial Differential Equations, Boundary Conditions

Lecture 47 - Separation of Variables

Lecture 48 - (Part A): Two-dimensional Wave Equation, Bessel Functions

Lecture 49 - (Part B): Two-dimensional Wave Equation, Bessel Functions

Lecture 50 - Recap of Module 10, Practice Problems

Lecture 51 - Discrete and Continuous Random Variables

Lecture 52 - Probability Distribution Functions

Lecture 53 - Poisson Distribution, Gaussain Distribution

Lecture 54 - Error Estimates, Least Square Fit, Correlation Functions

Lecture 55 - Recap of Module 11, Practice Problems

NPTEL : NOC:Solid State Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Madhav Ranganathan

Lecture 1 - Nature of solid state and the solid state materials

Lecture 2 - Thermodynamics of solids

Lecture 3 - Crystallisation Kinetics

Lecture 4 - Synthetic Strategy

Lecture 5 - Review of week 1 and Practice problems

Lecture 6 - Unit Cells

Lecture 7 - Conventional Unit Cell and Primitive Unit Cell

Lecture 8 - Bravais Lattices

Lecture 9 - Bravais Lattices, Basis and crystal

Lecture 10 - Summery of week 2 and Practices Problems

Lecture 11 - Symmetry In Crystals, Point Symmetries

Lecture 12 - Reflections, Inversions and Rotoinversions

Lecture 13 - Schonflies and Hermann-Mauguin Conventions

Lecture 14 - Fractional Coordinates, Planer Visualization

Lecture 15 - Review of week 3 And Practice Problems

Lecture 16 - Combining symmetry operations, translational symmetries

Lecture 17 - Screw Axis

Lecture 18 - Glide Planes

Lecture 19 - Symmetry and Symmetry Notations

Lecture 20 - Summary of week 4 and Practice Problems

Lecture 21 - Crystal Systems

Lecture 22 - Crystal Systems and Unit Cells

Lecture 23 - Point Groups

Lecture 24 - Space Groups

Lecture 25 - Week 5 Summary and Practice Problems

Lecture 26 - 32 Crystal Classes Based on Symmetry

Lecture 27 - Notation for 32 Crystal Classes

Lecture 28 - Short Form of Hermann-Mauguin Notations

Lecture 29 - Hermann - Mauguin notation for Space Groups

Lecture 30 - Summary and Practice Problems

Lecture 31 - Coordination number, Voids

Lecture 32 - Lattice Imperfections and Crystals

Lecture 33 - Line Planner and Bulk defects and crystals

Lecture 34 - Thermodynamics of defects in crystals

Lecture 35 - Review of Week 7,Practice Problems

Lecture 36 - Miller Planes, Miller Indices

Lecture 37 - Miller Indices for Hexagonal Systems, Distance between Planes

Lecture 38 - X-ray diffraction, Bragg's Law, Reciprocal Lattice

Lecture 39 - Reciprocal Lattice, XRD instrumentation

Lecture 40 - Review of week 8, Practice Problems

Lecture 41 - XRD - Analysis of Pattern

Lecture 42 - Geometric Structure Factor - Missing Peaks

Lecture 43 - X-Ray Crystallography

Lecture 44 - Electron Microscopy

Lecture 45 - Review of Week 9. Practice Problems

Lecture 46 - Closed - Packed Structures and Voids

Lecture 47 - Crystal Structures of Binary Compounds

Lecture 48 - Perovskites and Spinals

Lecture 49 - Space filling Polyhedra, Alloys

Lecture 50 - Summary of Week 10 and Practice Problems

Lecture 51 - Free electron Models

Lecture 52 - Bloch Theorem

Lecture 53 - Band Theory of Solids

Lecture 54 - Bands in Higher Dimensions

Lecture 55 - Summary of Week 11 and Practice Problems

Lecture 56 - More about Band Theory, Crystal Momentum

Lecture 57 - Density of States

Lecture 58 - Metals, Insulators and Semiconductors

Lecture 59 - Band Gap and Optical Properties

Lecture 60 - Summary of Week 12 and Practice Problems

NPTEL : NOC:Bioinorganic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. S. P. Rath

Lecture 1 - General Introduction and Prospects

Lecture 2 - Metals in Biology: Nature's Selection of Elements in Life

Lecture 3 - Metals in Biology: Control, Use and Enzymatic Action

Lecture 4 - Metals in Biology: Choice of Redox Active Metal Ions

Lecture 5 - Metals in Biology: Importance of Cobalt in Coenzyme-B12

Lecture 6 - Design Principles Used in Chemical Biology: Some Noteworthy Examples!

Lecture 7 - Design Principles Used in Chemical Biology: Role of Proteins in Controlling Reactivity!

Lecture 8 - Design Principles Used in Chemical Biology: Blue-Copper Proteins

Lecture 9 - Design Principles Used in Chemical Biology: Fixation of Nitrogen from Air

Lecture 10 - Life with Oxygen: Molecular and Chemical Properties of O2

Lecture 11 - Life with Oxygen: Cytochrome c oxidase

Lecture 12 - Life with Oxygen: Superoxide Dismutase Activity

Lecture 13 - Life with Oxygen: Catalase and Peroxidase Activities

Lecture 14 - Life with Oxygen: Oxygenase Activity

Lecture 15 - Life with Oxygen: O2-Carrying Proteins Hemocyanin and Hemerythrin

Lecture 16 - Life with Oxygen: O2-Carrying Proteins Hemoglobin and Myoglobin

Lecture 17 - Life with Oxygen: Reversible O2-binding and Transport

Lecture 18 - Life with Oxygen: Heme Oxygenase Activity

Lecture 19 - Metals in Medicine: Introduction to Medicinal Inorganic Chemistry

Lecture 20 - Metals in Medicine: Platinum-based Anti-Cancer Drugs

NPTEL : NOC:Chemistry and Physics of Surfaces and Interfaces (Chemistry and Biochemistry)

Co-ordinators : Prof. Thiruvancheril G. Gopakumar

Lecture 1 - Intro-Chemistry and Physics of Surfaces and Interfaces

Lecture 2 - Historic perspective to surface science

Lecture 3 - Creating surfaces from bulk lattices

Lecture 4 - Reconstruction of surfaces

Lecture 5 - Hexagonal lattice and miller bravais indices

Lecture 6 - Introduction to ultra-high Vaccum and Preparation of Clean Surfaces

Lecture 7 - Adsorption and the Energetic of Adsorption

Lecture 8 - Nomenclature and types of Adlayers

Lecture 9 - Thermal Desorption Spectroscopy

Lecture 10 - Different types of Preparation methods for Thin Films

Lecture 11 - Examples of PVD and CVD

Lecture 12 - Moire Pattern at Solid-Solid Interface

Lecture 13 - Growth Modes of Adlayers

Lecture 14 - Energies that Control the Growth of Adlayers

Lecture 15 - Kinetic and Thermodynamic Control in Adlayer Growth

Lecture 16 - Molecular Adsorbates: Preparation

Lecture 17 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - I

Lecture 18 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - II

Lecture 19 - Molecular Adsorbates: Factors Controlling Molecular Adlayer Formation - III

Lecture 20 - Scanning Tunneling Microscopy

Lecture 21 - Tip-vaccum Tunneling Junction

Lecture 22 - Scanning Tunneling Spectroscopy - I

Lecture 23 - Scanning Tunneling Spectroscopy - II

Lecture 24 - Scanning Tunneling Spectroscopy: Applications - I

Lecture 25 - Scanning Tunneling Spectroscopy: Applications - II

Lecture 26 - Imaging Molecules and Atom Manipulation on Surfaces

Lecture 27 - Single Molecule Manipulation on Surfaces

Lecture 28 - Inelastic Tunneling Spectroscopy

Lecture 29 - Ultra-violet Photo-electron Spectroscopy (UPS)

Lecture 30 - Ultra-violet Photo-electron Spectroscopy (UPS): Applications

Lecture 31 - X-ray Photo-electron Spectroscopy (XPS)

Lecture 32 - X-Ray Photo-electron Spectroscopy (XPS): Applications - 1

Lecture 33 - X-Ray Photo-electron Spectroscopy (XPS): Applications - 2

Lecture 34 - 2D Molecular Materials on Surface - 1

Lecture 35 - 2D Molecular Materials on Surface - 2

Lecture 36 - Atomic Force Microscopy (AFM) - I

Lecture 37 - Atomic Force Microscopy (AFM) - II

Lecture 38 - Atomic Force Microscopy (AFM) - III

Lecture 39 - Dynamics of Atoms on Surfaces

Lecture 40 - Summary

NPTEL : NOC:Supramolecular Chemistry-I (Chemistry and Biochemistry)

Co-ordinators : Prof. Parimal Kanti Bharadwaj

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Bio-inorganic chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. D. Ray

Lecture 1 - Introduction

Lecture 2 - Iron Storage and Transport - I

Lecture 3 - Iron Storage and Transport - II

Lecture 4 - Iron Storage and Transport - III

Lecture 5 - Electron Transport Proteins - I

Lecture 6 - Electron transport Proteins - II

Lecture 7 - Electron Transport Proteins - III

Lecture 8 - Electron Transport Proteins - IV

Lecture 9 - Electron Transport Proteins - V

Lecture 10 - Electron Transport Proteins - VI

Lecture 11 - Electron Transport Proteins - VII

Lecture 12 - Electron Transport Proteins - VIII

Lecture 13 - Electron Transport Proteins - IX

Lecture 14 - Electron Transfer in Photosynthesis - I

Lecture 15 - Electron Transfer in Photosynthesis - II

Lecture 16 - Manganese Enzymes

Lecture 17 - Nickel Enzymes - I

Lecture 18 - Nickel Enzymes - II

Lecture 19 - Nickel Enzymes - III

Lecture 20 - Nickel Enzymes - IV

Lecture 21 - Nickel Enzymes - V

Lecture 22 - Molybdenum Enzymes - I

Lecture 23 - Molybdenum Enzymes - II

Lecture 24 - Molybdenum Enzymes - III

Lecture 25 - Molybdenum Enzymes - IV

Lecture 26 - Molybdenum Enzymes - V

Lecture 27 - Molybdenum Enzymes - VI

Lecture 28 - Molybdenum and Tungsten in Biology

Lecture 29 - Tungsten Enzymes - I

Lecture 30 - Tungsten Enzymes - II

Lecture 31 - Tungsten Enzymes - III

Lecture 32 - Tungsten Enzymes - IV

Lecture 33 - Vanadium Enzymes - I

Lecture 34 - Vanadium Enzymes - II

Lecture 35 - Vanadium Enzymes - III

Lecture 36 - Vanadium Enzymes - IV

Lecture 37 - Non-metals in Biology - I

Lecture 38 - Non-metals in Biology - II

Lecture 39 - Non-metals in Biology - III

Lecture 40 - Non-metals in Biology - IV

NPTEL : Co-ordination Chemistry (Chemistry of Transition Elements) (Chemistry and Biochemistry)

Co-ordinators : Prof. D. Ray

Lecture 1 - Introduction

Lecture 2 - Definition

Lecture 3 - Classification of Ligands - I

Lecture 4 - Classification of Ligands - II

Lecture 5 - Ligands - III and Nomenclature - I

Lecture 6 - Nomenclature - II

Lecture 7 - Coordination Number - I

Lecture 8 - Coordination Number - II

Lecture 9 - Coordination Number - III

Lecture 10 - Coordination Number - IV

Lecture 11 - Isomerism - I

Lecture 12 - Isomerism - II

Lecture 13 - Coordination Equilibria - I

Lecture 14 - Coordination Equilibria - II

Lecture 15 - Bonding in Complexes - I

Lecture 16 - Bonding in Complexes - II

Lecture 17 - Bonding in Complexes - III

Lecture 18 - Bonding in Complexes - IV

Lecture 19 - Jahn-Teller Effect

Lecture 20 - Spin Crossover and Colour

Lecture 21 - Optical Spectra

Lecture 22 - d-d Transitions

Lecture 23 - Charge Transfer

Lecture 24 - Orgel Diagram

Lecture 25 - Tanabe Sugano Diagram

Lecture 26 - MLCT Transitions

Lecture 27 - Application of CFT

Lecture 28 - Spinels

Lecture 29 - Magnetochemistry

Lecture 30 - Magnetic Properties

Lecture 31 - Magnetic Measurements

Lecture 32 - Ligand Field Theory

Lecture 33 - Sigma Orbitals

Lecture 34 - Pi Orbitals

Lecture 35 - Reaction Mechanism - I

Lecture 36 - Reaction Mechanism - II

Lecture 37 - Reaction Mechanism - III

Lecture 38 - Reaction Mechanism - IV

Lecture 39 - Reaction Mechanism - V

Lecture 40 - Biological Inorganic Chemistry

NPTEL : Heterocyclic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. D.R. Mal

Lecture 1 - Definition and Scope

Lecture 2 - Single - Step Methods for IVPs

Lecture 3 - Systematic Nomenclature

Lecture 4 - Nomenclature (Continued...) and Important Names

Lecture 5 - Overview of Structure Determination in Heterocyclic Chemistry

Lecture 6 - 15N NMR in Heterocyclic Chemistry

Lecture 7 - Effects of Ring Nitrogen - A

Lecture 8 - Effects of Ring Nitrogen - B

Lecture 9 - Effects of Ring Nitrogen - C

Lecture 10 - Oxidation in Heterocyclic Chemistry

Lecture 11 - Oxidation in Heterocyclic Chemistry (Continued...)

Lecture 12 - Reduction in Heterocyclic Chemistry

Lecture 13 - Radicals in Heterocylic Chemistry - I

Lecture 14 - Radicals in Heterocylic Chemistry - II

Lecture 15 - Lithiation for 5-membered heterocycles

Lecture 16 - Lithiation for 5-membered heterocycles (Continued...)

Lecture 17 - Lithiation of 6-membered heterocycle and non-aromatic heterocycles

Lecture 18 - Magnetiation and Zincation in Heterocyclic Chemistry

Lecture 19 - Transition metal catalyzed cross coupling

Lecture 20 - Transition metal catalyzed cross coupling (Continued...)

Lecture 21 - Dehydrogenative (Oxidative) cross coupling

Lecture 22 - Tert-amino effect in heterocycle synthesis

Lecture 23 - [4 plus 2] cycloaddition in heterocyclic chemistry

Lecture 24 - [4 plus 2] cycloaddition in heterocyclic chemistry (Continued...)

Lecture 25 - [3 plus 2] Cycloaddition in heterocyclic chemistry

Lecture 26 - Cycloaddition : Revisited

Lecture 27 - [4 plus 3] Cycloaddition

Lecture 28 - [5 plus 2] Cycloaddition

Lecture 29 - [2 plus 2 plus 2] Cycloaddition

Lecture 30 - Pyrrole Synthesis - I

Lecture 31 - Pyrrole Synthesis - II

Lecture 32 - Indole Synthesis - I

Lecture 33 - Indole Synthesis - II

Lecture 34 - Furan Synthesis

Lecture 35 - Thiophene Synthesis

Lecture 36 - Oxazole, Imidazole and Thiazole Synthesis

Lecture 37 - Pyridine Synthesis

Lecture 38 - Synthesis of Quinolines and Isoquinolines

Lecture 39 - Bycyclic Polyheteroatomic Heterocycles

Lecture 40 - Heterocyclic Rearrangements

NPTEL : Organic Photochemistry and Pericyclic Reactions (Chemistry and Biochemistry)

Co-ordinators : Dr. N.D. Pradeep Singh

Lecture 1 - Introduction to Organic Photochemistry

Lecture 2 - Introduction to Organic Photochemistry (Continued...)

Lecture 3 - Reactivity of n-pi*

Lecture 4 - Î± - cleavage - I

Lecture 5 - Î± - cleavage - II

Lecture 6 - Î± - cleavage - III

Lecture 7 - Î² - cleavage

Lecture 8 - Intramolecular Hydrogen Abstraction - I

Lecture 9 - Intramolecular Hydrogen Abstraction - II

Lecture 10 - Intramolecular Hydrogen Abstraction - III

Lecture 11 - Intramolecular Hydrogen Abstraction

Lecture 12 - Addition to Î - System

Lecture 13 - Intramolecular Paterno-Buchi Reaction

Lecture 14 - Energy of Electron Transfer Reaction

Lecture 15 - Reactivity of Î - Î *

Lecture 16 - Addition Reaction of Î - Î *

Lecture 17 - Addition Reaction of Î - Î * (Continued...)

Lecture 18 - Di-Pi Methane Rearrangement

Lecture 19 - Photochemistry of Cyclohexanone

Lecture 20 - Singlet Oxygen Chemistry

Lecture 21 - Carbenes and Nitrenes

Lecture 22 - Remote Functionalisation

Lecture 23 - Introduction to Pericyclic Reaction

Lecture 24 - Sigmatropic Reactions - I

Lecture 25 - Sigmatropic Reactions - II

Lecture 26 - Sigmatropic Reactions - III

Lecture 27 - Cycloaddition Reactions - I

Lecture 28 - Cycloaddition Reactions - II

Lecture 29 - Cycloaddition - Diels-Alder Reactions

Lecture 30 - Cycloaddition - Diels-Alder Reactions (Continued...)

Lecture 31 - Cycloaddition - Ene Reactions

Lecture 32 - 1,3 Dipolar Cycloaddition - I

Lecture 33 - 1,3 Dipolar Cycloaddition - II

Lecture 34 - Electrocyclic Reaction - I

Lecture 35 - Electrocyclic Reaction - II

Lecture 36 - Practice Problems in Pericyclic Reaction - I

Lecture 37 - Practice Problems in Pericyclic Reaction - II

Lecture 38 - Practice Problems in Pericyclic Reaction - III

Lecture 39 - Chelotropic Reaction

Lecture 40 - Application of Photochemistry

NPTEL : Polymer Chemistry (Chemistry and Biochemistry)

Co-ordinators : Dr. D. Dhara

Lecture 1 - Introduction to Polymers

Lecture 2 - Introduction to Polymers (Continued...)

Lecture 3 - Introduction to Polymers (Continued...)

Lecture 4 - Step - growth Polymerization

Lecture 5 - Step - growth Polymerization (Continued...)

Lecture 6 - Step - growth Polymerization (Continued...)

Lecture 7 - Step - growth Polymerization (Continued...)

Lecture 8 - Step - growth Polymerization (Continued...)

Lecture 9 - Radical Chain Polymerization

Lecture 10 - Radical Chain Polymerization (Continued...)

Lecture 11 - Radical Chain Polymerization (Continued...)

Lecture 12 - Radical Chain Polymerization (Continued...)

Lecture 13 - Radical Chain Polymerization (Continued...)

Lecture 14 - Radical Chain Polymerization (Continued...)

Lecture 15 - Radical Chain Polymerization (Continued...)

Lecture 16 - Radical Chain Polymerization (Continued...)

Lecture 17 - Ionic Chain Polymerization

Lecture 18 - Ionic Chain Polymerization (Continued...)

Lecture 19 - Ionic Chain Polymerization (Continued...) and Chain Copolymerization

Lecture 20 - Chain Copolymerization (Continued...)

Lecture 21 - Chain Copolymerization (Continued...)

Lecture 22 - Chain Copolymerization (Continued...) and Ring Opening Polymerization

Lecture 23 - Polymer Stereochemistry and Coordination Polymerization

Lecture 24 - Polymer Stereochemistry and Coordination Polymerization (Continued...)

Lecture 25 - Polymer Solutions

Lecture 26 - Polymer Solutions (Continued...)

Lecture 27 - Polymer Solutions (Continued...)

Lecture 28 - Polymer Solutions (Continued...) and Chain Dimensions

Lecture 29 - Chain Dimensions (Continued...) and Frictional Properties of Solution

Lecture 30 - Frictional Properties of Solutions (Continued...) and Determination of Molecular Weight

Lecture 31 - Determination of Molecular Weight of Polymers (Continued...)

Lecture 32 - Determination of Molecular Weight of Polymers (Continued...)

Lecture 33 - Determination of Molecular Weight of Polymers (Continued...)

Lecture 34 - Structural Analysis of Polymers by Spectroscopic Methods

Lecture 35 - Amorphous and Crystalline State : Tg and Tm

Lecture 36 - Amorphous and Crystalline State : Tg and Tm (Continued...)

Lecture 37 - Polymer Properties and Evaluation : Mechanical Properties

Lecture 38 - Polymer Properties and Evaluation : Mechanical Properties (Continued...) and Other Properties

Lecture 39 - Other Properties (Continued...) and Polymer Additives

Lecture 40 - Polymer Additives (Continued...)

Lecture 41 - Polymer Additives (Continued...), Blends, Concluding Remarks

NPTEL : Rate processes (Chemistry and Biochemistry)

Co-ordinators : Dr. M. Halder

Lecture 1 - Rate Processes

Lecture 2 - Reaction Rates and Rate Laws

Lecture 3 - Effect of Temperature on Reaction Rate

Lecture 4 - Effect of Temperature on Reaction Rate (Continued...)

Lecture 5 - Complex Reaction

Lecture 6 - Complex Reaction (Continued...)

Lecture 7 - Complex Reaction (Continued...)

Lecture 8 - Complex Reaction (Continued...)

Lecture 9 - Theories of Reaction Rate

Lecture 10 - Theories of Reaction Rate (Continued...)

Lecture 11 - Theories of Reaction Rate (Continued...)

Lecture 12 - Theories of Reaction Rate (Continued...)

Lecture 13 - Theories of Reaction Rate (Continued...)

Lecture 14 - Kinetics of Some Specific Reactions

Lecture 15 - Kinetics of Some Specific Reactions (Continued...)

Lecture 16 - Enzyme Inhibition

Lecture 17 - Oscillatory Reactions

Lecture 18 - Acid Base Catalysis

Lecture 19 - Acid Base Catalysis (Continued...)

Lecture 20 - Kinetic Isotope Effects

Lecture 21 - Fast Reactions

Lecture 22 - Fast Reactions (Continued...)

Lecture 23 - Magneto Kinetics

Lecture 24 - Reactions in Solutions

Lecture 25 - Reactions in Solutions (Continued...)

Lecture 26 - Kinetics at Electrodes

Lecture 27 - Kinetics at Electrodes (Continued...)

Lecture 28 - Ultrafast Process

Lecture 29 - Ultrafast Process (Continued...)

Lecture 30 - Ultrafast Process (Continued...)

Lecture 31 - Reaction Dynamics

Lecture 32 - Reaction Dynamics (Continued...)

Lecture 33 - Reaction Dynamics (Continued...)

Lecture 34 - Reaction Dynamics : Scattering

Lecture 35 - Reaction Dynamics : Scattering (Continued...)

Lecture 36 - Reaction Dynamics : Controlling Reagents etc

Lecture 37 - Reaction Dynamics : Controlling Reagents etc (Continued...)

Lecture 38 - Reaction Dynamics : Controlling Reagents etc (Continued...)

Lecture 39 - Reaction Dynamics : Concluding

Lecture 40 - Concluding Remarks

NPTEL : NOC:Biochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. S. Dasgupta

Lecture 1 - Amino Acid - I

Lecture 2 - Amino Acid - II

Lecture 3 - Protein Structure - I

Lecture 4 - Protein Structure - II

Lecture 5 - Protein Structure - III

Lecture 6 - Protein Structure - IV

Lecture 7 - Enzymes - I

Lecture 8 - Enzymes - II

Lecture 9 - Enzymes - III

Lecture 10 - Enzyme Mechanisms - I

Lecture 11 - Enzyme Mechanisms - II

Lecture 12 - Myoglobin and Hemoglobin

Lecture 13 - Lipids and Membranes - I

Lecture 14 - Lipids and Membranes - II

Lecture 15 - Membrane Transport

Lecture 16 - Nucleic Acids - I

Lecture 17 - Nucleic Acids - II

Lecture 18 - Nucleic Acids - III

Lecture 19 - Vitamins and Coenzymes - I

Lecture 20 - Vitamins and Coenzymes - II

Lecture 21 - Carbohydrates - I

Lecture 22 - Carbohydrates - II

Lecture 23 - Bioenergetics - I

Lecture 24 - Bioenergetics - II

Lecture 25 - Metabolism - I

Lecture 26 - Metabolism - II

Lecture 27 - Metabolism - III

NPTEL : NOC:Analytical Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Debashis Ray

Lecture 1 - Chemicals and Materials Analysis

Lecture 2 - Methods

Lecture 3 - Methods (Continued...)

Lecture 4 - Methods (Continued...)

Lecture 5 - Methods (Continued...)

Lecture 6 - Role of Analytical Chemistry

Lecture 7 - Techniques, Wet Ashing

Lecture 8 - Apparatus and Weighing

Lecture 9 - Filtration, Ignition

Lecture 10 - Crucibles, Filter Papers and their Uses

Lecture 11 - Chemical Equilibria

Lecture 12 - Chemical Equilibria (Continued...)

Lecture 13 - Chemical Equilibria (Continued...)

Lecture 14 - Chemical Equilibria (Continued...)

Lecture 15 - Chemical Equilibria (Continued...)

Lecture 16 - Spectrochemic Methods - I

Lecture 17 - Spectrochemic Methods - I (Continued...)

Lecture 18 - Spectrochemic Methods - I (Continued...)

Lecture 19 - Spectrochemic Methods - I (Continued...)

Lecture 20 - Spectrochemic Methods - I (Continued...)

Lecture 21 - Spectrochemical Methods - II

Lecture 22 - Spectrochemical Methods - II (Continued...)

Lecture 23 - Spectrochemical Methods - III (Continued...)

Lecture 24 - Spectrochemical Methods - IV (Continued...)

Lecture 25 - Spectrochemical Methods - V (Continued...)

Lecture 26 - Spectrochemical Methods - III

Lecture 27 - Spectrochemical Methods - III (Continued...)

Lecture 28 - Spectrochemical Methods - III (Continued...)

Lecture 29 - Spectrochemical Methods - III (Continued...)

Lecture 30 - Spectrochemical Methods - III (Continued...)

Lecture 31 - Thermal Methods of Analysis - I

Lecture 32 - Thermal Methods of Analysis - I (Continued...)

Lecture 33 - Thermal Methods of Analysis - I (Continued...)

Lecture 34 - Thermal Methods of Analysis - I (Continued...)

Lecture 35 - Thermal Methods of Analysis - I (Continued...)

Lecture 36 - Thermal Methods of Analysis - II

Lecture 37 - Thermal Methods of Analysis - II (Continued...)

Lecture 38 - Thermal Methods of Analysis - II (Continued...)

Lecture 39 - Thermal Methods of Analysis - II (Continued...)

Lecture 40 - Thermal Methods of Analysis - II (Continued...)

Lecture 41 - Electrochemical Methods - I

Lecture 42 - Electrochemical Methods - I (Continued...)

Lecture 43 - Electrochemical Methods - I (Continued...)

Lecture 44 - Electrochemical Methods - I (Continued...)

Lecture 45 - Electrochemical Methods - I (Continued...):

Lecture 46 - Electrochemical Methods - II

Lecture 47 - Electrochemical Methods - II (Continued...)

Lecture 48 - Electrochemical Methods - II (Continued...)

Lecture 49 - Electrochemical Methods - II (Continued...)

Lecture 50 - Electrochemical Methods - II (Continued...)

Lecture 51 - Electrochemical Methods - III

Lecture 52 - Electrochemical Methods - III (Continued...)

Lecture 53 - Electrochemical Methods - III (Continued...)

Lecture 54 - Electrochemical Methods - III (Continued...)

Lecture 55 - Electrochemical Methods - III (Continued...)

Lecture 56 - Applications

Lecture 57 - Applications (Continued...)

Lecture 58 - Applications (Continued...)

Lecture 59 - Applications (Continued...)

Lecture 60 - Applications (Continued...)

NPTEL : NOC:Co-ordination Chemistry (Chemistry of Transition Elements) (Chemistry and Biochemistry)

Co-ordinators : Prof. Debashis Ray

Lecture 1 - Introduction

Lecture 2 - Definition

Lecture 3 - Classification of Ligands - I

Lecture 4 - Classification of Ligands - II

Lecture 5 - Ligands- III and Nomenclature - I

Lecture 6 - Nomenclature - II

Lecture 7 - Coordination Number - I

Lecture 8 - Coordination Number - II

Lecture 9 - Coordination Number - III

Lecture 10 - Coordination Number - IV

Lecture 11 - Isomerism - I

Lecture 12 - Isomerism - II

Lecture 13 - Co-ordination Equilibria - I

Lecture 14 - Co-ordination Equilibria - II

Lecture 15 - Bonding in Complexes - I

Lecture 16 - Bonding in Complexes - II

Lecture 17 - Bonding in Complexes - III

Lecture 18 - Bonding in Complexes - IV

Lecture 19 - Jahn - Teller Effect

Lecture 20 - Spin Crossover and Colour

Lecture 21 - Optical Spectra

Lecture 22 - d-d Transitions

Lecture 23 - Charge Transfer

Lecture 24 - Orgel Diagram

Lecture 25 - Tanabe Sugano Diagram

Lecture 26 - MLCT Transitions

Lecture 27 - Application of CFT

Lecture 28 - Spinels

Lecture 29 - Magnetochemistry

Lecture 30 - Magnetic Properties

Lecture 31 - Magnetic Measurements

Lecture 32 - Ligand Field Theory

Lecture 33 - Sigma Orbitals

Lecture 34 - Pi Orbitals

Lecture 35 - Reaction Mechanism - I

Lecture 36 - Reaction Mechanism - II

Lecture 37 - Reaction Mechanism - III

Lecture 38 - Reaction Mechanism - IV

Lecture 39 - Reaction Mechanism - V

Lecture 40 - Biological Inorganic Chemistry

NPTEL : NOC:Stereochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. A. Basak

Lecture 1 - Constitution and Configuration

Lecture 2 - Chirality, Symmetry Elements

Lecture 3 - Project Ion Formulae Rules for Drawing

Lecture 4 - Project Ion Formulae Rules for Drawing

Lecture 5 - Newmann Projection, Saw Horse Projection, Wedge Formula

Lecture 6 - Chirotopicity and Stereogenicity

Lecture 7 - Absolute Configuration

Lecture 8 - Absolute Configuration (Continued...)

Lecture 9 - Problems on the above topics

Lecture 10 - Topicity

Lecture 11 - Axial Chirality in Allenes, Biphenyls

Lecture 12 - Relative Configuration, Prochiral Faces and Prochiral Centres

Lecture 13 - Chirality in Heteroatom Systems

Lecture 14 - Conformations and Conformers

Lecture 15 - Conformational Analysis of Acyclic Molecules

Lecture 16 - Conformational Analysis of Acyclic Molecules (Continued...)

Lecture 17 - Conformations of Acyclic Molecues Containing Heteroatoms

Lecture 18 - Conformations of Cyclic Systems

Lecture 19 - Conformations of Cyclic Systems (Continued...)

Lecture 20 - Conformation of Cyclobutane and Cyclopentane

Lecture 21 - Conformation of Cyclohexane

Lecture 22 - Energy Changes During Flipping

Lecture 23 - Energy Comparison between Chair and Boat Conformations

Lecture 24 - Conformational Analysis of Substituted Cyclohexanes

Lecture 25 - Conformational Analysis of Substituted Cyclohexanes (Continued...)

Lecture 26 - Conformational Analysis of Substituted Cyclohexanes (Continued...)

Lecture 27 - Conformational Analysis of Substituted Cyclohexanes (Continued...)

Lecture 28 - Conformational Analysis of Systems with Preference for Axial Groups

Lecture 29 - Conformation and Reactivity

Lecture 30 - Conformation and Reactivity (Continued...)

Lecture 31 - Conformation and Reactivity (Continued...)

Lecture 32 - Stereoelectronic Effects

Lecture 33 - Stereoelectronic Effects (Continued...)

Lecture 34 - Substitution and Elimination in Cyclohexane Systems

Lecture 35 - Stereospecific and Stereoselective Reactions and Asymmetric Synthesis (Elementary Idea)

Lecture 36 - Asymmetric Induction: Nucleophilic Addition to Chiral Carbonyl Compounds

Lecture 37 - Asymmetric Induction: Nucleophilic Addition to Chiral Carbonyl Compounds (Continued...)

Lecture 38 - Asymmetric Induction (Continued...)

Lecture 39 - Facial Selectivity and Examples of Asymmetric Synthesis

Lecture 40 - Revisiting the Contents Covered

NPTEL : NOC:A Study Guide in Organic Retrosynthesis - Problem Solving Approach (Chemistry and Biochemistry)

Co-ordinators : Prof. Samik Nanda

Lecture 1 - Introductory Remarks

Lecture 2 - Introductory remarks (Continued...)

Lecture 3 - Introductory remarks and some rapid fire quiz

Lecture 4 - Retro Quiz based on simple Transformation

Lecture 5 - Transformation based strategy for a given target

Lecture 6 - Tf/Fg/SM based strategy and its exploratioin

Lecture 7 - Tf/SM/Fg based approaches to solve some basic problems

Lecture 8 - Tf/SM/Fg based strategy and its exploration

Lecture 9 - Tf/SM/Fg based strategy and its exploration for some simple target molecules

Lecture 10 - Tf/SM/Fg based strategy and its exploration

Lecture 11 - Tf/SM/Fg based strategies and its exploration

Lecture 12 - Tf/Fg/SM based strategies and its exploration

Lecture 13 - Tf/Fg/SM based approaches and its exploration

Lecture 14 - Tf/Fg/SM based strategies and its exploration

Lecture 15 - Multiple Tf based strategy for small molecule disconnection

Lecture 16 - Multiple Tf based strategies

Lecture 17 - Specific Tf such as Barton's nitrile ester photolysis

Lecture 18 - Specific transformation

Lecture 19 - Selective transformations

Lecture 20 - Functional Group (Fg) based strategies

Lecture 21 - Functional group based strategy

Lecture 22 - Fg based strategy

Lecture 23 - Fg based strategy

Lecture 24 - Fg based strategy based on protecting groups

Lecture 25 - Fg based strategy

Lecture 26 - Protecting group based strategic disconnection

Lecture 27 - Fg group based strategy

Lecture 28 - Fg based strategy

Lecture 29 - Fg based strategies

Lecture 30 - Fg based strategy

Lecture 31 - Fg based strategy

Lecture 32 - Fg based strategy

Lecture 33 - Starting material (SM) based strategy

Lecture 34 - Fg/Tf/SM based strategies

Lecture 35 - Fg/Tf/SM based strategies

Lecture 36 - Fg/Tf/SM based strategies

Lecture 37 - Fg based strategies

Lecture 38 - Fg based strategies in combination with SM and Tf

Lecture 39 - Fg/SM/Tf based combined strategies

Lecture 40 - Fg/SM/Tf based combined strategies

Lecture 41 - Fg based strategies

Lecture 42 - Fg based strategies

Lecture 43 - Symmetry based strategy

Lecture 44 - Symmetry based strategies

Lecture 45 - Symmetry based strategies

Lecture 46 - Symmetry based strategy

Lecture 47 - Symmetry based strategies

Lecture 48 - Symmetry based strategies

Lecture 49 - Topological based strategies

Lecture 50 - Topological strategies

Lecture 51 - Topological strategies

Lecture 52 - Stereochemical strategies

Lecture 53 - Stereochemical strategies

Lecture 54 - Stereochemical strategies

Lecture 55 - Stereochemical Strategies

Lecture 56 - Stereochemical strategies

Lecture 57 - Stereochemical strategies

Lecture 58 - Stereochemical strategies

Lecture 59 - Synthon concept revisited

Lecture 60 - Concluding remarks

NPTEL : NOC:Introduction to Molecular Thermodynamics (Chemistry and Biochemistry)

Co-ordinators : Prof. Srabani Taraphder

Lecture 1 - Review of Classical Thermodynamics - Part I

Lecture 2 - Review of Classical Thermodynamics - Part II

Lecture 3 - Thermodynamic potentials - Part 1

Lecture 4 - Thermodynamic potentials - Part 2

Lecture 5 - Microstates of a system

Lecture 6 - Microstates of a System (Continued...)

Lecture 7 - Microstates of a system (Continued...)

Lecture 8 - Microstates of a system (Continued...)

Lecture 9 - Microstates of a system

Lecture 10 - Microstates of a system

Lecture 11 - Microstates of a system (Continued...)

Lecture 12 - Microstates of a system (Continued...)

Lecture 13 - Microstates of a System (Continued...)

Lecture 14 - Fundamentals of Statistical Mechanics

Lecture 15 - Statistical Ensembles

Lecture 16 - Microstates of a system

Lecture 17 - Canonical ensemble - Part I

Lecture 18 - Canonical Ensemble - Part I (Continued...)

Lecture 19 - Canonical Ensemble - Part II

Lecture 20 - Canonical Ensemble - Part III

Lecture 21 - Ideal gas

Lecture 22 - Ideal gases (Continued...)

Lecture 23 - Ideal gases (Continued...)

Lecture 24 - Ideal gases (Continued...)

Lecture 25 - Statistical thermodynamics of ideal gases (Continued...)

Lecture 26 - Statistical Thermodynamics of ideal gases (Continued...)

Lecture 27 - Statistical thermodynamics of ideal gases (Continued...)

Lecture 28 - Statistical thermodynamics of ideal gases (Continued...)

Lecture 29 - Statistical thermodynamics of ideal gases (Continued...)

Lecture 30 - Statistical thermodynamics of diatomic ideal gases

Lecture 31 - Statistical thermodynamics of ideal gas

Lecture 32 - Chemical reaction equilibrium

Lecture 33 - Specific heat of solids

Lecture 34 - Application of Molecular Thermodynamics

Lecture 35 - Introduction to classical statistical mechanics

Lecture 36 - Introduction to classical statistical mechanics (Continued...)

Lecture 37 - Classical Statistical Mechanics

Lecture 38 - Classical Statistical Mechanics

Lecture 39 - Classical Statistical Mechanics

Lecture 40 - Rate of Chemical Reaction

NPTEL : NOC:Molecules in Motion (Chemistry and Biochemistry)

Co-ordinators : Prof. Amita Pathak Mahanty

Lecture 1 - Kinetic theory of gases

Lecture 2 - Kinetic theory of gases (Continued...)

Lecture 3 - Kinetic theory of gases (Continued...)

Lecture 4 - Kinetic theory of gases (Continued...)

Lecture 5 - Kinetic theory of gases (Continued...)

Lecture 6 - Kinetic theory of gases (Continued...)

Lecture 7 - Kinetic theory of gases (Continued...)

Lecture 8 - Kinetic theory of gases (Continued...)

Lecture 9 - Kinetic theory of gases (Continued...)

Lecture 10 - Kinetic theory of gases (Continued...)

Lecture 11 - Transport properties

Lecture 12 - Transport properties (Continued...)

Lecture 13 - Transport properties of gases

Lecture 14 - Molecular motion in Liquids

Lecture 15 - Molecular motion in Liquids (Continued...)

Lecture 16 - Molecular motion in Liquids (Continued...)

Lecture 17 - Molecular motion in Liquids (Continued...)

Lecture 18 - Molecular motion in Liquids (Continued...)

Lecture 19 - Molecular motion in Liquids (Continued...)

Lecture 20 - Molecular motion in Liquids (Continued...)

Lecture 21 - Molecular motion in Liquids (Continued...)

Lecture 22 - Molecular motion in Liquids (Continued...)

Lecture 23 - Molecular motion in Liquids (Continued...)

Lecture 24 - Molecular motion in Liquids (Continued...)

Lecture 25 - Molecular motion in Liquids (Continued...)

Lecture 26 - Molecular motion in Liquids (Continued...)

Lecture 27 - Molecular motion in Liquids (Continued...)

Lecture 28 - Molecular motion in Liquids (Continued...)

Lecture 29 - Molecular motion in Liquids (Continued...)

Lecture 30 - Molecular motion in Liquids (Continued...)

Lecture 31 - Molecular motion in Liquids (Continued...)

Lecture 32 - Molecular motion in Liquids (Continued...)

Lecture 33 - Molecular motion in Liquids (Continued...)

Lecture 34 - Molecular motion in Liquids (Continued...)

Lecture 35 - Molecular motion in Liquids (Continued...)

Lecture 36 - Molecular motion in Liquids (Continued...)

Lecture 37 - Molecular motion in Liquids (Continued...)

Lecture 38 - Molecular motion in gases

Lecture 39 - Molecular motion in gases

Lecture 40 - Molecular motion in gases

NPTEL : NOC:Experimental Biochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Soumya De, Prof. Swagata Dasgupta

Lecture 1 - Introduction

Lecture 2 - Buffers

Lecture 3 - Introduction to Biochemistry Laboratory Equipments and Safety Measures

Lecture 4 - Practical Aspects of Making Buffer

Lecture 5 - Making Tris Buffer (pH=8.2)

Lecture 6 - Making Phosphate Buffer (100mM)

Lecture 7 - Amino Acids and Their Properties

Lecture 8 - Amino Acid Titrations

Lecture 9 - pI Determination of Glycine

Lecture 10 - pI Determination of Lysine

Lecture 11 - Summary

Lecture 12 - UV and Visible Spectroscopy

Lecture 13 - Fluorescence Spectroscopy

Lecture 14 - UV/Visible Spectra of Amino Acids and Proteins

Lecture 15 - Fluorescence Spectra of Amino Acids and proteins

Lecture 16 - Spectroscopic Techniques Summary

Lecture 17 - Protein Folding and Denaturation - I

Lecture 18 - Protein Folding and Denaturation - II

Lecture 19 - Urea denaturation of HSA studied by UV/Vis absorbance

Lecture 20 - Temperature denaturation of HSA studied by UV/Vis absorbance

Lecture 21 - Denaturation of HSA by GdnHCl studied by Trp fluorescence

Lecture 22 - Protein Folding and Denaturation Summary

Lecture 23 - Chromatographic Techniques - I

Lecture 24 - Chromatographic Techniques - II

Lecture 25 - Protein Purification by Size Exclusion Chromatography (SEC)

Lecture 26 - Protein Purification by Affinity Chromatography

Lecture 27 - Gel Electrophoresis of DNA and Proteins - Part I

Lecture 28 - Gel Electrophoresis of DNA and Proteins - Part II

Lecture 29 - Gel Electrophoresis of DNA and Proteins - Part II

Lecture 30 - Isolation and Characterization of Proteins Part - I

Lecture 31 - Isolation and Characterization of Proteins Part - II

Lecture 32 - Isolation and Purification of Proteins

Lecture 33 - Quality and Quantity of the Isolated Protein

Lecture 34 - Enzyme Kinetics - I

Lecture 35 - Enzyme Kinetics - II

Lecture 36 - Enzyme Kinetics (by using enzyme from apple juice)

Lecture 37 - Enzyme Kinetics (by using enzyme from apple juice) (Continued...)

Lecture 38 - Isolation and Characterization of DNA Part - I

Lecture 39 - Isolation and Characterization of DNA Part - II

Lecture 40 - Bacterial Culture for Plasmid DNA Isolation

Lecture 41 - Isolation of Plasmid DNA

Lecture 42 - Isolation and Characterization of DNA Summary

Lecture 43 - Basics of rDNA Technology Part - I

Lecture 44 - Basics of rDNA Technology Part - II

Lecture 45 - Cloning : Polymerase Chain Reaction, Restriction Enzyme Digestion and Ligation

Lecture 46 - DNA Transformation

Lecture 47 - Protein-Ligand Interaction

Lecture 48 - Protein-Ligand Interaction (Continued...)

Lecture 49 - Interaction study of HSA protein with Curcumin and Gallic acid using UV-Vis spectroscopy

Lecture 50 - Interaction study of HSA protein with Circumin and Gallic acid using UV-Vis spectroscopy (Continued...)

Lecture 51 - Analysis of the Structure of Protein ligand complex

Lecture 52 - Immunoassay Techniques

Lecture 53 - Western Blotting Technique

NPTEL : NOC:Industrial Inorganic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Debashis Ray

Lecture 1 - Introduction

Lecture 2 - Importance of chemical industry, chemicals from materials

Lecture 3 - Bulk and commodity chemicals

Lecture 4 - Fine and speciality chemicals

Lecture 5 - Water

Lecture 6 - Hydrogen

Lecture 7 - Inorganic peroxide compounds

Lecture 8 - Nitrogen compounds

Lecture 9 - Chloramine and Hydroxylamine

Lecture 10 - Nitric acid, Ostwald process and uses

Lecture 11 - Phosphorus and its components

Lecture 12 - Phosphoric acid salts

Lecture 13 - Tetrapotassium diphosphate preparation

Lecture 14 - Hydroxy apatite

Lecture 15 - P4S10 and phosphide preparation

Lecture 16 - Sulfur and copper (1) phosphide

Lecture 17 - Sulfur compounds and sulfur from H2S and SO2

Lecture 18 - Sulfuric acid, catalyst and S2Cl2, applications

Lecture 19 - Sulfur dichloride, thionyl chloride

Lecture 20 - Thiosulfates and dithionite

Lecture 21 - Sodium hydroxyl methanesulfinate and hydrogen sulfide

Lecture 22 - Halogen and halogen compounds

Lecture 23 - Fluorine and inorganic fluorides

Lecture 24 - Hydrogen fluoride and aluminum fluoride

Lecture 25 - Cryolite and other industrially important fluoride salts

Lecture 26 - Electrochemical fluorination, sulfonyl fluorides

Lecture 27 - Chloralkali electrolysis

Lecture 28 - Ion conduction membrane in electrolysis

Lecture 29 - Hydrochloric acid manufacture

Lecture 30 - Bromine and bromine compounds

Lecture 31 - Hydrogen bromide and alkali bromates

Lecture 32 - Iodine and iodine compounds

Lecture 33 - Mineral fertilizers

Lecture 34 - Nitrogen fertilizer and Urea

Lecture 35 - Potassium fertilizer

Lecture 36 - Metals and their compounds: Lithium

Lecture 37 - Sodium and its compounds

Lecture 38 - Potassium and its compounds

Lecture 39 - Magnesium and its compounds

Lecture 40 - Calcium and its compounds

Lecture 41 - Barium and its compounds

Lecture 42 - Chromium and its compounds

Lecture 43 - Manganese and its industrially important compounds

Lecture 44 - Silicon and its compounds

Lecture 45 - Organosilicon compounds, organoalkoxysilanes

Lecture 46 - Organomercapto silanes and silicones

Lecture 47 - Silicone rubber

Lecture 48 - Inorganic solids: glass

Lecture 49 - Zeolites

Lecture 50 - Inorganic Fibres: asbestos, textile glass and optical fibres

Lecture 51 - Glass fibre production and construction materials

Lecture 52 - Ceramics and its manufacturing processes

Lecture 53 - Specialty ceramic products

Lecture 54 - Ferrites and porcelain enamel

Lecture 55 - Layers of enamelling

Lecture 56 - Carbon modifications: Glassy carbon, foamed carbon, carbon black

Lecture 57 - Activated carbon

Lecture 58 - Metallic hard materials: Carbides, borides, silicides

Lecture 59 - Fillers and inorganic pigments

Lecture 60 - Oxide pigments, luminescent pigments, corrosion protection pigments, magnetic pigments

NPTEL : NOC:Reactive Intermediates Carbene and Nitrene (Chemistry and Biochemistry)

Co-ordinators : Prof. Rajarshi Samanta

Lecture 1 - Introduction

Lecture 2 - Structure and Geometry of Carbenes

Lecture 3 - Structure and Geometry of Carbenes (Continued...)

Lecture 4 - Generation of Carbene

Lecture 5 - Generation of Carbene (Continued...)

Lecture 6 - Generation of Carbene (Continued...)

Lecture 7 - Reaction of Carbene

Lecture 8 - Reaction of Carbene (Continued...)

Lecture 9 - Reaction of Carbene (Continued...)

Lecture 10 - Reaction of Carbene (Continued...)

Lecture 11 - Reaction of Carbene (Continued...)

Lecture 12 - Reaction of Carbene (Continued...)

Lecture 13 - Reaction of Carbene (Continued...)

Lecture 14 - Reaction of Carbene (Continued...)

Lecture 15 - Reaction of Carbene (Continued...)

Lecture 16 - Nitrene

Lecture 17 - Nitrene (Continued...)

Lecture 18 - Reaction of Nitrene

Lecture 19 - Reaction of Nitrene (Continued...)

Lecture 20 - Reaction of Nitrene (Continued...)

NPTEL : NOC:Organic Chemistry in Biology and Drug Development (Chemistry and Biochemistry)

Co-ordinators : Prof. A. Basak

Lecture 1 - A brief introduction to Molecules of Life: Structure of Amino acids and their various charged forms

Lecture 2 - Biological Macromolecules and Small molecules: Importance and functions

Lecture 3 - Amino Acids: The building block of proteins

Lecture 4 - Amino acids: separation and detection, Electrophoresis and Ninhydrin reaction

Lecture 5 - Method of determination of Amino acid sequence: primary structure of polypeptide/protein

Lecture 6 - Selective peptide bond cleavage: Enzymatic and Non-enzymatic methods

Lecture 7 - Peptide synthesis: Protecting groups for amine and carboxyl functionality

Lecture 8 - Peptide synthesis (Continued...) Protection, coupling and deprotection method

Lecture 9 - Recent development of coupling agents; Merrifieldâ€™s method of solid phase peptide synthesis

Lecture 10 - Hierarchial structure of proteins: Secondary, tertiary and quaternary structure

Lecture 11 - Ramachandran plot and protein purification techniques

Lecture 12 - Protein purification techniques (Continued...)

Lecture 13 - Introduction to Enzymes and its kinetics

Lecture 14 - Enzyme catalysed reactions and introduction to catalytic activity of proteases

Lecture 15 - Enzyme Kinetics (Continued...)

Lecture 16 - Concept of Enzyme Inhibition

Lecture 17 - Concept of Enzyme Inhibition (Continued...)

Lecture 18 - Problems on Enzyme Kinetics and Enzyme Inhibition

Lecture 19 - Synthetic Biology

Lecture 20 - Synthetic Biology (Continued...)

Lecture 21 - Synthetic Biology (Continued...)

Lecture 22 - Nucleic Acid

Lecture 23 - Nucleic Acid (Continued...)

Lecture 24 - DNA sequencing method

Lecture 25 - DNA sequencing method (Continued...)

Lecture 26 - DNA sequencing method (Continued...)

Lecture 27 - Synthesis of oligonucleotide

Lecture 28 - Central dogma: DNA replication, transcription and translation

Lecture 29 - Central dogma: DNA replication, transcription and translation (Continued...)

Lecture 30 - Central dogma: DNA replication, transcription and translation (Continued...)

Lecture 31 - Central dogma: DNA replication, transcription and translation (Continued...)

Lecture 32 - Central dogma: DNA replication, transcription and translation (Continued...)

Lecture 33 - Molecular Biology

Lecture 34 - Molecular Biology (Continued...)

Lecture 35 - Chemistry of cofactors/coenzymes

Lecture 36 - Chemistry of cofactors/coenzymes (Continued...)

Lecture 37 - Chemistry of cofactors/coenzymes (Continued...)

Lecture 38 - Chemistry of cofactors/coenzymes (Continued...)

Lecture 39 - Chemistry of cofactors/coenzymes (Continued...)

Lecture 40 - Chemistry of cofactors/coenzymes (Continued...)

Lecture 41 - Introduction to Drug Discovery Process

Lecture 42 - Fundamental Principles of Drug Development Process

Lecture 43 - Combinatorial chemistry

Lecture 44 - Neurotransmitters

Lecture 45 - Catechol amine based and GABA neurotransmitters

Lecture 46 - Hypertension: humoral mechanism and renin/angiotensin system

Lecture 47 - Inhibitor design of angiotensin converting enzyme

Lecture 48 - Antimicrobial drugs

Lecture 49 - Chemistry of penicillins

Lecture 50 - Resistance to beta-lactam antibiotics

Lecture 51 - Mechanistic studies of beta-lactamase

Lecture 52 - Non beta-lactam antibiotics

Lecture 53 - Mechanistic enzymology of Isopenicillin N synthase

Lecture 54 - Polyketide Biosynthesis

Lecture 55 - Biosynthesis of macrolide polyketides and introduction to virus

Lecture 56 - Anti-viral drugs

Lecture 57 - Cancer and Chemotherapy

Lecture 58 - Anti-cancer drugs (Continued...)

Lecture 59 - Aromatase inhibition and Anti-ulcer drugs

Lecture 60 - Cholesterol lowering agents

Lecture 61 - Cholesterol Biosynthesis

Lecture 62 - Pharmakinetics and pharmadynamics

Lecture 63 - QSAR principles

NPTEL : NOC:Introduction to Polymer Science (Chemistry and Biochemistry)

Co-ordinators : Dr. D. Dhara

Lecture 1 - Importance of Polymer Science and Brief Historical background

Lecture 2 - Definitions/Terminologies, Classifications

Lecture 3 - Classifications, Nomenclature

Lecture 4 - Classification by Polymerization Mechanism, Nomenclature

Lecture 5 - Molecular Weight, Big Picture of Polymer Science, Common Polymers

Lecture 6 - Examples of Step Polymers, Linear Step Polymerization

Lecture 7 - Linear Step Polymerization: MW Control, MW Distribution, Kinetics

Lecture 8 - Linear Step Polymerization: Kinetics (Continued...), Equilibrium Consideration, General Requirements for Achieving High MW; Non-linear Step Polymerization

Lecture 9 - Linear Step Polymerization: Summary - General Requirement, Non-Linear Step Polymerization

Lecture 10 - Types of Chain polymerization, Mechanism and Kinetics of Radical Chain Polymerization

Lecture 11 - Kinetics of Radical Chain Polymerization (Continued...), Various Types of Initiators

Lecture 12 - Thermal Initiation (Continued...), Molecular Weight and Kinetic Chain Length, Other Types of Radical Initiators, Transfer Reactions

Lecture 13 - Transfer Reactions, Effect of Temperature on Rate and MW, MW Distribution, ceiling Temperature

Lecture 14 - Energetics and Thermodynamics of Chain Polymerization, MW Distribution, Common Polymers

Lecture 15 - Thermodynamics of Chain Polymerization, MW Distribution, Common Polymers

Lecture 16 - Process Conditions, Emulsion Polymerization

Lecture 17 - Emulsion Polymerization (Continued...), Common Polymers by Radical Chain Polymerization, RDRP

Lecture 18 - Reversible - Deactivation Radical Polymerizations (RDRP)

Lecture 19 - RAFT Polymerization (Continued...), Ionic Polymerization

Lecture 20 - Polymer Stereochemistry and Zeigler - Natta Coordination Polymerization

Lecture 21 - Ring Opening Polymerization, Copolymers

Lecture 22 - Copolymerization (Continued...)

Lecture 23 - Polymers in Solution : Flory - Huggins Theory

Lecture 24 - Polymers in Solution : Application of Flory - Huggins Theory

Lecture 25 - Polymers in Solution : Solubility Parameter, Polymer Phase Separation and Fractionation

Lecture 26 - Polymers Chain Dimensions

Lecture 27 - Frictional Properties of Polymer Molecules in Dilute Solution, Determination of Polymer MW (Overview)

Lecture 28 - Membrane Osmometry, End Group Analysis, Dilute Solution Viscometry

Lecture 29 - Dilute Solution Viscometry, Light Scattering Techniques for MW

Lecture 30 - Gel Permeation Chromatography

Lecture 31 - Light Scattering Techniques for MW and Size Measurements (Continued...)

Lecture 32 - Mass Spectroscopy of Polymers

Lecture 33 - Polymer Processing

Lecture 34 - Mechanical Properties, Amorphous State

Lecture 35 - Thermal Properties: Amorphous State

Lecture 36 - Thermal Properties: Crystalline State

Lecture 37 - Thermal Properties: Factors Influencing Tm, Determination of Tg and Tm, Other Thermal Properties

Lecture 38 - Thermomechanical Properties, Viscoelasticity

Lecture 39 - Thermomechanical Properties, Viscoelasticity (Continued...)

Lecture 40 - Optical, Electrical, Barrier Properties; Chemical Resistance and Weathering of Polymers

Lecture 41 - Polymer Additives

Lecture 42 - Polymer Blends, Concluding Remarks

NPTEL : NOC:Structure, Stereochemistry and Reactivity of Organic Compounds and Intermediates: A Problem Solving Approach (Chemistry and Biochemistry)

Co-ordinators : Prof. A. Basak

Lecture 1 - Introduction to structure and stereochemistry of organic molecules: salient features of symmetry elements; Role of principal axis, sigma plane, centre of symmetry, and alternating axis of symmetry in deciding chirality

Lecture 2 - Introduction to point group notation, classification, symmetry number and order

Lecture 3 - Examples of various point group notations, chiral and achiral point groups, examples of various point groups

Lecture 4 - Solving problems on point groups (Cn, Cnv, Cnh, Dnd)

Lecture 5 - Conformational Analysis of Perhydrophenanthrene

Lecture 6 - Concept Clearing Session on Achiral Point Groups

Lecture 7 - Axial, Planar and Helical Chirality, assignment of absolute configuration to such molecules

Lecture 8 - Concept of pseudoasymmetry; Reflection variance/invariance problem; methods of nomenclature system

Lecture 9 - Conformational analysis of bicyclic systems: the Decalins

Lecture 10 - Conformational analysis of Perhydrophenanthrene

Lecture 11 - Conformational analysis of Perhydroanthracene

Lecture 12 - Revisiting conformational analysis of Perhydrophenanthrene

Lecture 13 - Revisiting conformational analysis of Perhydroanthracene

Lecture 14 - Introduction to Linear Polarized light and interaction with chiral materials; Circular Birefringence, Circular Dichroism

Lecture 15 - ORD, CD and Cotton Effect (CE); Empirical rule to determine the sign of CE, 2-axial haloketone rule

Lecture 16 - Octant rule: application to substituted cyclohexanone and decalone system

Lecture 17 - Application of Octant rule to tricyclic system; drawing of octant projection

Lecture 18 - Application of Octant rule to steroidal ketones; drawing of octant projection

Lecture 19 - Stereoelectronic effects on conformation and reactivity

Lecture 20 - Examples of anomeric effect and Stereoelectronic effect

Lecture 21 - Baldwin rules

Lecture 22 - Cyclization in enolic systems

Lecture 23 - Problem solving on Baldwin rules

Lecture 24 - Reactive Functionalities: Chemistry of Alkynes

Lecture 25 - Reactive Functionalities: Chemistry of Alkynes (Continued...), arynes and enediynes

Lecture 26 - Reactive Functionalities: Enediynes (Continued...), allenes and Ketenes

Lecture 27 - Beta - Lactam Synthesis

Lecture 28 - Chemistry of radicals

Lecture 29 - Reactivity of radicals: Frontier orbital approach.

Lecture 30 - Radical mediated C-C bond formation

Lecture 31 - Radical mediated C-C bond formation (Continued...).

Lecture 32 - Radical mediated decarboxylation and deoxygenation

Lecture 33 - Dynamic Stereochemistry: Conformationally rigid and mobile systems

Lecture 34 - Dynamic Stereochemistry: Conformational analysis of elimination and addition

Lecture 35 - Dynamic Stereochemistry: Stereoselectivity in carbonyl reduction

Lecture 36 - Dynamic Stereochemistry: Reactivity of unsaturated carbonyl and enolate systems

Lecture 37 - Dynamic Stereochemistry: Enolate as nucleophile

Lecture 38 - Dynamic Stereochemistry: stereochemical issues in cyclohexenone reduction and alpha-electrophilic substitution in carbonyls

Lecture 39 - Dynamic Stereochemistry: Asymmetric aldol reactions

Lecture 40 - Dynamic Stereochemistry: Asymmetric aldol reaction (Continued...)

NPTEL : NOC:Approximate Methods in Quantum Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Sabyashachi Mishra

Lecture 1 - Review of Quantum Chemistry

Lecture 2 - Postulates of Quantum Mechanics - I

Lecture 3 - Postulates of Quantum Mechanics - II

Lecture 4 - Exactly Solvable Models - I

Lecture 5 - Exactly Solvable Models - II

Lecture 6 - Exactly Solvable Models - II (Continued...)

Lecture 7 - Variational Principle - I

Lecture 8 - Variational Principle - II

Lecture 9 - Variational Method: Applications - I

Lecture 10 - Linear Variational Method

Lecture 11 - Applications of Linear Variational Method

Lecture 12 - Variational Method in Chemical Bonding - I

Lecture 13 - Variational Method in Chemical Bonding - II

Lecture 14 - Variational Method in Chemical Bonding - III

Lecture 15 - Molecular Orbital Treatment of Polyatomics

Lecture 16 - Molecular Orbital Treatment of Polyatomics

Lecture 17 - Perturbation Theory

Lecture 18 - Examples of Perturbation Theory - I

Lecture 19 - Examples of Perturbation Theory - II

Lecture 20 - Molecular Response to Electric Field - I

Lecture 21 - Molecular Response to Electric Field - II

Lecture 22 - Degenerate Perturbation Theory

Lecture 23 - Excited States of He Atom - I

Lecture 24 - Excited States of He Atom - II

Lecture 25 - Slater Determinants - I

Lecture 26 - Slater Determinants - II

Lecture 27 - Energy Expectation Value with Slater Determinants - I

Lecture 28 - Energy Expectation Value with Slater Determinants - II

Lecture 29 - Self-Consistent Field Method

Lecture 30 - Canonical HF Equations

Lecture 31 - Hartree-Fock Energy

Lecture 32 - Hartree-Fock-Roothan Equations

Lecture 33 - The Density Matrix

Lecture 34 - Evaluation of Molecular Properties

Lecture 35 - Basis Sets - I

Lecture 36 - Basis Sets - II

Lecture 37 - Electron Correlation and Post HF Methods

Lecture 38 - Time-Dependent Perturbation Theory - I

Lecture 39 - Time-Dependent Perturbation Theory - II

Lecture 40 - Slowly Switched Constant Perturbation

Lecture 41 - Oscillating Perturbation

Lecture 42 - Einsteinâ€™s Coefficients

NPTEL : NOC:Biological Inorganic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Debashis Ray

Lecture 1 - Metal Ions In Biological Systems

Lecture 2 - Metallobiosite structures

Lecture 3 - Biomolecular structure and molecular biology component

Lecture 4 - Structures of nucleic acids

Lecture 5 - Coordination Chemistry in action

Lecture 6 - Coordination of peptide building blocks

Lecture 7 - Occurrence and availability

Lecture 8 - Potential ligands of different types

Lecture 9 - Metal ion insertion

Lecture 10 - Organic cofactors and siderophores

Lecture 11 - Introduction

Lecture 12 - CD and Raman spectroscopy

Lecture 13 - EPR

Lecture 14 - NMR and X-ray

Lecture 15 - Electrochemical methods

Lecture 16 - Metal ion assimilation

Lecture 17 - Transport of metal ions in bacteria and plants

Lecture 18 - Transport of metal ions in fungi and mammals

Lecture 19 - Homeostasis in bacteria and plants

Lecture 20 - Homeostasis in fungi and mammals

Lecture 21 - Transport across membranes

Lecture 22 - Ion channels and ion pumps

Lecture 23 - (K+) channels

Lecture 24 - (Na+) channels

Lecture 25 - (Na+)-(K+) ATPase

Lecture 26 - (Mg2+) dependent enzymes and kinases

Lecture 27 - Phosphatases and enolases

Lecture 28 - Photoreception and enzymes

Lecture 29 - (Ca2+) transporting, binding and sensor proteins

Lecture 30 - Cell signaling by (Ca2+) binding and sensing

Lecture 31 - Functions of iron ions and iron ion proteins

Lecture 32 - Heme proteins for (O2) transport and storage

Lecture 33 - Activators of (O2) and electron transport proteins

Lecture 34 - Iron-sulfur proteins

Lecture 35 - Mononuclear and dinuclear non-heme enzymes

Lecture 36 - Oxygen transport and SOD activity

Lecture 37 - Type 1 blue copper proteins

Lecture 38 - Type 2 non-blue copper proteins

Lecture 39 - Type 3 dinuclear copper proteins

Lecture 40 - Multicopper and mixed-copper enzymes

Lecture 41 - Coordination chemistry and function of zinc ions

Lecture 42 - Carbonic anhydrase and lyases

Lecture 43 - Carboxypeptidase and metalloproteinases

Lecture 44 - Alcohol dehydrogenase and Beta-lactamase

Lecture 45 - Redox catalysis by manganese ions

Lecture 46 - Redox catalysis by manganese ions

Lecture 47 - Catalysis by manganese and cobalt ions

Lecture 48 - Cobalt ion dependent proteins and enzymes

Lecture 49 - Nickel proteins and enzymes

Lecture 50 - More nickel ion bearing enzymes

Lecture 51 - Carbon, hydrogen and oxygen

Lecture 52 - Nitrogen and Silicon

Lecture 53 - Phosphorus

Lecture 54 - Sulfur and Selenium

Lecture 55 - Chlorine and Iodine

Lecture 56 - Brain and blood-brain barrier (BBB)

Lecture 57 - Zinc and copper ions

Lecture 58 - Iron ions

Lecture 59 - Metal ion based drugs and metallotherapeutics

Lecture 60 - Chemotherapy, radiotherapy and contrast agents

NPTEL : NOC:Principles and Applications of Enolate Alkylation (Chemistry and Biochemistry)

Co-ordinators : Prof. Samik Nanda

Lecture 1 - Enolate generation, structure of enolates and related topic - I

Lecture 2 - Enolate generation, structure of enolates and related topic - II

Lecture 3 - Enolate generation, structure of enolates and related topic - III

Lecture 4 - Different mode of asymmetric induction in enolate alkylation

Lecture 5 - Revisit again, Different mode of asymmetric induction in enolate alkylation

Lecture 6 - Substrate directed stereocontrol in acyclic and cyclic system

Lecture 7 - Substrate directed enolate alkylation in bicyclic system

Lecture 8 - SeebachÃ¢'s SRS principle and related systems - I

Lecture 9 - SeebachÃ¢'s SRS principle and related systems - II

Lecture 10 - SeebachÃ¢'s SRS principle and related systems - III

Lecture 11 - Evans oxazolidinone and related systems - I

Lecture 12 - Evans oxazolidinone and related systems - II

Lecture 13 - Evans oxazolidinone and related systems - III

Lecture 14 - Evans oxazolidinone and related systems - IV

Lecture 15 - Evans oxazolidinone and related systems - V

Lecture 16 - HelmchenÃ¢'s auxiliary, OppolzerÃ¢'s sultam based auxiliary

Lecture 17 - Camphor based N-acyloxazolidinones as chiral auxiliary

Lecture 18 - MyerÃ¢'s ephedrine, Chiral Weinreb amide equivalents and related systems

Lecture 19 - MyerÃ¢'s ephedrine and related systems

Lecture 20 - Chiral Weinreb amide equivalents and related systems

Lecture 21 - MeyerÃ¢'s oxazoline based alkylation - I

Lecture 22 - MeyerÃ¢'s oxazoline based alkylation - II

Lecture 23 - MeyerÃ¢'s bicyclic lactam based enolate alkylation

Lecture 24 - MeyerÃ¢'s bicyclic lactam based alkylation

Lecture 25 - MeyerÃ¢'s bicyclic lactams, GleasonÃ¢'s bicyclic thioglycolate lactam based systems

Lecture 26 - Few problem solving from MeyerÃ¢'s oxazoline/bicyclic lactam based alkylation

Lecture 27 - SchollkopfÃ¢'s bis-lactim ether and related systems; Auxiliary induced chiral relay

Lecture 28 - Chiral relay systems in amino acid derived enolate alkylation

Lecture 29 - Wiliams oxazinone, Yamada's chiral glycine enolate and related system

Lecture 30 - Tricycloiminolactone as chiral glycine equivalents

Lecture 31 - Najera's auxiliary, Davies diketopoperazine and related system

Lecture 32 - EnderÃ¢'s RAMP/SAMP,ColtartÃ¢'s cyclic carbamate hydrazone,EllmanÃ¢'s sulfinamide and related

Lecture 33 - EnderÃ¢'s RAMP/SAMP based systems

Lecture 34 - EnderÃ¢'s RAMP/SAMP based systems

Lecture 35 - EnderÃ¢'s RAMP/SAMP, ColtartÃ¢'s cyclic carbamate hydrazone,EllmanÃ¢'s sulfinamide

Lecture 36 - ColtartÃ¢'s cyclic carbamate hydrazone and its exploration

Lecture 37 - Memory of chirality in enolate alkylation

Lecture 38 - Organocatalytic methods for enolate alkylation (SOMO activation)

Lecture 39 - Enantioselective alkylation with chiral PTC

Lecture 40 - Overall analysis of the entire discussion

NPTEL : NOC:Overview and Integration of Cellular Metabolism (Chemistry and Biochemistry)

Co-ordinators : Dr. Arindam Ghosh, Dr. Aritri Bir

Lecture 1 - Bioenergetics: Understanding the significance in Biological Systems

Lecture 2 - Regulation of Enzyme Activity

Lecture 3 - Digestion and Absorption of Carbohydrates

Lecture 4 - Glycolysis, alcohol and lactic acid fermentation

Lecture 5 - Biochemistry of TCA Cycle (I)

Lecture 6 - TCA Cycle (II) - Regulation and special characteristics

Lecture 7 - Neoglucogenesis

Lecture 8 - Regulation of Glycolysis and Neoglucogenesis - I

Lecture 9 - Regulation of Glycolysis and Neoglucogenesis - II Cori Cycle, Rapoport Leubering

Lecture 10 - Hexose Monophosphate Shunt : Steps and Phases

Lecture 11 - Hexose Monophosphate Shunt : Regulation and Significance

Lecture 12 - Glycogen Metabolism - I

Lecture 13 - Glycogen Metabolism - II

Lecture 14 - Glycogen Metabolism - III

Lecture 15 - Glycogen Metabolism - IV

Lecture 16 - Galactose Metabolism and Associated Disorders

Lecture 17 - Fructose Metabolism and Associated Disorders

Lecture 18 - Regulation of Blood Glucose

Lecture 19 - Diabetes Mellitus and Metabolic Alterations

Lecture 20 - Digestion and absorption of Lipid

Lecture 21 - Lipoprotein Metabolism - I

Lecture 22 - Lipoprotein Metabolism - II

Lecture 23 - Lipoprotein metabolism - III

Lecture 24 - Fatty acid catabolism (Oxidation of Fatty acids) - I

Lecture 25 - Fatty acid catabolism (Oxidation of Fatty acids) - II

Lecture 26 - Fatty acid catabolism (Oxidation of Fatty acids) - III

Lecture 27 - Metabolism of Ketone Bodies

Lecture 28 - Biosynthesis of Fatty acid and its regulation

Lecture 29 - Biosynthesis of triacylglycerol, phosphoglycerides and sphingolipids

Lecture 30 - Cholesterol Metabolism

Lecture 31 - Digestion and absorption of Protein

Lecture 32 - Transformation of Amino acids

Lecture 33 - Metabolism of Ammonia and ammonia toxicity

Lecture 34 - Urea cycle - Steps, Significance and Energetics

Lecture 35 - Urea Cycle - Regulation and Enzyme Deficiency Disorders

Lecture 36 - Metabolism of Phenylalanine and Associated Disorders

Lecture 37 - Tyrosine Metabolism - I

Lecture 38 - Tyrosine Metabolism - II (Catecholamines)

Lecture 39 - Tyrosine Metabolism - III

Lecture 40 - Tryptophan Metabolism

Lecture 41 - Metabolism of Sulphur containing Amino acids (Methionine and Cysteine)

Lecture 42 - Metabolism of Glycine and its disorders

Lecture 43 - Metabolism of Serine, Threonine and Alanine

Lecture 44 - Branched chain amino acid metabolism and their disorders

Lecture 45 - Metabolism of Histidine, Proline, Arginine and Lysine

Lecture 46 - Heme Metabolism - I (Heme Synthesis and Regulation)

Lecture 47 - Heme Metabolism - II (Disorders of Heme Synthesis - Porphyrias)

Lecture 48 - Heme Metabolism - III (Heme Degradation, Transport and Bilirubin Metabolism)

Lecture 49 - Disorders of Bilirubin Metabolism

Lecture 50 - Nucleotide Metabolism - I (Purine Metabolism)

Lecture 51 - Nucleotide Metabolism - II (Disorders of Purine Metabolism)

Lecture 52 - Nucleotide Metabolism - III (Pyrimidine Metabolism and Disorders)

Lecture 53 - Inborn errors of Metabolism

Lecture 54 - Integration of Metabolism - I (Cellular and Organ level integration)

Lecture 55 - Integration of Metabolism - II (Starve feed cycle)

Lecture 56 - Integration of Metabolism - III (Metabolic Control Analysis)

Lecture 57 - Obesity, Metabolic Syndrome and Role of Adipokines

Lecture 58 - Fatty Liver and alcohol metabolism

Lecture 59 - Energy metabolism and Nutritional disorders, Protein Energy Malnutrition and Dietary

Lecture 60 - Metabolism in Cancer Cells

NPTEL : NOC:Elementary Thermodynamics for All (Chemistry and Biochemistry)

Co-ordinators : Prof. Srabani Taraphder

Lecture 1 - Introduction

Lecture 2 - System, Equilibrium States

Lecture 3 - Mathematical foundation - Exact differentials

Lecture 4 - Mathematical foundation - Inexact differentials

Lecture 5 - First law - Introduction to Internal energy

Lecture 6 - First law - Heat and work

Lecture 7 - First law - Pressure-volume work

Lecture 8 - First law - Internal energy revisited

Lecture 9 - First Law - Enthalpy

Lecture 10 - First law - Estimation of change in internal energy and enthalpy

Lecture 11 - Second law - Introduction

Lecture 12 - Second law - Carnot engine and entropy

Lecture 13 - Entropy and Third law

Lecture 14 - Entropy and Spontaneity in isolated systems

Lecture 15 - Spontaneity and equilibrium - Thermodynamic potentials

Lecture 16 - Spontaneity and equilibrium - Non-isolated systems

Lecture 17 - Thermodynamic potentials and Maxwell's relations

Lecture 18 - Application of Maxwell's relations

Lecture 19 - Thermodynamic response functions

Lecture 20 - Using Maxwell's relations to solve numerical problems

Lecture 21 - Fundamental Equation of Chemical Thermodynamics

Lecture 22 - Open systems and chemical potential

Lecture 23 - Chemical potential in one and many component ideal gas

Lecture 24 - Gibbs-Duhem relation and thermodynamics of ideal gas mixture

Lecture 25 - Numerical applications of Gibbs-Duhem relation

Lecture 26 - Phase equilibrium - Part 1

Lecture 27 - Phase equilibrium - Part 2

Lecture 28 - Phase equilibrium - Part 3

Lecture 29 - Phase equilibrium - Part 4

Lecture 30 - Numerical problems in phase equilibrium

Lecture 31 - Simple non-reactive mixtures - Part 1

Lecture 32 - Simple non-reactive mixtures - Part 2

Lecture 33 - Numerical problems in simple mixtures

Lecture 34 - Numerical problems on phase equilibrium in simple mixtures

Lecture 35 - Chemical potential of real systems - Activity and concentration

Lecture 36 - Numerical problems on chemical potential in real systems

Lecture 37 - Chemical Equilibrium - Part I

Lecture 38 - Chemical Equilibrium - Part II

Lecture 39 - Chemical Equilibrium - Part III

Lecture 40 - Chemical Equilibrium - Part IV

Lecture 41 - Numerical problems on chemical equilibrium

Lecture 42 - Numerical problems on chemical equilibrium (Continued...)

Lecture 43 - Electrochemical equilibrium - Part I

Lecture 44 - Electrochemical equilibrium - Part II

Lecture 45 - Electrochemical equilibrium - Part III

Lecture 46 - Electrochemical equilibrium - Part IV

Lecture 47 - Electrochemical equilibrium - Part V

Lecture 48 - Electrochemical equilibrium - Part VI

Lecture 49 - Numerical problems on electrochemistry

Lecture 50 - Numerical problems on electrochemistry (Continued...)

Lecture 51 - Numerical problems on electrochemistry (Continued...)

Lecture 52 - Numerical problems on electrochemistry (Continued...)

Lecture 53 - Numerical problems on electrochemistry (Continued...)

Lecture 54 - Thermodynamic stability

Lecture 55 - Thermodynamics in action - Part I

Lecture 56 - Thermodynamics in action - Part II

Lecture 57 - Thermodynamics in action - Part III

Lecture 58 - Thermodynamics in action - Part IV

Lecture 59 - Demonstration

Lecture 60 - Concluding Lecture

NPTEL : NOC:Molecular Rearrangements and Reactive Intermediates in Organic Synthesis (Chemistry and Biochemistry)

Co-ordinators : Prof. Santanu Panda

Lecture 1 - Carbocation

Lecture 2 - Carbocation (Continued...)

Lecture 3 - Carbocation (Continued...)

Lecture 4 - Carbocation (Continued...)

Lecture 5 - Carbocation (Continued...)

Lecture 6 - Carbanion

Lecture 7 - Carbanion (Continued...)

Lecture 8 - Carbanion (Continued...)

Lecture 9 - Carbanion (Continued...)

Lecture 10 - Carbanion (Continued...)

Lecture 11 - Carbene

Lecture 12 - Carbene (Continued...)

Lecture 13 - Carbene (Continued...)

Lecture 14 - Carbene (Continued...)

Lecture 15 - Nitrene

Lecture 16 - Nitrene(Continued...)

Lecture 17 - Radical

Lecture 18 - Radical (Continued...)

Lecture 19 - Free Radical

Lecture 20 - Radical

Lecture 21 - Radical

Lecture 22 - Free Radical (Continued...)

Lecture 23 - Radical

Lecture 24 - Free Radical Reactions

Lecture 25 - Radical (Continued...)

Lecture 26 - Radical (Continued...)

Lecture 27 - Radical (Continued...)

Lecture 28 - Benzyne

Lecture 29 - Benzyne (Continued...)

Lecture 30 - Benzyne (Continued...)

Lecture 31 - Benzyne question answer discussion

Lecture 32 - Organolithium

Lecture 33 - Organolithium (Continued...)

Lecture 34 - Organolithium (Continued...)

Lecture 35 - Organolithium (Continued...)

Lecture 36 - Organolithium (Continued...)

Lecture 37 - Grignard

Lecture 38 - Grignard (Continued...)

Lecture 39 - Organocopper

Lecture 40 - Organozinc

Lecture 41 - Organoboron Chemistry

Lecture 42 - Organoboron Chemistry (Continued...)

Lecture 43 - Organoboron Chemistry (Continued...)

Lecture 44 - Organoboron Chemistry (Continued...)

Lecture 45 - Organoboron

Lecture 46 - Organoboron Chemistry

Lecture 47 - Organosilicon Chemistry

Lecture 48 - Organosilicon Chemistry (Continued...)

Lecture 49 - Organosilicon Chemistry (Continued...)

Lecture 50 - Organosulfur Chemistry

Lecture 51 - Organosulfur

Lecture 52 - Organosulfur (Continued...)

Lecture 53 - Organosulfur (Continued...)

Lecture 54 - Organophosphorus Chemistry

Lecture 55 - Organophosphorus Chemistry (Continued...)

Lecture 56 - Tutorial 1

Lecture 57 - Tutorial 2

Lecture 58 - Tutorial 3

Lecture 59 - Tutorial 4

Lecture 60 - Tutorial 5

Lecture 61 - Tutorial 6

NPTEL : Principles and Application of Electron Paramagnetic Resonance (Chemistry and Biochemistry)

Co-ordinators : Prof. Ranjan Das

Lecture 1 - Remembering the Masters: From Zeeman to Zavoisky

Lecture 2 - Introduction to EPR spectroscopy

Lecture 3 - Electron-Nuclear Hyperfine Interaction - I

Lecture 4 - Electron-Nuclear Hyperfine Interaction - II

Lecture 5 - Magnetic Moment in Magnetic Field - I

Lecture 6 - Magnetic Moment in Magnetic Field - II

Lecture 7 - EPR Instrumentations - I

Lecture 8 - EPR Instrumentations - II

Lecture 9 - EPR Instrumentations - III

Lecture 10 - EPR Instrumentations - IV

Lecture 11 - Quantum Mechanical Description of EPR - I

Lecture 12 - Quantum Mechanical Description of EPR - II

Lecture 13 - Introduction to Spin Relaxation

Lecture 14 - Theory of First-order EPR Spectra - I

Lecture 15 - Theory of First-order EPR Spectra - II

Lecture 16 - How to Analyse First-order EPR Spectra

Lecture 17 - How to Record EPR Spectra

Lecture 18 - Second-order Effects on EPR Spectra

Lecture 19 - Photochemistry and EPR Spectroscopy

Lecture 20 - Electron Spin Polarisation - I

Lecture 21 - Electron Spin Polarisation - II

Lecture 22 - Anisotropic Interactions in EPR Spectroscopy

Lecture 23 - Theoretical Basis of isotropic Hyperfine Coupling

Lecture 24 - Spin Relaxation and Bloch Equations - I

Lecture 25 - Spin Relaxation and Bloch Equations - II

NPTEL : NOC:Chemistry-I (Chemistry and Biochemistry)

Co-ordinators : Prof. K. Mangala Sunder

Lecture 1

Lecture 2

Lecture 3 - Part I

Lecture 3 - Part II

Lecture 4 - Part I

Lecture 4 - Part II

Lecture 4 - Part III

Lecture 5 - Part I

Lecture 5 - Part II

Lecture 5 - Part III

Lecture 5 - Part IV

Lecture 5 - Part V

Lecture 6 - Part I

Lecture 6 - Part II

Lecture 6 - Part III

Lecture 6 - Part IV

Lecture 7 - Part I

Lecture 7 - Part II

Lecture 8 - Part I

Lecture 8 - Part II

Lecture 8 - Part III

Lecture 9 - Part I

Lecture 9 - Part II

Lecture 9 - Part III

Lecture 10

NPTEL : NOC:Chemistry-II (Chemistry and Biochemistry)

Co-ordinators : Prof. K. Mangala Sunder

Lecture 1 - Electromagnetic radiation

Lecture 2 - Interaction of radiation with matter

Lecture 3 - Introduction to chemical applications

Lecture 4 - Analysis of spectra

Lecture 5 - Radiation densities and Einstein's semi classical model

Lecture 6 - Introduction to quantum mechanics - I

Lecture 7 - Introduction to quantum mechanics - II

Lecture 8 - Born-Oppenheimer approximation

Lecture 9 - Beer-Lambert law

Lecture 10 - Diatomic Vibration Spectra Hermonic Model

Lecture 11 - Diatomic Vibration Morse Oscillator Model

Lecture 12 - Normal Vibrational modes Triatomic molecules

Lecture 13 - Normal Vibrational modes Polyatomic molecules

Lecture 14 - Vibrational Polyatomic Infrared Spectroscopy Local Modes and Group Frequencies

Lecture 15 - Microwave spectra of di-atomic molecules

Lecture 16 - Diatomic Molecules Microwave Energies and Transitions

Lecture 17 - Methodology of solving problems

Lecture 18 - Rotational and Vibrational Line Intensities

Lecture 19 - Microwave Spectra of Polyatomic molecules (Symmetric tops)

Lecture 20 - Video Tutorial 2 : Part - I

Lecture 21 - Video Tutorial 2 : Part - II

Lecture 22 - Introduction to Tensors

Lecture 23 - Polarizability Tensor

Lecture 24 - Introduction to Rotational Raman Spectra.

Lecture 25 - Review of basic concepts in Molecular Spectroscopy

Lecture 26 - Review of Microwave Spectroscopy

Lecture 27 - Review of Elementary Vibrational Spectroscopy

NPTEL : NOC:Application of Spectroscopic Methods in Molecular Structure Determination (Chemistry and Biochemistry)

Co-ordinators : Prof. S. Sankararaman

Module 1

Module 2

Module 3

Module 4

Module 5

Module 6

Module 7

Module 8

Module 9

Module 10

Module 11

Module 12

Module 13

Module 14

Module 15

Module 16

Module 17

Module 18

Module 19

Module 20

Module 21

Module 22

Module 23

Module 24

Module 25

Module 26

Module 27

Module 28

Module 29

Module 30

Module 31

Module 32

Module 33

Module 34

Module 35

Module 36

NPTEL : NOC:Pericyclic Reactions and Organic Photochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. S. Sankararaman

Lecture 1 - Activation of chemical reactions. Thermal and photochemical methods

Lecture 2 - MOs of polyene and their symmetry properties and methods of analyzing pericyclic reactions

Lecture 3 - Introduction to electrocyclic reactions and Woodward Hoffmann rules

Lecture 4 - Electrocyclic reactions Â– examples of 3, 4 and 5 membered ring systems (2e and 4e systems)

Lecture 5 - Electrocyclic reactions Â– examples of 6 and larger ring systems (6e and more)

Lecture 6 - Tutorial session 1

Lecture 7 - Cycloaddtion reactions - Introduction and Woodward Hoffmann rules - [2+2] cycloadditions

Lecture 8 - Cycloaddition reactions Â– ketene cycloadditions

Lecture 9 - Cycloaddition reactions Â– Diels-Alder reaction - Woodward Hoffmann rule - Regiochemistry and Stereochemistry aspects

Lecture 10 - Diels Alder reaction - synthetic applications

Lecture 11 - Diels Alder reaction continued - Hetero diene and dienophile - Lewis acid mediated - asymmetric

Lecture 12 - 1,3-Dipolar cycloaddition reactions

Lecture 13 - 1,3-Dipolar cycloaddition reactions (Continued...)

Lecture 14 - [4pi+4pi], [4pi+6pi] and higher order cycloaddition reactions

Lecture 15 - Tutorial session 2 on cycloaddition reactions

Lecture 16 - Pericyclic reactions Â– Sigmatropic rearrangements Â– Introduction and [1,3] migrations

Lecture 17 - Pericyclic reactions Â– Sigmatropic rearrangements (Continued...) [1,5] H and C migrations and Cope rearrangement

Lecture 18 - Pericyclic reactions Â– Sigmatropic rearrangements (Continued...) oxy Cope and Claisen Rearrangement

Lecture 19 - Pericyclic reactions Â– Sigmatropic rearrangements (Continued...)

Lecture 20 - Pericyclic reactions Â– Sigmatropic rearrangements (Continued...) [2,3] sigmatropic shifts and higher order rearrangements Completed

Lecture 21 - Pericyclic reactions Â– Sigmatropic rearrangements (Continued...) Wittig rearrangement and higher order Sigmatropic shifts

Lecture 22 - Pericyclic reactions Â– Chelotropic reactions - introduction, SO2 extrusion reactions

Lecture 23 - Pericyclic reactions Â– Tutorial session 3 - Problems on sigmatropic reactions

Lecture 24 - Chelotropic reactions 2

Lecture 25 - The Ene Reaction

Lecture 26 - Tutorial session - 4

Lecture 27 - Introduction to organic photochemistry

Lecture 28 - Photochemistry of alkenes cis-trans isomerization

Lecture 29 - Photochemistry of alkenes (Continued...)

Lecture 30 - Photochemistry of carbonyl compounds, Norrish type1 and 2 reactions

Lecture 31 - Photochemistry of carbonyl compounds, enone and dienone photochemistry

Lecture 32 - Photochemistry of Nitrogen compounds

Lecture 33 - Photochemistry of aromatic compounds

Lecture 34 - Photoinduced electron transfer reactions

NPTEL : NOC:Chemistry I:Introduction To Quantum Chemistry And Molecular Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. K. Mangala Sunder

Lecture 1 - Lecture 1 - Historical context and experiments: Introducing the SchrÃ¶dinger equation

Lecture 2 - Lecture 2 - Bohr's atom, De Broglie Matter Waves and Schrodinger equation

Lecture 3 - Lecture 3 - Electromagnetic Radiation

Lecture 4 - Lecture 4 - Interaction of Radiation with Matter

Lecture 5 - Lecture 5 - Molecular Spectroscopy

Lecture 6 - Lecture 6 - Elementary Mathematical Functions 1

Lecture 7 - Lecture 7 - Review of Properties of Elementary Functions II

Lecture 8 - Lecture 8 - Time Dependent SchrÃ¶dinger Equation & Time Independent SchrÃ¶dinger Equation

Lecture 9 - Lecture 9 - SchrÃ¶dinger Equation Particle in a One-dimensional Box : Part I

Lecture 10 - Lecture 10 - SchrÃ¶dinger Equation Particle in a One-dimensional Box : Part II

Lecture 11 - Lecture 11 - SchrÃ¶dinger Equation Particle in Two-dimensional Box : Part I

Lecture 12 - Lecture 12 - Particle in Two-dimensional Box : Part II Uncertainty Principle

Lecture 13 - Lecture 13 - Particle in Two-dimensional Box : Part III Expectation Values

Lecture 14 - Lecture 14 - The Quantum Mechanics of Hydrogen Atom - Part I

Lecture 15 - Lecture 15 - The Quantum Mechanics of Hydrogen Atom - Part II

Lecture 16 - Lecture 16 - The Quantum Mechanics of Hydrogen Atom - Part III

Lecture 17 - Lecture 17 - The Quantum Mechanics of Hydrogen Atom - Part IV

Lecture 18 - Lecture 18 - The Quantum Mechanics of Hydrogen Atom - Part V

Lecture 19 - Lecture 19A - Assignment 1 Solution/Hints

Lecture 20 - Lecture 19B - Assignment 1 Solution/Hints

Lecture 21 - Lecture 19C - Assignment 1 Solution/Hints

Lecture 22 - Lecture 19D - Assignment 1 Solution/Hints

Lecture 23 - Lecture 19E - Assignment 1 Solution/Hints

Lecture 24 - Lecture 20 - Harmonic Oscillator Model - Part I

Lecture 25 - Lecture 21 - Harmonic Oscillator Model - Part II

Lecture 26 - Lecture 22 - Harmonic Oscillator Model - Part III

Lecture 27 - Lecture 23 - Harmonic Oscillator Model - Part IV

Lecture 28 - Lecture 24 - Particle on a Ring - Part I

Lecture 29 - Lecture 25 - Particle on a Ring - Part II

Lecture 30 - Lecture 26 - HeisenbergÂ's Uncertainty Relation

Lecture 31 - Lecture 27A - Operators, Commutators, Eigenvalues and Eigenvectors

Lecture 32 - Lecture 27B - Operators, Commutators, Eigenvalues and Eigenvectors

Lecture 33 - Lecture 28 - Introduction to Chemical Applications

Lecture 34 - Lecture 29 - Radiation Densities and EinsteinÂ's Semiclassical model

Lecture 35 - Lecture 30 - Born Oppenheimer Approximation

Lecture 36 - Lecture 31 - Beer Lambert Law

Lecture 37 - Lecture 32 - Diatomic Vibrational Spectra Harmonic Model

Lecture 38 - Lecture 33 - Diatomic Vibration Morse Oscillator Model

Lecture 39 - Lecture 34 - Molecular Vibrations in Polyatomic Molecules - Qualitative Account

Lecture 40 - Lecture 35 - Polyatomic Vibrations - Illustrative examples of normal vibrations

NPTEL : NOC:Introduction to Chemical Thermodynamics and Kinetics (Chemistry and Biochemistry)

Co-ordinators : Prof.Arijit Kumar De

Lecture 1 - Introduction to Chemical Thermodynamics and Kinetics

Lecture 2 - Properties of gases - Part 1

Lecture 3 - Properties of gases - Part 2

Lecture 4 - Introduction - Part 1

Lecture 5 - Introduction - Part 2

Lecture 6 - First law - Part 1

Lecture 7 - First law - Part 2

Lecture 8 - First law - Part 3

Lecture 9 - First law - Part 4

Lecture 10 - First law - Part 5

Lecture 11 - Second law - Part 1

Lecture 12 - Second law - Part 2

Lecture 13 - Spontaneity and equilibrium - Part 1

Lecture 14 - Spontaneity and equilibrium - Part 2

Lecture 15 - Spontaneity and equilibrium - Part 3

Lecture 16 - Phase equilibrium - Part 1

Lecture 17 - Phase equilibrium - Part 2

Lecture 18 - Phase equilibrium - Part 3

Lecture 19 - Phase equilibrium - Part 4

Lecture 20 - Phase equilibrium - Part 5

Lecture 21 - Phase equilibrium - Part 6

Lecture 22 - Phase equilibrium - Part 7

Lecture 23 - Mixtures - Part 1

Lecture 24 - Mixtures - Part 2

Lecture 25 - Mixtures - Part 3

Lecture 26 - Mixtures - Part 4

Lecture 27 - Mixtures - Part 5

Lecture 28 - Chemical Equilibrium - Part 1

Lecture 29 - Chemical Equilibrium - Part 2

Lecture 30 - Chemical Equilibrium - Part 3

Lecture 31 - Chemical Equilibrium - Part 4

Lecture 32 - Chemical Equilibrium - Part 5

Lecture 33 - Chemical equilibrium - Part 2B

Lecture 34 - Chemical equilibrium - Part 2C

Lecture 35 - Electrochemistry - Part 1

Lecture 36 - Electrochemistry - Part 2

Lecture 37 - Electrochemistry - Part 3

Lecture 38 - Surfaces and interfaces

Lecture 39 - Chemical Kinetics: Rate laws - Part 1

Lecture 40 - Chemical Kinetics: Rate laws - Part 2

Lecture 41 - Chemical Kinetics: Rate laws - Part 3

Lecture 42 - Chemical Kinetics: Rate laws - Part 4

Lecture 43 - Chemical Kinetics: Mechanisms - Part 1

Lecture 44 - Chemical Kinetics: Mechanisms - Part 2

Lecture 45 - Chemical Kinetics: Mechanisms - Part 3

Lecture 46 - Chemical Kinetics: Mechanisms - Part 4

Lecture 47 - Chemical Kinetics: Mechanisms - Part 5

Lecture 48 - Chemical Kinetics: Mechanisms - Part 6

Lecture 49 - Reaction dynamics - Part 1

Lecture 50 - Reaction dynamics - Part 2

Lecture 51 - Reaction dynamics - Part 3

Lecture 52 - Reaction dynamics - Part 4

Lecture 53 - Reaction dynamics - Part 5

Lecture 54 - Reaction dynamics - Part 6

Lecture 55 - Reaction dynamics - Part 7

NPTEL : NOC:Chemical Crystallography (Chemistry and Biochemistry)

Co-ordinators : Prof.Angshuman Roy Choudhury

Lecture 1 - Introduction to X-Ray Crystallography

Lecture 2 - Sources of X-Rays, Crystal Systems and Bravais lattices

Lecture 3 - Crystallographic Symmetries

Lecture 4 - Equivalent Points and 1D Lattices

Lecture 5 - 5 Fold Symmetry and 2D Lattices

Lecture 6 - 2D Space Lattices

Lecture 7 - Crystallographic Point Groups

Lecture 8 - Stereographic Projections of Point Groups

Lecture 9 - Understanding of Crystallographic Space Groups

Lecture 10 - 2D Projection of Space Groups

Lecture 11 - Tutorial - 01

Lecture 12 - 3D Space Groups and Equivalent Points

Lecture 13 - Obtaining Equivalent Points by Shifting of Origin

Lecture 14 - Representation of Orthorhombic and Tetragonal Space Groups

Lecture 15 - Miller Indices for Crystallographic Directions and Planes

Lecture 16 - Miller Indices and Planar Densities

Lecture 17 - Tutorial - 02

Lecture 18 - Cubic Structues and atomic packing factors

Lecture 19 - Ceramic Structures

Lecture 20 - Theory of X-Ray Diffraction

Lecture 21 - Tutorial - 03

Lecture 22 - Origin of Reciprocal Lattice

Lecture 23 - Bragg's Law in Reciprocal Lattice and Origin of Systematic Absences

Lecture 24 - Systematic Absences and Crystallisation Methods

Lecture 25 - Special Method of Crystallisation

Lecture 26 - Tutorial

Lecture 27 - Single Crystal X-Ray Diffraction Data Collection

Lecture 28 - Diffractometers

Lecture 29 - Diffractometers and Detectors

Lecture 30 - Laue's and Bragg's Analysis

Lecture 31 - Experimental Methods and Theoretical Understanding of X-Ray Diffraction

Lecture 32 - Derivation of Friedel's Law from Structure Factor by Vector Space Diagram

Lecture 33 - Structure Fcator and Electron Density

Lecture 34 - Systematic Absence Conditions from Special Structure Factor Expression

Lecture 35 - Structure Refinement

Lecture 36 - Single Crystal X-Ray Diffractometer

Lecture 37 - Understanding the X-Ray Data

Lecture 38 - Data Handling (Solution and Refinement) using Various Crystallographic Packages

Lecture 39 - Structure Solution using Apex II (Bruker Diffractometer)

Lecture 40 - Direct Methods - Part 1

Lecture 41 - Direct Methods - Part 2

Lecture 42 - Disorder Treatment using Olex 2

Lecture 43 - Cambridge Structure Database and its Application

Lecture 44 - Data Reduction - Absorption Correction

Lecture 45 - Data Reduction - Lorentz and Polarization Correction

Lecture 46 - Data Reduction - Scale and Temperature Factor

Lecture 47 - Identification from Intensity Statistics the Correct Crystal System and Presence of Inversion Center

Lecture 48 - Identification from Intensity Statistics the presence of 2 fold axis in Lattice

Lecture 49 - Phase Problem

Lecture 50 - Direct Methods - Part 1

Lecture 51 - Direct Methods - Part 2

Lecture 52 - Sigma 1 and Triplet Relationship

Lecture 53 - Patterson Method

Lecture 54 - Powder X-Ray Diffractometer - Theory

Lecture 55 - Powder X-Ray Diffractometer - Lab

Lecture 56 - Polymorphs

Lecture 57 - Polymorphs

Lecture 58 - Review of Reciprocal Lattice

Lecture 59 - Review of Reciprocal Lattice

Lecture 60 - Review of Reciprocal Lattice and Bragg's Law in Reciprocal Lattice

Lecture 61 - Ewald's Sphere and Limiting Sphere

Lecture 62 - Origin of/Introduction to Systematic absences

NPTEL : NOC:Advanced Chemical Thermodynamics and Kinetics (Chemistry and Biochemistry)

Co-ordinators : Prof.Arijit Kumar De

Lecture 1 - Review of Classical Thermodynamics - 1

Lecture 2 - Review of Classical Thermodynamics - 2

Lecture 3 - Review of Classical Thermodynamics - 3

Lecture 4 - Review of Classical Thermodynamics - 4

Lecture 5 - Review of Classical Thermodynamics - 5

Lecture 6 - Molecular Interactions - 1

Lecture 7 - Molecular Interactions - 2

Lecture 8 - Molecular Interactions - 3

Lecture 9 - Molecular Interactions - 4

Lecture 10 - Molecular Interactions - 5

Lecture 11 - Transport Phenomena - 1

Lecture 12 - Transport Phenomena - 2

Lecture 13 - Transport Phenomena - 3

Lecture 14 - Review of Chemical Kinetics - 1

Lecture 15 - Review of Chemical Kinetics - 2

Lecture 16 - Review of Chemical Kinetics - 3

Lecture 17 - Review of Chemical Kinetics - 4

Lecture 18 - Review of Chemical Kinetics - 5

Lecture 19 - Advanced Topic in Chemical Kinetics - 1

Lecture 20 - Advanced Topic in Chemical Kinetics - 2

Lecture 21 - Advanced Topic in Chemical Kinetics - 3

Lecture 22 - Introduction to statistical thermodynamics - 1

Lecture 23 - Introduction to statistical thermodynamics - 2

Lecture 24 - Introduction to statistical thermodynamics - 3

Lecture 25 - Introduction to bimolecular reaction dynamics - 1

Lecture 26 - Introduction to bimolecular reaction dynamics - 2

Lecture 27 - Introduction to bimolecular reaction dynamics - 3

Lecture 28 - Introduction to bimolecular reaction dynamics - 4

Lecture 29 - Unimolecular reaction - 1

Lecture 30 - Unimolecular reaction - 2

Lecture 31 - Introduction to solution phase reactions dynamics - 1

Lecture 32 - Introduction to solution phase reactions dynamics - 2

Lecture 33 - Introduction to solution phase reactions dynamics - 3

Lecture 34 - Introduction to solution phase reactions dynamics - 4

Lecture 35 - Introduction to solution phase reactions dynamics - 5

Lecture 36 - Non-ideal solutions, Activity of ions (Debye-Huckel theory) - 1

Lecture 37 - Non-ideal solutions, Activity of ions (Debye-Huckel theory) - 2

Lecture 38 - Electrochemistry: Insights into electrode processes, Ionic conductivity - 1

Lecture 39 - Electrochemistry: Insights into electrode processes, Ionic conductivity - 2

Lecture 40 - Reaction Dynamics: Femtosecond Pump Probe Spectroscopy

Lecture 41 - Chemical Kinetics: Hydrolysis of an ester

Lecture 42 - Transport Phenomena: Coefficient of viscosity

Lecture 43 - Equilibrium constant using partition method

Lecture 44 - Photochemistry: Degradation of a dye

NPTEL : NOC:Chemistry: Atomic Structure and Chemical Bonding (Chemistry and Biochemistry)

Co-ordinators : Prof. K. Mangala Sunder

Lecture 1 - Welcome

Lecture 2 - Elementary Mathematical Functions Used in Our Course

Lecture 3 - Schrodinger Equation: Particle in a One Dimensional Box

Lecture 4 - Particle in a One dimensional Box: Probabilities and Expectation Values

Lecture 5 - Elementary Mathematics: Introduction to Matrix Algebra - Part 1

Lecture 6 - Elementary Mathematics: Introduction to Matrix Algebra - Part 2

Lecture 7 - Elementary Mathematics: Matrix Eigenvalues and Eigenfunctions - Part I

Lecture 8 - Elementary Mathematics: Matrix Eigenvalues and Eigenfunctions - Part II

Lecture 9 - Particle in a Two Dimensional Box (Infinite Barrier)

Lecture 10 - Heisenbergâ€™s Uncertainty Principle

Lecture 11 - Expectation Values and Postulates in Quantum Mechanics

Lecture 12 - Problems and Solutions for Particle in One and Two Dimensional Boxes

Lecture 13 - Linear Vector Spaces: Matrix Representations

Lecture 14 - Linear Vector Spaces and Operators: Diracâ€™s Bracket Notation

Lecture 15 - Simple Harmonic Oscillator: Classical Hamiltonian

Lecture 16 - Simple Harmonic Oscillator: Quantum Mechanical Solutions

Lecture 17 - Simple Harmonic Oscillator: Wave Functions, Probabilities and Average Values

Lecture 18 - Simple Harmonic Oscillator: Average Values for Position and Momentum

Lecture 19 - Particle on a Ring: The Quantum Model

Lecture 20 - Particle on a Ring: Expectation Values for Angular Momentum

Lecture 21 - Coordinate Transformation

Lecture 22 - Problems and Solutions for Harmonic Oscillator

Lecture 23 - Hydrogen Atom: The Hamiltonian in Spherical Polar Coordinates

Lecture 24 - Hydrogen Atom: Separation of the SchrÃ¶dinger Equation

Lecture 25 - Hydrogen Atom: Radial and Angular Solutions and Animations - Part I

Lecture 26 - Hydrogen Atom: Radial and Angular Solutions and Animations - Part II

Lecture 27 - Hydrogen Atom: Radial Solutions and Probabilities

Lecture 28 - Power Series Method for Differential Equation - I

Lecture 29 - Hermiteâ€™s Differential Equation

Lecture 30 - Legendre and Associated Legendre Equation

Lecture 31 - Born-Oppenheimer Approximation

Lecture 32 - Introduction to Angular Momentum

Lecture 33 - Spin Â½ Angular Momentum

Lecture 34 - Spin Angular Momentum and Coupling of Two Spin-1/2 Angular Momenta

Lecture 35 - Coupling of Two Angular Momenta

Lecture 36 - Video Tutorial for Hermite polynomials and hydrogen atom - Part 1

Lecture 37 - Video Tutorials - Part 2

Lecture 38 - Variational Principle in Quantum Chemistry: Linear superposition Principle

Lecture 39 - Introduction to Variational Principle in Quantum Chemistry

Lecture 40 - Variational Method: Method of Lagrange Multipliers

Lecture 41 - Hydrogen Molecule Ion: The Molecular Orbital Method

Lecture 42 - Hydrogen Molecule Ion: Calculations and Results

Lecture 43 - Hydrogen Molecule: The Valence Bond Method

Lecture 44 - Hydrogen Molecule: Calculations and Molecular Orbital Method

Lecture 45 - Video Tutorials on Angular Momentum (Orbital and Spin) and Variational Method - Part 1

Lecture 46 - Video Tutorials on Angular Momentum (Orbital and Spin) and Variational Method - Part 2

Lecture 47 - Introduction to Quantum Mechanical Perturbation Theory

Lecture 48 - First Order Time Independent perturbation Theory for Non-Degenerate states

Lecture 49 - First and Second Order Time Independent Perturbation Theory for Non-Degenerate States

Lecture 50 - First and Second Order Time Independent Perturbation Theory: Simple Examples

Lecture 51 - Time Independent Perturbation Theory for Degenerate States: First Order

Lecture 52 - General MO method for Homonuclear Diatomic Molecules

Lecture 53 - General MO method for Heteronuclear Diatomic Molecules

Lecture 54 - Introduction to Hybridization and Valence Bond for Polyatomic Molecules

Lecture 55 - HÃœckel Molecular Orbital Theory - I

Lecture 56 - HÃœckel Molecular Orbital Theory - II

NPTEL : NOC:Electrochemical Impedance Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Dr. S. Ramanathan

Lecture 1 - Electrochemistry, double layer, 3 electrode systems, supporting electrolyte

Lecture 2 - Rate constant, concept of impedance, Z of electrical elements, differential impedance

Lecture 3 - Time domain results

Lecture 4 - Graphical representation of data (Complex plane, Bode)

Lecture 5 - Introduction to other techniques

Lecture 6 - Tutorial 01

Lecture 7 - Type of analyzers, single and multi sine

Lecture 8 - FFT details, frequency range and resolution, cross correlation

Lecture 9 - Multi sine, odd harmonic, non-harmonics, crest factor, spectral leakage

Lecture 10 - Windowing

Lecture 11 - Tutorial 02

Lecture 12 - Introduction to KKT

Lecture 13 - Linearity, causality, stability, impedance vs. admittance, measurement model

Lecture 14 - Linear KKT illustration

Lecture 15 - Tutorial 03

Lecture 16 - Introduction to EEC, Choice of circuits, confidence intervals, AIC

Lecture 17 - EEC fitting, initial values, distinguishability

Lecture 18 - Zero/pole representation, Rt and Rp

Lecture 19 - Maxwell, Voigt, Ladder circuits, choice of initial values illustrated

Lecture 20 - Tutorial 04

Lecture 21 - Simple electron transfer reaction

Lecture 22 - Two step reaction with an intermediate (1 of 3)

Lecture 23 - Two step reaction with an intermediate (2 of 3)

Lecture 24 - Two step reaction with an intermediate (3 of 3)

Lecture 25 - E-EAR reaction, negative resistance (1 of 2)

Lecture 26 - E-EAR reaction, negative resistance (2 of 2)

Lecture 27 - Three step reaction with two adsorbed intermediates

Lecture 28 - Catalytic mechanism

Lecture 29 - Examples with Frumkin or Temkin isotherms

Lecture 30 - Challenges in RMA

Lecture 31 - Patterns Reported in Experiments

Lecture 32 - Warburg part - 1

Lecture 33 - Warburg part - 2

Lecture 34 - Warburg part - 3

Lecture 35 - Bounded Warburg

Lecture 36 - CPE

Lecture 37 - Porous electrodes

Lecture 38 - Films, PDM

Lecture 39 - PDM

Lecture 40 - Applications

Lecture 41 - NLEIS. Introduction and mathematical background

Lecture 42 - Electron Transfer reaction

Lecture 43 - Two step reaction

Lecture 44 - Two step reaction (Continued...)

Lecture 45 - Rt and Rp estimation

Lecture 46 - Galvanostatic simulations

Lecture 47 - Instabilities

Lecture 48 - Solution resistance effects

Lecture 49 - Detection on nonlinearities using KKT

Lecture 50 - Frumkin and Temkin isotherms

Lecture 51 - NLEIS Experimental aspects. FFT, PSD, THD

Lecture 52 - Application - other techniques HA, EFM

NPTEL : NOC:Medicinal Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Harinath Chakrapani

Lecture 1 - Introduction to Medicinal Chemistry - Part I

Lecture 2 - Introduction to Medicinal Chemistry - Part II

Lecture 3 - Intermolecular Binding Forces

Lecture 4 - Protein Structure and Function

Lecture 5 - Tutorial 1 - Acidity, Basicity and Related concepts

Lecture 6 - Tutorial 2 - Basic Concepts of Thermodynamics and Kinetics

Lecture 7 - Enzyme Catalysis - Part I

Lecture 8 - Enzyme Catalysis - Part II

Lecture 9 - Tutorial 3 - Binding Forces, Protein Structure and Function

Lecture 10 - Introduction to Receptors

Lecture 11 - Receptor Types and Functions

Lecture 12 - Tutorial 4 - Receptors, Binding Interactions, Ion Channels

Lecture 13 - Nucleic Acids

Lecture 14 - RNA and Protein Synthesis

Lecture 15 - Tutorial 5 - Nucleic acids, and Basics of Molecular Biology

Lecture 16 - Enzymes as Drug Targets

Lecture 17 - Enzyme Kinetics and Inhibition

Lecture 18 - Tutorial 6 - Enzyme Kinetics, Various Modes of Inhibition etc.

Lecture 19 - Receptors as Drug Targets - Part I

Lecture 20 - Receptors as Drug Targets - Part II

Lecture 21 - Tutorial 7 - Receptor-Drug Interactions, Stereochemistry, Chirality, Nomenclature

Lecture 22 - Receptor-Drug Interactions.

Lecture 23 - Stereochemistry and Conformation

Lecture 24 - Tutorial 8 - Determination of Drug-Receptor Interactions, Conformation of Cyclic and Acyclic Structures etc.

Lecture 25 - Nucleic Acids as Drug Targets - Part I

Lecture 26 - Nucleic Acids as Drug Targets - Part II

Lecture 27 - Miscellaneous Drug Targets

Lecture 28 - Tutorial 9 - Nucleic Acids and Related Topics

Lecture 29 - Mechanisms in Biological Chemistry - Part I

Lecture 30 - Mechanisms in Biological Chemistry - Part II

Lecture 31 - Mechanisms in Biological Chemistry - Part III

Lecture 32 - Pharmacokinetics - Part I

Lecture 33 - Pharmacokinetics - Part II

Lecture 34 - Drug Metabolism - Part I

Lecture 35 - Drug Metabolism - Part II

Lecture 36 - Drug Metabolism - Part III

Lecture 37 - Drug Metabolism - Part IV

Lecture 38 - Tutorial 10 - ADME

Lecture 39 - Drug Administration Routes - Part I

Lecture 40 - Drug Administration Routes - Part II

Lecture 41 - Finding a Lead - Part I

Lecture 42 - Finding a Lead - Part II

Lecture 43 - Drug Screening

Lecture 44 - Tutorial 11 - Drug administration routes and finding a lead

Lecture 45 - Optimizing Drug-Target Interactions - Part I

Lecture 46 - Optimizing Drug-Target Interactions - Part II

Lecture 47 - Optimizing Drug-Target Interactions - Part III

Lecture 48 - Optimizing Drug-Target Interactions - Part IV

Lecture 49 - Tutorial 12

Lecture 50 - Optimizing Access to the Target

Lecture 51 - Prodrugs

Lecture 52 - Prodrugs and Drug Alliances

Lecture 53 - Endogenous Compounds, Peptidomimetics and Oligonucleotides as Drugs

Lecture 54 - Tutorial 13- Optimizing Access-Prodrugs

Lecture 55 - Combinatorial and parallel synthesis

Lecture 56 - Computer in Medicinal Chemistry

Lecture 57 - Antibacterial agents - 1

Lecture 58 - Antibacterial agents - 2

Lecture 59 - Tutorial14-Combinatorial and parallel synthesis, computers in med chem and anti-bacterial agents

Lecture 60 - Anti-viral agents - 1

Lecture 61 - Anti-viral agents - 2

Lecture 62 - Anti-cancer agents - 1

Lecture 63 - Anti-cancer agents - 2

Lecture 64 - Cholinergics

Lecture 65 - Anti-ulcer agents

Lecture 66 - QSAR - 1

Lecture 67 - QSAR - 2

Lecture 68 - QSAR - 3

Lecture 69 - Drug Resistance and Synergy

NPTEL : NOC:Chemical Principles-II (Chemistry and Biochemistry)

Co-ordinators : Prof. Arnab Mukherjee

Lecture 1 - Introduction to The Thermodynamics

Lecture 2 - History of Thermodynamic

Lecture 3 - Thermodynamic Systems and Variables

Lecture 4 - Zeroth Law of Thermodynamic

Lecture 5 - Microscopic Definition of Temperature - Part 1

Lecture 6 - Microscopic Definition of Temperature - Part 2

Lecture 7 - Different Forms of Energy

Lecture 8 - Real Gas and Virial Equation

Lecture 9 - Van der Waals Gas

Lecture 10 - Work and Heat - Part 1

Lecture 11 - Work and Heat - Part 2

Lecture 12 - First Law of Thermodynamics

Lecture 13 - Microscopic Definition of Heat and Work

Lecture 14 - Work done at a Constant Temperature

Lecture 15 - Heat is a path function

Lecture 16 - Joule-Thomson Effect (For Ideal Gases)

Lecture 17 - Joule-Thomson Effect (For Van der Waals gas)

Lecture 18 - Adiabatic Reversible Work

Lecture 19 - Adiabatic Irreversible Work

Lecture 20 - Tutorial Problem - 1

Lecture 21 - Tutorial Problem - 2

Lecture 22 - Thermochemistry - Part 1

Lecture 23 - Thermochemistry - Part 2

Lecture 24 - Second Law of Thermodynamics

Lecture 25 - Statements of the Second Law of Thermodynamics

Lecture 26 - Carnot Cycle and Definition of Entropy

Lecture 27 - Ideal Stirling Engine

Lecture 28 - Gasoline Engine and Diesel Engine

Lecture 29 - CarnotÃ¢â‚¬â„¢ Cycle: The Most Efficient Engine

Lecture 30 - Thermodynamic Temperature

Lecture 31 - Definition of Entropy

Lecture 32 - Tutorial Problem - 3

Lecture 33 - Tutorial Problem - 4

Lecture 34 - Tutorial Problem - 5

Lecture 35 - Tutorial Problem - 6

Lecture 36 - Tutorial Problem - 7

Lecture 37 - Tutorial Problem - 8

Lecture 38 - Statistical Formulation of the Second Law

Lecture 39 - Probability

Lecture 40 - Microstates and Distributions

Lecture 41 - Permutation and Combination

Lecture 42 - Two-Level Systems

Lecture 43 - Most Probable Distribution

Lecture 44 - Calculation with Multi-Level systems

Lecture 45 - Calculation with Multi-Level systems with fixed energy - Part 1

Lecture 46 - Calculation with Multi-Level systems with fixed energy - Part 2

Lecture 47 - Calculation with Multi-Level systems with fixed energy - Part 3

Lecture 48 - Bose-Einstein, Fermi-Dirac and Maxwell-Boltzmann distribution

Lecture 49 - Most Probable Distribution is the Boltzmann Distribution

Lecture 50 - Demonstration of Boltzmann Distribution

Lecture 51 - Estimating Entropy for Various Processes

Lecture 52 - Microscopic equivalent of Heat and Work

Lecture 53 - Probability and Boltzmann Distribution

Lecture 54 - Thermodynamic Observables: It is all in the Average

Lecture 55 - Tutorial Problem - 9

Lecture 56 - Tutorial Problem - 10

Lecture 57 - Tutorial Problem - 11

Lecture 58 - Tutorial Problem - 12

Lecture 59 - Thermodynamic free energy

Lecture 60 - Condition for Spontaneity

Lecture 61 - Legendre Transformation of Thermodynamic Potentials

Lecture 62 - Maxwell Relations and Applications

Lecture 63 - Thermodynamic Relations using Jacobian Method - Part 1

Lecture 64 - Thermodynamic Relations using Jacobian Method - Part 2

Lecture 65 - Tutorial Problem - 13

Lecture 66 - Tutorial Problem - 14

Lecture 67 - Tutorial Problem - 15

Lecture 68 - Tutorial Problem - 16

Lecture 69 - Chemical Principle II - Overview and Road Ahead

NPTEL : Organic Chemistry Lab Certification (Chemistry and Biochemistry)

Co-ordinators : Prof. Harinath Chakrapani

Lecture 1 - Feedback on Techniques in Organic Chemistry

Lecture 2 - Introduction to Claesen - Condensation

Lecture 3 - Introduction to Claesen - Condensation

Lecture 4 - How to separate different components from a mixture using column chromatography

Lecture 5 - Flurescence phenomenon

Lecture 6 - Reaction Mechanism and Sterochemistry

Lecture 7 - Chemiluminescence Phenomenon

Lecture 8 - Post Lab Questions

NPTEL : NOC:Introductory Organic Chemistry-I (Chemistry and Biochemistry)

Co-ordinators : Prof. Harinath Chakrapani

Lecture 1 - Introduction Structure of atom and molecules

Lecture 2 - Introduction to Molecular Orbital Theory - Part 1

Lecture 3 - Introduction to Molecular Orbital Theory - Part 2

Lecture 4 - Tutorial 01

Lecture 5 - Learning Objectives for week 2

Lecture 6 - Alkanes and Cycloalkanes - Part 1

Lecture 7 - Alkanes and Cycloalkanes - Part 2

Lecture 8 - Conformational Analysis of Cyclohexane - Part 1

Lecture 9 - Conformational Analysis of Cyclohexane - Part 2

Lecture 10 - Physical Properties of Alkanes

Lecture 11 - Nomenclature of Alkanes, Cycloalkanes and Bicycloalkanes

Lecture 12 - Tutorial 02

Lecture 13 - Learning Objectives for week 3

Lecture 14 - Chirality and Stereochemistry - Part 1

Lecture 15 - Chirality and Stereochemistry - Part 2

Lecture 16 - Chirality and Stereochemistry - Part 3

Lecture 17 - Tutorial 03

Lecture 18 - Learning Objectives for week 4

Lecture 19 - Acids and Bases - Part 1

Lecture 20 - Acids and Bases - Part 2

Lecture 21 - Acids and Bases - Part 3

Lecture 22 - Tutorial 04

Lecture 23 - Learning Objectives for week 5

Lecture 24 - Arrow Pushing mechanism in Organic Chemistry

Lecture 25 - Alkenes_Structure, Properties and Nomenclature

Lecture 26 - Reactions of Alkenes - Part 1

Lecture 27 - Reactions of Alkenes - Part 2

Lecture 28 - Reactions of Alkenes - Part 3

Lecture 29 - Tutorial 05 - Part 1

Lecture 30 - Tutorial 05 - Part 2

Lecture 31 - Learning Objectives for week 6

Lecture 32 - Reactions of Alkenes - Part 4

Lecture 33 - Reactions of Alkenes - Part 5

Lecture 34 - Alkynes

Lecture 35 - Reactions of Alkynes - Part 1

Lecture 36 - Reactions of Alkynes - Part 2

Lecture 37 - Tutorial-6

Lecture 38 - Learning Objectives for week 7

Lecture 39 - Substitution and Elimination - Part 1

Lecture 40 - Substitution and Elimination - Part 2

Lecture 41 - Substitution and Elimination - Part 3

Lecture 42 - Substitution and Elimination - Part 4

Lecture 43 - Substitution and Elimination - Part 5

Lecture 44 - Tutorial-7

Lecture 45 - Learning Objectives for week 8

Lecture 46 - Alcohols - Part 1

Lecture 47 - Alcohols - Part 2

Lecture 48 - Alcohols - Part 3

Lecture 49 - Ethers and Epoxides - Part 1

Lecture 50 - Ethers and Epoxides - Part 2

Lecture 51 - Aromaticity

Lecture 52 - Tutorial-8

NPTEL : NOC:Quantitative Methods in Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Aasheesh Srivastava, Prof. Bharathwaj Sathyamoorthy

Lecture 1 - A brief history of the beginnings of quantitation in Chemistry, defining chemical stoichiometry and molarity

Lecture 2 - Defining Molality and Normality, relationship with Molarity

Lecture 3 - Defining other parameters for concentration (%, ppm/ppb, p-value)

Lecture 4 - Relationship between various concentration parameters

Lecture 5 - Problems on acid-base equilibria, calculation of pH of strong and weak acids

Lecture 6 - Brief introduction to normal distribution and statistical analysis

Lecture 7 - Using a spreadsheet towards basic statistical analysis, exact equation of error propagation, accuracy and precision

Lecture 8 - Error propagation and its application to a few examples, significant figures

Lecture 9 - Introduction to use spreadsheets to analyze errors, reiteration of significant figures, repeats and reproducibility

Lecture 10 - Classification of errors

Lecture 11 - A look at uncertainties in a measurement taking an example

Lecture 12 - A comprehensive and step-wise look at an experimental protocol towards understanding systematic errors in an experiment

Lecture 13 - Introductory Statistics - Part 1

Lecture 14 - Introductory Statistics - Part 2

Lecture 15 - Hypothesis testing and Finding Outliers - Part 1

Lecture 16 - Hypothesis testing and Finding Outliers - Part 2

Lecture 17 - Pooling of data

Lecture 18 - Introduction to Analysis of Variance (ANOVA) and comparing precisions

Lecture 19 - Protocol for undertaking ANOVA - Part 1

Lecture 20 - Protocol for undertaking ANOVA - Part 2

Lecture 21 - ANOVA and Least Significant Difference (LSD)

Lecture 22 - ANOVA and solved Least Significant Difference example

Lecture 23 - Using spreadsheet software to perform data analysis towards calibrating a burette

Lecture 24 - Using spreadsheet to analyze linear dependence between two variables

Lecture 25 - Using spreadsheet and MATLAB towards data analysis with example of rate kinetics

Lecture 26 - Simulating simple straight lines and kinetic curves using MATLAB

Lecture 27 - Simulating the Michaelis Menten kinetics using MATLAB

Lecture 28 - Curve fitting and simulating with variance for the Michaelis Menten kinetics using MATLAB

Lecture 29 - Standards and Volumetric/Gravimetric titrations - Part 1

Lecture 30 - Standards and Volumetric/Gravimetric titrations - Part 2

Lecture 31 - Standards and Volumetric/Gravimetric titrations - Part 3

Lecture 32 - Standards and Volumetric/Gravimetric titrations - Part 4

Lecture 33 - Standards and Volumetric/Gravimetric titrations - Part 5

Lecture 34 - Analytical Separations - Multistage extractions - Part 1

Lecture 35 - Analytical Separations - Multistage extractions - Part 2

Lecture 36 - Analytical Separations - Chromatography - Part 1

Lecture 37 - Analytical Separations - Chromatography - Part 2

Lecture 38 - Analytical Separations - Electrophoresis, Capillary electrophoresis, Isoelectric Focusing

Lecture 39 - Basics of Chromatography - Part 1

Lecture 40 - Basics of Chromatography - Part 2

Lecture 41 - Chromatography - Concept of Theoretical plates

Lecture 42 - Chromatography - Rate Theory

Lecture 43 - Practice of Chromatography - HPLC

Lecture 44 - Practice of Chromatography - Gas Chromatography

Lecture 45 - Supercritical Fluid Chromatography

Lecture 46 - Detectors employed during chromatographic separations

Lecture 47 - Course Revision

Lecture 48 - Course Revision - Week 1 to 3

Lecture 49 - Course Revision - Week 4 and 5

Lecture 50 - Course Revision - Week 6 and 7

Lecture 51 - Course Revision - Week 8 to 11

NPTEL : NOC:Fundamentals of Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Sayan Bagchi, Prof. Anirban Hazra

Lecture 1 - Introduction to Spectroscopy

Lecture 2 - Introduction to Quantum Mechanics - I

Lecture 3 - Introduction to Quantum Mechanics - II

Lecture 4 - A Simple Quantum Mechanical System: Particle in a one Dimensional Box

Lecture 5 - Spectroscopic Transitions

Lecture 6 - Intensity of a Transtion Depends on the Transition Dipole Moment - I

Lecture 7 - Intensity of a Transtion Depends on the Transition Dipole Moment - II

Lecture 8 - Comparision between Chemical Reactions and Spectroscopic Transitions

Lecture 9 - Lineshape Analysis

Lecture 10 - Different Forms of Spectroscopy

Lecture 11 - Spectroscopic Timescales

Lecture 12 - Correspondence between Linear Motion and Rotational Motion

Lecture 13 - Diatomic Rigid Rotor

Lecture 14 - Selection Rules and Rotational Spectrum

Lecture 15 - Isotope effect

Lecture 16 - Degeneracy

Lecture 17 - Intensities of Rotational Lines

Lecture 18 - Non Rigid Rotor

Lecture 19 - Polyatomic Molecules - I

Lecture 20 - Polyatomic Molecules - II and Numericals

Lecture 21 - Origin of the Rotational Selection Rule

Lecture 22 - Simple Harmonic Oscillator

Lecture 23 - Energy Levels

Lecture 24 - Selection Rules

Lecture 25 - Anharmonicity

Lecture 26 - Effects of Anharmonicity

Lecture 27 - Ro-vibrational Spectrum - I

Lecture 28 - Ro-vibrational Spectrum - II

Lecture 29 - Harmonic Oscillator Eigenvalues and Eigenfunctions - I

Lecture 30 - Harmonic Oscillator Eigenvalues and Eigenfunctions - II

Lecture 31 - Vibration of a Diatomic Molecule and Derivation of the Vibrational Selection Rule

Lecture 32 - Ro-vibrational Spectrum - III

Lecture 33 - Vibration of Polyatomic Molecules - I

Lecture 34 - Vibration of Polyatomic Molecules - II

Lecture 35 - Vibration of Polyatomic Molecules - III

Lecture 36 - Normal Mode Coordinates

Lecture 37 - Introduction to Raman Spectroscopy

Lecture 38 - Quantum theory of Raman effect

Lecture 39 - Rotational Raman Spectroscopy

Lecture 40 - Nuclear Spin Statistics

Lecture 41 - Polarizability and Polarizability Ellipsoid

Lecture 42 - Raman Activity of Vibrations

Lecture 43 - Vibrational Raman Spectroscopy

Lecture 44 - Polarization Effects and Numericals

Lecture 45 - Resonance Spectroscopy - Introduction 1

Lecture 46 - Resonance Spectroscopy - Introduction 2

Lecture 47 - NMR Spectroscopy - 1

Lecture 48 - NMR Spectroscopy - 2

Lecture 49 - NMR Spectroscopy - 3

Lecture 50 - NMR Spectroscopy - 4

Lecture 51 - NMR Spectroscopy - 5

Lecture 52 - NMR Spectroscopy - 6

Lecture 53 - ESR Spectroscopy - 1

Lecture 54 - ESR Spectroscopy - 2

Lecture 55 - ESR Spectroscopy - 3

Lecture 56 - ESR Spectroscopy - 4

Lecture 57 - Electronic Spectroscopy - 1

Lecture 58 - Electronic Spectroscopy - 2

Lecture 59 - Electronic Spectroscopy - 3

Lecture 60 - Electronic Spectroscopy - 4

Lecture 61 - Electronic Spectroscopy - 5

NPTEL : NOC:Symmetry, Stereochemistry and Applications (Chemistry and Biochemistry)

Co-ordinators : Prof. Angshuman Roy Choudhury

Lecture 1 - Introduction to stereochemistry

Lecture 2 - Nomenclature of Various Organic Molecules

Lecture 3 - Nomenclature of Cyclic molecules and other functional groups

Lecture 4 - Nomenclature of some complex molecules

Lecture 5 - Practising naming of molecules

Lecture 6 - Symmetry, Stereochemistry and Applications

Lecture 7 - Symmetry elements in organic molecules

Lecture 8 - Molecular point groups - Part I

Lecture 9 - Molecular point groups - Part II

Lecture 10 - Conformations and Configurations

Lecture 11 - Conformational Analysis - Part I

Lecture 12 - Conformational Analysis - Part II

Lecture 13 - Chair and Boat Conformation of Cyclohexane

Lecture 14 - Conformational Analysis of Disubstituted Cyclohexane Molecules

Lecture 15 - Isomerism and Representation of Isomers

Lecture 16 - Stereoisomerism

Lecture 17 - Drawing One Projection from Another

Lecture 18 - Optical Activity of Organic Molecules and Isomerism

Lecture 19 - Allenes and Biphenyls

Lecture 20 - Absolute Configuration in Biphenyls and D/L Systems

Lecture 21 - Asymmetry and Dissymmetry Molecules

Lecture 22 - Stereoisomerism and Local Symmetry

Lecture 23 - Topicity of Ligands

Lecture 24 - Topicity of Faces

Lecture 25 - Problems on Isomers and Topicity

Lecture 26 - Diastereomerism in Ring System - Part 1

Lecture 27 - Diastereomerism in Ring System - Part 2

Lecture 28 - Diastereomerism in Ring System - Part 3

Lecture 29 - Diastereomerism in PI System

Lecture 30 - Nucleophilic Reactions

Lecture 31 - Mechanism of Nucleophilic Substitution Reaction

Lecture 32 - Stability of Carbocation

Lecture 33 - Elimination Reactions

Lecture 34 - Substitution VS Elimination Reactions

Lecture 35 - Addition Reactions to Alkenes and Alkynes - Part 1

Lecture 36 - Addition Reactions to Alkenes and Alkynes - Part 2

Lecture 37 - Oxidizing Agents in Organic Chemistry and Organometallic Compounds

Lecture 38 - Some Problems and their Answers in Stereochemistry

Lecture 39 - Dynamic Stereochemistry - Part 1

Lecture 40 - Dynamic Stereochemistry - Part 2

Lecture 41 - Reaction Specificity and Selectivity

Lecture 42 - Cram's Rule and Felkin-Anh Model

Lecture 43 - Kinetics of Organic Reactions

Lecture 44 - Name Reactions and Their Mechanism - Part 1

Lecture 45 - Name Reactions and Their Mechanism - Part 2

Lecture 46 - Modifications of Diels-Alder Reaction

Lecture 47 - Name Reactions and Their Mechanism - Part 3

Lecture 48 - Name Reactions and Their Mechanism - Part 4

Lecture 49 - Rearrangement Reactions in Organic Chemistry - Part 1

Lecture 50 - Rearrangement Reactions in Organic Chemistry - Part 2

Lecture 51 - Rearrangement Reactions in Organic Chemistry - Part 3

Lecture 52 - Rearrangement Reactions in Organic Chemistry - Part 4

Lecture 53 - Brief introduction to crystallographic symmetry

Lecture 54 - Symmetries in X-ray Crystallography

Lecture 55 - 2D lattices and space groups

Lecture 56 - 3D crystallographic point groups and space groups

NPTEL : NOC:Symmetry and Group Theory (2021) (Chemistry and Biochemistry)

Co-ordinators : Prof. Jeetender Chugh

Lecture 1 - Course Contents

Lecture 2 - Symmetry and Parity Operator

Lecture 3 - Symmetry Elements and Operations - Part 1

Lecture 4 - Symmetry Elements and Operations - Part 2

Lecture 5 - Planes and Reflections

Lecture 6 - Tutorial - 1

Lecture 7 - Coordinate System and Inversion Center

Lecture 8 - Improper axis and improper rotation

Lecture 9 - Solved Examples of Symmetry Elements and Operations

Lecture 10 - Product of Symmetry Operations

Lecture 11 - Tutorial - 2

Lecture 12 - Symmetry Point Groups - Part 1

Lecture 13 - Symmetry Point Groups - Part 2

Lecture 14 - Symmetry Point Groups - Part 3

Lecture 15 - Dipole Moment and Optical Acitivity

Lecture 16 - Tutorial - 3

Lecture 17 - Point Group Definition and Examples

Lecture 18 - Sub-Group and Classes

Lecture 19 - Matrix Representation of Symmetry Operations

Lecture 20 - Matrix Representation of Point Group

Lecture 21 - Tutorial - 4

Lecture 22 - Matrix Representation of Point Group

Lecture 23 - Reducible and Irreducible Representations

Lecture 24 - Great Orthogonality Theorem

Lecture 25 - Properties of Great Orthogonality Theorem

Lecture 26 - Tutorial - 5

Lecture 27 - Irreducible Representation using GOT

Lecture 28 - Reducible to Irreducible Representation using GoT

Lecture 29 - Character Table and Mulliken Symbols

Lecture 30 - How to write a complete character table

Lecture 31 - Tutorial - 6

Lecture 32 - Representations of a cyclic group

Lecture 33 - Group Theory and Quantum Mechanics

Lecture 34 - 1) Degenerate Eigen Functions 2) Direct Product

Lecture 35 - Direct Product

Lecture 36 - Tutorial - 7

Lecture 37 - Direct Product Applications - Part 1

Lecture 38 - Direct Product Applications - Part 2

Lecture 39 - Symmetry Adapted Linear Combinations - Part 1

Lecture 40 - Symmetry Adapted Linear Combinations - Part 2

Lecture 41 - Tutorial - 8

Lecture 42 - Incomplete Projection Operator

Lecture 43 - SALC using Projection Operator

Lecture 44 - Symmetry and Chemical Bonding

Lecture 45 - Valence Bond Theory

Lecture 46 - Tutorial - 9

Lecture 47 - Molecular Orbital Theory

Lecture 48 - Localised MO Theory

Lecture 49 - Delocalized MO Theory - Part 1

Lecture 50 - Delocalized MO Theory - Part 2

Lecture 51 - Ascent and Descent in Symmetry - Part 1

Lecture 52 - Ascent and Descent in Symmetry - Part 2

Lecture 53 - Crystal Field Theory - Part 1

Lecture 54 - Crystal Field Theory - Part 2

Lecture 55 - Jahn-Teller Distortion - Part 1

Lecture 56 - Jahn-Teller Distortion - Part 2

Lecture 57 - Introduction to Spectroscopy - Part 1

Lecture 58 - Introduction to Spectroscopy - Part 2

Lecture 59 - Vibrational Spectroscopy

Lecture 60 - 1) Raman Spectroscopy and 2) Atomic Motions

Lecture 61 - Symmetry of Normal Modes of Vibration

Lecture 62 - Visualizing Molecular Vibrations using Internal Coordinates

Lecture 63 - Spectral Transition Probabilities - Part 1

Lecture 64 - Spectral Transition Probabilities - Part 2

NPTEL : NOC:Introductory Organic Chemistry - II (Chemistry and Biochemistry)

Co-ordinators : Prof. Harinath Chakrapani

Lecture 1 - Introduction - 1

Lecture 2 - Essentials of NMR Spectroscopy - Part 1

Lecture 3 - Essentials of NMR Spectroscopy - Part 2

Lecture 4 - Essentials of NMR Spectroscopy - Part 3

Lecture 5 - Electrophilic Aromatic Substitution - Part 1

Lecture 6 - Electrophilic Aromatic Substitution - Part 2

Lecture 7 - Electrophilic Aromatic Substitution - Part 3

Lecture 8 - Tutorial - 1

Lecture 9 - Introduction - 2

Lecture 10 - Electrophilic Aromatic Substitution in Phenols

Lecture 11 - EAS_Effect of Electron Donating group

Lecture 12 - EAS_Effect of Electron Withdrawing group

Lecture 13 - Nucleophilic aromatic substitution - Part 1

Lecture 14 - Nucleophilic aromatic substitution - Part 2

Lecture 15 - Special Topic_Hammond's Postulate

Lecture 16 - Tutorial-2 - Part 1

Lecture 17 - Tutorial-2 - Part 2

Lecture 18 - Essentials of IR Spectroscopy

Lecture 19 - Introduction - 3

Lecture 20 - Basics of Carbonyl Compounds

Lecture 21 - Addition Reactions on Carbonyl functional group

Lecture 22 - Addition Reactions on Carbonyl functional group

Lecture 23 - Nucleophilic Addition Reactions and its stereochemistry

Lecture 24 - Nucleophilic Addition Reactions and its Stereochemistry

Lecture 25 - Tutorial - 3

Lecture 26 - Introduction - 4

Lecture 27 - Carboxylic acid and its derivatives - Part 1

Lecture 28 - Carboxylic acid and its derivatives - Part 2

Lecture 29 - Reactions of Carboxylic acid and its derivatives

Lecture 30 - Alcohols, Ethers, and Epoxides

Lecture 31 - Tutorial - 4

Lecture 32 - Special Topic - E1CB reaction

Lecture 33 - Introduction - 5

Lecture 34 - Enols and Enolates_Intro

Lecture 35 - Enols and Enolates_Molecular Orbital Picture

Lecture 36 - Reactions of Enols and Enolates

Lecture 37 - Tutorial - 5A

Lecture 38 - Tutorial - 5B

Lecture 39 - Introduction - 6

Lecture 40 - Active methylene group

Lecture 41 - Aldol and related Reactions

Lecture 42 - Aldol Reactions: Specific enol equivalents - Part 1

Lecture 43 - Aldol Reactions: Specific enol equivalents - Part 2

Lecture 44 - Tutorial - 6

Lecture 45 - Introduction - 7

Lecture 46 - Conjugate Addition:1,2-addition and 1,4-addition

Lecture 47 - Conjugate Addition: Kinetic versus thermodynamic products

Lecture 48 - Conjugate Addition: Hard and Soft nucleophiles

Lecture 49 - Enol and Enolate alkylation

Lecture 50 - Regioselectivity of alkylation reactions

Lecture 51 - Acylation of enol/enolates and related Name Reactions

Lecture 52 - Tutorial-7: Felkin-Ahn Problems

Lecture 53 - Introduction - 8

Lecture 54 - Rearrangements - Part 1

Lecture 55 - Rearrangements - Part 2

Lecture 56 - Rearrangements - Part 3

Lecture 57 - Rearrangements - Part 4

Lecture 58 - Named Reactions - Part 1

Lecture 59 - Named Reactions - Part 2

Lecture 60 - Tutorial - 8

Lecture 61 - Conclusion

NPTEL : NOC:Elementary Electrochemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Angshuman Roy Choudhury

Lecture 1 - Introduction to Elementary Electrochemistry

Lecture 2 - The Laws of Electrochemistry and Electrolysis

Lecture 3 - Applications of Faraday's Laws of Electrolysis

Lecture 4 - Electrolytic Conduction: Arrhenius Theory of Electrolytic Dissociation

Lecture 5 - Electrochemical/Galvanic Cell: Construction and Cell Reactions

Lecture 6 - Numerical Problems on Faraday's Laws of Electrolysis

Lecture 7 - Estimation of EMF of a Cell Using Potentiometer

Lecture 8 - EMF of a Cell and Free Energy Change of a Reaction

Lecture 9 - EMF of a Cell and Equilibrium Constant of a Reaction: The Nernst Equation

Lecture 10 - Various Types of Electrodes (Glass,SHE,Calomel) in Electrochemistry

Lecture 11 - Electrode Potential and Applications of Nernst Equation

Lecture 12 - Numerical Problems: Nernst Equation, EMF of Half Cell Reactions

Lecture 13 - Measurement of Cell EMF

Lecture 14 - Electrochemical Cells: Liquid Junction Potential

Lecture 15 - Electrolytic Solutions: Determination of Activity Coefficient

Lecture 16 - Theory of Potentiometric Titrations

Lecture 17 - Preparation of Primary Standard and Standardization of NaOH

Lecture 18 - Potentiometric Titration of Strong Acid and Strong Base

Lecture 19 - Potentiometric Titration of Weak Acid with Strong Base

Lecture 20 - Potentiometric Titration of Dibasic Acid with Strong Base

Lecture 21 - Experimental Calculation of Potentiometric Titrations

Lecture 22 - Conductance and Conductivity of the Solution

Lecture 23 - Experimental Methods to Determine Transport Number

Lecture 24 - Experimental Method to Calculate Transport Number

Lecture 25 - Electrolytic Solutions

Lecture 26 - Conductance Measurement

Lecture 27 - Variation of Conductance with Concentration

Lecture 28 - Ionic Mobilities in terms of ion Conductivities

Lecture 29 - Application of Conductance Measurement - Part 1

Lecture 30 - Application of Conductance Measurement - Part 2

Lecture 31 - Activities in Electrolytic Solutions

Lecture 32 - Ionic Strength of an Electrolyte and its Importance

Lecture 33 - Hydration of Ions and Their Ionic Mobility

Lecture 34 - Solubility and Activity Product

Lecture 35 - Applications of EMF and Conductance Measurement

Lecture 36 - Dissociation Constant of Weak Acids

Lecture 37 - Conductometric Titrations of Strong Acid with Strong Base

Lecture 38 - Conductometric Titrations of Weak Acid with Strong Base

Lecture 39 - Estimation of HCl and Ammonium Chloride in a Triple Mixture using NaOH

Lecture 40 - Estimation of Total Chloride ion Concentration in Triple Mixture using Primary Standard AgNO3

Lecture 41 - Validation of Ostwald Dilution Law using HCl

Lecture 42 - Validation of Ostwald Dilution Law using Acetic Acid

Lecture 43 - Calculation and Graph Plotting for Conductometric Experiments

NPTEL : NOC:Organic Chemistry-I (Tamil) (Chemistry and Biochemistry)

Co-ordinators : Prof. Srinivasan Venkataraman

Lecture 1 - Phenols Structure, Preparation, Properties and Reactions - Part 1

Lecture 2 - Phenols Structure, Preparation, Properties and Reactions - Part 2

Lecture 3 - Phenols Structure, Preparation, Properties and Reactions - Part 3

Lecture 4 - Phenols Structure, Preparation, Properties and Reactions - Part 4

Lecture 5 - Phenols Structure, Preparation, Properties and Reactions - Part 5

Lecture 6 - Phenols Structure, Preparation, Properties and Reactions - Part 6

Lecture 7 - Phenol Assignment I and II - Part 7

Lecture 8 - Carbonyl Compounds - Part 1

Lecture 9 - Carbonyl Compounds - Part 2 (Continued...)

Lecture 10 - Carbonyl Compounds - Part 3 (Continued...)

Lecture 11 - Carbonyl Compounds - Part 4 (Continued...)

Lecture 12 - Carbonyl Compounds Assignment I and II - Part 5

Lecture 13 - Carboxylic Acids - Part 1

Lecture 14 - Functional Derivatives - Part 2

Lecture 15 - Appendices I and II - Part 3

Lecture 16 - Carboxylic Acids - Assignment I and II - Part 4

Lecture 17 - Nitro Compounds

Lecture 18 - Amines Structure, Preparation and Properties - Part 1

Lecture 19 - Amines Appendices I to IV - Part 1 (Continued...)

Lecture 20 - Assignments I to II - Part 2

Lecture 21 - Green Chemistry Introduction - Part 1

Lecture 22 - Green Chemistry Terminologies and strategies in green chemistry - Part 2 (Continued...)

Lecture 23 - Approches to Less Polluting Reactions - Part 3

Lecture 24 - Biocatalysis - Part 4

Lecture 25 - Microwave mediated and photochemical reactions and conclusion - Part 5

Lecture 26 - Acknowledgement

NPTEL : Essentials in Immunolgy (Chemistry and Biochemistry)

Co-ordinators : Prof. Anjali Karande, Dr. Dipankar Nandi, Dr. R. Manjunath

Lecture 1 - Introduction to the immune system

Lecture 2 - Cells and Organs of the immune system - Part 1

Lecture 3 - Cells and Organs of the immune system - Part 2

Lecture 4 - Cells and Organs of the immune system - Part 3

Lecture 5 - Innate immunity - Part 1

Lecture 6 - Innate immunity - Part 2

Lecture 7 - Development and differentiation of B cells - Part 1

Lecture 8 - Signaling in B cells

Lecture 9 - Organization of immunoglobulin genes and Mechanism of immunoglobulin gene rearrangement

Lecture 10 - Generation of antibody diversity

Lecture 11 - Immunoglobulin class switching Regulation of Immunoglobulin gene regulation

Lecture 12 - Structures and functions of Immunoglobulinâ€™s

Lecture 13 - The three complement pathways

Lecture 14 - Hypersensitivity type 1

Lecture 15 - Hypersensitivity types 2, 3 ,4 and Autoimmunity

Lecture 16 - Autoimmunity Autoimmuno-deficiencies f the B cells

Lecture 17 - Autoimmuno-deficiencies f the B cells

Lecture 18 - Cancer

Lecture 19 - The major histocompatibility complex - Part 1

Lecture 20 - The major histocompatibility complex - Part 2

Lecture 21 - The major histocompatibility complex - Part 3

Lecture 22 - The Major Histocompatibility Complex

Lecture 23 - The Major Histocompatibility Complex: MHC class I pathway

Lecture 24 - The Major Histocompatibility Complex: MHC class II pathway

Lecture 25 - T cell receptors

Lecture 26 - T cell Activation

Lecture 27 - T cell Activation / Differentiation

Lecture 28 - T cell synapse, motility and subsets

Lecture 29 - T cell survival

Lecture 30 - Cytokines - Part 1

Lecture 31 - Cytokines - Part 2

Lecture 32 - Autoimmunity

Lecture 33 - Immunodeficiency

Lecture 34 - Host response mechanisms during infectious diseases - Part 1

Lecture 35 - Host response mechanisms during infectious diseases - Part 2

Lecture 36 - Transplantation immunology

Lecture 37 - Vaccines

Lecture 38 - Antigens and Immunogens

Lecture 39 - Synthetic vaccines

Lecture 40 - Evolution of the immune system

NPTEL : Eukaryotic Gene Expression - basics and benefits (Chemistry and Biochemistry)

Co-ordinators : Prof. P.N. Rangarajan

Lecture 1 - Eukaryotic RNA polymerases and basal transcription factors

Lecture 2 - Diversity in core promoter elements

Lecture 3 - Diversity in general transcription factors

Lecture 4 - Proximal & Distal Promoter Elements, Enhancers and Silencers, Gene-specific Regulators

Lecture 5 - Transcription factors - DNA binding domains

Lecture 6 - Transcription factors - Transcription activation domain

Lecture 7 - Role of chromatin in eukaryotic gene regulation

Lecture 8 - Role of histones in eukaryotic gene regulation

Lecture 9 - Role of DNA methylation in eukaryotic gene regulation

Lecture 10 - Chromatin remodelling & gene regulation

Lecture 11 - mRNA processing - Role of RNA Pol II in mRNA capping and mRNA splicing

Lecture 12 - mRNA processing - Role of RNA Pol II in polyadenylation & mRNA editing

Lecture 13 - Regulation of RNA Pol I transcription

Lecture 14 - Regulation of RNA Pol III transcription

Lecture 15 - Signal Transduction Pathways - Introduction

Lecture 16 - Regulation of gene expression by cyclicAMP

Lecture 17 - Regulation of gene expression by second messengers other than cAMP

Lecture 18 - Regulation of gene expression by Protein Kinase C

Lecture 19 - Regulation of gene expression by Growth factors

Lecture 20 - Regulation of gene expression by cytokines

Lecture 21 - Regulation of gene expression by steroid hormones

Lecture 22 - Regulation of gene expression by type II nuclear receptors

Lecture 23 - Mechanism of transcriptional activation by nuclear receptors

Lecture 24 - Gene Regulation during Drosophila Development

Lecture 25 - Signal transduction pathways involved in embryonic development

Lecture 26 - Homeotic genes

Lecture 27 - Epigenetic regulation of gene expression during development

Lecture 28 - Embryonic stem cells and Transcription factor-mediated epigenetic reprogramming

Lecture 29 - Cloning and Expression vectors

Lecture 30 - Eukaryotic protein expression systems - I

Lecture 31 - Eukaryotic protein expression systems - II

Lecture 32 - Eukaryotic protein expression systems - III: Gene expression in mammalian cells using viral vectors

Lecture 33 - Human Gene Therapy

Lecture 34 - DNA vaccines

Lecture 35 - Transgenic animals

Lecture 36 - Transgenic plants

Lecture 37 - Knockout mic

Lecture 38 - Regulation of Eukaryotic Gene Expression by Small RNAs (RNA Interference, RNAi)

Lecture 39 - Genomics & Proteomics

Lecture 40 - Metabolic Engineering & Synthetic Biology

NPTEL : Introductory Quantum Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. K.L. Sebastian

Lecture 1 - Wave Paticle Duality

Lecture 2 - Standing Waves

Lecture 3 - Path Integrals and Schrodinger Equation

Lecture 4 - Postulates - Part 1

Lecture 5 - Postulates - Part 2

Lecture 6 - Postulates - Part 3

Lecture 7 - Separting Variables and Particle in a Box - Part 1

Lecture 8 - Particle in a box - Part 2

Lecture 9 - Particle in a box - Part 3

Lecture 10 - Particle in a box-time dependent states-Expectations values and time dependent states

Lecture 11 - Particle in a 3 dimensional box

Lecture 12 - Particle in a well of finite depth

Lecture 13 - Finite well, Delta and Step Functions

Lecture 14 - Finite well (Continued...)

Lecture 15 - Tunneling - Part 1

Lecture 16 - Tunneling - Part 2

Lecture 17 - Schrodinger equation for Harmonic Oscillator

Lecture 18 - Harmonic Oscillator - The Series Solution

Lecture 19 - Harmonic Oscillator - Generating function

Lecture 20 - Harmonic Oscillator - Orthogonality of Eigenfunctions

Lecture 21 - Hydrogen Atom: Separating centre of mass motion and integral motion

Lecture 22 - Hydrogen Atom: Polar Co-ordinates

Lecture 23 - Hydrogen atom continued : Separation of variables

Lecture 24 - Hydrogen atom : Finding the functions Î˜ (Î¸) and Î¦(Ï†)

Lecture 25 - Finding R(r)

Lecture 26 - Atomic Orbitals - Part 1

Lecture 27 - Atomic Orbitals - Part 2

Lecture 28 - Atomic Orbitals - Part 3

Lecture 29 - Atomic Orbitals - Part 4 and Hermitian Operators

Lecture 30 - Measurement, Uncertainty Principle

Lecture 31 - Generalized Uncertainty Principle

Lecture 32 - Generalized Uncertainty Principle (Continued...)

Lecture 33 - Angular Momentum

Lecture 34 - Angular Momentum (Continued...)

Lecture 35 - Angular Momentum (Continued...) and Spin

Lecture 36 - Pertubation Theory

Lecture 37 - Pertubation Theory (Continued...)

Lecture 38 - Variation Method - Introduction

Lecture 39 - Variation Method - Proof and Illustration

Lecture 40 - He atom wave function with spin included - Paulis principle

Lecture 41 - Hydrogen Molecular ion - Linear variation method

Lecture 42 - Hydrogen Molecular ion (Continued...)

Lecture 43 - Hydrogen Molecular ion (Continued...)

Lecture 44 - Molecuar Orbitals The Hydrogen Molecule

Lecture 45 - MO and VB theory

Lecture 46 - MO theory of diatoms

Lecture 47 - Di-atomics (Continued...)

Lecture 48 - Hybridization Huckel theory

Lecture 49 - Huckel MO Theory (Continued...)

NPTEL : Introduction to Organometallic Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. A.G. Samuelson

Lecture 1 - Introduction to Organometallic chemistry

Lecture 2 - Metal carbonyl complexes

Lecture 3 - Metal carbonyls - Part II

Lecture 4 - Ligand substitution reactions

Lecture 5 - Substitutes for carbonyl ligands

Lecture 6 - Carbene complexes

Lecture 7 - Carbene complexes (Continued...)

Lecture 8 - Non-Carbon Ancillary ligands

Lecture 9 - Non-Carbon Ancillary ligands (Continued...)

Lecture 10 - Metal alkyl complexes

Lecture 11 - Ligand Insertion Reactions

Lecture 12 - Metal alkene complexes

Lecture 13 - Alkynes ?2 bonding

Lecture 14 - Metal dihydrogen and hydrides

Lecture 15 - Migratory Insertion reaction with alkynes

Lecture 16 - Î·m (m=4 dienes and m=2n,polyenes)

Lecture 17 - Oxidative addition & Vaskas complex mechanism

Lecture 18 - Reductive elimination

Lecture 19 - Reductive Elimination mechanism

Lecture 20 - Oxidative coupling with C-C bond formation

Lecture 21 - Metathesis reactions

Lecture 22 - Metal-allyls - ? 3 complexes-synthesis, bonding

Lecture 23 - Metal-allyls - Î· 3 complexes-fluxionality, reactivity

Lecture 24 - C-C single bond forming reactions

Lecture 25 - ? 5 Cyclopentadienyl - complexes

Lecture 26 - Î·6 arene Metal complexes

Lecture 27 - Half sandwich complexes

Lecture 28 - Reactivity changes in coordinated ligands

Lecture 29 - The isolobal analogy

Lecture 30 - Fluxional Properties of Organometallics

Lecture 31 - Quantifying Steric and electronic factors

Lecture 32 - Hydrogenation reactions

Lecture 33 - Addition of HX to olefins

Lecture 34 - Reactions with CO insertion

Lecture 35 - Organometallics promoted C-X coupling

Lecture 36 - Organometallic polymerization

Lecture 37 - C-H activation

Lecture 38 - Asymmetric Catalysis

Lecture 39 - Medicinal applications of organometallic complexes

Lecture 40 - Special Properties and Applications

NPTEL : NOC:Principles and Applications of NMR Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Hanudatta S. Atreya

Lecture 1 - Introduction to NMR spectroscopy

Lecture 2 - The alignment of nuclear spins in presence of magnetic field

Lecture 3 - Introduction to rotating frame

Lecture 4 - Free induction decay and Fourier transformation of FID

Lecture 5 - NMR Hardware

Lecture 6 - The concept of chemical shift

Lecture 7 - Factors that affect chemical shifts

Lecture 8 - Chemical shift referencing

Lecture 9 - J-coupling

Lecture 10 - Recap of basics

Lecture 11 - Introduction to general one dimensional NMR experiment

Lecture 12 - Practical aspects of recording a 1D NMR experiment - I

Lecture 13 - Practical aspects of recording a 1D NMR experiment - II

Lecture 14 - Practical aspects of recording a 1D NMR experiment - III

Lecture 15 - NMR Data processing

Lecture 16 - Basic aspects of 1D proton NMR analysis

Lecture 17 - Analysis of an example 1D proton spectrum

Lecture 18 - Analysis of 1D 1H NMR spectra of molecules - I

Lecture 19 - Analysis of 1D 1H NMR spectra of molecules - II

Lecture 20 - 1D 13C NMR

Lecture 21 - Why do we need 2D NMR

Lecture 22 - A qualitative explanation of how 2D NMR experiment works

Lecture 23 - Principles of 2D COSY and Total correlation spectroscopy (2D TOCSY)

Lecture 24 - 2D NOE-spectroscopy

Lecture 25 - 2D NOESY and 2D ROESY

Lecture 26 - What is heteronuclear correlation NMR spectroscopy

Lecture 27 - Sensitivity enhancement of heternuclei via polarization transfer

Lecture 28 - Heteronucler multiple quantum NMR spectroscopy (2D HMQC) and Heteronuclear single quantum NMR spectroscopy (2D HSQC)

Lecture 29 - Practical aspects of recording and processing 2D HMQC or HSQC

Lecture 30 - HMBC and its utility

Lecture 31 - 2D HSQC TOCSY and its analysis with examples

Lecture 32 - Structure determination of molecules by NMR

Lecture 33 - Structure determination of peptides - I

Lecture 34 - Structure determination of peptides - II

Lecture 35 - Structure determination of peptides - III

Lecture 36 - Chemical exchange

Lecture 37 - Hydrogen or deuterium exchange

Lecture 38 - Diffusion ordered spectroscopy DOSY I

Lecture 39 - DOSY II

Lecture 40 - STD NMR for drug target interactions

NPTEL : NOC:Multidimensional NMR Spectroscopy for Structural Studies of Biomolecules (Chemistry and Biochemistry)

Co-ordinators : Prof. Hanudatta S. Atreya

Lecture 1 - Introduction to NMR spectroscopy

Lecture 2 - Energy levels in NMR spectroscopy: Quantum mechanical model and Vector model

Lecture 3 - Observing the NMR signal

Lecture 4 - Basic concepts in 1D NMR: Chemical shift and Spin-spin coupling

Lecture 5 - Basic concepts in 1D NMR: Nuclear Spin Relaxation, 1H NMR and 13C NMR

Lecture 6 - Basic concepts in 2D NMR spectroscopy

Lecture 7 - Principles of 2D correlation spectroscopy COSY

Lecture 8 - Principles of 2D Total correlation spectroscopy (TOCSY)

Lecture 9 - 2D Nuclear Overhauser Effect Spectroscopy (NOESY)

Lecture 10 - 2D NOESY and 2D ROESY

Lecture 11 - Principles of 2D Heteronuclear NMR

Lecture 12 - 2D Heteronuclear NMR: HSQC

Lecture 13 - Heteronuclear multiple quantum coherence (HMQC) and single quantum coherence (HSQC) - Part I

Lecture 14 - Heteronuclear multiple quantum coherence (HMQC) and single quantum coherence (HSQC) - Part II

Lecture 15 - 2D HSQC-TOCSY

Lecture 16 - 3D NMR Spectroscopy - Part I

Lecture 17 - 3D NMR Spectroscopy - Part II

Lecture 18 - 3D HNCA and 3D HNCO

Lecture 19 - 3D HNCACB and 3D HN(CO)CACB

Lecture 20 - Protein Backbone resonance assignment and side chain resonance assignment

Lecture 21 - Basic concepts of protein structure

Lecture 22 - Introduction to Structure Determination of Bio-Molecules by NMR

Lecture 23 - Over-expression of proteins in Bacteria

Lecture 24 - Isotope labeling of proteins for NMR studies - Part I

Lecture 25 - Isotope labeling of proteins for NMR studies - Part II

Lecture 26 - Isotope labeling of proteins for NMR studies - Part III

Lecture 27 - Isotope labeling of proteins for NMR studies - Part IV

Lecture 28 - Resonance assignments of Proteins - Part I

Lecture 29 - Resonance assignments of Proteins - Part II

Lecture 30 - Resonance assignments of Proteins - Part III

Lecture 31 - Determination of protein secondary structure from NMR data: CSI method

Lecture 32 - Determination of protein secondary structure from NMR data: J coupling based method

Lecture 33 - Determination of protein tertiary structure from NMR data - Part I

Lecture 34 - 3D NOESY HSQC

Lecture 35 - Determination of protein tertiary structure from NMR data - Part II

Lecture 36 - Understanding Protein ligand interaction by NMR : Chemical shift perturbation

Lecture 37 - Understanding Protein ligand interaction by NMR : Chemical exchange

Lecture 38 - Understanding Protein ligand interaction by NMR : T2 Filter

Lecture 39 - Understanding Protein ligand interaction by NMR : STD NMR

Lecture 40 - Understanding Protein ligand interaction by NMR : Transfer NOE NMR

Lecture 41 - Understanding Protein ligand interaction by NMR : Diffusion ordered Spectroscopy (DOSY) - Part I

Lecture 42 - Understanding Protein ligand interaction by NMR : Diffusion ordered Spectroscopy (DOSY) - Part II

NPTEL : NOC:Symmetry and Structure in the Solid State (Chemistry and Biochemistry)

Co-ordinators : Prof. T. N. Guru Row

Lecture 1 - Symmetry in 3D World

Lecture 2 - Two Fold Axis Representation with the Help of Esher Diagrams

Lecture 3 - Pure Rotation Axes

Lecture 4 - Properties of Crystal

Lecture 5 - Point Group Generation

Lecture 6 - Combination ofSymmetry Elements

Lecture 7 - Arrangement of Symmetry Equivalent Objects

Lecture 8 - Introduction to Plane Lattices

Lecture 9 - Bravais Lattices

Lecture 10 - Details of Stereographic Projections

Lecture 11 - Stereographic Projections (Continued)

Lecture 12 - Point Group and Crystal Systems - 1

Lecture 13 - Point Group and Crystal Systems - 2

Lecture 14 - Point Groups to Space Groups

Lecture 15 - Translation componentsin Monoclinic System

Lecture 16 - Additional Symmetry Elements

Lecture 17 - Additional Symmetry Elements (Continued...)

Lecture 18 - Space Groups - 1

Lecture 19 - Space Groups - 2

Lecture 20 - Space Groups - 3

Lecture 21 - Space Groups - 4

Lecture 22 - Additional Information on Space Groups

Lecture 23 - Details of Space Groups - 1

Lecture 24 - Details of Space Groups - 2

Lecture 25 - Details of Space Groups - 3

Lecture 26 - Details of Space Groups - 4

Lecture 27 - Crystal Structure of Calcium Carbonate

Lecture 28 - Crystal Structure of Some Minerals

Lecture 29 - Atoms in the Crystal: Positions and Relevant Properties

Lecture 30 - Crystallographic Directions and Planes

Lecture 31 - Interference of Waves

Lecture 32 - X Ray Scattering ; optical Analogy

Lecture 33 - X Ray Scattering ; Fourier transforms

Lecture 34 - X Ray Scattering ; Deriving Laue Conditions from scattering theory

Lecture 35 - X Ray Scattering ; Laue conditions to Bragg Ã¢â‚¬Ëœs Law, Introduction to Reciprocal lattice

Lecture 36 - Bragg's Law in Reciprocal Space - 1

Lecture 37 - Bragg's Law in Reciprocal Space - 2

Lecture 38 - Calculation of Intensities - 1

Lecture 39 - Calculation of Intensities - 2

Lecture 40 - Conversion from Direct to reciprocal space, the inverse relations

Lecture 41 - Diffraction and Reciprocal Space (Continued...)

Lecture 42 - Limits of Resolution

Lecture 43 - Concept of Structure Factors

Lecture 44 - Systematic Absences - 1

Lecture 45 - Systematic Absences - 2

Lecture 46 - Systematic Absences - 3

Lecture 47 - Friedel's Law and Laue classes

Lecture 48 - Experimental Aspects of Data Collection

Lecture 49 - Structure Determination - 1

Lecture 50 - Structure Determination - 2

Lecture 51 - Data Reduction

Lecture 52 - Fourier Syntheses

Lecture 53 - Patterson Method - 1

Lecture 54 - Patterson Method - 2

Lecture 55 - Direct Method

Lecture 56 - Powder Diffraction - 1

Lecture 57 - Powder Diffraction - 2

Lecture 58 - Powder Diffraction - 3

Lecture 59 - Quantum Crystallography - 1

Lecture 60 - Quantum Crystallography - 2

Lecture 61 - Intermolecular Interactions

NPTEL : NOC:Ultrafast Optics and Spectroscopy (Chemistry and Biochemistry)

Co-ordinators : Prof. Atanu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8 - Nonlinear Effects

Lecture 9 - Nonlinear Effects (Continued...)

Lecture 10 - Nonlinear Effects (Continued...)

Lecture 11 - Nonlinear Effects (Continued...)

Lecture 12 - Nonlinear Effects (Continued...)

Lecture 13 - Nonlinear Effects (Continued...)

Lecture 14 - Nonlinear Effects (Continued...)

Lecture 15 - Dispersion Effects

Lecture 16 - Nonlinear and Dispersion Effects (Continued...)

Lecture 17 - Nonlinear and Dispersion Effects (Continued...)

Lecture 18 - Transverse Electromagnetic Mode

Lecture 19 - Transverse Electromagnetic Mode (Continued...)

Lecture 20 - Construction of Ultrafast Laser

Lecture 21 - Construction of Ultrafast Laser (Continued...)

Lecture 22 - Construction of Ultrafast Laser (Continued...)

Lecture 23 - Measurement of Ultrafast Pulse

Lecture 24 - Measurement of Ultrafast Pulse (Continued...)

Lecture 25 - Measurement Techniques in Ultrafast Spectroscopy

Lecture 26 - Kinetic Model of Ultrafast Spectroscopy

Lecture 27 - Kinetic Model of Ultrafast Spectroscopy (Continued...)

Lecture 28 - Quantum Mechanical Model of Ultrafast Spectroscopy

Lecture 29 - Ultrafast Physical Chemistry: Photophysics and Photochemistry

Lecture 30 - Ultrafast Physical Chemistry: Solid State

Lecture 31 - Ultrafast Physical Chemistry: Transition Metal Complexes and Biomolecules

Lecture 32 - Maxwellâ€™s Equations

Lecture 33 - Maxwellâ€™s Equations (Continued...)

Lecture 34 - Ab Initio Molecular Dynamics - 1

Lecture 35 - Ab Initio Molecular Dynamics - 2

Lecture 36 - Ab Initio Molecular Dynamics - 3

Lecture 37 - Ab Initio Molecular Dynamics - 4

Lecture 38 - Attosecond Chemical Dynamics - 1

Lecture 39 - Attosecond Chemical Dynamics - 2

Lecture 40 - Attosecond Chemical Dynamics - 3

Lecture 41 - Attosecond Chemical Dynamics - 4

Lecture 42 - Femtochemistry of Nanocatalysis - 1

Lecture 43 - Femtochemistry of Nanocatalysis - 2

NPTEL : NOC:One and two dimensional NMR Spectroscopy for Chemists (Chemistry and Biochemistry)

Co-ordinators : Prof. N. Suryaprakash

Lecture 1 - NMR an historical perspective and NMR active nuclei

Lecture 2 - Spin Angular Momentum and Magnetic moment

Lecture 3 - Interaction of Spins with the magnetic field

Lecture 4 - Larmor Precession and Energy of interaction

Lecture 5 - NMR detection and sensitivity

Lecture 6 - Inducing Resonance and Bulk Magnetization

Lecture 7 - Signal detection and Rotating Frame Concept

Lecture 8 - Pulse phase and signal phase

Lecture 9 - FID and Fourier Transformation

Lecture 10 - Selection rules and transitions

Lecture 11 - External and Internal interactions in NMR

Lecture 12 - Chemical Shifts

Lecture 13 - NMR Spectrum and chemical equivalence

Lecture 14 - Conversion of frequency and ppm

Lecture 15 - Field dependence and factors affecting chemical shift

Lecture 16 - Factors contributing to chemical shifts - 1

Lecture 17 - Factors contributing to chemical shifts - 2

Lecture 18 - Scalar Couplings - 1

Lecture 19 - Scalar Couplings - 2

Lecture 20 - Energy levels of coupled spins

Lecture 21 - Spin system classification and multiplicity

Lecture 22 - Multiplicity pattern of coupled spins

Lecture 23 - Active and passive coupling

Lecture 24 - Coupling among equivalent spins - 1

Lecture 25 - Coupling among equivalent spins - 2

Lecture 26 - Coupling among non-equivalent spins

Lecture 27 - Geminal and Vicinal couplings

Lecture 28 - Spin system Nomenclature

Lecture 29 - Isotope effect

Lecture 30 - Analysis of Strongly coupled spin systems

Lecture 31 - Eigen values of A2 and AMX spin systems

Lecture 32 - Analysis of Three spin coupled systems

Lecture 33 - Analysis of Proton NMR spectra - 1

Lecture 34 - Analysis of Proton NMR spectra - 2

Lecture 35 - Analysis of Proton NMR spectra - 3

Lecture 36 - Basics of 13C-NMR

Lecture 37 - Coupled and Decoupled 13C-Spectra

Lecture 38 - Broadband decoupling in 13C-NMR

Lecture 39 - Analysis of 13C spectra and DEPT

Lecture 40 - Heteronuclear couplings and satellite analysis - 1

Lecture 41 - Heteronuclear couplings and satellite analysis - 2

Lecture 42 - Coupling among magnetic equivalent nuclei and isotope effect

Lecture 43 - Analysis of spectra of other nuclei

Lecture 44 - Spin Echoes

Lecture 45 - Polarization transfer techniques

Lecture 46 - INEPT and DEPT

Lecture 47 - Decoupling and NOE

Lecture 48 - NOE-2

Lecture 49 - Introduction to 2D NMR

Lecture 50 - Two-dimensional NMR

Lecture 51 - Two dimensional NMR

Lecture 52 - Two dimensional COSY

Lecture 53 - COSY and examples

Lecture 54 - Variants of COSY and TOCSY spectra

Lecture 55 - Heteronuclear correlation and inverse detection

Lecture 56 - Coupled and decoupled HSQC and HMBC

Lecture 57 - NMR data acquisition - 1

Lecture 58 - NMR data acquisition - 2

Lecture 59 - Practical considerations of 1D NMR

Lecture 60 - NMR Data processing

Lecture 61 - NMR Data processing

Lecture 62 - NMR Instrumentation - 1

Lecture 63 - NMR Instrumentation - 2

Lecture 64 - Relaxation processes - 1

Lecture 65 - Relaxation processes - 2

NPTEL : NOC:Time Dependent Quantum Chemistry (Chemistry and Biochemistry)

Co-ordinators : Prof. Atanu Bhattacharya

Lecture 1 - Introduction to TDSE

Lecture 2 - Solution to TDSE, Stationary and Non-stationary States

Lecture 3 - Electron and Vibrational Superposition States

Lecture 4 - Optical Analogy to Quantum Superposition

Lecture 5 - Introdution to Python Programming

Lecture 6 - Simple Computation with Python Programming

Lecture 7 - Plotting Graph with Python Programming

Lecture 8 - Meaning of Probability Density

Lecture 9 - Time Evolution of Normalization Constant

Lecture 10 - Expectation Value and its Time Evolution

Lecture 11 - Equation of Continuity

Lecture 12 - Bohmian Mechanics

Lecture 13 - Bohmian Mechanics and Standard Interpretation

Lecture 14 - Grid Representation of Wavefunction

Lecture 15 - Normalizing the Discretized Wavefunction and Finding Expectation Value

Lecture 16 - Plane Matter Wave and Wavepacket

Lecture 17 - Wavepacket

Lecture 18 - Stationary Gaussian Wavepacket

Lecture 19 - Travelling Gaussian Wavepacket

Lecture 20 - General Form of the Gaussian Wavepacket

Lecture 21 - Fourer Transform of a wavefunction

Lecture 22 - x-grid to k-grid

Lecture 23 - Fourier Transform using fft

Lecture 24 - Hilbert Space and Its Properties

Lecture 25 - Basis Set Approach to Quantum Mechanics

Lecture 26 - Matrix Algebra

Lecture 27 - Eigenvalue and Eigenfunction

Lecture 28 - Matrix Representation of Operators

Lecture 29 - Matrix Representation of Hamiltonian Operator

Lecture 30 - Python Tutorial 4 (Eigenvalue and Eigenfunction)

Lecture 31 - Python Tutorial 4 (Eigenvalue and Eigenfunction)

Lecture 32 - Time Evolution Operator

Lecture 33 - Split Operator Metho

Lecture 34 - Numerical Implementation of Split Operator Method

Lecture 35 - Wavepacket Dynamics under zero interaction potential

Lecture 36 - Wavepacket Dynamics under zero interaction potential (Continued...)

Lecture 37 - Wavepacket Dynamics under linear interaction potential

Lecture 38 - Quantum Adiabatic Theory

Lecture 39 - Formal Derivation of Quantum Adiabat

Lecture 40 - Geometric Phase and Dynamical Phase

Lecture 41 - Nonradiative Transition - Part 1

Lecture 42 - Nonradiative Transition - Part 2

Lecture 43 - Nonradiative Transition

Lecture 44 - Quantum Dissipative Dynamics

Lecture 45 - Quantum Dissipative Dynamics

Lecture 46 - Formal Derivation of Dissipative Quantum Dynamics

Lecture 47 - Classical Description of Light

Lecture 48 - Vector and Scalar Potential

Lecture 49 - Vector and Scalar Potential

Lecture 50 - Master Equation of Light

Lecture 51 - Hamiltonian for Light-Atom Interaction

Lecture 52 - Hamiltonian for Light-Atom Interaction

Lecture 53 - Absorption and Stimulated Emission

Lecture 54 - Absorption and Stimulated Emission

Lecture 55 - Time Correlation Function

Lecture 56 - Fourier Transform of Time Correlation Function

NPTEL : NOC:One and Two Dimensional NMR Spectroscopy: Concepts and Spectral Analysis (Chemistry and Biochemistry)

Co-ordinators : Prof. N. Suryaprakash

Lecture 1 - Nuclear Spin

Lecture 2 - NMR spin physics - I

Lecture 3 - NMR spin physics - II

Lecture 4 - Energy levels and allowed transitions

Lecture 5 - Transitions in coupled spin systems

Lecture 6 - Interaction parameters

Lecture 7 - Chemical Shifts

Lecture 8 - Shielding and deshielding, ppm and frequency scales

Lecture 9 - Factors affecting the chemical shifts

Lecture 10 - Scalar couplings

Lecture 11 - Scalar couplings

Lecture 12 - Coupling mechanism

Lecture 13 - Splitting patterns

Lecture 14 - Multiplicity patterns

Lecture 15 - Analysis of multiplicity patterns

Lecture 16 - Coupled spin system

Lecture 17 - Nomenclature for coupled spins

Lecture 18 - Energy levels of two and three coupled spins

Lecture 19 - Analysis of 1H NMR spectra - I

Lecture 20 - Analysis of 1H NMR spectra - II

Lecture 21 - Analysis of 1H NMR spectra - III

Lecture 22 - Coupling of 1H with other nuclei - I

Lecture 23 - Coupling of 1H with other nuclei - II

Lecture 24 - 13C-NMR - I

Lecture 25 - 13C-NMR - II

Lecture 26 - 13C-NMR - III

Lecture 27 - 13C-NMR - IV

Lecture 28 - Analysis of 19F spectra

Lecture 29 - 31P NMR

Lecture 30 - Analysis of spectra of Heteronuclei

Lecture 31 - Heteronuclear spectral analysis

Lecture 32 - Spin Echoes - I

Lecture 33 - Spin Echoes - II

Lecture 34 - Sensitivity enhancement

Lecture 35 - Polarization transfer

Lecture 36 - INEPT

Lecture 37 - 2D NMR - I

Lecture 38 - 2D NMR - II

Lecture 39 - 2D-COSY - I

Lecture 40 - 2D COSY - II

Lecture 41 - Types of COSY spectra

Lecture 42 - TOCSY

Lecture 43 - HSQC - I

Lecture 44 - HSQC - II

Lecture 45 - me-HSQC

Lecture 46 - HSQC and HMBC

Lecture 47 - HMBC - II

Lecture 48 - 2D INADEQUATE

Lecture 49 - 2D-INADEQUATE and 2D J-Resolved

Lecture 50 - Homo and Heteronuclear J-resolved

Lecture 51 - Conceptual understanding of NOE

Lecture 52 - Positive and negative NOE

Lecture 53 - NOE and correlation times

Lecture 54 - Complications in NOE, Steady state NOE

Lecture 55 - ROESY and Tr NOE

Lecture 56 - Combined utility of COSY, TOCSY, HSQC, NOESY

Lecture 57 - Steady State NOE

Lecture 58 - 1D NOE, 1D TOCSY

Lecture 59 - 1D-TOCSY, PURESHIFT

Lecture 60 - PURSHIFT NMR

NPTEL : Advanced Geotechnical Engineering (Civil Engineering)

Co-ordinators : Dr. B.V.S. Viswanadham

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56

Lecture 57

Lecture 58

Lecture 59

Lecture 60

NPTEL : Soil Dynamics (Civil Engineering)

Co-ordinators : Dr. Deepankar Choudhury

Lecture 1 - Introduction

Lecture 2 - Degrees of Freedom, SDOF System, Types of Vibrations

Lecture 3 - SDOF System, Types of Vibrations, Free Vibration

Lecture 4 - Problems on Tortional Motion

Lecture 5 - Damped Free Vibrations

Lecture 6 - Damped Free Vibrations, Definition of Critical Damping and problems

Lecture 7 - Decay of Motion

Lecture 8 - Forced Vibrations, Dynamic Magnification Factor

Lecture 9 - Maxwells Diagram of DMF, Discussion on Phase

Lecture 10 - Transmissibility Ratio, Response to Arbitrary, Step and Pulse Excitations

Lecture 11 - Response to Arbitrary, Step and Pulse Excitations, Response to Impact Load

Lecture 12 - Vibration Isolation, Vibrations Measuring Instruments

Lecture 13 - Solutions of Quiz Questions, Multi-Degree of Freedom (MDOF) Systems

Lecture 14 - (MDOF) System : Equation of Motion, Longitudinal Waves in an Infinitely long rod

Lecture 15 - 3 Dimensional Wave Propagation, Waves in semi-infinite media, Rayleigh Wave

Lecture 16 - Love Wave, Waves in layered medium, 3D case-Inclined wave, Earthquake Waves

Lecture 17 - Earthquake Waves; P-waves, S-waves, 3 circle method, Estimation of Earthquake Epicentre

Lecture 18 - Stresses in Soil Element, Field Tests, Seismic Reflection Test

Lecture 19 - Seismic Refraction Test, SASW Test, Laboratory & Model Tests

Lecture 20 - Centrifuge Tests Stress Strain Behavior of Cyclically Loaded Soils

Lecture 21 - Estimation of Gmax, Modulus Reduction Curves, Variation of Damping Ratio, Cyclic Plate load Test

Lecture 22 - Liquefaction, Preliminary sceening, Simplified Procedure for Liquefaction

Lecture 23 - Cyclic Stress Ratio, Evaluation of CRR, Correction Factors, Corrections for SPT

Lecture 24 - Becker Penetrometer Test (BPT), Cone Penetrometer Test (CPT), SPT v BPT, SASW Test

Lecture 25 - Types of Machine Foundations, Methods of Analysis, Design of Machine Foundations as per IS:2974 (Part-1)-1969

Lecture 26 - Tschebotarioff's

Lecture 27 - Problem on Tschebotarioff's method contd., Mass-Spring-Dashpot (MSD) Model

Lecture 28 - MSD Model- Yawing mode of Vibration, Use of MSD model for analysis

Lecture 29 - Problems on Use of MSD Model for Analysis, Rocking mode of Vibrations

Lecture 30 - Torsional Mode/Yawing Mode, Constant Force type excitation, EHS Theory

Lecture 31 - EHS Theory, Vibrational Control

Lecture 32 - Use of EHS Theory for analysis

Lecture 33 - Use of EHS Theory for analysis II

Lecture 34 - Liquefaction mitigation methods,Vibro Compaction,Densification Techniques

Lecture 35 - Soil Improvement methods,Dynamic Compaction,Reinforcement Techniques

Lecture 36 - Force-based Analysis,Dynamic analysis using MSD model

Lecture 37 - Behaviour of Subgrade Soil below Rail Track

Lecture 38 - Quiz

NPTEL : Structural Dynamics (Civil Engineering)

Co-ordinators : Dr. P. Banerji

Lecture 1 - Introduction

Lecture 2 - Inverse Power Method

Lecture 3 - Dynamics of SDOF Structure

Lecture 4 - SDOF Response to Harmonic Loads

Lecture 5 - Response of SDOF Structure to Harmonic Loading

Lecture 6 - Response to Harmonic Loading

Lecture 7 - Response to Harmonic Loading (Continue...)

Lecture 8 - Transmissibility & Base Isolation

Lecture 9 - Dynamic Characteristics & Periodic Loading

Lecture 10 - Pulse Loading

Lecture 11 - Pulse Load Response Characteristics & Impulse Loading

Lecture 12 - Frequency Domain Response Analysis

Lecture 13 - Methods of Analysis for General Loading

Lecture 14 - Numerical Analysis of Response of Single Degree of Freedom Structure & Time Domain Approaches

Lecture 15 - Response Analysis of Single Degree of Freedom System for Earthquake Loads

Lecture 16 - Earthquake Response Analysis for Single Degree of Freedom Structures

Lecture 17 - Generalized Single Degree of Freedom Systems Equations of Motions

Lecture 18 - Generalized Single Degree of Freedom Systems Equations of Motions

Lecture 19 - Generalized Single Degree of Freedom Systems Equations of Motions

Lecture 20 - Generalized Single Degree of Freedom Systems Equations of Motion & Free Vibrations

Lecture 21 - Equations of Motion for Multi Degree of Freedom Structures

Lecture 22 - Equations of Motion for Multi Degree of Freedom Systems

Lecture 23 - Multi Degree of Freedom Structure Equations of Motions

Lecture 24 - Multi Degree of Freedom Structure Equations of Motions & Free Vibration

Lecture 25 - Free Vibration for Multi Degree of Freedom Structures

Lecture 26 - Free Vibration for Multi Degree of Freedom Structures

Lecture 27 - Practical Free Vibration Analysis

Lecture 28 - Dynamic Response of Multi Degree of Freedom Systems

Lecture 29 - Dynamic Response of Multi Degree of Freedom Structures

Lecture 30 - Damping for Multi Degree of Freedom Structures

Lecture 31 - Earthquake Response of Multi Degree of Freedom Structures

Lecture 32 - Earthquake Response of Multi Degree of Freedom Structures

Lecture 33 - Dynamic Analysis of Buildings

Lecture 34 - Introduction to Dynamics of Continuous Systems

Lecture 35 - Free Vibration Response of Continuous Systems

Lecture 36 - Free Vibration & Dynamic Response of Continuous Systems

Lecture 37 - Dynamic Response of Continuous Systems

Lecture 38 - Examples for Dynamic Response of Continuous Systems

NPTEL : Watershed Management (Civil Engineering)

Co-ordinators : Dr. T.I. Eldho

Lecture 1 - Introduction to Watershed Management

Lecture 2 - Watershed Management & Stakeholder Analysis

Lecture 3 - Watershed Management Policies

Lecture 4 - Sustainable Watershed Management

Lecture 5 - Agricultural Practices & Watershed Management

Lecture 6 - Soil Erosion & Conservation

Lecture 7 - Watershed Management in Arid Regions & Strategic Planning

Lecture 8 - Integrated Water Resources Management

Lecture 9 - Conjuctive Use of Water Resources

Lecture 10 - Rainwater Harvesting System

Lecture 11 - Rainwater Harvesting & Roof Catchment System

Lecture 12 - Watershed Characteristics

Lecture 13 - Watershed Delineation & Modeling

Lecture 14 - Hydrologic Processes

Lecture 15 - Watershed Modeling

Lecture 16 - Hydrologic Modeling

Lecture 17 - Numerical Watershed Modeling

Lecture 18 - Subsurface & Groundwater Flows

Lecture 19 - Social & Community Aspects of Watershed Management

Lecture 20 - Socio-economy, Private Sector Participation & Gender Issues

Lecture 21 - Integrated Development, Water Legislation & Implementation Issues

Lecture 22 - GIS & Applications in Watershed Management

Lecture 23 - Remote Sensing & Applications in Watershed Management

Lecture 24 - Decision Support Systems & Applications in Watershed Management

Lecture 25 - Integrated Watershed Modeling Using Numerical Methods, GIS & Remote Sensing

Lecture 26 - Applications of Knowledge Based Models in Watershed Management

Lecture 27 - Surface Water Quality & Pollution Issues

Lecture 28 - Groundwater Pollution Problems & Transport Processes

Lecture 29 - Water Quality Modeling

Lecture 30 - Environmental Guidelines for Water Quality Management

Lecture 31 - Storm Water Management

Lecture 32 - Urban Drainage System

Lecture 33 - Flood Routing

Lecture 34 - Flood Control & Management

Lecture 35 - Drought Assessment

Lecture 36 - Drought Analysis

Lecture 37 - Drought Mitigation

Lecture 38 - Water Conservation

Lecture 39 - Water Recycling

Lecture 40 - Water Reclaimation & Reuse

NPTEL : Fluid Mechanics (Civil Engineering)

Co-ordinators : Dr. T.I. Eldho

Lecture 1 - Fluid Mechanics

Lecture 2 - Fundamental Concepts of Fluid Flow & Fluid Statics

Lecture 3 - Fluid Statics

Lecture 4 - Fluid Statics

Lecture 5 - Fluid Statics

Lecture 6 - Kinematics of Fluid Flow

Lecture 7 - Kinematics of Fluid Flow

Lecture 8 - Kinematics of Fluid Flow

Lecture 9 - Kinematics of Fluid Flow

Lecture 10 - Kinematics of Fluid Flow

Lecture 11 - Kinematics & Dynamics of Fluid Flow

Lecture 12 - Dynamics of Fluid Flow

Lecture 13 - Dynamics of Fluid Flow

Lecture 14 - Dynamics of Fluid Flow

Lecture 15 - Dynamics of Fluid Flow

Lecture 16 - Dynamics of Fluid Flow

Lecture 17 - Laminar and Turbulent Flows

Lecture 18 - Laminar and Turbulent Flows

Lecture 19 - Laminar and Turbulent Flows

Lecture 20 - Laminar and Turbulent Flows

Lecture 21 - Laminar and Turbulent Flows

Lecture 22 - Laminar and Turbulent Flows

Lecture 23 - Dimensional Analysis

Lecture 24 - Dimensional Analysis

Lecture 25 - Dimensional Analysis

Lecture 26 - Navier-Stocks Equations and Applications

Lecture 27 - Navier-Stocks Equations and Applications

Lecture 28 - Navier-Stocks Equations and Applications

Lecture 29 - Navier-Stocks Equations and Applications

Lecture 30 - Boundary Layer Theory and Applications

Lecture 31 - Boundary Layer Theory and Applications

Lecture 32 - Boundary Layer Theory and Applications

Lecture 33 - Boundary Layer Theory and Applications

Lecture 34 - Boundary Layer Theory and Applications

Lecture 35 - Boundary Layer Theory and Applications

Lecture 36 - Pipe Flow Systems

Lecture 37 - Pipe Flow Systems

Lecture 38 - Pipe Flow Systems

Lecture 39 - Pipe Flow Systems

Lecture 40 - Pipe Flow Systems

Lecture 41 - Pipe Flow Systems

Lecture 42 - Pipe Flow Systems

NPTEL : Soil Mechanics (Civil Engineering)

Co-ordinators : Dr. B.V.S. Viswanadham

Lecture 1 - Soil Mechanics

Lecture 2 - Soil Mechanics

Lecture 3 - Soil Mechanics

Lecture 4 - Soil Mechanics

Lecture 5 - Soil Mechanics

Lecture 6 - Soil Mechanics

Lecture 7 - Soil Mechanics

Lecture 8 - Soil Mechanics

Lecture 9 - Soil Mechanics

Lecture 10 - Soil Mechanics

Lecture 11 - Compaction of Soils - I

Lecture 12 - Soil Mechanics

Lecture 13 - Soil Mechanics

Lecture 14 - Compaction of Soils - IV

Lecture 15 - Compaction of Soils - V

Lecture 16 - Compaction of Soils - VI

Lecture 17 - Effective Stress - I

Lecture 18 - Effective Stress - II

Lecture 19 - Effective Stress - III

Lecture 20 - Flow of water through soils - I

Lecture 21 - Flow of water through soils - II

Lecture 22 - Flow of water through soils - III

Lecture 23 - Flow of water through soils - IV

Lecture 24 - Flow of water through soils - V

Lecture 25 - Flow of water through soils - VI

Lecture 26 - Flow of water through soils - VII

Lecture 27 - Flow of water through soils - VIII

Lecture 28 - Soil Mechanics

Lecture 29 - Soil Mechanics

Lecture 30 - Soil Mechanics

Lecture 31 - Soil Mechanics

Lecture 32 - Soil Mechanics

Lecture 33 - Soil Mechanics

Lecture 34 - Soil Mechanics

Lecture 35 - Soil Mechanics

Lecture 36 - Soil Mechanics

Lecture 37 - Soil Mechanics

Lecture 38 - Soil Mechanics

Lecture 39 - Soil Mechanics

Lecture 40 - Soil Mechanics

Lecture 41 - Soil Mechanics

Lecture 42 - Soil Mechanics

Lecture 43 - Soil Mechanics

Lecture 44 - Soil Mechanics

Lecture 45 - Soil Mechanics

Lecture 46 - Soil Mechanics

Lecture 47 - Soil Mechanics

Lecture 48 - Soil Mechanics

Lecture 49 - Soil Mechanics

Lecture 50 - Soil Mechanics

Lecture 51 - Soil Mechanics

Lecture 52 - Soil Mechanics

Lecture 53 - Soil Mechanics

Lecture 54 - Soil Mechanics

Lecture 55 - Soil Mechanics

Lecture 56 - Soil Mechanics

Lecture 57 - Soil Mechanics

NPTEL : Structural Analysis II (Civil Engineering)

Co-ordinators : Dr. P. Banerji

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Geotechnical Earthquake Engineering (Civil Engineering)

Co-ordinators : Dr. Deepankar Choudhury

Lecture 1 - Introduction to Geotechnical Earthquake Engineering - Part I

Lecture 2 - Introduction to Geotechnical Earthquake Engineering - Part II

Lecture 3 - Basics of Vibration Theory

Lecture 4 - Engineering Seismology - Part - I

Lecture 5 - Engineering Seismology - Part - II

Lecture 6 - Engineering Seismology - Part - III

Lecture 7 - Engineering Seismology - Part - IV

Lecture 8 - Engineering Seismology - Part - V

Lecture 9 - Engineering Seismology - Part - VI

Lecture 10 - Strong Ground Motion - Part I

Lecture 11 - Strong Ground Motion - Part II

Lecture 12 - Strong Ground Motion - Part III

Lecture 13 - Strong Ground Motion - Part IV

Lecture 14 - Strong Ground Motion - Part V

Lecture 15 - Strong Ground Motion - Part VI

Lecture 16 - Strong Ground Motion - Part VII

Lecture 17 - Wave Propagation - Part I

Lecture 18 - Wave Propagation - Part II

Lecture 19 - Wave Propagation - Part III

Lecture 20 - Wave Propagation - Part IV

Lecture 21 - Dynamic Soil Properties - Part I

Lecture 22 - Dynamic Soil Properties - Part II

Lecture 23 - Seismic Hazard Analysis - Part I

Lecture 24 - Seismic Hazard Analysis - Part II

Lecture 25 - Seismic Hazard Analysis - Part III

Lecture 26 - Seismic Hazard Analysis - Part IV

Lecture 27 - Seismic Hazard Analysis - Part V

Lecture 28 - Seismic Hazard Analysis - Part VI

Lecture 29 - Seismic Hazard Analysis - Part VII

Lecture 30 - Seismic Hazard Analysis - Part VIII

Lecture 31 - Site Response Analysis - Part I

Lecture 32 - Site Response Analysis - Part II

Lecture 33 - Site Response Analysis - Part III

Lecture 34 - Seismic Analysis and Design of Various Geotechnical Structures - Part I

Lecture 35 - Seismic Analysis and Design of Various Geotechnical Structures - Part II

Lecture 36 - Seismic Analysis and Design of Various Geotechnical Structures - Part III

Lecture 37 - Seismic Analysis and Design of Various Geotechnical Structures - Part IV

Lecture 38 - Seismic Analysis and Design of Various Geotechnical Structures - Part V

Lecture 39 - Seismic Analysis and Design of Various Geotechnical Structures - Part VI

Lecture 40 - Seismic Analysis and Design of Various Geotechnical Structures - Part VII

Lecture 41 - Seismic Analysis and Design of Various Geotechnical Structures - Part VIII

Lecture 42 - Quiz

Lecture 43 - Seismic Analysis and Design of Various Geotechnical Structures - Part IX

NPTEL : Geosynthetics Engineering: In Theory and Practice (Civil Engineering)

Co-ordinators : Prof. J.N. Mandal

Lecture 1 - Introduction

Lecture 2 - Introduction to Reinforced Earth

Lecture 3 - Introduction to Reinforced Earth

Lecture 4 - Introduction to Reinforced Earth

Lecture 5 - Introduction to Reinforced Earth

Lecture 6 - An Overview of Geosynthetics - Part I

Lecture 7 - An Overview of Geosynthetics - Part II

Lecture 8 - An Overview of Geosynthetics - Part III

Lecture 9 - An Overview of Gosynthetics

Lecture 10 - Geosynthetic Properties and Test Methods

Lecture 11 - Geosynthetic Properties and Test Methods

Lecture 12 - Geosynthetic Properties and Test Methods

Lecture 13 - Geosynthetic Properties and Test Methods

Lecture 14 - Geosynthetic Properties and Test Methods

Lecture 15 - Geosynthetic in Filtration, Drainage and Erosion Control

Lecture 16 - Geosynthetic in Filtration, Drainage and Erosion Control

Lecture 17 - Geosynthetic in Filtration, Drainage and Erosion Control

Lecture 18 - Geosynthetic in Filtration, Drainage and Erosion Control

Lecture 19 - Geosynthetic in Filtration, Drainage and Erosion Control

Lecture 20 - Geosynthetic in pavements

Lecture 21 - Geosynthetic in pavements

Lecture 22 - Geosynthetic in pavements

Lecture 23 - Geosynthetic in pavements

Lecture 24 - Geosynthetic in pavements

Lecture 25 - Geosynthetic in pavements

Lecture 26 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 27 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 28 - Geosynthetics for Reinfroced Soil Retaining Walls

Lecture 29 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 30 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 31 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 32 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 33 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 34 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 35 - Geosynthetics for Reinforced Soil Retaining Walls

Lecture 36 - Geosynthetic for Steep Slopes

Lecture 37 - Geosynthetic for Steep Slopes

Lecture 38 - Geosynthetic for Steep Slopes

Lecture 39 - Geosynthetic for Steep Slopes

Lecture 40 - Geosynthetic for Embankments on Soft Foundations

Lecture 41 - Geosynthetic for Embankments on Soft Foundations

Lecture 42 - Geosynthetic for Embankments on Soft Foundations

Lecture 43 - Geosynthetic for Ground Improvement

Lecture 44 - Geosynthetic for Ground Improvement

Lecture 45 - Geosynthetic for Ground Improvement

Lecture 46 - Geosynthetic for Ground Improvement

Lecture 47 - Geosynthetic for Ground Improvement

Lecture 48 - Geosynthetic for Ground Improvement

Lecture 49 - Geosynthetic for Ground Improvement

Lecture 50 - Geosynthetic for Improvement in Bearing Capacity

Lecture 51 - Designing with Geotextile Tube

Lecture 52 - Designing with Geotextile Tube

Lecture 53 - Design of Geosynthetic for Landfills

Lecture 54 - Design of Geosynthetic for Landfills

Lecture 55 - Design of Geosynthetic for Landfill

Lecture 56 - Design of Geosynthetic for Landfill

Lecture 57 - Design of Geosynthetic for Landfill

Lecture 58 - Designing With Geofoam

Lecture 59 - Designing With Geofoam

Lecture 60 - Designing With Geofoam

Lecture 61 - Designing With Geofoam

Lecture 62 - Designing With Geofoam

Lecture 63 - Designing With Geofoam

NPTEL : NOC:Geotechnical Engineering Laboratory (Civil Engineering)

Co-ordinators : Prof. J. N. Mandal

Lecture 1 - Soil Processing

Lecture 2 - Specific Gravity and Field Density

Lecture 3 - Field Density

Lecture 4 - Grain Size Analysis

Lecture 5 - Grain Size Analysis (Continued...)

Lecture 6 - Grain Size Analysis (Continued...)

Lecture 7 - Atterberg Limit

Lecture 8 - Compaction

Lecture 9 - Compaction (Continued...)

Lecture 10 - Compaction (Continued...)

Lecture 11 - Compaction and Permeability

Lecture 12 - Permeability

Lecture 13 - Permeability and Shear Strength

Lecture 14 - Shear Strength

Lecture 15 - Shear Strength (Continued...)

Lecture 16 - Shear Strength (Continued...)

Lecture 17 - Shear Strength (Continued...)

Lecture 18 - Shear Strength (Continued...)

Lecture 19 - Shear Strength (Continued...)

Lecture 20 - Consolidation

Lecture 21 - Consolidation (Continued...)

Lecture 22 - Consolidation (Continued...)

NPTEL : NOC:Geosynthetics Testing Laboratory (Civil Engineering)

Co-ordinators : Prof. J. N. Mandal

Lecture 1 - Introduction

Lecture 2 - Types of Geosynthetics

Lecture 3 - Functions

Lecture 4 - Tests for Physical Properties and tensile strength of geosynthetics

Lecture 5 - Tensile Modulus

Lecture 6 - Drop Cone Test

Lecture 7 - Puncture Resistance Test

Lecture 8 - Puncture Resistance Test and Burst Strength Test

Lecture 9 - Grab Tensile Test

Lecture 10 - Grab Tensile Test and Triaxial Test

Lecture 11 - Triaxial and Pullout Test

Lecture 12 - Pullout Test

Lecture 13 - Sewn Seam Strength, Permittivity and Transmissivity

Lecture 14 - Hydraulic Properties and abrasion Test of geosynthetics

Lecture 15 - Endurance properties of Geosynthetics

Lecture 16 - Density, Water Absorption and Compressive Properties tests of Geofoam

Lecture 17 - Compressive Properties of Geofoam

Lecture 18 - Compressive and Tensile Properties of Geofoam

Lecture 19 - Tensile and Shear Properties of Geofoam

Lecture 20 - Shear and Flexural Properties of Geofoam

Lecture 21 - Flexural Properties and Flammability Test of Geofoam

NPTEL : NOC:Environmental Geotechnics (Civil Engineering)

Co-ordinators : Prof. Devendra Narain Singh

Lecture 1 - Overview - 1

Lecture 2 - Overview - 2

Lecture 3 - Overview - 3

Lecture 4 - Civil Engineering

Lecture 5 - Recent Trends in civil engineering

Lecture 6 - Recent Trends and Subject organization

Lecture 7 - Civil Engineering and Soil Mechanics

Lecture 8 - Soil mechanics

Lecture 9 - Recent Trends in Soil mechanics

Lecture 10 - Soil contamination

Lecture 11 - Soil Improvement and wastes

Lecture 12 - Contaminant transport in soils

Lecture 13 - Soil- water- Environment Interaction

Lecture 14 - Basic concepts of analysis

Lecture 15 - Particle Energy Field Theory

Lecture 16 - Waste and types

Lecture 17 - Municipal and Industrial solid waste

Lecture 18 - Industrial non-hazardous and Hazardous wastes

Lecture 19 - Application of Industrial by-products

Lecture 20 - Introduction to Characterization of waste

Lecture 21 - Geomaterial characterization - 1

Lecture 22 - Geomaterial characterization - 2 (Morphological and physical characterization)

Lecture 23 - Geomaterial characterization - 3 (Chemical characterization)

Lecture 24 - Geomaterial characterization - 4 (Mercury Intrusive Porosimeter)

Lecture 25 - Geomaterial characterization - 5 (Specific Surface Area - I)

Lecture 26 - Geomaterial characterization - 6 (Specific surface area - II)

Lecture 27 - Geomaterial characterization - 7

Lecture 28 - Geomaterial characterization - 8 (Pore solution studies - I)

Lecture 29 - Geomaterial characterization - 9 (Pore solution studies - II)

Lecture 30 - Geomaterial characterization - 10 (Assessing soil contamination)

Lecture 31 - Geomaterial characterization - 11

Lecture 32 - Contaminant transport through porous media - 1

Lecture 33 - Contaminant transport through porous media - 2

Lecture 34 - Contaminant transport through porous media - 3

Lecture 35 - Contaminant transport through porous media - 4

Lecture 36 - Contaminant transport through porous media - 5

Lecture 37 - Sorption and Desorption characteristics of geomaterials - 1

Lecture 38 - Sorption and Desorption characteristics of geomaterials - 2

Lecture 39 - Sorption and Desorption characteristics of geomaterials - 3

Lecture 40 - Thermal Characterisation - 1

Lecture 41 - Thermal characterization - 2

Lecture 42 - Thermal characterisation - 3

Lecture 43 - Electrical characterization - 1

Lecture 44 - Electrical characterization - 2

Lecture 45 - Electrical characterization - 3

Lecture 46 - Electrical characterization - 4

Lecture 47 - Electrical characterization - 5

Lecture 48 - Swelling, shrinkage and cracking characteristics of soil - 1

Lecture 49 - Swelling, shrinkage and cracking characteristics of soil - 2

Lecture 50 - Swelling, shrinkage and cracking characteristics of soil - 3

Lecture 51 - Swelling, shrinkage and cracking characteristics of soil - 4

Lecture 52 - Swelling, shrinkage and cracking characteristics of soil - 5

Lecture 53 - Swelling, shrinkage and cracking characteristics of soil - 6

NPTEL : NOC:Environmental Geomechanics (Civil Engineering)

Co-ordinators : Prof. Devendra Narain Singh

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Overview

Lecture 4 - Civil Engineering and Soil Mechanics

Lecture 5 - Soil mechanics

Lecture 6 - Environmental Geomechanics

Lecture 7 - Scope of Environmental Geomechanics - I

Lecture 8 - Scope of Environmental Geomechanics - II

Lecture 9 - Scope of Environmental Geomechanics - III

Lecture 10 - Recent trends - I

Lecture 11 - Recent trends - II

Lecture 12 - Energy Geotechnics

Lecture 13 - Soil: A living entity

Lecture 14 - Soil- water- environment interaction - I

Lecture 15 - Soil- water- environment interaction - II

Lecture 16 - Soil- water- environment interaction - III

Lecture 17 - Particle energy field theory - I

Lecture 18 - Particle energy field theory - II

Lecture 19 - Particle energy field theory - III

Lecture 20 - Waste: A manmade resource - I

Lecture 21 - Waste: A manmade resource - II

Lecture 22 - Waste: A manmade resource - III

Lecture 23 - Application of industrial by-products - I

Lecture 24 - Application of industrial by-products - II

Lecture 25 - Geomaterial characterization - I (Mineralogical characterization)

Lecture 26 - Geomaterial characterization - II (Mineralogical characterization)

Lecture 27 - Geomaterial characterization - III (Morphological characterization)

Lecture 28 - Geomaterial characterization - IV (Morphological characterization)

Lecture 29 - Geomaterial characterization - V (Specific surface area)

Lecture 30 - Geomaterial characterization - VI (Chemical characterization)

Lecture 31 - Geomaterial characterization - VII (Chemical characterization)

Lecture 32 - Geomaterial characterization - VIII (Chemical characterization)

Lecture 33 - Geomaterial characterization - IX (Chemical characterization)

Lecture 34 - Geomaterial characterization - X (Chemical characterization)

Lecture 35 - Geomaterial characterization - XI (Chemical characterization)

Lecture 36 - Geomaterial characterization - XII (Corrosion potential of soils)

Lecture 37 - Soil characteristics and environmental variables

Lecture 38 - Corrosion potential of soils

Lecture 39 - Contaminant transport through porous media - I

Lecture 40 - Contaminant transport through porous media - II

Lecture 41 - Contaminant transport through porous media - III

Lecture 42 - Sorption â€“ desorption characteristics - I

Lecture 43 - Sorption â€“ desorption characteristics - II

Lecture 44 - Sorption â€“ desorption characteristics - III

Lecture 45 - Thermal characterization - I

Lecture 46 - Thermal characterization - II

Lecture 47 - Thermal characterization - III

Lecture 48 - Cracking characteristics of fine-grained soils - I

Lecture 49 - Cracking characteristics of fine-grained soils - II

Lecture 50 - Cracking characteristics of fine-grained soils - III

Lecture 51 - Electrical characterization - I

Lecture 52 - Electrical characterization - II

Lecture 53 - Electrical characterization - III

Lecture 54 - Magnetic characterization

Lecture 55 - Pore-structure characterization - I

Lecture 56 - Pore-structure characterization - II

NPTEL : NOC:Geotechnical Engineering - 1 (Civil Engineering)

Co-ordinators : Prof. Devendra Narain Singh

Lecture 1 - Introduction

Lecture 2 - Origin and Definition of Soils

Lecture 3 - Classification of Soils - I

Lecture 4 - Classification of Soils - II

Lecture 5 - Classification of Soils - III and Challenging Situations

Lecture 6 - Soil constituents - I

Lecture 7 - Soil constituents - II

Lecture 8 - Particulate Nature of the Soils

Lecture 9 - Soil Aggregate and Phase Relations

Lecture 10 - Classification of Soils and Sieve Analysis

Lecture 11 - Particle Size Analysis of Finegrained Soils

Lecture 12 - Soil-water Interaction - I

Lecture 13 - Soil-water Interaction - II

Lecture 14 - Compaction Characteristics of Soil - I

Lecture 15 - Compaction Characteristics of Soil - II

Lecture 16 - Permeability of Soil and Ground Water Flow - I

Lecture 17 - Permeability of Soil and Ground Water Flow - II

Lecture 18 - Coefficient of Permeability

Lecture 19 - Seepage Theory

Lecture 20 - Applications of Seepage Theory

Lecture 21 - Flow Net in the Earthen Dam - I

Lecture 22 - Flow Net in the Earthen Dam - II

Lecture 23 - Stresses in the Soil Mass due to External Loadings - I

Lecture 24 - Stresses in the Soil Mass due to External Loadings - II

Lecture 25 - Compression Characteristics of Soils - I

Lecture 26 - Compression Characteristics of Soils - II

Lecture 27 - Consolidation of soils

Lecture 28 - Coefficient of consolidation

NPTEL : NOC:Remote Sensing: Principles and Applications (Civil Engineering)

Co-ordinators : Prof. Eswar Rajasekaran

Lecture 1 - Introduction to RS and EMR

Lecture 2 - Introduction to EMR

Lecture 3 - Basic Laws of RS

Lecture 4 - Properties of EMR - Part 1

Lecture 5 - Properties of EMR - Part 2

Lecture 6 - Interaction of EMR with atmosphere

Lecture 7 - Radiometry - Part 1

Lecture 8 - Radiometry - Part 2

Lecture 9 - Radiometry - Part 3

Lecture 10 - Reflectance, albedo and related quantities

Lecture 11 - Interaction of EMR with terrain features - Part 1

Lecture 12 - Interaction of EMR with terrain features - Part 2

Lecture 13 - Radiation reaching sensor - Part 1

Lecture 14 - Radiation reaching sensor - Part 2

Lecture 15 - RS data: From Radiance to reflectance - Part 1

Lecture 16 - RS data: From Radiance to reflectance - Part 2

Lecture 17 - RS data: From Radiance to reflectance - Part 3

Lecture 18 - RS image acquisition and RS systems - Part 1

Lecture 19 - RS image acquisition and RS systems - Part 2

Lecture 20 - RS image acquisition and RS systems - Part 3

Lecture 21 - RS image acquisition and RS systems - Part 4

Lecture 22 - RS image acquisition and RS systems - Part 5

Lecture 23 - RS image acquisition and RS systems - Part 6

Lecture 24 - RS image acquisition and RS systems - Part 7

Lecture 25 - RS image acquisition and RS systems - Part 8

Lecture 26 - RS image acquisition and RS systems - Part 9

Lecture 27 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 1

Lecture 28 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 2

Lecture 29 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 3

Lecture 30 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 4

Lecture 31 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 5

Lecture 32 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 6

Lecture 33 - Spectral Properties of few common earth features in the Visible, NIR and SWIR bands - Part 7

Lecture 34 - Spectral Indices

Lecture 35 - Thermal Infrared Remote Sensing - Part 1

Lecture 36 - Thermal Infrared Remote Sensing - Part 2

Lecture 37 - Thermal Infrared Remote Sensing - Part 3

Lecture 38 - Thermal Infrared Remote Sensing - Part 4

Lecture 39 - Thermal Infrared Remote Sensing - Part 5

Lecture 40 - Passive Microwave Remote Sensing - Part 1

Lecture 41 - Passive Microwave Remote Sensing - Part 2

Lecture 42 - Passive Microwave Remote Sensing - Part 3

Lecture 43 - Passive Microwave Remote Sensing - Part 4

Lecture 44 - Active microwave Remote Sensing - Radar - Part 1

Lecture 45 - Active microwave Remote Sensing - Radar - Part 2

Lecture 46 - Active microwave Remote Sensing - Radar - Part 3

Lecture 47 - Active microwave Remote Sensing - Radar - Part 4

Lecture 48 - Active microwave Remote Sensing - Radar - Part 5

Lecture 49 - Active microwave Remote Sensing - Radar - Part 6

Lecture 50 - Platforms for remote sensing observations - Part 1

Lecture 51 - Platforms for remote sensing observations - Part 2

Lecture 52 - Platforms for remote sensing observations - Part 3

Lecture 53 - Platforms for remote sensing observations - Part 4

Lecture 54 - Platforms for remote sensing observations - Part 5

Lecture 55 - Platforms for remote sensing observations - Part 6

Lecture 56 - LIDAR - Part 1

Lecture 57 - LIDAR - Part 2

Lecture 58 - LIDAR - Part 3

Lecture 59 - RS data, data portals and processing tools - Part 1

Lecture 60 - RS data, data portals and processing tools - Part 2

Lecture 61 - RS data, data portals and processing tools - Part 3

Lecture 62 - Land use, land cover monitoring and change detection - Part 1

Lecture 63 - Land use, land cover monitoring and change detection - Part 2

Lecture 64 - Application of RS in water resources management - Part 1

Lecture 65 - Application of RS in water resources management - Part 2

Lecture 66 - Application of RS in water resources management - Part 3

Lecture 67 - Application of RS in water resources management - Part 4

NPTEL : NOC:Dynamics of Structures (Civil Engineering)

Co-ordinators : Prof. Manish Kumar

Lecture 1 - Introduction to Structural Dynamics

Lecture 2 - Idealization of Structures

Lecture 3 - Components of Dynamic System

Lecture 4 - Equation of Motion

Lecture 5 - Free Vibration

Lecture 6 - Damped Free Vibration - Part 1

Lecture 7 - Damped Free Vibration - Part 2

Lecture 8 - Undamped Harmonic Excitations

Lecture 9 - Damped Harmonic Excitations

Lecture 10 - Frequency response curves

Lecture 11 - Transmissibility

Lecture 12 - Energy in Forced Vibrations

Lecture 13 - Unit impulse Functions

Lecture 14 - Step and Ramp Forces

Lecture 15 - Pulse Excitations

Lecture 16 - Numerical Response Methods

Lecture 17 - Seismic Response Spectra

Lecture 18 - Continuous systems

Lecture 19 - Lumped mass systems

Lecture 20 - Equation of motion

Lecture 21 - Equation of motion - examples

Lecture 22 - Mode shapes and frequencies

Lecture 23 - Free vibration - Undamped and Damped

Lecture 24 - Damping in MDOF Systems

Lecture 25 - Forced response of MDOF systems

Lecture 26 - Modal superposition Analysis

Lecture 27 - Response Spectrum Analysis

Lecture 28 - Concept of Seismic Isolation

Lecture 29 - Dynamics of Base-isolation Systems

NPTEL : NOC:Microwave Remote Sensing in Hydrology (Civil Engineering)

Co-ordinators : Prof. J. Indu

Lecture 1 - Syllabus

Lecture 2 - History Of Microwave Remote Sensing

Lecture 3 - Overview Of Active and Passive Microwave Remote Sensing

Lecture 4 - Fundamentals Laws Of Remote Sensing

Lecture 5 - Tutorial 1: Python Programming From Beginner Perspective

Lecture 6 - Scattering Of Microwaves

Lecture 7 - Synthetic Aperture Radars - Basics

Lecture 8 - Sar Image Processing - Fundamental Terminologies

Lecture 9 - Working With Sar Imagery

Lecture 10 - Understanding Radar Equation

Lecture 11 - Tutorial 2 : Exploring Alos Palsar Data In Python

Lecture 12 - Understanding Radar Imagery

Lecture 13 - Tutorial 3: Introduction To SNAP

Lecture 14 - Doppler Shift

Lecture 15 - Speckle

Lecture 16 - Speckle - How To Handle

Lecture 17 - Tutorial 4 Part 1: Plotting In 1 D Using Python

Lecture 18 - Tutorial 4 Part 2: Plotting In 2 D Using Python

Lecture 19 - Tutorial 4 Part 3: Statistics Using Python

Lecture 20 - Tutorial 4 Part 4: Hypothesis Tesing Using Python

Lecture 21 - Sar Image Pre Processing

Lecture 22 - Sar Image Texture

Lecture 23 - Texture For Image Classification

Lecture 24 - Polarization

Lecture 25 - Tutorial 5 Part 1: Speckle Filtering Using Python

Lecture 26 - Tutorial 5 Part 2: Speckle Filtering Using Python Using Gaussian Filter

Lecture 27 - Numerical On Radar Remote Sensing

Lecture 28 - Numerical On Radar Remote Sensing

Lecture 29 - Image Classification - Basics

Lecture 30 - Supervised Classification

Lecture 31 - Maximum Likelihood Classification

Lecture 32 - Tutorial 6 Part 1: Sar Image Pre-processing

Lecture 33 - Tutorial 6 Part 2: Maximum Likelihood Classification In Snap

Lecture 34 - Unsupervised Classification And Accuracy Assessment

Lecture 35 - Fuzzy Classification

Lecture 36 - Tutorial 7 Part 1: Working With Grace Data In Python

Lecture 37 - Tutorial 7 Part 2: Altimetry Data In Python

Lecture 38 - Tutorial 7 Part 3: Swot Mission For Altimetry

Lecture 39 - Radars In Hydrology

Lecture 40 - Applications Of Radar Remote Sensing In Hydrology

Lecture 41 - Doppler Weather Radar

Lecture 42 - Tutorial 8 Part 1: Doppler Weather Radar Data Visualization And Precipitation Estimation

Lecture 43 - Tutorial 8 Part 2: Doppler Weather Radar Data Visualization And Precipitation Estimation

Lecture 44 - Radar Altimetry

Lecture 45 - Measuring Soil Moisture And Terrestrial Water Storage Using Radar Remote Sensing

Lecture 46 - Tutorial 9: Handling Passive Microwave Obsevations

Lecture 47 - Fundamentals Of Passive Microwave Remote Sensing - Part 1

Lecture 48 - Fundamentals Of Passive Microwave Remote Sensing - Part 2

Lecture 49 - Applications Of Passive Microwave Remote Sensing In Hydrology

Lecture 50 - Passive Microwave Radiometers And Their Applications

Lecture 51 - Tutorial 10: Processing Satellite Precipitation Data Using Python

Lecture 52 - Introduction To The Basics Of Sar Intereferometry

Lecture 53 - Sar Interferometry (Insar) And Applications

Lecture 54 - Introduction To Other Modes Of Sar Interferometry And Applications - DInSAR, PSInSAR and DEM's

Lecture 55 - Tutorial 11: Sar Interferometry Processing Using Snaphu

Lecture 56 - Tutorial 12 Part 1: Hydrologic Modelling Using Microwave Remote Sensing

Lecture 57 - Tutorial 12 Part 2: Introduction To Swat+ Hydrological Model

Lecture 58 - Tutorial 12 Part 3: Introductory Tutorial On Vic Hydrological Model

NPTEL : NOC:Groundwater Hydrology and Management (Civil Engineering)

Co-ordinators : Prof. Pennan Chinnasamy

Lecture 1 - Introduction to Groundwater - Part 1

Lecture 2 - Introduction to Groundwater - Part 2

Lecture 3 - Introduction to Groundwater - Part 3

Lecture 4 - Introduction to Groundwater - Part 4

Lecture 5 - Introduction to Groundwater - Part 5

Lecture 6 - International importance of groundwater and India - Part 1

Lecture 7 - International importance of groundwater and India - Part 2

Lecture 8 - International importance of groundwater and India - Part 3

Lecture 9 - International importance of groundwater and India - Part 4

Lecture 10 - International importance of groundwater and India - Part 5

Lecture 11 - Physics and hydrology of Groundwater - Part 1

Lecture 12 - Physics and hydrology of Groundwater - Part 2

Lecture 13 - Physics and hydrology of Groundwater - Part 3

Lecture 14 - Physics and hydrology of Groundwater - Part 4

Lecture 15 - Physics and hydrology of Groundwater - Part 5

Lecture 16 - Groundwater governing equations 1 - Part 1

Lecture 17 - Groundwater governing equations 1 - Part 2

Lecture 18 - Groundwater governing equations 1 - Part 3

Lecture 19 - Groundwater governing equations 1 - Part 4

Lecture 20 - Groundwater governing equations 1 - Part 5

Lecture 21 - Groundwater governing equations 2 - Part 1

Lecture 22 - Groundwater governing equations 2 - Part 2

Lecture 23 - Groundwater governing equations 2 - Part 3

Lecture 24 - Groundwater governing equations 2 - Part 4

Lecture 25 - Groundwater governing equations 2 - Part 5

Lecture 26 - Groundwater recharge and discharge - Part 1

Lecture 27 - Groundwater recharge and discharge - Part 2

Lecture 28 - Groundwater recharge and discharge - Part 3

Lecture 29 - Groundwater recharge and discharge - Part 4

Lecture 30 - Groundwater recharge and discharge - Part 5

Lecture 31 - Constructing aquifers using groundwater data - Part 1

Lecture 32 - Constructing aquifers using groundwater data - Part 2

Lecture 33 - Constructing aquifers using groundwater data - Part 3

Lecture 34 - Constructing aquifers using groundwater data - Part 4

Lecture 35 - Constructing aquifers using groundwater data - Part 5

Lecture 36 - Conceptual model for groundwater - Part 1

Lecture 37 - Conceptual model for groundwater - Part 2

Lecture 38 - Conceptual model for groundwater - Part 3

Lecture 39 - Conceptual model for groundwater - Part 4

Lecture 40 - Conceptual model for groundwater - Part 5

Lecture 41 - Groundwater data in India - Part 1

Lecture 42 - Groundwater data in India - Part 2

Lecture 43 - Groundwater data in India - Part 3

Lecture 44 - Groundwater data in India - Part 4

Lecture 45 - Groundwater data in India - Part 5

Lecture 46 - Application of Groundwater data in India - Part 1

Lecture 47 - Application of Groundwater data in India - Part 2

Lecture 48 - Application of Groundwater data in India - Part 2

Lecture 49 - Application of Groundwater data in India - Part 3

Lecture 50 - Application of Groundwater data in India - Part 3

Lecture 51 - Introduction to Groundwater modeling - Part 1

Lecture 52 - Introduction to Groundwater modeling - Part 2

Lecture 53 - Introduction to Groundwater modeling - Part 3

Lecture 54 - Introduction to Groundwater modeling - Part 4

Lecture 55 - Introduction to Groundwater modeling - Part 5

Lecture 56 - Case studies of Groundwater in India - Part 1

Lecture 57 - Case studies of Groundwater in India - Part 2

Lecture 58 - Case studies of Groundwater in India - Part 3

Lecture 59 - Case studies of Groundwater in India - Part 4

Lecture 60 - Case studies of Groundwater in India - Part 5

NPTEL : NOC:Rural Water Resources Management (Civil Engineering)

Co-ordinators : Prof. Pennan Chinnasamy

Lecture 1 - Importance of water resource management and Hydrological Cycle and representations - Part 1

Lecture 2 - Importance of water resource management and Hydrological Cycle and representations - Part 2

Lecture 3 - Importance of water resource management and Hydrological Cycle and representations - Part 3

Lecture 4 - Importance of water resource management and Hydrological Cycle and representations - Part 4

Lecture 5 - Importance of water resource management and Hydrological Cycle and representations - Part 5

Lecture 6 - Key Hydrological Parameters 1 - Part 1

Lecture 7 - Key Hydrological Parameters 1 - Part 2

Lecture 8 - Key Hydrological Parameters 1 - Part 3

Lecture 9 - Key Hydrological Parameters 1 - Part 4

Lecture 10 - Key Hydrological Parameters 1 - Part 5

Lecture 11 - Key Hydrological Parameters 2 - Part 1

Lecture 12 - Key Hydrological Parameters 2 - Part 2

Lecture 13 - Key Hydrological Parameters 2 - Part 3

Lecture 14 - Key Hydrological Parameters 2 - Part 4

Lecture 15 - Key Hydrological Parameters 2 - Part 5

Lecture 16 - Introduction to Groundwater hydrology - Part 1

Lecture 17 - Introduction to Groundwater hydrology - Part 2

Lecture 18 - Introduction to Groundwater hydrology - Part 3

Lecture 19 - Introduction to Groundwater hydrology - Part 4

Lecture 20 - Introduction to Groundwater hydrology - Part 5

Lecture 21 - Groundwater components - Part 1

Lecture 22 - Groundwater components - Part 2

Lecture 23 - Groundwater components - Part 3

Lecture 24 - Groundwater components - Part 4

Lecture 25 - Groundwater components - Part 5

Lecture 26 - Surface water hydrology - Part 1

Lecture 27 - Surface water hydrology - Part 2

Lecture 28 - Surface water hydrology - Part 3

Lecture 29 - Surface water hydrology - Part 4

Lecture 30 - Surface water hydrology - Part 5

Lecture 31 - Water Mass Balance Equation - Part 1

Lecture 32 - Water Mass Balance Equation - Part 2

Lecture 33 - Water Mass Balance Equation - Part 3

Lecture 34 - Water Mass Balance Equation - Part 4

Lecture 35 - Water Mass Balance Equation - Part 5

Lecture 36 - Rural water management issues, data challenges and observation records - Part 1

Lecture 37 - Rural water management issues, data challenges and observation records - Part 2

Lecture 38 - Rural water management issues, data challenges and observation records - Part 3

Lecture 39 - Rural water management issues, data challenges and observation records - Part 4

Lecture 40 - Rural water management issues, data challenges and observation records - Part 5

Lecture 41 - Rural water resource management infrastructure (engineered) - Part 1

Lecture 42 - Rural water resource management infrastructure (engineered) - Part 2

Lecture 43 - Rural water resource management infrastructure (engineered) - Part 3

Lecture 44 - Rural water resource management infrastructure (engineered) - Part 4

Lecture 45 - Rural water resource management infrastructure (engineered) - Part 5

Lecture 46 - Rural water resource management infrastructure (nature based) - Part 1

Lecture 47 - Rural water resource management infrastructure (nature based) - Part 2

Lecture 48 - Rural water resource management infrastructure (nature based) - Part 3

Lecture 49 - Rural water resource management infrastructure (nature based) - Part 4

Lecture 50 - Rural water resource management infrastructure (nature based) - Part 5

Lecture 51 - Solving case studies in rural water resource management - Part 1

Lecture 52 - Solving case studies in rural water resource management - Part 2

Lecture 53 - Solving case studies in rural water resource management - Part 3

Lecture 54 - Solving case studies in rural water resource management - Part 4

Lecture 55 - Solving case studies in rural water resource management - Part 5

Lecture 56 - Rural hydrological databases for India - Part 1

Lecture 57 - Rural hydrological databases for India - Part 2

Lecture 58 - Rural hydrological databases for India - Part 3

Lecture 59 - Rural hydrological databases for India - Part 4

Lecture 60 - Rural hydrological databases for India - Part 5

NPTEL : NOC:Geotechnical Engineering-II (Civil Engineering)

Co-ordinators : Prof. Devendra Narain Singh

Lecture 1 - Introduction

Lecture 2 - Shear Strength of Soils - I

Lecture 3 - Shear Strength of Soils - II

Lecture 4 - Shear Strength of Soils - III

Lecture 5 - Shear Strength of Soils - IV

Lecture 6 - Testing for shear strength parameters: Introduction

Lecture 7 - Direct shear box test

Lecture 8 - Direct Shear Interpretation of Test Results - I

Lecture 9 - Direct Shear Interpretation of Test Results - II

Lecture 10 - Kf line

Lecture 11 - Selection of Parameter (Shear Strength,SS) - I

Lecture 12 - Selection of Parameter (Shear Strength,SS) - II

Lecture 13 - Shear Strength of Cohesive Soils - I

Lecture 14 - Shear Strength of Cohesive Soils - II

Lecture 15 - Triaxial Test - I

Lecture 16 - Triaxial Test - II

Lecture 17 - Triaxial Test - III

Lecture 18 - Interpretation of Triaxial test Results - I

Lecture 19 - Interpretation of Triaxial test Results - II

Lecture 20 - Interpretation of Triaxial test Results - III

Lecture 21 - Pore Pressure Parameters - I

Lecture 22 - Pore Pressure Parameters - II

Lecture 23 - Stress Paths - I

Lecture 24 - Stress Paths - II

Lecture 25 - Plastic Equilibrium in Soils

Lecture 26 - Mechanisms of Development of Plastic Equilibrium in Soils - I

Lecture 27 - Mechanisms of Development of Plastic Equilibrium in Soils - II

Lecture 28 - Earth Pressure Analysis (Trial Wedge) - I

Lecture 29 - Earth Pressure Analysis (Trial Wedge) - II

Lecture 30 - Earth Pressure Analysis (Trial Wedge) - III

Lecture 31 - Analysis of Completely Submerged Retaining wall

Lecture 32 - Gravity Walls Supporting Cohesive Soil Mass (Backfill)

Lecture 33 - Sloping Backfill

Lecture 34 - Earth Pressure Analysis - I

Lecture 35 - Earth Pressure Analysis - II

Lecture 36 - Sheet Pile Wall Introduction - I

Lecture 37 - Sheet Pile Wall Introduction - II

Lecture 38 - Sheet pile wall Introduction - III

Lecture 39 - Analysis of sheet piles - I

Lecture 40 - Analysis of sheet piles - II

Lecture 41 - Anchored Bulkheads

Lecture 42 - Cantilever Sheet Piles

Lecture 43 - Lateral Earth Pressure Braced Sheet Pile Walls

Lecture 44 - Slope Stability - I

Lecture 45 - Slope Stability - II

Lecture 46 - Slope Instability - I

Lecture 47 - Slope Instability - II

Lecture 48 - Slope Instability - III

Lecture 49 - Analysis of Finite Slopes - I Planar Failure Surface

Lecture 50 - Analysis of Finite Slopes - II Circular Failure Surface

Lecture 51 - Finite Slopes Friction Circle Method

Lecture 52 - Slip Circle Method

NPTEL : NOC:Remote Sensing and GIS for Rural Development (Civil Engineering)

Co-ordinators : Prof. Pennan Chinnasamy

Lecture 1 - Introduction to course - Rural development (RD)

Lecture 2 - Water security (SF) and Water security (GW) and issues

Lecture 3 - Food security and issues

Lecture 4 - Agriculture and rural infrastructure issues

Lecture 5 - Rural Development

Lecture 6 - Data and mapping issues for Rural regions

Lecture 7 - Introduction to Remote Sensing and need

Lecture 8 - Remote Sensing for Water and Food Security

Lecture 9 - Remote Sensing for Rural infrastructures

Lecture 10 - Remote Sensing for Rural Development

Lecture 11 - Intro to Remote Sensing Data for Rural Development

Lecture 12 - Intro to Remote Sensing Data for Rural Development : Water

Lecture 13 - Intro to Remote Sessing Data for Rural Development : Soil and Climate

Lecture 14 - Intro to Remote Sensing Data for Rural Development : NASA datasets for water

Lecture 15 - Intro to Remote Sensing Data for Rural Development

Lecture 16 - Intro to GIS and QGIS

Lecture 17 - Intro to GIS data types and download

Lecture 18 - Intro to GIS vector data type and QGIS panel

Lecture 19 - Vector Tools in QGIS

Lecture 20 - QGIS tutorials for vector analysis and data searching

Lecture 21 - Intro to Raster Data type in GIS

Lecture 22 - Raster data type formats and uses

Lecture 23 - Raster data and Vector data quality issues

Lecture 24 - Raster data tools: Raster calculator and Raster Align

Lecture 25 - Raster data tools: Clip and Masking tools

Lecture 26 - Intro to GIS Projections and Co-ordinate systems

Lecture 27 - Intro to digitization of images for raster data

Lecture 28 - Digitization of scanned maps into raster data

Lecture 29 - Extracting point and line features from georeferenced data

Lecture 30 - Extracting polygon features from georeferenced data

Lecture 31 - Creating shapefiles from georefrenced maps

Lecture 32 - Google Earth Pro introduction for extracting data

Lecture 33 - Ground Control points from Google Earth Pro and Basemaps

Lecture 34 - Digital Elevation models and sources

Lecture 35 - Digital Elevation models (hands on example)

Lecture 36 - Introduction to Land Use Land Cover

Lecture 37 - Data for LULC and proxy data

Lecture 38 - Analyzing Bhuvan LULC data - Part 1

Lecture 39 - Analyzing Bhuvan LULC data - Part 2

Lecture 40 - Analyzing USGS LULC data

Lecture 41 - Different types of LULC classifications

Lecture 42 - Different types of LULC classifications

Lecture 43 - Remote Sensing for irrigation assessments

Lecture 44 - Remote Sensing for Groundwater irrigation assessments

Lecture 45 - Methods for Crop Statistics using Remote Sensing data

Lecture 46 - Remote Sensing based indicators for rural development

Lecture 47 - Remote Sensing methods for crop area and health assessments

Lecture 48 - NDVI data access

Lecture 49 - NDVI data from NASA platforms

Lecture 50 - NDVI data from Sentinel and NASA platforms

Lecture 51 - Remote Sensing based indicators database

Lecture 52 - Synergized mapping using Remote Sensing and Crowd Sourced data for rural infrastructures

Lecture 53 - RS and OSM for mapping rural infrastructures: Schools

Lecture 54 - RS and OSM for mapping rural infrastructures: Hospitals

Lecture 55 - RS and OSM for mapping rural infrastructures: Adding data, crops and water bodies

Lecture 56 - RS and GIS application for Rural Development: Moniotring and Evaluation

Lecture 57 - RS and GIS application for Rural Development: Monitoring and Evaluation using NDVI and NDWI

Lecture 58 - RS and GIS application for Rural Development: Water Quality Assessment

Lecture 59 - RS and GIS application for Rural Development: Indicators and Dashboards

Lecture 60 - RS and GIS for Rural Development - Summary, Wrap and Ways Forward

NPTEL : NOC:Stress and Strain Issues in Structural Geology (Civil Engineering)

Co-ordinators : Prof. Soumyajit Mukherjee

Lecture 1 - Doming and Diapirism

Lecture 2 - Isostasy - I

Lecture 3 - Isostasy - II

Lecture 4 - Ghyben-Herzberg law, Hydrostatic and Deviatoric stresses and strains

Lecture 5 - Resolution of stress as vectors

Lecture 6 - Addition and resolution of Stress (& Force) - I

Lecture 7 - Addition and resolution of Stress (& Force) - II

Lecture 8 - Addition and resolution of Stress (& Force) - III

Lecture 9 - Addition and resolution of Stress (& Force) - IV

Lecture 10 - Principle of centrifuge analogue modeling

Lecture 11 - Stress Issue: Mohr circle - I

Lecture 12 - Stress Issue: Mohr circle - II

Lecture 13 - Stress Issue: Mohr circle - III

Lecture 14 - Stress Issue: Mohr circle - IV

Lecture 15 - Strain parameters: Definitions and Calculations - I

Lecture 16 - Finding out areas of irregular geometries

Lecture 17 - Elementary strain analysis - I

Lecture 18 - Elementary strain analysis - II

Lecture 19 - Stress and strain behaviour of rocks - I

Lecture 20 - Stress and strain behaviour of rocks - II

Lecture 21 - Stress and strain behaviour of rocks - III

Lecture 22 - Ductile simple shear zone kinematics - I

Lecture 23 - Ductile simple shear zone kinematics - II

Lecture 24 - Ductile simple shear zone kinematics - III

Lecture 25 - Ductile simple shear zone kinematics - IV

Lecture 26 - Ductile simple shear zone kinematics - V

Lecture 27 - Ductile simple shear zone kinematics - VI

Lecture 28 - Ductile simple shear zone kinematics - VII

Lecture 29 - Ductile simple shear zone kinematics - VIII

Lecture 30 - Ductile pure shear zone kinematics

Lecture 31 - Ductile pure shear zone kinematics and Taylor-Couette flow

Lecture 32 - Taylor-Couette flow

Lecture 33 - Introduction to Second-Rank Tensors - I

Lecture 34 - Introduction to Second-Rank Tensors - II

Lecture 35 - Second-Rank Tensors and Stress Issues - I

Lecture 36 - Second-Rank Tensors and Stress Issues - II

Lecture 37 - Second-Rank Tensors and Stress Issues - III

Lecture 38 - Cauchy Stress Tetrahedron

Lecture 39 - Stress Invariants

Lecture 40 - Stress and strain invariants, Hooke law for isotropic materials

Lecture 41 - Hookeâ€™s law - II

Lecture 42 - Triaxial stress applied on materials with thermal effects

Lecture 43 - How stress can alter permeability, double dot product and applications

Lecture 44 - Deviatoric stress and strain, deformation gradient and Jacobian matrix

Lecture 45 - General definition of 3D strain, application of Jacobian matrix

Lecture 46 - Application of Jacobian matrix, nonhomogeneous deformation

Lecture 47 - Rotation and translation - changes in coordinates

Lecture 48 - Principles of 1g analogue modeling - I

Lecture 49 - Principles of 1g analogue modeling - II

Lecture 50 - Principles of 1g analogue modeling - III

Lecture 51 - Anderson's theory of faulting

Lecture 52 - Stereoplot of principal stress axes - I

Lecture 53 - Stereoplot of principal stress axes - II

Lecture 54 - Stereoplot of principal stress axes - III

Lecture 55 - Deduction of principal stress axes orientation from fault data

Lecture 56 - Elementary stress problems dealing with stereonet - I

Lecture 57 - Elementary stress problems dealing with stereonet - II

Lecture 58 - Poroelasticity - I

Lecture 59 - Poroelasticity - II, stereonet problem

Lecture 60 - Poroelasticity - III

NPTEL : Concrete Technology (Civil Engineering)

Co-ordinators : Dr. B. Bhattacharjee

Lecture 1 - Production and Composition

Lecture 2 - Structure and Hydration

Lecture 3 - Structure and Hydration

Lecture 4 - Properties and Tests

Lecture 5 - Types and Use

Lecture 6 - Aggregates (Size, Shape)

Lecture 7 - Packing, FM, SM

Lecture 8 - Properties

Lecture 9 - Chemical Admixtures

Lecture 10 - Chemical Admixtures

Lecture 11 - Mineral Admixtures

Lecture 12 - Mineral Admixtures

Lecture 13 - Mineral Admixtures

Lecture 14 - Mix Proportioning of Concrete: General Principles

Lecture 15 - Mix design of Concrete: General and IS Method

Lecture 16 - Mix Design of Concrete: Is Example and British (DOE) Method

Lecture 17 - Mix Design of concrete: ACI 211 Method

Lecture 18 - Mix Design of concrete: Packing Density, Rheology

Lecture 19 - Batching and Mixing of concrete: General Principles

Lecture 20 - RMC and Transporting Concrete

Lecture 21 - Workability and Pumping of Concrete

Lecture 22 - Compaction and Curing Concrete

Lecture 23 - Strength of Concrete: Factors Affecting

Lecture 24 - Strength of Concrete: Aggregate Contribution

Lecture 25 - Strength of Concrete: Factors Affecting Test Results

Lecture 26 - Mechanical Properties of Concrete:Elastic Moduls, Poision'Ratio, Fatigue, Impact

Lecture 27 - Creep of Concrete

Lecture 28 - Creep and Shrinkage of Concrete

Lecture 29 - Shrinkage of Concrete

Lecture 30 - Shrinkage of Concrete

Lecture 31 - Fundamental Concepts, Degradation Process, Attacks

Lecture 32 - Frost Action and Rebar Corrosion

Lecture 33 - Carbonation and Chloride Affect

Lecture 34 - Rebar Corrosion

Lecture 35 - Rebar Corrosion and General Strateggy

Lecture 36 - High Strength Concrete

Lecture 37 - High Strength Matrics and SCC

Lecture 38 - Self Compacting Concrete

Lecture 39 - Fiber Concrete

Lecture 40 - Fiber and Roller Compacted Concrete

Lecture 41 - Special Concrete and Sustainability

NPTEL : Seismic Analysis of Structures (Civil Engineering)

Co-ordinators : Dr. T.K. Datta, Dr. Ashok Gupta

Lecture 1 - Seismology

Lecture 2 - Seismology (Continued...)

Lecture 3 - Seismology (Continued...)

Lecture 4 - Seismology (Continued...)

Lecture 5 - Seismic Inputs

Lecture 6 - Seismic Inputs (Continued...)

Lecture 7 - Seismic Inputs (Continued...)

Lecture 8 - Seismic Inputs (Continued...)

Lecture 9 - Response Analysis for Specified Ground Motion

Lecture 10 - Response Analysis for Specified Ground Motion (Continued...)

Lecture 11 - Response Analysis for Specified Ground Motion (Continued...)

Lecture 12 - Response Analysis for Specified Ground Motion (Continued...)

Lecture 13 - Response Analysis for Specified Ground Motion (Continued...)

Lecture 14 - Response Analysis for Specified Ground Motion (Continued...)

Lecture 15 - Frequency Domain Spectral Analysis

Lecture 16 - Frequency Domain Spectral Analysis.

Lecture 17 - Frequency Domain Spectral Analysis (Continued...)

Lecture 18 - Frequency Domain Spectral Analysis (Continued...)

Lecture 19 - Frequency Domain Spectral Analysis (Continued...)

Lecture 20 - Response Spectrum Method of Analysis

Lecture 21 - Response Spectrum Method of Analysis.

Lecture 22 - Response Spectrum Method of Analysis (Continued...)

Lecture 23 - Response Spectrum Method of Analysis (Continued...)

Lecture 24 - Response Spectrum Method of Analysis (Continued...)

Lecture 25 - Inelastic Seismic Response of Structures

Lecture 26 - Inelastic Seismic Response of Structures (Continued...)

Lecture 27 - Inelastic Seismic Response of Structures (Continued...)

Lecture 28 - Inelastic Seismic Response of Structures (Continued...)

Lecture 29 - Inelastic Seismic Response of Structures (Continued...)

Lecture 30 - Inelastic Seismic Response of Structures (Continued...)

NPTEL : Building materials and Construction (Civil Engineering)

Co-ordinators : Dr. B. Bhattacharjee

Lecture 1 - Functions Of Buildings

Lecture 2 - Role Of Material In Construction

Lecture 3 - Concrete:Material

Lecture 4 - Concrete Production (Continued...)

Lecture 5 - Concrete Production (Continued...)

Lecture 6 - Concrete:Production Pumping, Placing

Lecture 7 - Concrete:Production Curing

Lecture 8 - Cement: Hydration

Lecture 9 - Cement and Cementitious Material

Lecture 10 - Fresh Concrete

Lecture 11 - Fresh Concrete : Role of Mix Parameters

Lecture 12 - Fresh Concrete : Role of Admixtures

Lecture 13 - Fresh Concrete : Segregation Bleeding

Lecture 14 - Strength of Concrete - I

Lecture 15 - Strength of Concrete - II

Lecture 16 - Strength of Concrete - III

Lecture 17 - Mechanical Properties of Concrete - I

Lecture 18 - Mechanical Properties of Concrete - II

Lecture 19 - Strength of Concrete : Non Destructive

Lecture 20 - Durability of Concrete - I

Lecture 21 - Durability of Concrete - II

Lecture 22 - Durability of Concrete - III

Lecture 23 - Cement Aggregate and Water Selection

Lecture 24 - Mix Design of Concrete

Lecture 25 - Mix Design Of concrete IS Method

Lecture 26 - Mix Design Of Concrete: British

Lecture 27 - Masonry : Materials

Lecture 28 - Masonry : Walls

Lecture 29 - Masonry : Walls; Resistance - I

Lecture 30 - Masonry : Walls; Resistance - II

Lecture 31 - Walls : Functional Performances

Lecture 32 - Walls : Defects and Durability

Lecture 33 - Metals Fundamentals

Lecture 34 - Metals and Iron Systems

Lecture 35 - Steel : Uses in Construction

Lecture 36 - Steel : Uses in Rebar

Lecture 37 - Polymer in Construction

Lecture 38 - Polymer in Construction : Uses

Lecture 39 - Glass and Timber : Glass

Lecture 40 - Glass and Timber : Timber

Lecture 41 - Roof and Floor Construction

NPTEL : Water Management (Civil Engineering)

Co-ordinators : Dr. A.K. Gosain

Lecture 1 - Introduction to Irrigation Water Management

Lecture 2 - Soil - Water - Plant Relationships

Lecture 3 - Soil - Water - Plant Relationships (Continued...)

Lecture 4 - Soil - Water - Plant Relationships (Continued...)

Lecture 5 - Soil - Water - Plant Relationships (Continued...)

Lecture 6 - Soil - Water - Plant Relationships (Continued...) and Infiltration

Lecture 7 - Crop Water Requirements

Lecture 8 - Crop Water Requirements (Continued...)

Lecture 9 - Crop Water Requirements (Continued...)

Lecture 10 - Crop Water Requirements (Continued...)

Lecture 11 - Crop Water Requirements (Continued...)

Lecture 12 - Crop Water Requirements (Continued...)

Lecture 13 - Crop Water Requirements (continued...)

Lecture 14 - Irrigation Efficiencies - Part I

Lecture 15 - Irrigation Efficiencies - Part II and Irrigation Methods and their Suitability

Lecture 16 - Irrigation Methods - III

Lecture 17 - Irrigation Methods - IV

Lecture 18 - Irrigation Methods - V

Lecture 19 - Irrigation Methods - VI

Lecture 20 - Irrigation Methods and their Suitability

Lecture 21 - Border Irrigation System - I

Lecture 22 - Border Irrigation System - II

Lecture 23 - Border Irrigation System - III

Lecture 24 - Border Irrigation System - IV

Lecture 25 - Furrow Irrigation System - I

Lecture 26 - Furrow Irrigation System - II

Lecture 27 - Furrow Irrigation System - III

Lecture 28 - Furrow Irrigation System - IV

Lecture 29 - Sprinkler Irrigation System - I

Lecture 30 - Sprinkler Irrigation System - II

Lecture 31 - Sprinkler Irrigation System - III

Lecture 32 - Sprinkler Irrigation System - IV

Lecture 33 - Sprinkler Irrigation System - V

Lecture 34 - Sprinkler Irrigation System - VI

Lecture 35 - Sprinkler Irrigation System - VII

Lecture 36 - Sprinkler Irrigation System - VIII

Lecture 37 - Drip Irrigation System - I

Lecture 38 - Drip Irrigation System - II

Lecture 39 - Drip Irrigation System - III

Lecture 40 - Drip Irrigation System - IV

NPTEL : NOC:Geoenvironmental Engineering (Environmental Geotechnology) Landfills, Slurry Ponds and Contaminated Sites (Civil Engineering)

Co-ordinators : Prof. Manoj Datta

Lecture 1 - Introduction to Geoenvironmental Engineering

Lecture 2 - Sources and Impact of Contamination

Lecture 3 - Waste-Soil Interaction

Lecture 4 - Solid Waste Generation and Disposal

Lecture 5 - Waste Minimization by Integrated Solid Waste Management (ISWM)

Lecture 6 - Integrated Solid Waste Management (ISWM) - Case Studies

Lecture 7 - Principles of Landfilling

Lecture 8 - Planning of Landfills - Part 1

Lecture 9 - Planning of Landfills - Part 2

Lecture 10 - Liners for Landfills - Part 1

Lecture 11 - Liners for Landfills - Part 2

Lecture 12 - Liners for Landfills - Part 3

Lecture 13 - Liners for Landfills - Part 4

Lecture 14 - Covers for Landfills - Part 1

Lecture 15 - Covers for Landfills - Part 2

Lecture 16 - Generation and Control of Leachate

Lecture 17 - Generation and Control of Landfill Gas

Lecture 18 - Stability of Slopes - Part 1

Lecture 19 - Stability of Slopes - Part 2

Lecture 20 - Stability of Slopes - Part 3

Lecture 21 - (Lecture Missing)

Lecture 22 - Some Solved Examples

Lecture 23 - Subsurface Monitoring Around Landfills - Part 1

Lecture 24 - Subsurface Monitoring Around Landfills - Part 2

Lecture 25 - Cost of Geotechnical Components of Landfills

Lecture 26 - Construction and Operation of Landfills

Lecture 27 - Site Selection for Landfills

Lecture 28 - Closure, Rehabilitation and Expansion of MSW Landfills

Lecture 29 - Control and Remedial Measures at Contaminated Sites - Part 1

Lecture 30 - Control and Remedial Measures at Contaminated Sites - Part 2

Lecture 31 - Slurry Disposal on Land

Lecture 32 - Disposal of Slurry Waste in Ponds and Impoundments and Dry Waste in Mounds

Lecture 33 - Geotechnical Properties of Coal Ash and Mine Tailings - Part 1

Lecture 34 - Geotechnical Properties of Coal Ash and Mine Tailings - Part 2

Lecture 35 - Planning and Design of Slurry Ponds

Lecture 36 - Stability of Incrementally Raised Embankments - Part 1

Lecture 37 - Stability of Incrementally Raised Embankments - Part 2

Lecture 38 - Remedial Measures for Slope Failures in Embankments / Dykes of Slurry Ponds

Lecture 39 - Environmental Control at Slurry Ponds

Lecture 40 - Geotechnical Reuse of Waste Materials - Part 1

Lecture 41 - Geotechnical Reuse of Waste Materials - Part 2

Lecture 42 - End-of-the-Course Review

NPTEL : NOC:Energy Efficiency, Acoustics and Daylighting in Building (Civil Engineering)

Co-ordinators : Dr. B. Bhattacharjee

Lecture 1 - Introduction to Environmental Factors - 1

Lecture 2 - Introduction to Environmental Factors - 2

Lecture 3 - Introduction to Environmental Factors - 3

Lecture 4 - Introduction to Environmental Factors - 4

Lecture 5 - Introduction to Environmental Factors - 5

Lecture 6 - Introduction to Environmental Factors - 6

Lecture 7 - Introduction to Environmental Factors - 7

Lecture 8 - Comfort and Heat Transfer Concepts

Lecture 9 - Heat Flow in Buildings - 1

Lecture 10 - Heat Flow in buildings - 2

Lecture 11 - Heat Flow in buildings - 3

Lecture 12 - Admittance Method - 1

Lecture 13 - Admittance Method - 2

Lecture 14 - Heat Flow in buildings - 1 (Frequency Domain)

Lecture 15 - Heat Flow in buildings - 2 (Frequency Domain)

Lecture 16 - Heat Flow in buildings - 2 (Frequency Domain)

Lecture 17 - Heat flow in buildings

Lecture 18 - Admittance Method

Lecture 19 - Comfort - 1

Lecture 20 - Comfort - 2

Lecture 21 - Comfort and Thermal Design of Buildings - 1

Lecture 22 - Comfort and Thermal Design of Buildings - 2

Lecture 23 - Comfort and Thermal Design of Buildings - 3

Lecture 24 - Thermal Design of Unconditioned Building

Lecture 25 - External Shading Multipliers for external suns shading

Lecture 26 - Passive Concepts

Lecture 27 - Design for Thermal Efficiency

Lecture 28 - Ventilation - 1

Lecture 29 - Ventilation - 2

Lecture 30 - Natural ventilation design

Lecture 31 - Noise and Acoustic Fundamentals - 1

Lecture 32 - Noise and Acoustic Fundamentals - 2

Lecture 33 - Noise and Acoustic Fundamentals - 3

Lecture 34 - Noise and Acoustic Fundamentals, Noise Outdoors

Lecture 35 - Noise outdoors

Lecture 36 - Sound within enclosure - 1

Lecture 37 - Sound within enclosure - 2

Lecture 38 - Sound within enclosure - 3

Lecture 39 - Sound within enclosure - 4

Lecture 40 - Sound within enclosure - 5

Lecture 41 - Sound within enclosure - 6

Lecture 42 - Sound within enclosure, isolation

Lecture 43 - Isolation - 1

Lecture 44 - Isolation - 2

Lecture 45 - Auditorium - 1

Lecture 46 - Auditorium - 2

Lecture 47 - Daylighting - 1

Lecture 48 - Daylighting - 2

Lecture 49 - Daylighting - 3

Lecture 50 - Daylighting - 4

Lecture 51 - Daylighting - 5

Lecture 52 - Daylighting - 6

Lecture 53 - Artificial Lighting

Lecture 54 - Design Sky models

Lecture 55 - Live Session

NPTEL : NOC:Fire Protection, Services and Maintenance Management of Building (Civil Engineering)

Co-ordinators : Dr. B. Bhattacharjee

Lecture 1 - Basic concepts of Fire Protection - I

Lecture 2 - Basic concepts of Fire Protection - II

Lecture 3 - Fire Resistance

Lecture 4 - Introduction Process of Combustion

Lecture 5 - ventilation and fuel Process of Combustion controlled fire

Lecture 6 - Process of Combustion: Flashover condition

Lecture 7 - Effect of Fire on Construction Materials

Lecture 8 - Design for Fire Resistance: Steel

Lecture 9 - Design for Fire Resistance: Steel

Lecture 10 - Design for Fire Resistance: Concrete

Lecture 11 - Fire Safety: Urban Planning

Lecture 12 - Fire Safety: Escape and Refuge

Lecture 13 - Fire safety: Internal planning, Detection and Suppression

Lecture 14 - Fire Safety: Detection and Suppression

Lecture 15 - Introduction to Lift Design

Lecture 16 - Design of Lift systems

Lecture 17 - Design of Lift systems: expected stops and floor of reversal

Lecture 18 - Design of Lift systems: Different cases

Lecture 19 - Design of Lift systems: Simulation and arrangement and Escalators

Lecture 20 - Introduction to System and Flow Systems

Lecture 21 - Water Supply System: Constant Demand

Lecture 22 - Water Supply System: Variable Demand and Diversity Factor

Lecture 23 - Diversity factor (Continued...)

Lecture 24 - Control Systems

Lecture 25 - Introduction to HVAC

Lecture 26 - Governing Equations for HVAC Process

Lecture 27 - Numerical Problem on HVAC System

Lecture 28 - Numerical Problem on HVAC System (Continued...)

Lecture 29 - Psychrometric Chart: Equation based Approach

Lecture 30 - Flow in Pipe Networks and Fixture Units

Lecture 31 - Flow in Pipe Networks (Continued...) and Design of Water Supply Distribution System

Lecture 32 - Design of Water Supply Distribution System (Continued...) and Flow in Waste Water pipes

Lecture 33 - Electrical Systems (introduction)

Lecture 34 - Design of Electrical Systems

Lecture 35 - Intelligent Building

Lecture 36 - Life cycle cost and basics of building maintenance

Lecture 37 - Stages of maintenance management

Lecture 38 - Planning for building maintenance

Lecture 39 - Periodicity of maintenance management

Lecture 40 - Estimation of repair cycle

Lecture 41 - Cost profile of maintenance

Lecture 42 - Lamp replacement

Lecture 43 - Building inspection, Planned and Ad-hoc maintenance

Lecture 44 - Condition survey and health evaluation of buildings

Lecture 45 - Diagnosis of building by visual survey

Lecture 46 - Case studies of visual survey

Lecture 47 - Effect of corrosion and Alkali Aggregate Reaction

Lecture 48 - Sampling and choice of test location

Lecture 49 - Non Destructive Testing - 1

Lecture 50 - Non Destructive Testing - 2

Lecture 51 - Core strength test

Lecture 52 - Carbonation and Chloride measurement

Lecture 53 - Electrical methods of progress measurement

Lecture 54 - Repair, Rehabilitation and Retrofit

Lecture 55 - Periodicity and economics of condition survey

Lecture 56 - Interpretation of test results

NPTEL : NOC:Sustainable Materials and Green Buildings (Civil Engineering)

Co-ordinators : Dr. B. Bhattacharjee

Lecture 1 - Introduction and Planet Equivalent

Lecture 2 - Basics of Carbon Cycle

Lecture 3 - Factors Affecting carbon Cycle

Lecture 4 - Fundamentals of Sustainability

Lecture 5 - Role of Materials and Embodied Energy

Lecture 6 - Case Study for Energy in Building

Lecture 7 - Calculation of Ecological Footprint

Lecture 8 - Role of Cement in Sustainability and Calculation of Chemical Exergy

Lecture 9 - Fuel for Cement

Lecture 10 - Cemebtitious/Supplementary Cementitious Materials and Their Characterization

Lecture 11 - Strength of Concrete With Supplementary Cementitious Materials and Composite Cements

Lecture 12 - Types of Composite Cements

Lecture 13 - Alternative Fuel for cement and Embodied Energy

Lecture 14 - Life Cycle Embodied Energy and Concrete Sustainability

Lecture 15 - Strength of Concrete and Use of Admixtures

Lecture 16 - Curing Methods and Use of Waste Water for Mixing and Curing

Lecture 17 - Modern Composite Concrete

Lecture 18 - Recycled Aggregate-ITZ and Proessing

Lecture 19 - Classification of Recycled Aggregate: Crushing and Grinding of Aggregates

Lecture 20 - Crushing and Grinding: Bond's Law+Operational Energy: U-Value

Lecture 21 - Operational Energy: Thermal Conductivity Models

Lecture 22 - Operational Energy: Thermal Conductivity Models (Continued...)

Lecture 23 - Operational Energy: Estimation of Thermal Conductivity

Lecture 24 - Thermal Diffusivity and Clay Bricks

Lecture 25 - Types of Bricks Kilns and Carbon Balance

Lecture 26 - Carbon Balance, Comparison of Various Types of Brick Kilns and Sealants, Paints, Adhesive

Lecture 27 - Sealants, Health Hazards of Building Materials and Emission Models

Lecture 28 - Emission Models and Testing

Lecture 29 - Energy Efficient Design of Buildings

Lecture 30 - Design Optimization of Buildings

Lecture 31 - Building Design Optimization Using Genetic Algorithm

Lecture 32 - Urban Heat Island: Radiation Concepts

Lecture 33 - Urban Heat Island: Urban Canopy Layer

Lecture 34 - Evapotranspiration: Theory and Models

Lecture 35 - Evapotranspiration: Case Study and Surface Water Balance

Lecture 36 - Energy Conservation Building Code (ECBC2007)

Lecture 37 - Energy Conservation Building Code (ECBC2007) (Continued...)

Lecture 38 - ECBC Compliant Methodology

Lecture 39 - OTTV Methodology

Lecture 40 - Solar Energy and Solar Cells

Lecture 41 - Solar Photo Volatic Cells

Lecture 42 - Solar Water Heating

Lecture 43 - Design Strategies and the Green Design Process

Lecture 44 - Green Building Rating Systems

Lecture 45 - Autoclaved Aerated Concrete, Insulated Precast System and Insulated Precast Forms

Lecture 46 - Insulated Concrete Form and Tunnel Form

Lecture 47 - Modular Construction

NPTEL : NOC:Scheduling Techniques in Projects (Civil Engineering)

Co-ordinators : Prof. J. Uma Maheswari

Lecture 1 - Introduction to Projects

Lecture 2 - Inputs to Scheduling

Lecture 3 - Critical Path Method

Lecture 4 - Precedence Diagramming Method

Lecture 5 - Line of Balance Method

Lecture 6 - Resource-driven Scheduling

Lecture 7 - Information-driven Scheduling

Lecture 8 - Dependency Structure Matrix - I

Lecture 9 - Dependency Structure Matrix - II

Lecture 10 - Dependency Structure Matrix - III

Lecture 11 - Beeline Diagramming Method

Lecture 12 - Other Scheduling Techniques

NPTEL : NOC:Safety in Construction (Civil Engineering)

Co-ordinators : Prof. J. Uma Maheswari

Lecture 1 - Introduction to Safety in Construction

Lecture 2 - Introduction to Safety Standards; Signs, Signals in Construction

Lecture 3 - Role of Stakeholders in Construction safety

Lecture 4 - Cost of Injury Vs Investment in Safety

Lecture 5 - Safety Program Accident/Incident Investigation

Lecture 6 - PPE in Construction

Lecture 7 - A Case Study on Construction Safety

Lecture 8 - Introduction to Fatal Falls

Lecture 9 - Fall hazard in Concerting

Lecture 10 - Fall hazard in Demolition Works

Lecture 11 - Safety in Demolttion Work Practical Examples

Lecture 12 - Trench Cav-ins

Lecture 13 - Tunneling Safety

Lecture 14 - Struck by and Caught-inbetween

Lecture 15 - Crane Safety

Lecture 16 - A case Study on Construction Safety - Jigar-Crane

Lecture 17 - A case Study on Construction Safety - Safety Talk

Lecture 18 - Fire Safety and Steel Construction

Lecture 19 - Electrical Safety

Lecture 20 - A case Study on Construction Safety - Contractual Provision on Construction Zone Safety

Lecture 21 - Health Issues in Construction

Lecture 22 - Ergonomics and Health Issues with Concerting

Lecture 23 - General Safety Precautions

Lecture 24 - Safety in MEP Services

Lecture 25 - Managing Hazards in Construction

Lecture 26 - BIM for Construction

Lecture 27 - BIM for Safety

NPTEL : Advanced Hydraulics (Civil Engineering)

Co-ordinators : Dr. Suresh A Kartha

Lecture 1 - Introduction - advanced hydraulics & course structure

Lecture 2 - Various classifications of open channel flows

Lecture 3 - Flow classifications & velocity distribution

Lecture 4 - Pressure distribution

Lecture 5 - Equation of continuity & energy

Lecture 6 - Specific energy & critical flow

Lecture 7 - Energy, momentum & specific force

Lecture 8 - Computation of critical flow - Part 1

Lecture 9 - Critical flow computations

Lecture 10 - Introduction to uniform flow

Lecture 11 - Manning's equation and normal depth

Lecture 12 - Uniform Flow Computations - Part 1

Lecture 13 - Uniform flow in compound sections, concept of normal slope

Lecture 14 - Uniform flow approximation for flood discharge

Lecture 15 - Design of channels for uniform flow

Lecture 16 - Design of channels using uniform flow

Lecture 17 - Design of erodible channels

Lecture 18 - Introduction to gradually varied flows

Lecture 19 - Gradually varied flow equations

Lecture 20 - Classification of gradually varied flow - Part 1

Lecture 21 - Classification of gradually varied flow - Part 2

Lecture 22 - Gradually varied flow profiles with change in bed slopes

Lecture 23 - GVF profile properties and transitional depths

Lecture 24 - Gradually varied flow computations - Part 1

Lecture 25 - Gradually varied flow computations RK method - Part 2

Lecture 26 - Standard step method for gradually varied flow computations

Lecture 27 - Spatially varied flow

Lecture 28 - Features on spatially varied flow

Lecture 29 - Rapidly varied flow - introduction

Lecture 30 - Theoretical aspects of hydraulic jump

Lecture 31 - Characteristics of jumps in rectangular channel

Lecture 32 - Features of hydraulic jumps

Lecture 33 - Jumps as energy dissipators

Lecture 34 - Jump controls

Lecture 35 - Surges - Part 1

Lecture 36 - Surges - Part 2

Lecture 37 - Channel transitions - Part 1

Lecture 38 - Channel transitions - Part 2

Lecture 39 - Channel transitions - Part 3

Lecture 40 - Application of momentum principles

Lecture 41 - Pumps - 1

Lecture 42 - Turbines - Part 3 (pumps, turbines)

Lecture 43 - Turbines, cavitation

NPTEL : Design of Steel Structures (Civil Engineering)

Co-ordinators : Prof. Damodar Maity

Lecture 1 - Introduction to Design of Steel Structures

Lecture 2 - Connections

Lecture 3 - Riveted Connections

Lecture 4 - Design of Rivet Joint

Lecture 5 - Welding

Lecture 6 - Design of Fillet and Butt Welds

Lecture 7 - Bolted Connection

Lecture 8 - Eccentric Connections: Rivet Joints

Lecture 9 - Design of Eccentric Connection With Load Lying in Plane of Joint Rivet Bolt

Lecture 10 - Eccentric Connection With Load Perpendicular to Plane of Riveted Joint

Lecture 11 - Analysis and Design of Join with Seat Connection

Lecture 12 - Eccentric Connection

Lecture 13 - Load Lying Perpendicular to the Plane of Weld Joint

Lecture 14 - Tension Member

Lecture 15 - Design of Tension Member

Lecture 16 - Design of Tension Member: Gusset Plates. Lug Angles and Tension Splices

Lecture 17 - Design of Tension Member: Subjected to Axial and Bending

Lecture 18 - Compression Member

Lecture 19 - Design of Compression Member

Lecture 20 - Design of Eccentrically Loaded tension Member

Lecture 21 - Built up Compression Member

Lecture 22 - Design of Built up Compression Member

Lecture 23 - Lacing for Built Up Compression Member

Lecture 24 - Design of Lacing System

Lecture 25 - Design of Batten Plates

Lecture 26 - Introduction to Flexural Members: Beams

Lecture 27 - Design Procedure of Beam Members

Lecture 28 - Design of Laterally Supported Beams

Lecture 29 - Design of Laterally Unsupported Beams

Lecture 30 - Built-Up Beams

Lecture 31 - Built-Up Beams: Curtailment of the Flange Plates and Shear Connections

Lecture 32 - Design of a Built-Up Beams

Lecture 33 - Design of Shear Connections and Purlins

Lecture 34 - Gantry Girders

Lecture 35 - Design of Gantry Girders

Lecture 36 - Introduction to Plate Girders - Part 1

Lecture 37 - Introduction to Plate Girders - Part 2

Lecture 38 - Design of a Plate Girder

Lecture 39 - Column Base - Part 1

Lecture 40 - Column Base - Part 2

NPTEL : Hydraulics (Civil Engineering)

Co-ordinators : Prof. Arup Kumar Sharma

Lecture 1 - Introduction to Hydraulics

Lecture 2 - Open Channel Hydraulics - Part 1

Lecture 3 - Open Channel Hydraulics - Part 2

Lecture 4 - Velocity and Pressure Distribution

Lecture 5 - Practical use of velocity co-efficient in channel flow

Lecture 6 - Conservation Principles & ioioGoverning Equations

Lecture 7 - Uniform Flow

Lecture 8 - Uniform Flow Formula

Lecture 9 - Computation of Uniform Flow - Part 1

Lecture 10 - Computation of Uniform Flow - Part 2

Lecture 11 - Uniform Flow in Mobile Boundary Channel

Lecture 12 - Incipient Motion Condition and Regime of Flow

Lecture 13 - Concept of Specific Energy

Lecture 14 - Computation of Critical Depth

Lecture 15 - Specific Force, Critical Depth & Sequent Depth

Lecture 16 - Non-uniform Flow: Gradually Varied Flow

Lecture 17 - Classification of Gradually Varied Flow

Lecture 18 - Characteristic of Gradually Varied Flow

Lecture 19 - Characteristic of Gradually Varied Flow & its Computation

Lecture 20 - Gradually Varied Flow & its Computation

Lecture 21 - Computation of Gradually Varied Flow

Lecture 22 - Gradually Varied Flow: Numerical Methods and Problem Solving

Lecture 23 - Rapidly Varied Flow: Hydraulic Jump

Lecture 24 - Hydraulic Jump

Lecture 25 - Flow Over Hump and Channel Contraction

Lecture 26 - Canal Design - 1

Lecture 27 - Canal Design - 2

Lecture 28 - Design of Alluvial Channel - 1

Lecture 29 - Design of Alluvial Channel - 2

Lecture 30 - Design of Alluvial Channel - 3

Lecture 31 - Unsteady Flow: Waves and its Classification

Lecture 32 - Unsteady Flow Part - 2

Lecture 33 - Unsteady Flow Part - 3

Lecture 34 - Pipe Flow: Friction Loss

Lecture 35 - Pipe Flow: Losses in Pipes

Lecture 36 - Pipe in Series & Parallel

Lecture 37 - Pipe Network Analysis

Lecture 38 - Water Hammer & Surge Tank

Lecture 39 - Pipe Flow Friction Loss

Lecture 40 - Pipe Flow: Losses in Pipe

NPTEL : NOC:Higher Surveying (Civil Engineering)

Co-ordinators : Prof. Ajay Dashora

Lecture 1 - Introduction to Higher Surveying

Lecture 2 - Understanding reference system, reference frame, and coordinate system for Earth

Lecture 3 - Coordinate and datum transformations

Lecture 4 - Projected coordinate system

Lecture 5 - Fundamentals of astronomy

Lecture 6 - Applications of concepts of astronomy

Lecture 7 - Time

Lecture 8 - Application of concepts of astronomy and time

Lecture 9 - Fundamental concepts of error, accuracy, and error propagation

Lecture 10 - Applications of error propagation

Lecture 11 - Observation Equation Method of adjustments

Lecture 12 - Condition Equation Method and Combined Method of adjustments

Lecture 13 - Analysis of adjustments and reporting of errors

Lecture 14 - Global Positioning System (GPS)

Lecture 15 - Introduction to Photogrammetry

Lecture 16 - Vertical photogrammetry

Lecture 17 - Stereo photogrammetry

Lecture 18 - Analytical photogrammetry - I

Lecture 19 - Analytical photogrammetry - II

Lecture 20 - Photogrammetric products

Lecture 21 - Image matching

Lecture 22 - Close range photogrammetry

Lecture 23 - Fundamentals of LiDAR

Lecture 24 - LiDAR data acquisition

Lecture 25 - Geolocation and errors of LiDAR data

Lecture 26 - Information extraction from LiDAR data

Lecture 27 - RADAR fundamenetals - I

Lecture 28 - RADAR fundamenetals - II

Lecture 29 - RADAR fundamenetals - III

Lecture 30 - Radargrammetry

Lecture 31 - Geoscience perspective for RADAR applications

Lecture 32 - Fundamental concepts of hydrographic survey

Lecture 33 - Field procedures for hydrographic Surveying

Lecture 34 - Modern techniques for hydrographic Survey

Lecture 35 - Navigation

Lecture 36 - Conclusive lecture

NPTEL : NOC:Unsaturated Soil Mechanics (Civil Engineering)

Co-ordinators : Dr. Tadikonda Venkata Bharat

Lecture 1 - Fundamental Aspects of Unsaturated Soil Mechanics and its Basic Principles

Lecture 2 - Phases of Unsaturated Soils-I

Lecture 3 - Phases of Unsaturated Soils-II

Lecture 4 - Equilibrium between Air and Water Phases

Lecture 5 - Capillary Phenomenon in Unsaturated Soils - I

Lecture 6 - Capillary Phenomenon in Unsaturated Soils - II

Lecture 7 - Summary: Fundamental Principles and Constitutive Relationships

Lecture 8 - Concept of Water Retention and Soil Water Characteristics - I

Lecture 9 - Concept of Water Retention and Soil Water Characteristics - II

Lecture 10 - Hydraulic conductivity functions and determination of state variables

Lecture 11 - Suction Measurement/Control Techniques - I

Lecture 12 - Suction Measurement/Control Techniques - II

Lecture 13 - Summary: Suction Measurement and Control Techniques

Lecture 14 - HCF Determination

Lecture 15 - SWCC and HCF Models

Lecture 16 - HCF Modelling

Lecture 17 - Fitting of SWCC and HCF modelling

Lecture 18 - Pedo-transfer Functions (PTF)

Lecture 19 - Steady-State Flow Through Soils

Lecture 20 - Steady-State and Transient Flow

Lecture 21 - Analytical Methods for Transient Flow - I

Lecture 22 - Analytical Methods for Transient Flow - II

Lecture 23 - Shear Strength of Unsaturated Soils

Lecture 24 - Suction-Controlled Direct Shear Test

Lecture 25 - Suction-Controlled Triaxial Test

Lecture 26 - Extended M-C Criterion - I

Lecture 27 - Extended M-C Criterion - II

Lecture 28 - Extended M-C Criterion - III

Lecture 29 - Concept of Suction Stress - I

Lecture 30 - Concept of Suction Stress - II

Lecture 31 - Concept of Suction Stress - III

Lecture 32 - Summary: Shear Strength of Unsaturated Soils and Introduction to Volume Change

Lecture 33 - Swelling Behaviour of Soils

Lecture 34 - Estimation of Swelling Pressure in the Laboratory and Behaviour of Collapsible soil

Lecture 35 - Volume Change Behaviour of Bentonite and Kaolin Clay

Lecture 36 - Demonstration of Various Experiments Related to Unsaturated Soil Mechanics

NPTEL : NOC:Subsurface Exploration: Importance and Techniques Involved (Civil Engineering)

Co-ordinators : Prof. Abhishek Kumar

Lecture 1 - Introduction

Lecture 2 - Phases and classification of subsurface Investigation

Lecture 3 - Test Pits+ Borings

Lecture 4 - Ground water table and rock drilling

Lecture 5 - Standard Penetration Test

Lecture 6 - Cone Penetration Test

Lecture 7 - Dilatometer Test

Lecture 8 - Pressuremeter Test

Lecture 9 - Seismic reflection method

Lecture 10 - Seismic refraction method

Lecture 11 - Electrical Resistivity Survey

Lecture 12 - Magnetic Survey

Lecture 13 - Surface wave method

Lecture 14 - Gravity Survey

Lecture 15 - Offshore Investigation

Lecture 16 - Geophysical Investigation in Offshore Environment

Lecture 17 - Sampling and Geotechnical Investigations in Offshore Environment

Lecture 18 - Important Terminologies in Offshore Environment

Lecture 19 - Dynamic Testing in Pile Driving

Lecture 20 - Dynamic Testing in Pile (Low Strain)

Lecture 21 - Conclusion

NPTEL : NOC:Fluid Mechanics (Civil Engineering)

Co-ordinators : Dr. Subhashisa Dutta

Lecture 1 - Basic Concepts of Fluid

Lecture 2 - Properties of Fluid

Lecture 3 - Properties of Fluid

Lecture 4 - Concepts of Hydrostatic

Lecture 5 - Measurement of Pressure and Hydrostatic forces

Lecture 6 - Buoyancy, Metacentre, Stability and Rigid body motion

Lecture 7 - Reynolds Transport Theorem

Lecture 8 - Conservation of Mass

Lecture 9 - Conservation of Momentum

Lecture 10 - Conservation of Momentum Applications

Lecture 11 - Bernoulliâ€™s Equation

Lecture 12 - Applications of Bernoulliâ€™s Equation

Lecture 13 - Fluid Statics Applications: Example Problems

Lecture 14 - Conservation of Momentum: Example problems

Lecture 15 - Bernoulliâ€™s Equation: Problems Solving on Black Board

Lecture 16 - Lagrangian and Eulerian Descriptions

Lecture 17 - Motion and deformation of fluid elements

Lecture 18 - Problems Solving on Black Board

Lecture 19 - Dimensional Homogeneity

Lecture 20 - Dimensional Analysis and Similarity

Lecture 21 - Laminar and Turbulent Flows

Lecture 22 - Losses in Pipe Fittings

Lecture 23 - Flow in Noncircular Conduits and Multiple Path Pipeflow

Lecture 24 - Mass Conservation Equation - I

Lecture 25 - Mass Conservation Equation - II

Lecture 26 - Stream Function

Lecture 27 - Cauchy's Equation

Lecture 28 - The Navier-Stokes Equation - Part I

Lecture 29 - The Navier-Stokes Equation - Part II

Lecture 30 - The Navier-Stokes Equation - Part III

Lecture 31 - Approximate solutions of Navier Stokes Equation: Bounary Layer Approximation

Lecture 32 - Boundary Layer Approximation - II

Lecture 33 - Boundary Layer Approximation - III

Lecture 34 - Open Channel Flow - I

Lecture 35 - Open Channel Flow - II

Lecture 36 - Open Channel Flow - III

Lecture 37 - Drag and Lift

NPTEL : NOC:Remote Sensing and GIS (Civil Engineering)

Co-ordinators : Prof. Rishikesh Bharti

Lecture 1 - Overview and Introduction

Lecture 2 - Basics of Remote Sensing

Lecture 3 - Error corrections in satellite image

Lecture 4 - Error Identification and Correction - I

Lecture 5 - Error Identification and Correction - II

Lecture 6 - Error Identification and Correction - III

Lecture 7 - DIP - I

Lecture 8 - DIP - II

Lecture 9 - DIP - III

Lecture 10 - DIP - IV

Lecture 11 - Image Classification - I

Lecture 12 - Image Classification - II

Lecture 13 - Photogrammetry

Lecture 14 - Thermal Remote Sensing

Lecture 15 - Microwave Remote Sensing

Lecture 16 - HRS - I

Lecture 17 - HRS - II

Lecture 18 - HRS - III

Lecture 19 - HRS - IV

Lecture 20 - HRS - V

Lecture 21 - GIS - I

Lecture 22 - GIS - II

Lecture 23 - Applications of Remote Sensing and GIS - I

Lecture 24 - Applications of Remote Sensing and GIS - II

NPTEL : NOC:River Engineering (Civil Engineering)

Co-ordinators : Dr. Subhashisa Dutta

Lecture 1 - Introduction to River Engineering

Lecture 2 - Basic properties of sediment - I

Lecture 3 - Basic properties of sediment - II

Lecture 4 - Mass Conservation

Lecture 5 - Linear Momentum Equation

Lecture 6 - Navier-Stokes Equations

Lecture 7 - St. Venant Equation and Solver

Lecture 8 - Specific Energy and Critical Flow

Lecture 9 - Hydraulic Jump and Celerity

Lecture 10 - Floodwave Celerity and Loop Rating Curve

Lecture 11 - Sediment Transport in River - I

Lecture 12 - Sediment Transport in River - II

Lecture 13 - Sediment Transport in River - III

Lecture 14 - Physical River Models

Lecture 15 - Bridge Scour: processes and estimation

Lecture 16 - Bridge Scour-II

Lecture 17 - Jet Scour and River Navigation

Lecture 18 - River Training Work

Lecture 19 - Riverbank Stabilization - I

Lecture 20 - Riverbank Stabilization - II

Lecture 21 - Riverbank Protection and Control Structures

Lecture 22 - River Equilibrium - I

Lecture 23 - River Equilibrium - II

Lecture 24 - River Equilibrium - III

NPTEL : NOC:Municipal Solid Waste Management (Civil Engineering)

Co-ordinators : Prof. Ajay Kalamdhad

Lecture 1 - Introduction to solid waste

Lecture 2 - Functional elements

Lecture 3 - Types and sources of solid waste

Lecture 4 - Sampling and characteristics

Lecture 5 - Estimation of solid waste quantity

Lecture 6 - Factors affecting solid waste generation rate

Lecture 7 - Handling, separation and storage at source

Lecture 8 - Processing at source

Lecture 9 - Primary collection

Lecture 10 - Types of collection system

Lecture 11 - Analysis of collection system - Part I

Lecture 12 - Analysis of collection system - Part II

Lecture 13 - Analysis of collection system - Part III

Lecture 14 - Need and types of transfer station

Lecture 15 - Transport means and methods

Lecture 16 - Unit operation for component separation

Lecture 17 - Material recovery facilities (MRF)

Lecture 18 - Recycling of dry waste components

Lecture 19 - Waste as a fuel

Lecture 20 - Incineration/Combustion

Lecture 21 - Flue gas characteristics and treatment

Lecture 22 - Solid residue generation, characterization and treatment

Lecture 23 - Waste-to-energy (WtE) plants (case studies) pyrolysis and gasification

Lecture 24 - Definition and phases of composting

Lecture 25 - Factors affecting composting process

Lecture 26 - Types of composting - I

Lecture 27 - Types of composting - II

Lecture 28 - Compost quality

Lecture 29 - Vermicomposting

Lecture 30 - Definition, stages and factors affecting anaerobic digestion

Lecture 31 - Pretreatment and co-digestion for enhancement of biogas production

Lecture 32 - Types of biogas digesters

Lecture 33 - Site selection and types of landfill

Lecture 34 - Leachate collection and treatment

Lecture 35 - Landfill gas collection and treatment

Lecture 36 - Design of landfill and Bio-minning of old dumpsite

Lecture 37 - Construction and demolition waste

Lecture 38 - Management of bio-mediacal, e-waste and inert waste

Lecture 39 - Integrated solid waste management (ISWM)

Lecture 40 - Municipal solid waste management rules

Lecture 41 - Financing in MSWM projects

Lecture 42 - Public-Private-Partnership (PPP)

Lecture 43 - Public-Private-Partnership (PPP) in MSWM projects

NPTEL : NOC:Construction Methods and Equipment Management (Civil Engineering)

Co-ordinators : Prof. Indu Siva Ranjani Gandhi

Lecture 1 - Planning process of equipment

Lecture 2 - Estimation of Ownership cost (Average Annual Investment method)

Lecture 3 - Estimation of Ownership cost (Time value method)

Lecture 4 - Operating cost of Equipment

Lecture 5 - Equipment cost estimation

Lecture 6 - Equipment life and replacement analysis - Part 1

Lecture 7 - Equipment life and replacement analysis - Part 2

Lecture 8 - Equipment life and replacement analysis - Part 3

Lecture 9 - Engineering Fundamentals of Moving Earth

Lecture 10 - Bull Dozers

Lecture 11 - Scrapers - Part 1

Lecture 12 - Scrapers - Part 2

Lecture 13 - Front End loaders

Lecture 14 - Excavators

Lecture 15 - Trucks

Lecture 16 - Piles and Pile driving equipment - Part 1

Lecture 17 - Piles and Pile driving equipment - Part 2

Lecture 18 - Cranes - Part 1

Lecture 19 - Cranes - Part 2

Lecture 20 - Concreting Equipment - Part 1

Lecture 21 - Concreting Equipment - Part 2

Lecture 22 - Summary

NPTEL : NOC:Advanced Soil Mechanics (Civil Engineering)

Co-ordinators : Prof. Sreedeep S

Lecture 1 - Introduction to course content

Lecture 2 - Stress acting at a point - Cauchy stress

Lecture 3 - Stress acting at a point - Stress tensor

Lecture 4 - Stress acting on a plane

Lecture 5 - Stress acting on a plane example

Lecture 6 - Transformation of stress tensor

Lecture 7 - Stress invariants

Lecture 8 - Relationship between stress invariants

Lecture 9 - Principle stresses and Eigen vectors

Lecture 10 - Strain in soils

Lecture 11 - Cause effect relationship

Lecture 12 - Important constitutive relationship

Lecture 13 - 3D to 2D idealization

Lecture 14 - Mathematical formulation plane stress plane strain

Lecture 15 - Mathematical formulation axisymmetric

Lecture 16 - Summary of Module 1

Lecture 17 - Basics of shear strength

Lecture 18 - Stress representation

Lecture 19 - Shear strength granular soil - I

Lecture 20 - Shear strength granular soil - II

Lecture 21 - Shear strength cohesive soil

Lecture 22 - Shear strength cohesive soil - Stress strain

Lecture 23 - Pore water pressure and Skemptons equation

Lecture 24 - Overall pore water pressure parameter

Lecture 25 - Pore water pressure - plane strain-effect of sampling

Lecture 26 - Pore water pressure estimation

Lecture 27 - Triaxial test

Lecture 28 - Interpretation triaxial test - UU UCS

Lecture 29 - Interpretation triaxial test - CU

Lecture 30 - Interpretation triaxial test - CD

Lecture 31 - Some additional aspects of shear strength

Lecture 32 - Summary of Module 2

Lecture 33 - Stress path and representation

Lecture 34 - Failure line in stress path

Lecture 35 - Stress path-some common cases - I

Lecture 36 - Stress path-some common cases - II

Lecture 37 - Stress path-triaxial test-drained

Lecture 38 - Stress path-triaxial test-undrained

Lecture 39 - Stress path-additional undrained case

Lecture 40 - Stress path-field cases - I

Lecture 41 - Stress path-field cases - II

Lecture 42 - Stress path problems

Lecture 43 - Summary of Module 3

Lecture 44 - Introduction-critical state soil mechanics

Lecture 45 - Introduction-critical state soil mechanics

Lecture 46 - CSSM-2 D representation

Lecture 47 - Peak state

Lecture 48 - Soil yielding

Lecture 49 - Cam clay

Lecture 50 - Modified Cam clay

Lecture 51 - Prediction of soil behavior from MCCM

Lecture 52 - Prediction of soil behavior from MCCM

Lecture 53 - Strain from MCCM

Lecture 54 - State boundary surface

Lecture 55 - CSSM problems

Lecture 56 - Summary of Module 4

Lecture 57 - Closure of Advanced Soil Mechanics Course

NPTEL : NOC:Plates and Shells (Civil Engineering)

Co-ordinators : Prof. Sudip Talukdar

Lecture 1 - Introduction, classification of plates and some useful relations

Lecture 2 - Theory of thin plate bending

Lecture 3 - Plate equations and boundary conditions with examples

Lecture 4 - Exercises on the plate bending theory

Lecture 5 - Simply supported plate subjected to distributed loading

Lecture 6 - Simply supported plate subjected to concentrated load and couple

Lecture 7 - Simply supported plate resting on elastic foundation and other examples

Lecture 8 - General formulation for rectangular plate with two opposite edges simply supported

Lecture 9 - Levy's solution for different loading and boundary conditions

Lecture 10 - Rectangular plate with Levy's boundary condition subjected to edge moment

Lecture 11 - Transformation of plate equation from rectangular co-ordinates to polar co-ordinates

Lecture 12 - Axi-symmetrical bending of circular plate under pure moment and uniformly distributed load

Lecture 13 - Examples in axisymmetrical bending of solid and annular plate

Lecture 14 - Variational principle in plate problem

Lecture 15 - Applications of Rayleigh-Ritz and Gallerkin's method

Lecture 16 - Finite difference method in plate bending

Lecture 17 - Plate subjected to inplane forces and transverse load

Lecture 18 - Buckling load of rectangular plate plate with Navier's boundary condition

Lecture 19 - Buckling load of rectangular with Levy's boundary condition

Lecture 20 - Rayleigh-Ritz and Gallerkin method in buckling of plate

Lecture 21 - Finite difference method in buckling of plate

Lecture 22 - Introduction to shell structure and behavior of stretched membrane

Lecture 23 - Classification of shell structure

Lecture 24 - Stress resultants and couples in shells

Lecture 25 - Membrane analysis of shells of surface of revolution

Lecture 26 - Analysis of Spherical dome

Lecture 27 - Some examples of axi-symmetrical cases in surface of revolution

Lecture 28 - Membrane theory in pressure vessels

Lecture 29 - Membrane theory in pressure vessel in the form a Torus and in a tank of arbitrary meridian

Lecture 30 - Membrane theory of hyperboloid of revolution: Application to cooling tower

Lecture 31 - Differential Equations of Equilibrium in Cylindrical shell using membrane hypothesis

Lecture 32 - Membrane Analysis of Cylindrical Shell roof subjected to self weight and snow load

Lecture 33 - Circular Cylindrical Shell for Fourier Loading in a membrane state of stress

Lecture 34 - Simplified Bending Theory of Cylindrical Shell-Beam and Arch theories

Lecture 35 - General bending theory of cylindrical shell

Lecture 36 - Some applications of symmetrical bending of circular cylindrical shell

NPTEL : NOC:Optimization methods for Civil engineering (Civil Engineering)

Co-ordinators : Prof. Rajib Kumar Bhattacharjya

Lecture 1 - Introduction to Optimization

Lecture 2 - Classical Optimization

Lecture 3 - Introduction to Linear Problem

Lecture 4 - General system of equations

Lecture 5 - Simplex Method

Lecture 6 - Solution of Linear Problem using Excel Solver

Lecture 7 - Bracketing Method

Lecture 8 - Region Elimination Methods

Lecture 9 - Gradient Based Method and Examples

Lecture 10 - Convex Function

Lecture 11 - Line Search Methods for Multi-Variable Problems

Lecture 12 - Quadratic Approximation Method

Lecture 13 - Constrained Optimization I: Equality constraints

Lecture 14 - Constrained Optimization II: Inequality constraints

Lecture 15 - Constrained Optimization III: Penalty function methods

Lecture 16 - Introduction to Metaheuristic Optimization

Lecture 17 - Genetic Algorithms - Part I

Lecture 18 - Genetic Algorithms - Part II

Lecture 19 - Genetic Algorithms - Part III

Lecture 20 - Real Coded Genetic Algorithms

Lecture 21 - Multi-modal optimization

Lecture 22 - Introductioin to R

Lecture 23 - GA using R (Unconstrained problem)

Lecture 24 - GA using R (Constrained problem)

Lecture 25 - Constraint Handling in GAs

Lecture 26 - Evolution Strategies (ESs)

Lecture 27 - Particle swarm optimization

Lecture 28 - Introductioin to R - Part II

Lecture 29 - Multi-objective Genetic Algorithms

Lecture 30 - Introduction to Differential Evolution

Lecture 31 - Introduction to Matlab

Lecture 32 - Optimization using Matlab (Classical methods)

Lecture 33 - A tutorial on Differential Evolution

Lecture 34 - NSGA II Using R

Lecture 35 - Optimization using MATLAB

Lecture 36 - Optimization using Excel Solver

Lecture 37 - Multi-objective Genetic Algorithms using MATLAB

Lecture 38 - Solution of a Design Problem Using MATLAB

NPTEL : NOC:Engineering Hydrology (Civil Engineering)

Co-ordinators : Prof. Sreeja Pekkat

Lecture 1 - Course Contents

Lecture 2 - Preliminary Concepts

Lecture 3 - Introduction to Reynolds Transport Theorem

Lecture 4 - Derivation of Reynolds Transport Theorem - Part I

Lecture 5 - Derivation of Reynolds Transport Theorem - Part II

Lecture 6 - Conservations Laws

Lecture 7 - Numerical Examples

Lecture 8 - Summary of Module - I

Lecture 9 - Atmospheric Water

Lecture 10 - Water Vapor Dynamics

Lecture 11 - Precipitable Water in the Static Atmospheric Column

Lecture 12 - Numerical Examples on Basic Atmospheric Parameters

Lecture 13 - Precipitation-Types and Formation

Lecture 14 - Terminal Velocity

Lecture 15 - Thunderstorm Cell Model

Lecture 16 - Numerical Examples on Terminal Velocity and Thunderstorm Cell

Lecture 17 - Forms of Precipitation

Lecture 18 - Measurement of rainfall

Lecture 19 - Raingauge Network

Lecture 20 - Presentation of Rainfall Data

Lecture 21 - Analysis of Rainfall Data

Lecture 22 - Average Areal Rainfall

Lecture 23 - Evaporation

Lecture 24 - Evaporation-Energy Balance Method

Lecture 25 - Evaporation-Aerodynamic Method

Lecture 26 - Evaporation-Combined Method

Lecture 27 - Numerical Examples on Evaporation

Lecture 28 - Evaporation-Empirical method

Lecture 29 - Evapotranspiration

Lecture 30 - Evapotranspiration-Numerical Example

Lecture 31 - Summary of Module - II

Lecture 32 - Subsurface Water

Lecture 33 - 1-D Unsteady Unsaturated Flow Equation

Lecture 34 - Infiltration

Lecture 35 - Measurement of Infiltration

Lecture 36 - Estimation of Infiltration-Empirical Equations

Lecture 37 - Numerical examples - Infiltration estimation using empirical equations

Lecture 38 - Estimation of Infiltration-Theoretical Equation

Lecture 39 - Infiltration-Green Ampt Equation

Lecture 40 - Ponding time

Lecture 41 - Numerical Examples on Green Ampt Infiltration Equation

Lecture 42 - Summary of Module - III

Lecture 43 - Surface Water

Lecture 44 - Excess Rainfall and Direct Runoff

Lecture 45 - Numerical Examples on Direct Runoff

Lecture 46 - Overland flow

Lecture 47 - Streamflow Measurement - I

Lecture 48 - Streamflow Measurement - II

Lecture 49 - Representation of Streamflow

Lecture 50 - Numerical Examples on Streamflow Measurement

Lecture 51 - Summary of Module - IV

Lecture 52 - Hydrologic Analysis - Introduction

Lecture 53 - Linear System Theory

Lecture 54 - Hydrograph Analysis-UH

Lecture 55 - Hydrograph Analysis-DRH

Lecture 56 - Numerical examples on UH and DRH

Lecture 57 - S-Hydrograph

Lecture 58 - Unit Hydrograph of Different Duration

Lecture 59 - Numerical examples UH of Different Duration

Lecture 60 - Instantaneous Unit Hydrograph

Lecture 61 - Instantaneous Unit Hydrograph-Nash's Model

Lecture 62 - Numerical Examples on IUH

Lecture 63 - Synthetic Unit Hydrograph

Lecture 64 - SCS-Synthetic Unit Hydrograph

Lecture 65 - Numerical Examples on SUH

Lecture 66 - Hydrograph Routing

Lecture 67 - Reservoir Routing

Lecture 68 - Numerical Example on Reservoir Routing

Lecture 69 - Hydrologic Channel Routing

Lecture 70 - Numerical Examples on Channel Routing

Lecture 71 - Summary of Module - V

Lecture 72 - Hydrologic Statistics-Preliminary Concepts

Lecture 73 - Probability Distribution and Basic Descriptive Statistics

Lecture 74 - Probabiity Distributions

Lecture 75 - Frequency Analysis

Lecture 76 - Exreme Value Analysis

Lecture 77 - Summary of Module - VI

Lecture 78 - Hydrologic Design

Lecture 79 - Numerical examples on probability and risk

Lecture 80 - Design Storm

Lecture 81 - Design Flood

Lecture 82 - Summary of Module - VII

Lecture 83 - Closure of Engineering Hydrology

NPTEL : NOC:Expansive Soil (Civil Engineering)

Co-ordinators : Prof. Anil Kumar Mishra

Lecture 1 - Formation of soil

Lecture 2 - Index properties and classification of soil

Lecture 3 - Engineering properties of soil - I

Lecture 4 - Engineering properties of soil - II

Lecture 5 - Clay mineralogy

Lecture 6 - Properties of clay particles

Lecture 7 - Defination, type and behaviour

Lecture 8 - Mechanism of soil-water interaction

Lecture 9 - Swelling of expansive soil

Lecture 10 - Factors controlling DDL thickness

Lecture 11 - Determination of swelling properties

Lecture 12 - Classification and prediction

Lecture 13 - Factors controlling swelling of soil

Lecture 14 - Shrinkage behaviour of soil

Lecture 15 - Factors controlling shrinkage behavior of soils

Lecture 16 - Measurement of various shrinkage characteristics of soil

Lecture 17 - Cyclic Swelling-Shrinkage Behaviour of Soil

Lecture 18 - Thermo-Mechanical-Hydraulic-Chemical Behaviour - I

Lecture 19 - Thermo-Mechanical-Hydraulic-Chemical Behaviour - II

Lecture 20 - Thermo-Mechanical-Hydraulic-Chemical Behaviour - III

Lecture 21 - Mechanical Methods

Lecture 22 - Hydraulic methods

Lecture 23 - Chemical methods - 1

Lecture 24 - Chemical methods - 2

Lecture 25 - By inclusion or confinement

Lecture 26 - Foundation on expansive soil

Lecture 27 - Use of expansive soil for various geotechnical engineering applications

Lecture 28 - Closure lecture

NPTEL : NOC:Vibration of Continuous Systems (Civil Engineering)

Co-ordinators : Prof. Sudip Talukdar

Lecture 1 - General Introduction and Modelling of Dynamic Systems

Lecture 2 - Time Domain Analysis of Linear System - Harmonic input

Lecture 3 - Time Domain Analysis of Linear System - Arbitrary Input

Lecture 4 - Transformed technique in vibration of linear system

Lecture 5 - Formulation of problem: Equilibrium Approach

Lecture 6 - Formulation of problem by Energy Principle

Lecture 7 - Hamilton's principles for formulating vibration problems

Lecture 8 - Lagrange's equation for formulating vibration problems

Lecture 9 - One Dimensional Wave Equation

Lecture 10 - D-Alembert's Solution of the Wave Equation

Lecture 11 - Transverse Vibration of String

Lecture 12 - Forced Transverse Vibration of String

Lecture 13 - Axial Vibration of Bar

Lecture 14 - Torsional Vibration of Bar

Lecture 15 - Some typical problems in axial and torsional vibrations

Lecture 16 - Transverse vibration of beams

Lecture 17 - Natural frequencies and mode shapes of beams with various end conditions

Lecture 18 - Free damped transverse vibration analysis of beam

Lecture 19 - Forced damped vibration analysis of Euler Bernoulli beam

Lecture 20 - Vibration of beams subjected to moving load

Lecture 21 - Some special topics on the transverse vibration of beam

Lecture 22 - Combination of continuous and lumped parameter system

Lecture 23 - State space solutions in vibration problems

Lecture 24 - Beam with moving oscillator, pulstating force and rolling mass

Lecture 25 - Vibration of membrane

Lecture 26 - Vibration of Circular membrane

Lecture 27 - Vibration of Rectangular plate

Lecture 28 - Free vibration of rectangular plates

Lecture 29 - Forced vibration of rectangular plates

Lecture 30 - Approximate method for vibration analysis

Lecture 31 - Rayleigh-Ritz method for vibration analysis

Lecture 32 - Gallerkin's method and Finite difference method

Lecture 33 - System subjected to support excitation

Lecture 34 - Response of continuous systems to transient excitations

Lecture 35 - Shock spectrum due to half sine pulse

Lecture 36 - Numerical Evaluation of Duhamel Integral

Lecture 37 - Direct Integration Methods

Lecture 38 - Spectral Analysis of structures for earthquake excitation

NPTEL : NOC:Reliability-Based Structural Design (Civil Engineering)

Co-ordinators : Dr. Arunasis Chakarborty

Lecture 1 - Introduction

Lecture 2 - Random Variable

Lecture 3 - Functions of Random Variables

Lecture 4 - Joint Distributions

Lecture 5 - Mt. Gen. Func. and CLT

Lecture 6 - Theory of Estimation

Lecture 7 - Goodness of Fit

Lecture 8 - MVFOSM

Lecture 9 - MVFOSM (Continued...)

Lecture 10 - Hasofer-Lind Rel. Index

Lecture 11 - Rackwitz's Algorithm (Continued...)

Lecture 12 - HL-RF for Non-Normal Problems

Lecture 13 - HL-RF for Correlated Problems

Lecture 14 - FORM using MATLAB

Lecture 15 - FORM using MATLAB (Continued...)

Lecture 16 - FORM Using FEM

Lecture 17 - Morgenstern Model

Lecture 18 - Nataf Model

Lecture 19 - Rosenblatt Transformation

Lecture 20 - Brietung's Model

Lecture 21 - Tvedt's Model

Lecture 22 - Monte-Carlo Simulation

Lecture 23 - Importance Sampling

Lecture 24 - Least Square Curve Fitting

Lecture 25 - Orthogonal Polinomials

Lecture 26 - RSM

Lecture 27 - Stochastic Response Surface Method

Lecture 28 - Moving Least Square Method

Lecture 29 - Adaptive-SRSM

Lecture 30 - Partial Safety Factors

Lecture 31 - Optimal Partial Safety Factors

Lecture 32 - FORM - Revisited

Lecture 33 - Subset Simulation

Lecture 34 - Applications

Lecture 35 - Applications (Continued...)

Lecture 36 - Introduction to Stochastic FEM

NPTEL : NOC:Applied Seismology for Engineers (Civil Engineering)

Co-ordinators : Prof. Abhishek Kumar

Lecture 1 - Plate tectonics and continental drift theory

Lecture 2 - Fault Plane Solution - Part 1

Lecture 3 - Fault Plane Solution - Part 2

Lecture 4 - Fault Plane Solution (Stereonets)

Lecture 5 - Seismic gaps

Lecture 6 - Analogy of active and inactive fault

Lecture 7 - Seismic waves and their use in locating EQ epicentre

Lecture 8 - EQ Intensity, magnitude and wave attenuation

Lecture 9 - Seismic source characterization and seismic activity

Lecture 10 - Earthquake catalogue preparation and seismic activity parameters

Lecture 11 - Ground motion simulation models and GMPEs

Lecture 12 - Deterministic seismic hazard analysis (DSHA)

Lecture 13 - Probabilistic seismic hazard analysis (PSHA)

Lecture 14 - One Dimensional equation of motion: P wave

Lecture 15 - One Dimensional equation of motion: S wave

Lecture 16 - Solution to 1D equation of motion: S wave

Lecture 17 - Local Site Effect (LSE) and Ground Response Analysis - Part I

Lecture 18 - Local Site Effect (LSE) and Ground Response Analysis - Part II

Lecture 19 - Ground Response Analysis - Part III

Lecture 20 - Ground Response Analysis - Part IV

Lecture 21 - State Criteria for Liquefaction - Part 1

Lecture 22 - State Criteria for Liquefaction - Part 2

Lecture 23 - Initiation of Liquefaction

Lecture 24 - Assessment of Liquefaction Potential

Lecture 25 - Paleoliquefaction

Lecture 26 - Seismic Microzonation

Lecture 27 - Landslides: Introduction and classification

Lecture 28 - Seismic vulnerability and risk - Part 1

Lecture 29 - Seismic vulnerability and risk - Part 2

Lecture 30 - Seismic vulnerability and risk - Part 3

NPTEL : NOC:Structural Vibration (Civil Engineering)

Co-ordinators : Prof. Arunasis Chakarborty

Lecture 1 - D'Alembert Principle and Degrees of Freedom

Lecture 2 - Simple Harmonic Motion

Lecture 3 - Examples

Lecture 4 - Undamped Free Vibration

Lecture 5 - Damped free vibration

Lecture 6 - Logarithmic Decrement and Coulomb Damped Free Vibration

Lecture 7 - Structural Damping

Lecture 8 - Damped Forced Vibration

Lecture 9 - Response due to Harmonic Excitation

Lecture 10 - Response due to Harmonic Excitation (Continued...)

Lecture 11 - Examples Set 1

Lecture 12 - Transmissibility and Support Motion Problem

Lecture 13 - Examples Set 2

Lecture 14 - Impulse Response function

Lecture 15 - Duhamel's Integral

Lecture 16 - Response in Frequency Domain

Lecture 17 - Response due to Periodic and Non Periodic Excitations

Lecture 18 - Nigam and Jennings and Central Difference method

Lecture 19 - Wilson Theta and Newmark Method

Lecture 20 - MATLAB Examples

Lecture 21 - Response Spectrum

Lecture 22 - MATLAB Code Generation

Lecture 23 - Generalized SDOF system

Lecture 24 - Rayleigh's Method and Calculus of Variation

Lecture 25 - Hamilton's Principle to Lagrange Equation

Lecture 26 - D'Alembert's Principle to Lagrange Equation

Lecture 27 - Hamilton's Canonical Form

Lecture 28 - Natural Frequencies and Mode shapes of MDOF system

Lecture 29 - Modal Orthogonality and Modal Decomposition

Lecture 30 - Rayleigh Damping Model and Free Vibration

Lecture 31 - Response Analsysis in Time Domain

Lecture 32 - Response Analysis in Frequency Domain

Lecture 33 - Response History Analysis

Lecture 34 - Response Spectrum Analysis

Lecture 35 - Model Reduction Techniques

Lecture 36 - Free Vibration of Beams

Lecture 37 - Forced Vibration of Beams

Lecture 38 - FE Modelling and Modal Analysis of a Building

Lecture 39 - Modal Superposition Analysis of a Building

Lecture 40 - Response Spectrum Analysis of a Building

Lecture 41 - Modal Analysis of a Steel Bridge

NPTEL : Advanced Hydrology (Civil Engineering)

Co-ordinators : Dr. Ashu Jain

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

NPTEL : Concrete Engineering and Technology (Civil Engineering)

Co-ordinators : Dr. Sudhir Misra

Lecture 1 - Introduction and course overview

Lecture 2 - Constituents of concrete - Part 1 of 2

Lecture 3 - Constituents of concrete - Part 2 of 2

Lecture 4 - Admixtures in concrete â€“ mineral and chemical

Lecture 5 - Hydration of cement

Lecture 6 - Basic properties of concrete

Lecture 7 - Proportioning of concrete mixes - Part 1 of 3

Lecture 8 - Proportioning of concrete mixes - Part 2 of 3

Lecture 9 - Proportioning of concrete mixes - Part 3 of 3

Lecture 10 - Pores and porosity in concrete

Lecture 11 - Porosimetry â€“ measuring pores in concrete

Lecture 12 - Principles of quality control in concrete construction

Lecture 13 - Quality control and acceptance criteria for concrete based on compressive strength

Lecture 14 - Fibre reinforced concrete

Lecture 15 - High strength concrete

Lecture 16 - Mass concrete - Part 1 of 2

Lecture 17 - Mass concrete - Part 2 of 2

Lecture 18 - Concreting in cold weather

Lecture 19 - Concreting in hot weather

Lecture 20 - Roller compacted concrete

Lecture 21 - Self-compacting concrete

Lecture 22 - Testing self-compacting concrete

Lecture 23 - Shotcrete and underwater concrete

Lecture 24 - Alkali â€“ aggregate reaction - Part 1 of 2

Lecture 25 - Alkali â€“ aggregate reaction - Part 2 of 2

Lecture 26 - Reinforcement corrosion in concrete

Lecture 27 - Chloride penetration in concrete

Lecture 28 - Using epoxy-coated bars in concrete structures

Lecture 29 - Using FRP as reinforcement in concrete structures - Part 1 of 2

Lecture 30 - Using FRP as reinforcement in concrete structures - Part 2 of 2

Lecture 31 - Grouting and importance of formwork in concrete construction

Lecture 32 - Carbonation and freezing & thawing in concrete structures

Lecture 33 - Using recycled aggregates in concrete construction

Lecture 34 - Basic non-destructive testing for concrete structures

Lecture 35 - Measuring permeability in concrete

Lecture 36 - Some additional topics

Lecture 37 - Considerations in repair of concrete structures - Part 1 of 2

Lecture 38 - Considerations in repair of concrete structures - Part 2 of 2

Lecture 39 - Laboratory demonstration

Lecture 40 - Review of the course

NPTEL : Environmental Air Pollution (Civil Engineering)

Co-ordinators : Prof. Mukesh Sharma

Lecture 1 - Introduction to Atmosphere

Lecture 2 - Air Pollution Systems

Lecture 3 - Air Quality Standards

Lecture 4 - Types and Forms of Air Pollutants

Lecture 5 - Measurement Units and Particulate classification

Lecture 6 - Interpretation and Particle size Distribution

Lecture 7 - Atmospheric formation of Air Pollutants - I

Lecture 8 - Atmospheric formation of Air Pollutants - II

Lecture 9 - Atmospheric formation of Air Pollutants - III

Lecture 10 - Kinetics of Air pollution and combustion processes

Lecture 11 - Internal Combustion Engine and Air Pollution - I

Lecture 12 - Internal Combustion Engine and Air Pollution - II

Lecture 13 - Air Pollution and Health - I

Lecture 14 - Air Pollution and Health - II

Lecture 15 - Emission Inventory

Lecture 16 - Sources of Air Pollution

Lecture 17 - Emission from Fugitive Sources and Sulfuric Acid Production

Lecture 18 - Aluminium Production and Air Pollution - I

Lecture 19 - Aluminium Production and Air Pollution - II

Lecture 20 - Coke Production and Air Pollution

Lecture 21 - Examples for Practice

Lecture 22 - Meteorological Measurements and their interpretation

Lecture 23 - Examples for Practice - Dispersion Modeling

Lecture 24 - Vertical Temperature Profile of Atmosphere

Lecture 25 - Stability, Mixing Height and Plume Behavior - I

Lecture 26 - Stability, Mixing Height and Plume Behavior - II

Lecture 27 - Examples - Solar Radiation Based Stability Calculation

Lecture 28 - Air Quality Modeling - I

Lecture 29 - Air Quality Modeling - II

Lecture 30 - Derivation of Gaussian Model

Lecture 31 - Gaussian Model - Useful Formulation

Lecture 32 - Plume rise, Area and Line Source Model

Lecture 33 - Air Quality Modeling - Maximum Ground Level concentration

Lecture 34 - Examples of Air Quality Modeling

Lecture 35 - Air Pollution Control Devices - I

Lecture 36 - Air Pollution Control Devices - II

Lecture 37 - Source Emission Monitoring

Lecture 38 - Receptor Source Modeling

Lecture 39 - Environmental laws

NPTEL : Surveying (Civil Engineering)

Co-ordinators : Dr. Bharat Lohani

Module 1 - Lecture 1

Module 2 - Lecture 1

Module 2 - Lecture 2

Module 2 - Lecture 3

Module 2 - Lecture 4

Module 2 - Lecture 5

Module 3 - Lecture 1

Module 3 - Lecture 2

Module 3 - Lecture 3

Module 3 - Lecture 4

Module 4 - Lecture 1

Module 4 - Lecture 2

Module 5 - Lecture 1

Module 5 - Lecture 2

Module 5 - Lecture 3

Module 5 - Lecture 4

Module 5 - Lecture 5

Module 5 - Lecture 6

Module 6 - Lecture 1

Module 6 - Lecture 2

Module 6 - Lecture 3

Module 7 - Lecture 1

Module 7 - Lecture 2

Module 7 - Lecture 3

Module 7 - Lecture 4

Module 7 - Lecture 5

Module 8 - Lecture 1

Module 8 - Lecture 2

Module 9 - Lecture 1

Module 9 - Lecture 2

Module 9 - Lecture 3

Module 9 - Lecture 4

Module 9 - Lecture 5

Module 10 - Lecture 1

Module 11 - Lecture 1

Module 11 - Lecture 2

Module 11 - Lecture 3

Module 12 - Lecture 1

Module 12 - Lecture 2

Module 12 - Lecture 3

NPTEL : Water Resources Engineering (Civil Engineering)

Co-ordinators : Dr. Pranab K Mohapatra, Prof. Rajesh Srivastava

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25 (Lecture Missing)

Lecture 26

Lecture 27

Lecture 28

Lecture 29

NPTEL : Geotechnical Measurements and Explorations (Civil Engineering)

Co-ordinators : Dr. Nihar Ranjan Patra

Lecture 1 - Geotechnical Measurements & Explorations

Lecture 2 - Geotechnical Measurements & Explorations

Lecture 3 - Geotechnical Measurements & Explorations

Lecture 4 - Geotechnical Measurements & Explorations

Lecture 5 - Geotechnical Measurements & Explorations

Lecture 6 - Geotechnical Measurements & Explorations

Lecture 7 - Geotechnical Measurements & Explorations

Lecture 8 - Geotechnical Measurements & Explorations

Lecture 9 - Geotechnical Measurements & Explorations

Lecture 10 - Geotechnical Measurements & Explorations

Lecture 11 - Geotechnical Measurements & Explorations

Lecture 12 - Geotechnical Measurements & Explorations

Lecture 13 - Geotechnical Measurements & Explorations

Lecture 14 - Geotechnical Measurements & Explorations

Lecture 15 - Geotechnical Measurements & Explorations

Lecture 16 - Geotechnical Measurements & Explorations

Lecture 17 - Geotechnical Measurements & Explorations

Lecture 18 - Geotechnical Measurements & Explorations

Lecture 19 - Geotechnical Measurements & Explorations

Lecture 20 - Geotechnical Measurements & Explorations

Lecture 21 - Geotechnical Measurements & Explorations

Lecture 22 - Geotechnical Measurements & Explorations

Lecture 23 - Geotechnical Measurements & Explorations

Lecture 24 - Geotechnical Measurements & Explorations

Lecture 25 - Geotechnical Measurements & Explorations

Lecture 26 - Geotechnical Measurements & Explorations

Lecture 27 - Geotechnical Measurements & Explorations

Lecture 28 - Geotechnical Measurements & Explorations

Lecture 29 - Geotechnical Measurements & Explorations

Lecture 30 - Geotechnical Measurements & Explorations

Lecture 31 - Geotechnical Measurements & Explorations

Lecture 32 - Geotechnical Measurements & Explorations

Lecture 33 - Geotechnical Measurements & Explorations

Lecture 34 - Geotechnical Measurements & Explorations

Lecture 35 - Geotechnical Measurements & Explorations

Lecture 36 - Geotechnical Measurements & Explorations

Lecture 37 - Geotechnical Measurements & Explorations

Lecture 38 - Geotechnical Measurements & Explorations

Lecture 39 - Geotechnical Measurements & Explorations

Lecture 40 - Geotechnical Measurements & Explorations

NPTEL : Application of Soil Mechanics (Civil Engineering)

Co-ordinators : Dr. Nihar Ranjan Patra

Lecture 1 - Application of Soil Mechanics

Lecture 2 - Application of Soil Mechanics

Lecture 3 - Application of Soil Mechanics

Lecture 4 - Application of Soil Mechanics

Lecture 5 - Application of Soil Mechanics

Lecture 6 - Application of Soil Mechanics

Lecture 7 - Application of Soil Mechanics

Lecture 8 - Application of Soil Mechanics

Lecture 9 - Application of Soil Mechanics

Lecture 10 - Application of Soil Mechanics

Lecture 11 - Application of Soil Mechanics

Lecture 12 - Application of Soil Mechanics

Lecture 13 - Application of Soil Mechanics

Lecture 14 - Application of Soil Mechanics

Lecture 15 - Application of Soil Mechanics

Lecture 16 - Application of Soil Mechanics

Lecture 17 - Application of Soil Mechanics

Lecture 18 - Application of Soil Mechanics

Lecture 19 - Application of Soil Mechanics

Lecture 20 - Application of Soil Mechanics

Lecture 21 - Application of Soil Mechanics

Lecture 22 - Application of Soil Mechanics

Lecture 23 - Application of Soil Mechanics

Lecture 24 - Application of Soil Mechanics

Lecture 25 - Application of Soil Mechanics

Lecture 26 - Application of Soil Mechanics

Lecture 27 - Application of Soil Mechanics

Lecture 28 - Application of Soil Mechanics

Lecture 29 - Application of Soil Mechanics

Lecture 30 - Application of Soil Mechanics

Lecture 31 - Application of Soil Mechanics

Lecture 32 - Application of Soil Mechanics

Lecture 33 - Application of Soil Mechanics

Lecture 34 - Application of Soil Mechanics

Lecture 35 - Application of Soil Mechanics

Lecture 36 - Application of Soil Mechanics

Lecture 37 - Application of Soil Mechanics

Lecture 38 - Application of Soil Mechanics

Lecture 39 - Application of Soil Mechanics

Lecture 40 - Application of Soil Mechanics

NPTEL : NOC:Geology and Soil Mechanics (Civil Engineering)

Co-ordinators : Dr. Priyanka Ghosh

Lecture 1 - Description of soil, Engineering Geology Of Soils and Thier Formation

Lecture 2 - Index Properties Of Soil

Lecture 3 - Index Properties Of Soil - A

Lecture 4 - Index Properties Of Soil - B

Lecture 5 - Index Properties Of Soil - C

Lecture 6 - Index Properties Of soil - D

Lecture 7 - Classification Of Soils - A

Lecture 8 - Classification Of Soils - B

Lecture 9 - Classification Of Soils And Clay Mineralogy - A

Lecture 10 - Classification Of Soils And Clay Mineralogy - B

Lecture 11 - Soil compaction - A

Lecture 12 - Soil compaction - B

Lecture 13 - Soil compaction - C

Lecture 14 - Soil compaction - D

Lecture 15 - Soil compaction and Permeability

Lecture 16 - Permeability - A

Lecture 17 - Permeability - B

Lecture 18 - Permeability - C

Lecture 19 - Problems on permeability

Lecture 20 - Seepage

Lecture 21 - Seepage - A

Lecture 22 - Seepage - B

Lecture 23 - Seepage and In situ stress

Lecture 24 - In situ stresses - A

Lecture 25 - In situ stresses - B

Lecture 26 - In situ stresses - A

Lecture 27 - In situ stresses - B

Lecture 28 - In situ stresses - C

Lecture 29 - Consolidation - A

Lecture 30 - Consolidation - B

Lecture 31 - Consolidation - A

Lecture 32 - Consolidation - B

Lecture 33 - Consolidation - C

Lecture 34 - Consolidation - D

Lecture 35 - Consolidation - E

Lecture 36 - Consolidation - F

Lecture 37 - Shear strength of Soil - A

Lecture 38 - Shear strength of Soil - B

Lecture 39 - Shear strength of Soil - C

Lecture 40 - Shear Strength of Soils

Lecture 41 - Shear Strength of Soils.

Lecture 42 - Shear Strength of Soils..

Lecture 43 - Shear strength of Soil

Lecture 44 - Shear strength of Soil- e

Lecture 45 - Shear strength of Soil_B

Lecture 46 - Problem on shear strength of soil

Lecture 47 - Problem on shear strength of soil -a

Lecture 48 - Problem on shear strength of soil -a

Lecture 49 - Earth Pressure on retaining wall

Lecture 50 - Earth Pressure on retaining wall -A

Lecture 51 - Tutorial on Index properties of soil

Lecture 52 - Tutorial on compaction

Lecture 53 - Tutorial on Permeability - a

Lecture 54 - Tutorial on Permeability - b

Lecture 55 - Tutorial On Consoildation

Lecture 56 - Tutorial on consoildation - a

Lecture 57 - Tutorial on Sheer Strength

Lecture 58 - Tutorial on Sheer Strength - a

Lecture 59 - Earth Pressure on Retaining Wall - a

Lecture 60 - Earth Pressure on Retaining Wall - 1

Lecture 61 - Earth Pressure Theories and Problems on Earth Pressure on Retaining Wall

Lecture 62 - Problems on Earth Pressure on Retaining Wall Edit Lesson

Lecture 63 - Problems on Earth Pressure on Retaining Wall - 2

Lecture 64 - Problems on Earth Pressure Theories - 3

Lecture 65 - Problems on Earth Pressure Theories - 4

NPTEL : NOC:Engineering Graphics (Civil Engineering)

Co-ordinators : Dr. Nihar Ranjan Patra

Lecture 1 - Course Objectives, Lettering and Numbering

Lecture 2 - Geometric Constructions - Part I

Lecture 3 - Geometric Constructions - Part II

Lecture 4 - Orthographic Projections - Part I

Lecture 5 - Orthographic Projections - Part II

Lecture 6 - Orthographic Projections - Part III

Lecture 7 - Orthographic Projections - Part IV

Lecture 8 - Orthographic Projections - Part V

Lecture 9 - Isometric Projections - Part I

Lecture 10 - Isometric Projections - Part II

Lecture 11 - Isometric Projections - Part III

Lecture 12 - Isometric Projections - Part IV

Lecture 13 - Isometric Projections - Part V and Oblique Projections - Part I

Lecture 14 - Oblique Projections - Part II

Lecture 15 - Sectioning

Lecture 16 - Hatching

Lecture 17 - Orthographic Projections - Assemblies

Lecture 18 - Missing Lines and Missing Views

Lecture 19 - Perspective View - Part I

Lecture 20 - Perspective View - Part II

Lecture 21 - Perspective View - Part III

Lecture 22 - Angular Perspective and Circles in perspective

Lecture 23 - Perspective View examples and Space Geometry

Lecture 24 - Space Geometry (Continued...)

Lecture 25 - True Length, Point View and Slope of Oblique lines

Lecture 26 - Space Geometry - Introduction

Lecture 27 - Space Geometry - Part 2

Lecture 28 - Auxiliary View, Lines, Planes

Lecture 29 - Relationship between Lines and Planes, Planes and Planes

Lecture 30 - Intersection of Solids

Lecture 31 - AUTOCAD

Lecture 32 - Development of Surfaces

NPTEL : NOC:Earth Sciences for Civil Engineering (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Geosciences in Civil Engineering - Part 1

Lecture 2 - Introduction to Geosciences in Civil Engineering - Part 2

Lecture 3 - Plate Tectonics and Continental Drift - Part 2

Lecture 4 - Plate Tectonics and Continental Drift - Part 3

Lecture 5 - Plate Tectonics and Continental Drift - Part 4

Lecture 6 - Rock Forming Minerals and their Properties - Part 1

Lecture 7 - Rock types and their Properties - Part 1

Lecture 8 - Rock types and their Properties - Part 2

Lecture 9 - Rock types and their Properties - Part 3

Lecture 10 - Rock types and their Properties - Part 4

Lecture 11 - Rock types and their properties - Part 5

Lecture 12 - Rock types and their properties - Part 6

Lecture 13 - Rock types and their properties - Part-6 Seismology and the internal structure of the earth - Part 1

Lecture 14 - Seismology and the internal structure of the earth - Part 2

Lecture 15 - Seismology and the internal structure of the earth - Part 3 Edit Lesson

Lecture 16 - Seismology and the internal structure of the earth - Part 4

Lecture 17 - Seismology and the internal structure of the earth - Part 5 and Geological Structures - Part 1

Lecture 18 - Geological Structures - Part 2

Lecture 19 - Geological Structures - Part 3

Lecture 20 - Geological Structures - Part 4

NPTEL : NOC:Earth Sciences for Civil Engineering - Part 2 (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Geological Hazards and Enviromental Impact - Part 1

Lecture 2 - Introduction to Geological Hazards and Enviromental Impact - Part 2

Lecture 3 - Introduction to Geological Hazards and Enviromental Impact - Part 3

Lecture 4 - Active Faults and its Related Hazards in India - Part 1

Lecture 5 - Active Faults and its Related Hazards in India - Part 2

Lecture 6 - Active faults and its related hazards in India - Part 3

Lecture 7 - Active faults and its related hazards in India - Part 4

Lecture 8 - Active faults its related hazards in India - Part 5

Lecture 9 - Active faults its related hazards in India - Part 6

Lecture 10 - Active faults its related hazards in India - Part 7 and Civil Engineering applications - geological considerations in dams, tunnels - Part 1

Lecture 11 - Civil Engineering applications Â– geological considerations in dams, tunnels - Part 2

Lecture 12 - Civil Engineering applications Â– geological considerations in dams, tunnels - Part 3 and Tsunami and related hazard - Part 1

Lecture 13 - Tsunami and related hazard - Part 2

Lecture 14 - Tsunami and related hazard - Part 3

Lecture 15 - Landslide and subsidence - Part 1

Lecture 16 - Landslide and subsidence - Part 2

Lecture 17 - Landslide and subsidence - Part 3

Lecture 18 - Flood and related hazard - Part 1

Lecture 19 - Flood and related hazard - Part 2

Lecture 20 - Groundwater

NPTEL : NOC:Hydration, Porosity and Strength of Cementitious Materials (Civil Engineering)

Co-ordinators : Dr. Satyaki Roy, Dr. Sudhir Misra

Lecture 1 - Lecture 1 - Introduction to the course

Lecture 2 - Lecture 2 - Concrete - A Three Phase System

Lecture 3 - Lecture 3 - Basic Properties of Concrete

Lecture 4 - Lecture 4 - Portland Cement

Lecture 5 - Lecture 5 - Portland Cement (Continued...)

Lecture 6 - Lecture 6 - Introduction (Aggregates) - 1

Lecture 7 - Lecture 7 - Introduction (Aggregates) - 2

Lecture 8 - Lecture 8 - Introduction (Aggregates) - 3

Lecture 9 - Lecture 9 - Introduction (Concrete Mixture Proportioning Strategies)

Lecture 10 - Lecture 10 - Introduction (Chemical Admixtures)

Lecture 11 - Lecture-11 - Portland Cement Based Paste Systems - I

Lecture 12 - Lecture 12 - Portland Cement Based Paste Systems - II

Lecture 13 - Lecture 13 - Portland Cement Based Paste Systems - III

Lecture 14 - Lecture 14 - Portland Cement Paste Based Systems - IV

Lecture 15 - Lecture 15 - Portland Cement Based Paste Systems - V

Lecture 16 - Lecture 16 - 18 Part 1 - Portland Cement Based Paste Systems - VI

Lecture 17 - Lecture 16 - 18 Part 2 - Portland Cement Based Paste Systems - VII

Lecture 18 - Lecture 19 - Heat of hydration of Portland Cement

Lecture 19 - Lecture 20 - Mass Concrete

Lecture 20 - Lecture 21-22 - Mineral Admixtures - 1

Lecture 21 - Lecture 23-24 - Mineral Admixtures - 2

Lecture 22 - Lecture 25-27 - Mineral Admixtures - 3

Lecture 23 - Lecture 28-30 - Mineral Admixtures - 4

Lecture 24 - Lecture 31 - From paste to concrete

Lecture 25 - Lecture 32 - Demonstration

Lecture 26 - Lecture 33 - Pores and porosity - A revisit

Lecture 27 - Lecture 34 - Measuring permeability of concrete

Lecture 28 - Lecture 35 - Behavior under load

Lecture 29 - Lecture 36 - Curing of concrete

Lecture 30 - Lecture 37 - Stress strain behaviour

Lecture 31 - Lecture 38 - Durability of concrete - I

Lecture 32 - Lecture 39 - Durability of concrete - II - Specifications

NPTEL : NOC:Mechanics of Solids (Civil Engineering)

Co-ordinators : Dr. Priyanka Ghosh

Lecture 1 - Course Handout

Lecture 2 - Analysis of Mechanical System

Lecture 3 - Conditions of equilibrium in 2D and 3D

Lecture 4 - FBD with examples on modelling of typical supports and joints

Lecture 5 - Support Conditions

Lecture 6 - FBD of Frame Structures

Lecture 7 - Stability of Truss

Lecture 8 - Solutions of Plane Truss

Lecture 9 - Method of Sections

Lecture 10 - Friction 2

Lecture 11 - Tutorial on Truss

Lecture 12 - Tutorial on Friction

Lecture 13 - Force Displacement Relationship

Lecture 14 - Hoop Stresses

Lecture 15 - Mechanism of belt around wheel

Lecture 16 - Tutorial on Force Displacement Relationship and Geometric Compatibility - 1

Lecture 17 - Tutorial on Force Displacement Relationship and Geometric Compatibility - 2

Lecture 18 - Tutorial on Force Displacement Relationship and Geometric Compatibility - 3

Lecture 19 - Concept of Stress

Lecture 20 - Plane Stress

Lecture 21 - State of Stresses

Lecture 22 - Mohrs Circle representation of plane stress

Lecture 23 - Construction of Mohrs Circle

Lecture 24 - Principal Stresses and Introduction to Concept of Strain

Lecture 25 - Normal Strain and Shear Strain

Lecture 26 - Strain Transformation

Lecture 27 - Strain Measurement

Lecture 28 - Tutorial

Lecture 29 - Tutorial on Concept of Strain.

Lecture 30 - Elastic Stress Strain Relationship

Lecture 31 - Von Mises Yield Criteria

Lecture 32 - Tresca Criteria

Lecture 33 - True Stress Strain

Lecture 34 - Tutorial 2

Lecture 35 - Forces and Moments Transmitted by Slender Members

Lecture 36 - Bending Moment

Lecture 37 - Shear Force and Bending Moment Diagrams

Lecture 38 - Differential Equation Relationship

Lecture 39 - Tutorial 3

Lecture 40 - Tutorial 4

Lecture 41 - Torsion

Lecture 42 - Stress Components

Lecture 43 - Tutorial A

Lecture 44 - Tutorial B

Lecture 45 - Stresses due to Bending

Lecture 46 - Equilibrium Requirements

Lecture 47 - Beam Transmitting both Shear Force and Bending Moment

Lecture 48 - Shear Stress Distribution

Lecture 49 - Distribution of Shear Stress in I Beam

Lecture 50 - Tutorial 1

Lecture 51 - Deflections due to Bending

Lecture 52 - Integration of Moment Curvature Relation

Lecture 53 - Superposition Continued

Lecture 54 - Load Deflection Differential Equation

Lecture 55 - Castiglianoâ€™s Theorem

Lecture 56 - Strain Energy Methods

Lecture 57 - Introduction to Concept of Elastic Instability

Lecture 58 - Critical Load

Lecture 59 - Critical Load for Flexible Columns

Lecture 60 - Concluding Lecture

NPTEL : NOC:Principles of Construction Management (Civil Engineering)

Co-ordinators : Dr. Sudhir Misra

Lecture 1 - Introduction to the course

Lecture 2 - Interdisciplinary nature of modern construction projects

Lecture 3 - Overview of steps in execution of a project

Lecture 4 - Illustrative examples for evaluation of bids based on different schemes

Lecture 5 - Resource management in construction projects

Lecture 6 - Estimating quantities

Lecture 7 - Description of items

Lecture 8 - Estimation of project cost

Lecture 9 - Discussion on the case study of boundary wall

Lecture 10 - Running account bills

Lecture 11 - Economic decision making in construction projects

Lecture 12 - Depreciation of construction equipment

Lecture 13 - Repayment of a loan

Lecture 14 - Introduction to planning and scheduling

Lecture 15 - Introduction to planning and scheduling (Continued...)

Lecture 16 - Project scheduling

Lecture 17 - Uncertainties in duration of activities -Using PERT in scheduling

Lecture 18 - Project monitoring and control systems

Lecture 19 - Resource leveling and allocation

Lecture 20 - Crashing of networks

Lecture 21 - Introduction to construction safety

Lecture 22 - Accidents in construction industry - I

Lecture 23 - Accidents in construction industry - II

Lecture 24 - Personal protective equipment

Lecture 25 - Implications of construction accidents

Lecture 26 - Safety organization and safety officer

Lecture 27 - Quality control in construction

Lecture 28 - Quality in construction - welding

Lecture 29 - Epoxy coated bars

Lecture 30 - Quality control of grouts in ducts of post-tensioned PC members

Lecture 31 - Quality control (QC) issues in concrete

Lecture 32 - Legal issues in Construction Management - An Introduction

Lecture 33 - Essentials of a Good Contract

Lecture 34 - Dispute Resolution in Construction Projects

Lecture 35 - Types of Construction Contracts - Definitions

Lecture 36 - Closing the Discussion on Legal Aspects

Lecture 37 - Quality Control - Concrete Sewer Pipeline

NPTEL : NOC:Foundation Design (Civil Engineering)

Co-ordinators : Dr. Nihar Ranjan Patra

Lecture 1 - (1A) Subsoil Investigation or Site Investigation - Part 1

Lecture 2 - (1B) Subsoil Investigation or Site Investigation - Part 2

Lecture 3 - (2A) Subsoil Investigation or Site Investigation - Part 3

Lecture 4 - (2B) Subsoil Investigation or Site Investigation - Part 4

Lecture 5 - (3A) Subsoil Investigation or Site Investigation - Part 5

Lecture 6 - (3B) Subsoil Investigation or Site Investigation - Part 6

Lecture 7 - (4A) Subsoil Investigation or Site Investigation - Part 7

Lecture 8 - (4B) Foundations

Lecture 9 - (5A) Bearing Capacity Of Shallow Foundations - Part 1

Lecture 10 - (5B) Bearing Capacity Of Shallow Foundations - Part 2

Lecture 11 - (6A) Bearing Capacity Of Shallow Foundations - Part 3

Lecture 12 - (6B) Bearing Capacity Of Shallow Foundations - Part 4

Lecture 13 - (7A) Bearing Capacity Of Shallow Foundations - Part 5

Lecture 14 - (7B) Bearing Capacity Of Shallow Foundations - Part 6

Lecture 15 - (8A) Settlement Analysis - Part 1

Lecture 16 - (8B) Settlement Analysis - Part 2

Lecture 17 - (9A) Settlement Analysis - Part 3

Lecture 18 - (9B) Stress distribution in soils - Part 1

Lecture 19 - (10A) Stress distribution in soils - Part 2

Lecture 20 - (10B) Stress distribution in soils - Part 3

Lecture 21 - (11A) Stress distribution in soils - Part 4

Lecture 22 - (11B) Stress distribution in soils - Part 5

Lecture 23 - (12A) Examples based on bearing capacity and settlement

Lecture 24 - (12B) Design of foundation - Part 1

Lecture 25 - (13A) Design of Foundation - Part 2

Lecture 26 - (13B) Design of Foundation - Part 3

Lecture 27 - (14A) Design of Foundation - Part 4

Lecture 28 - (14B) Design of Foundation - Part 5

Lecture 29 - (15A) Types of foundations (Combined Footing)

Lecture 30 - (15B) Design of Raft Foundation

Lecture 31 - (16A) Earth Pressure Theories - Part 1

Lecture 32 - (16B) Earth Pressure Theories - Part 2

Lecture 33 - (17A) Earth Pressure Theories - Part 3

Lecture 34 - (17B) Earth Pressure Theories - Part 4

Lecture 35 - (18A) Earth Pressure Theories - Part 5

Lecture 36 - (18B) Deep Foundation - Part 1

Lecture 37 - (18C) Deep Foundation - Part 2

Lecture 38 - (18D) Deep Foundation - Part 3

Lecture 39 - (20A) Deep Foundation - Part 4

Lecture 40 - (20B) Deep Foundation - Part 5

NPTEL : NOC:Photogeology In Terrain Evaluation (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Remote Sensing - Photogeology

Lecture 2 - Introduction to Remote Sensing - Photogeology

Lecture 3 - Fundamental Principle in Remote Sensing

Lecture 4 - Aerial Photography

Lecture 5 - Stereo-photos and their Importance

Lecture 6 - Photo-interpretation Techniques

Lecture 7 - Photogrammetry and its Significance

Lecture 8 - Sensors, Cameras and Panchromatic Data

Lecture 9 - Stereoscopy and Methods

Lecture 10 - Relief Displacement on Aerial Photographs

Lecture 11 - Fluvial Processes and Landforms

Lecture 12 - Geomorphology of River Channels

Lecture 13 - Drainage Basins and their Features

Lecture 14 - Morphometric Parameters of Fluvial Channels

Lecture 15 - Drainage Patterns and their Morphology

Lecture 16 - Determination of Flightline (Lab)

Lecture 17 - Determination of Flightline (Lab)

Lecture 18 - Exercise on Relief Displacement

Lecture 19 - Exercise on Stereoscopic Parallax

Lecture 20 - Exercise on Stereoscopic Parallax

Lecture 21 - Generation of Digital Elevation Model and Anaglyph

NPTEL : NOC:Photogeology In Terrain Evaluation - Part 2 (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Geological Structures, Photo interpretation and Terrain evaluation

Lecture 2 - Photo interpretation/identification of Landforms associated with Folds - 1

Lecture 3 - Photo interpretation/identification of Landforms associated with Folds - 2

Lecture 4 - Identification of features related to ongoing Crustal Deformation and Mountain Building process

Lecture 5 - Identification of Fault Topography

Lecture 6 - Photogeology:Interpretations of Tectonic Landforms

Lecture 7 - Photo Interpretations: Demarcation of Faults and related Landforms - 1

Lecture 8 - Photo Interpretations

Lecture 9 - Photo Interpretations

Lecture 10 - Photo-Interpretations: Lithology and Geomorphic Mapping

Lecture 11 - Photo Interpretations: Lithology of Sedimentary and Intrusive Igneous Rocks

Lecture 12 - Photo Interpretations: Lithology of Metamorphic and Extrusive Igneous Rocks

Lecture 13 - Photo Interpretations: Coastal and Fluvial Landforms - 1

Lecture 14 - Photo Interpretations: Coastal and Fluvial Landforms - 2

Lecture 15 - Photo Interpretations: Aeolian Landforms and their Surface Expressions

Lecture 16 - Exercise on Identification of Geological Structures and related Landforms

Lecture 17 - Exercise on Identification of Geomorphic Features related to Various Environments

Lecture 18 - Exercise on Identification of Tectonic Features and Geomorphic Mapping using Satellite Data

Lecture 19 - Exercise on Identification of Geological Structures and Geomorphic Landforms on Aerial/Satellite Photos

Lecture 20 - Exercise on Morphometric Parameters and 3D observation of the Earth Surface Features

NPTEL : NOC:Introduction to Accounting and Finance for Civil Engineers (Civil Engineering)

Co-ordinators : Dr. Sudhir Misra

Lecture 1 - Overview of the Course

Lecture 2 - Introduction

Lecture 3 - General Discussion on Construction Projects

Lecture 4 - Time value of money

Lecture 5 - Economic Decision Making - I

Lecture 6 - Economic decision making - II

Lecture 7 - Incremental Rate of Return (IROR)

Lecture 8 - Benefit cost ratio

Lecture 9 - Sensitivity analysis - Part 1

Lecture 10 - Sensitivity analysis - Part 2

Lecture 11 - Break-even analysis - Part 1

Lecture 12 - Break-even analysis - Part 2

Lecture 13 - Depreciation of construction equipment

Lecture 14 - Effect of depreciation on cash flows

Lecture 15 - Effect of depreciation and inflation on economic decision making

Lecture 16 - Replacement analysis

Lecture 17 - Risk analysis - Part 1

Lecture 18 - Risk analysis - Part 2

Lecture 19 - Risk analysis - Part 3

Lecture 20 - Simulation - Part 1

Lecture 21 - Simulation - Part 2

Lecture 22 - Bidding - Part 1

Lecture 23 - Bidding - Part 2

Lecture 24 - Bidding - Part 3

Lecture 25 - Bidding - Part 4

Lecture 26 - Bidding - Part 5

Lecture 27 - Bidding - Part 6

Lecture 28 - Bidding - Part 7

Lecture 29 - Introduction to accounting - Part 1

Lecture 30 - Introduction to accounting - Part 2

Lecture 31 - Introduction to accounting - Part 3

Lecture 32 - Revenue recognition

Lecture 33 - Construction Contract Status Reports

Lecture 34 - Assets and Liabilities

Lecture 35 - Accounting statements - case study

Lecture 36 - Working capital

Lecture 37 - Financing resources for working capital

Lecture 38 - Ratio analysis

NPTEL : NOC:Natural Hazards - Part 1 (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Natural Hazards

Lecture 2 - Introduction to Natural Hazards (Types of Hazard)

Lecture 3 - Introduction to Natural Hazards (Earth as a system)

Lecture 4 - Introduction to Natural Hazards (Cyclones and Earthquakes - Part I)

Lecture 5 - Introduction to Natural Hazards (Cyclones and Earthquakes - Part II)

Lecture 6 - Introduction to Natural Hazards (Disaster Management)

Lecture 7 - Introduction to Natural Hazards (Seismic Zonation of India and Landslide)

Lecture 8 - Introduction to Natural Hazards (Flood and Tsunami)

Lecture 9 - Introduction to Natural Hazards (Disaster Prediction and Warning)

Lecture 10 - Introduction to Natural Hazards (Recent Natural Calamities in India and Worldwide)

Lecture 11 - Plate tectonics and related hazards - Part I

Lecture 12 - Plate tectonics and related hazards - Part II

Lecture 13 - Plate tectonics and related hazards - Part III

Lecture 14 - Active fault and Paleoseismology

Lecture 15 - Case study on 2015 Gorkha Earthquake

Lecture 16 - Earthquake and related hazard - Part I

Lecture 17 - Earthquake and related hazard - Part II

Lecture 18 - Earthquake and related hazard - Part III

Lecture 19 - Ground Effects and Evaluation of Earthquake Hazards - Part I

Lecture 20 - Ground Effects and Evaluation of Earthquake Hazards - Part II

Lecture 21 - Ground Effects and Evaluation of Earthquake Hazards - Part III

Lecture 22 - Liquefaction and Related Geological Features

Lecture 23 - Motoring Seismic Activity - Part I

Lecture 24 - Motoring Seismic Activity - Part II

Lecture 25 - Volcano and Related Hazard - Part I

Lecture 26 - Volcano and Related Hazard - Part II

Lecture 27 - Introduction to Landslides

Lecture 28 - Types of Landslide and Related Hazards

Lecture 29 - Civil Engineering applications geological considerations in dams, tunnels - Part 2

Lecture 30 - Civil Engineering applications geological considerations in dams, tunnels - Part 3 and Tsunami and related hazard - Part 1

Lecture 31 - Tsunami and related hazard - Part 2

Lecture 32 - Tsunami and related hazard - Part 3

Lecture 33 - Landslide and subsidence - Part I

Lecture 34 - Flood and Related Hazards - Part I

Lecture 35 - Flood and Related Hazards - Part II

Lecture 36 - Flood and Related Hazards - Part III

Lecture 37 - Flood and Related Hazards - Part IV

Lecture 38 - Flood and Related Hazards - Part V

Lecture 39 - Introduction to Tsunami

Lecture 40 - Tsunami and Related Hazards - Part I

Lecture 41 - Tsunami and Related Hazards - Part II

Lecture 42 - Tsunami and Related Hazards - Part III

Lecture 43 - Tsunami Modelling

NPTEL : NOC:Structural Dynamics for Civil Engineers - SDOF Systems (Civil Engineering)

Co-ordinators : Prof. Riya Catherine George

Lecture 1 - Introduction to Structural Dynamics

Lecture 2 - Modelling of Dynamic System

Lecture 3 - Undamped Free vibration

Lecture 4 - Damped Free Vibrations

Lecture 5 - Coulomb Damped Free Vibrations

Lecture 6 - Forced Vibrations - Part 1

Lecture 7 - Forced Vibrations - Part 2

Lecture 8 - Examples

Lecture 9 - Harmonic Vibration Examples

Lecture 10 - Vibrations under Periodic Forces

Lecture 11 - Energy and Damping

Lecture 12 - Response to Arbitrary excitations

Lecture 13 - Response to Pulse Excitations

NPTEL : NOC:Geomorphic Processes: Landforms and Landscapes (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Geomorphic processes- Landforms and Landscapes - Part I

Lecture 2 - Introduction to Geomorphic Processes- Landforms and Landscapes - Part II

Lecture 3 - Introduction to Geomorphic Processes- Landforms and Landscapes - Part III

Lecture 4 - Earth Energy Budget - Part I

Lecture 5 - Earth Energy Budget - Part II

Lecture 6 - Earth and Environment

Lecture 7 - Surface and Ground Water System and Management - Part I

Lecture 8 - Surface and Ground Water System and Management - Part II

Lecture 9 - Surface and Ground Water System and Management - Part III

Lecture 10 - Interior of the Earth and Plate Tectonics - Part I

Lecture 11 - Interior of the Earth and Plate Tectonics - Part II

Lecture 12 - Interior of the Earth and Plate Tectonics - Part III

Lecture 13 - Interior of the Earth and Plate Tectonics - Part IV

Lecture 14 - Interior of the Earth and Plate Tectonics - Part V

Lecture 15 - Fluvial Processes and Related Landforms - Part I

Lecture 16 - Fluvial Processes and Related Landforms - Part II

Lecture 17 - Fluvial Processes and Related Landforms - Part III

Lecture 18 - Fluvial Processes and Related Landforms - Part IV

Lecture 19 - Fluvial Processes and Related Landforms - Part V

Lecture 20 - Fluvial Processes and Related Landforms - Part VI

Lecture 21 - Fluvial Processes and Related Landforms - Part VII

Lecture 22 - Fluvial Processes and Related Landforms - Part VIII

Lecture 23 - Fluvial Processes and Related Landforms - Part IX

Lecture 24 - Tectonic Geomorphology - Part I

Lecture 25 - Tectonic Geomorphology - Part II

Lecture 26 - Tectonic Geomorphology - Part III

Lecture 27 - Tectonic Geomorphology - Part IV

Lecture 28 - Tectonic Geomorphology - Part V

Lecture 29 - Glacial Landforms - Part I

Lecture 30 - Glacial Landforms - Part II

Lecture 31 - Glacial Landforms - Part III

Lecture 32 - Coastal Processes and Landforms - Part I

Lecture 33 - Coastal Processes and Landforms - Part II

Lecture 34 - Coastal Processes and Landforms - Part III

Lecture 35 - Aeolian Processes and Landforms - Part I

Lecture 36 - Aeolian Processes and Landforms - Part II

Lecture 37 - Tectonic Geomorphology of Kachchh - Part I

Lecture 38 - Tectonic Geomorphology of Kachchh - Part II

NPTEL : NOC:Structural Geology (Civil Engineering)

Co-ordinators : Prof. Santanu Misra

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Structural Elements and Measurements

Lecture 4 - How to measure strike-dip-pitch/rake-plunge

Lecture 5 - Stereographic Projection in Structural Geology

Lecture 6 - Concept of Strain and Deformation - Part I

Lecture 7 - Concept of Strain and Deformation - Part II

Lecture 8 - Strain Measurement

Lecture 9 - Stress - Part I

Lecture 10 - Stress - Part II

Lecture 11 - Basics of Rheology - Part I

Lecture 12 - Basics of Rheology - Part II

Lecture 13 - Basics of Rheology - Part III

Lecture 14 - Complex Rheology

Lecture 15 - Role of External Parameters

Lecture 16 - Crystal Defects and associated structures

Lecture 17 - Cataclastic Deformation

Lecture 18 - Intracrystalline Deformation

Lecture 19 - Diffusive Mass Transfer

Lecture 20 - Planar Fabrics (Foliation/ Cleavage/ Schistosity) - I

Lecture 21 - Planar Fabrics (Foliation/ Cleavage/ Schistosity) - II

Lecture 22 - Linear Fabrics (Lineation)

Lecture 23 - Folds and Folding: Basic Concepts

Lecture 24 - Folds and Folding: Classifications

Lecture 25 - Folds and Folding: Dip Isogons and Mechanisms

Lecture 26 - Folds and Folding: Superposed Folding

Lecture 27 - Porphyroblasts

Lecture 28 - Boudinage and Pinch-and-Swell Structures - I

Lecture 29 - Boudinage and Pinch-and-Swell Structures - II

Lecture 30 - Stereonet Problem I: True dip from two apparent dips

Lecture 31 - Stereonet Problem II: True dip from strike and one apparent dip

Lecture 32 - Stereonet Problem III: Pole to the Plane

Lecture 33 - Stereonet Problem IV: Fold axis and Axial plane

Lecture 34 - Stereonet Problem V: Fold geometry from pole data of two limbs

Lecture 35 - Fractures and Joints - I

Lecture 36 - Fractures and Joints - II

Lecture 37 - Faults and Faulting - I

Lecture 38 - Stereonet Problem VI - Fold geometry from interlimb angle and fold axes

Lecture 39 - Stereonet Problem VII - Fold geometry from pitch of the limbs on another plane

Lecture 40 - Faults and Faulting - II

Lecture 41 - Ductile Shear Zones - I

Lecture 42 - Ductile Shear Zones - II

Lecture 43 - Basic of Litho-Structural Mapping

Lecture 44 - Paleostress analysis

Lecture 45 - Graphical Problem

Lecture 46 - Three point problem

Lecture 47 - Construction of Topographic Profile

Lecture 48 - Construction of Geological Cross-section

NPTEL : NOC:Earthquake Geology: A tool for Seismic Hazard Assessment (Civil Engineering)

Co-ordinators : Prof. Javed N. Malik

Lecture 1 - Introduction to Earthquake Geology - Part I

Lecture 2 - Introduction to Earthquake Geology - Part II

Lecture 3 - Introduction to Earthquake Geology - Part III

Lecture 4 - Introduction to Earthquake Geology - Part IV

Lecture 5 - Fundamentals Related to Paleoseismology - Part I

Lecture 6 - Fundamentals Related to Paleoseismology - Part II

Lecture 7 - Fundamentals Related to Paleoseismology - Part III

Lecture 8 - Plate Tectonics - Part I

Lecture 9 - Plate Tectonics - Part II

Lecture 10 - Plate Tectonics - Part III

Lecture 11 - Plate tectonics - Part IV

Lecture 12 - Plate Tectonics - Part V

Lecture 13 - Seismic Zonation of India

Lecture 14 - Interior of the Earth - Part I

Lecture 15 - Interior of the Earth - Part II

Lecture 16 - Earthquake Forecasting and Prediction Model - Part I

Lecture 17 - Earthquake Forecasting and Prediction Model - Part II

Lecture 18 - Earthquake Forecasting and Prediction Model - Part III

Lecture 19 - Earthquake in Interplate and Intraplate Region

Lecture 20 - Earthquake Magnitude and Intensity Scale - Part I

Lecture 21 - Earthquake Magnitude and Intensity Scale - Part II

Lecture 22 - Fundamentals Related to Active Faults - Part I

Lecture 23 - Fundamentals Related to Active Faults - Part II

Lecture 24 - Fundamentals Related to Active Faults - Part III

Lecture 25 - Fundamentals Related to Active Faults - Part IV

Lecture 26 - Lab and Field Techniques in Active Fault Mapping and Paleoseismic studies - Part I

Lecture 27 - Lab and Field Techniques in Active Fault Mapping and Paleoseismic studies - Part II

Lecture 28 - Lab and Field Techniques in Active Fault Mapping and Paleoseismic studies - Part III

Lecture 29 - Lab and Field Techniques in Active Fault Mapping and Paleoseismic studies - Part IV

Lecture 30 - Lab and Field Techniques in Active Fault Mapping and Paleoseismic studies - Part V

Lecture 31 - Extensional Tectonic Environments and Related Landforms - Part I

Lecture 32 - Extensional Tectonic Environments and Related Landforms - Part II

Lecture 33 - Extensional Tectonic Environments and Related Landforms - Part III

Lecture 34 - Extensional Tectonic Environments and Related Landforms - Part IV

Lecture 35 - Compressional Tectonic Environments and Related Landforms - Part I

Lecture 36 - Compressional Tectonic Environments and Related Landforms - Part II

Lecture 37 - Compressional Tectonic Environments and Related Landforms - Part III

Lecture 38 - Compressional Tectonic Environments and Related Landforms - Part IV

Lecture 39 - Compressional Tectonic Environments and Related Landforms - Part V

Lecture 40 - Compressional Tectonic Environments and Related Landforms - Part VI

Lecture 41 - Compressional Tectonic Environments and Related Landforms - Part VII

Lecture 42 - Strike-Slip Tectonic Environments and Related Landforms - Part I

Lecture 43 - Strike-Slip Tectonic Environments and Related Landforms - Part II

Lecture 44 - Strike-Slip Tectonic Environments and Related Landforms - Part III

Lecture 45 - Strike-Slip Tectonic Environments and Related Landforms - Part IV

Lecture 46 - Geomoprhic Markers for Fluvial Environment - Part I

Lecture 47 - Geomoprhic Markers for Fluvial Environment - Part II

Lecture 48 - Geomorphic Markers - Part III

Lecture 49 - Tectonic Geomorphology - Part I

Lecture 50 - Tectonic Geomorphology - Part II

Lecture 51 - Coastal Geomorphic Markers - Part I

Lecture 52 - Coastal Geomorphic Markers - Part II

Lecture 53 - Coastal Geomorphic Markers - Part III

Lecture 54 - Tsunami and Paleostsunami signatures Investigation - Part I

Lecture 55 - Tsunami and Paleostsunami signatures Investigation - Part II

Lecture 56 - Tsunami and Paleostsunami signatures Investigation - Part III

Lecture 57 - Field Documentary

NPTEL : NOC:Development and Applications of Special Concretes (Civil Engineering)

Co-ordinators : Prof. Sudhir Misra

Lecture 1 - Some starting points

Lecture 2 - Concrete - A composite material

Lecture 3 - Basic properties (Fresh concrete)

Lecture 4 - Basic properties (Hardened concrete)

Lecture 5 - Fundamentals of proportioning concrete mixes

Lecture 6 - Proportioning of normal concrete mixes

Lecture 7 - Concrete mix proportions: Analysis and adjustments

Lecture 8 - Pores and porosity in concrete

Lecture 9 - Admixtures in concrete

Lecture 10 - Curing of Concrete

Lecture 11 - Cold weather Concreting

Lecture 12 - Hot Weather Concreting

Lecture 13 - Special Topics I - Importance of Right Methods and Specifications

Lecture 14 - Heat of Hydration of Cement and Thermal Stresses

Lecture 15 - Antiwashout Underwater Concrete

Lecture 16 - Concreting Underwater

Lecture 17 - Roller Compacted Concrete

Lecture 18 - Self Compacting Concrete - I

Lecture 19 - Self Compacting Concrete - II

Lecture 20 - Self Compacting Concrete - III

Lecture 21 - Special Topics - Rheology

Lecture 22 - Fibre-Reinforced Concrete - I

Lecture 23 - Fibre-Reinforced Concrete - II

Lecture 24 - Fibre-Reinforced Concrete - III

Lecture 25 - Mixing of Concrete

Lecture 26 - Shotcrete

Lecture 27 - High Strength Concrete

Lecture 28 - Using Polymers in Concrete

Lecture 29 - Improving the Quality of Cover Concrete

Lecture 30 - Compaction of Concrete

Lecture 31 - Precast Concrete

Lecture 32 - Closing the Course

NPTEL : NOC:Introductory Field Structural Geology (Civil Engineering)

Co-ordinators : Prof. Santanu Misra

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

NPTEL : NOC:Earth Sciences for Civil Engineering (Hindi) (Civil Engineering)

Co-ordinators : Prof. Javed N Malik

Lecture 1 - Introduction to Geosciences in Civil Engineering - I

Lecture 2 - Introduction to Geosciences in Civil Engineering - II

Lecture 3 - Introduction to Geosciences in Civil Engineering - III

Lecture 4 - Plate Tectonics and Continental Drift - I

Lecture 5 - Plate Tectonics and Continental Drift - II

Lecture 6 - Plate Tectonics and Continental Drift - III

Lecture 7 - Plate Tectonics and Continental Drift - IV

Lecture 8 - Plate Tectonics and Continental Drift - V

Lecture 9 - Plate Tectonics and Continental Drift - VI

Lecture 10 - Plate Tectonics and Continental Drift - VII

Lecture 11 - Plate Tectonics and Continental Drift - VIII

Lecture 12 - Rock-Forming Minerals and their Properties - I

Lecture 13 - Rock-Forming Minerals and their Properties - II

Lecture 14 - Rock-Forming Minerals and their Properties - III

Lecture 15 - Igneous Rocks and their Properties - I

Lecture 16 - Igneous Rocks and their Properties - II

Lecture 17 - Igneous Rocks and their Properties - III

Lecture 18 - Sedimentary Rocks and their Properties - I

Lecture 19 - Sedimentary Rocks and their Properties - II

Lecture 20 - Sedimentary Rocks and their Properties - III

Lecture 21 - Metamorphic Rocks and their Properties - I

Lecture 22 - Metamorphic Rocks and their Properties - II

Lecture 23 - Seismology and Internal Structure of the earth - Part 1

Lecture 24 - Seismology and Internal Structure of the earth - Part 2

Lecture 25 - Seismology and Internal Structure of the earth - Part 3

Lecture 26 - Seismology and Internal Structure of the earth - Part 4

Lecture 27 - Seismology and Internal Structure of the earth - Part 5

Lecture 28 - Seismic Events and Sediments Amplification - I

Lecture 29 - Seismic Events and Sediments Amplification - II

Lecture 30 - Geological Structures - I

Lecture 31 - Geological Structures - II

Lecture 32 - Geological Structures - III

Lecture 33 - Geological Structures - IV

Lecture 34 - Sterographic Projection of Geological Strata

Lecture 35 - Faults and its Characteristics

Lecture 36 - Active Faults and Associated Hazard - I

Lecture 37 - Active Faults and Associated Hazard - II

Lecture 38 - Active Faults and Associated Hazard - III

Lecture 39 - Rivers and Associated Landforms - I

Lecture 40 - Rivers and Associated Landforms - II

Lecture 41 - Shear Strength of Soil and its Implications towards Hazard

Lecture 42 - Landslides and Associated Hazard

Lecture 43 - Rock Mass Classification System

Lecture 44 - Dam and Tunnels

NPTEL : NOC:Construction Management (Civil Engineering)

Co-ordinators : Prof. Sudhir Misra

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

NPTEL : NOC:Laboratory Practices in Earth Sciences: Landscape Mapping (Civil Engineering)

Co-ordinators : Prof. Javed N Malik

Lecture 1 - Basic Introduction about the Course

Lecture 2 - Generation Introduction to the Remote Sensing - Part 1

Lecture 3 - Generation Introduction to the Remote Sensing - Part 2

Lecture 4 - Aerial Photogrammetry - Part 1

Lecture 5 - Aerial Photogrammetry - Part 2

Lecture 6 - Stereoscopy

Lecture 7 - Relief Displacement

Lecture 8 - Exploring the Remote Sensing Data and GIS Software - Part 1

Lecture 9 - Exploring the Remote Sensing Data and GIS Software - Part 2

Lecture 10 - Exploring the Remote Sensing Data and GIS Software - Part 3

Lecture 11 - Georeferencing of Toposheets on QGIS

Lecture 12 - Georeferencing of Remote Sensing Data on QGIS

Lecture 13 - Mosaicking, Merging and Generation of Shape Files on QGIS

Lecture 14 - Fluvial Systems and Associated Landforms - Part 1

Lecture 15 - Fluvial Systems and Associated Landforms - Part 2

Lecture 16 - Fluvial Systems and Associated Landforms - Part 3

Lecture 17 - Fluvial Systems and Associated Landforms - Part 4

Lecture 18 - Fluvial Systems and Associated Landforms - Part 5

Lecture 19 - Fluvial Systems and Associated Landforms - Part 6

Lecture 20 - Tectonic Geomorphology - Part 1

Lecture 21 - Tectonic Geomorphology - Part 2

Lecture 22 - Tectonic Geomorphology - Part 3

Lecture 23 - Tectonic Geomorphology - Part 4

Lecture 24 - Anaglyph and DEM Generation of Cartosat-1 data on ENVI

Lecture 25 - Tectono-Geomorphic Mapping on QGIS - Part 1

Lecture 26 - Tectono-Geomorphic Mapping on QGIS - Part 2

Lecture 27 - Tectono-Geomorphic Mapping on QGIS - Part 3

Lecture 28 - Tectono-Geomorphic Mapping on QGIS - Part 4

Lecture 29 - Total Station (TS) and Real Time Kinematics (RTK) and its Applications

Lecture 30 - Field Demonstration of Real Time Kinematics (RTK) - Part 1

Lecture 31 - Field Demonstration of Real Time Kinematics (RTK) - Part 2

Lecture 32 - Field Demonstration of Total Station (TS) - Part 1

Lecture 33 - Field Demonstration of Total Station (TS) - Part 2

Lecture 34 - Ground Penetrating Radar (GPR) and its Applications - Part 1

Lecture 35 - Ground Penetrating Radar (GPR) and its Applications - Part 2

Lecture 36 - Field Demonstration of GPR - Part 1

Lecture 37 - Field Demonstration of GPR - Part 2

Lecture 38 - Optically Stimulated Luminescence (OSL) Dating technique and its Applications

Lecture 39 - Optically Stimulated Luminescence (OSL) Dating Lab

NPTEL : Advanced Foundation Engineering (Civil Engineering)

Co-ordinators : Dr. Kousik Deb

Lecture 1 - Introduction

Lecture 2 - Soil Exploration

Lecture 3 - Soil Exploration - Penetration Tests

Lecture 4 - Soil Exploration - Geophysical Exploration

Lecture 5 - Shallow Foundation - Introduction

Lecture 6 - Shallow Foundation : Bearing Capacity - I

Lecture 7 - Shallow Foundation : Bearing Capacity - II

Lecture 8 - Shallow Foundation : Bearing Capacity - III

Lecture 9 - Shallow Foundation : Bearing Capacity - IV

Lecture 10 - Shallow Foundation : Bearing Capacity - V

Lecture 11 - Shallow Foundation - Settlement Calculation - I

Lecture 12 - Shallow Foundation - Settlement Calculation - II

Lecture 13 - Shallow Foundation - Settlement Calculation - III

Lecture 14 - Design of Shallow Foundation

Lecture 15 - Design of Raft Foundation

Lecture 16 - Deep Foundation - Introduction

Lecture 17 - Pile Foundation - Load Carrying Capacity - I

Lecture 18 - Pile Foundation - Load Carrying Capacity - II

Lecture 19 - Pile Foundation - Load Carrying Capacity - III and Settlement Calculation

Lecture 20 - Tension and Lateral Loaded Piles

Lecture 21 - Well Foundation

Lecture 22 - Well Foundation (Continued...)

Lecture 23 - Design of Retaining Wall

Lecture 24 - Design of Retaining Wall (Continued...)

Lecture 25 - Design of Sheet Piles

Lecture 26 - Design of Sheet Piles (Continued...)

Lecture 27 - Design of Sheet Piles (Continued...)

Lecture 28 - Design of Sheet Piles (Continued...)

Lecture 29 - Reinforced Earth

Lecture 30 - Reinforced Retaining Wall

Lecture 31 - Seismic Design of Retaining Wall

Lecture 32 - Seismic Design of Retaining Walls (Continued...)

Lecture 33 - Soil - Foundation Interaction

Lecture 34 - Soil - Foundation Interaction (Continued...)

Lecture 35 - Soil - Foundation Interaction (Continued...)

Lecture 36 - Soil - Foundation Interaction (Continued...)

Lecture 37 - Soil - Foundation Interaction (Continued...)

Lecture 38 - Soil - Foundation Interaction (Continued...)

Lecture 39 - Soil - Foundation Interaction (Continued...)

Lecture 40 - Soil - Foundation Interaction (Continued...)

NPTEL : Ground Water Hydrology (Civil Engineering)

Co-ordinators : Dr. Anirban Dhar, Dr. V.R. Desaai

Lecture 1 - Introduction : Ground Water (GW) Utilization and Historical Background, GW in hydrologic Cycle

Lecture 2 - Ground Water in & % Hydrologic Cycle (Continued...), Ground Water Budget, Ground Water Level Fluctuations and Environmental Influence

Lecture 3 - Ground water Level Fluctuations and Environmental Influence (Continued...) Literature/Data/Internet Resources

Lecture 4 - Ground water Level Fluctuations and Environmental Influence (Continued...) Literature/Data/Internet Resources

Lecture 5 - Occurrence and Movement of Ground Water : Origin and Age of Ground Water, Rock Properties Affecting Ground Water, Ground Water Column

Lecture 6 - Zones of Aeration and Saturation; Aquifers and their characteristics/classification

Lecture 7 - Aquifer Classification (Continued...), Ground water Basins and Springs; Dorcy's Law; Permeability

Lecture 8 - Determination pf Permeability :Heterogeneity and Anisotropy

Lecture 9 - Ground Water (GW) flowrates and flow directions; general flow equations through porous media

Lecture 10 - General Flow Equations Through Porous Media (Continued...), Dupuit's Assumptions

Lecture 11 - 1-D Unconfined Ground water Flows; Steady Flow into Wells

Lecture 12 - Steady Flow into Wells (Continued...); Unsteady Flow into Wells

Lecture 13 - Unsteady Flow into Wells (Continued...)

Lecture 14 - Unsteady Radial Flow in Confined and Unconfined Aquifers

Lecture 15 - Unsteady Radial Flow in Leaky Aquifers (Continued...); Well Flow Near Aquifer Boundaries

Lecture 16 - Well Flow for Special Conditions; Partially Penetrating Wells; Horizontal Wells and Collector Wells;Multiple Well Systems

Lecture 17 - Well Completion;Well Development; Well Protection; Well Rehabilitation; Well testing for Yields

Lecture 18 - Well Protection/Rehabilitation/Testing for yield (Continued...); Artificial Ground Water Recharge : Concept and Methods

Lecture 19 - Concept and methods of Artificial Ground Water Recharge (Continued...); Recharge Mounds and Induced Recharge

Lecture 20 - Induced Recharge (Continued...); Wastewater recharge for reuse; Water spreading

Lecture 21 - Pollution and Quality Analysis of Ground Water : Sources of Pollution of GW-Municipal, Industrial,Agricultural and Miscellaneous

Lecture 22 - Ground Water Pollution from Industrial, Agricultural and Miscellaneous Sources (Continued...)

Lecture 23 - Ground Water Pollution from Miscellaneous Sources (Continued...), Attenuation and Underground Distribution of Pollutants

Lecture 24 - Potential Evaluation of Ground water Pollution; Physical/Chemical/Biological analysis of Ground Water quality; Criteria and measures of Ground water quality

Lecture 25 - Ground water salinity and samples ;Graphical representations of ground water quality

Lecture 26 - Graphical representations of ground water quality (Continued...), Surface/Sub-Surface Investigation Of Ground Water:Geological/geophysical exploration;Remote sensing/electrical resistivity methods

Lecture 27 - Surface Investigation of ground water (Continued...):Electrical resistivity seismic refraction/gravity/magnetic methods

Lecture 28 - Seismic refraction/gravity/magnetic methods (Continued...);Sub-surface investigation of ground water: Geographical/resistivity methods

Lecture 29 - Sub-surface investigation of ground water (Continued...): Geographical/resistivity/spontaneous potential/radiation of methods of logging

Lecture 30 - Radiation method of logging (Continued...); Temperature/caliper/fluid conductivity/fluid velocity/miscellaneous logging methods

Lecture 31 - Saline Water Intrusion in Aquifers:Occurence, Features affecting aquifers,Bodon - Ghyben - Hergberg Principle

Lecture 32 - Saline Water Intrusion in Aquifers : Bodon - Ghyben - Hergberg principle (Continued...), Analytical Solution of Saline Water Intrusion in Coastal Aquifer

Lecture 33 - Saline Water Intrusion in Aquifers : Analytical Solution of Saline Water Intrusion in Coastal Aquifer (Continued...), Density dependent salt water intrusion model

Lecture 34 - Saline Water Intrusion in Aquifers : Geochemical Investigations, Control of salt water intrusion, Practical Modeling of salt water intrusion

Lecture 35 - Modeling and Management of Ground Water : Ground Water Simulation Models, Ground Water Management Model : Confined Aquifer

Lecture 36 - Modeling and Management of Ground Water : Ground Water Management Model : Confined and Unconfined Aquifer, Linked Simulation - Optimization, Meta Model Based Approach

Lecture 37 - Modeling and Management of Ground Water : Contaminant Source Identification , Monitoring Network Design

Lecture 38 - Modeling and Management of Ground Water : Aquifer Yield and Ground Water Availability, Effects of Ground Water Development, Regional Scale Development of Ground Water

Lecture 39 - Modeling and Management of Ground Water : Conjunctive Surface - Subsurface Modeling of Overland Flow including flow through Vadose zone

Lecture 40 - Modeling and Management of Ground Water : Ground Water - Surface Water Interaction

NPTEL : Numerical Methods in Civil Engineering (Civil Engineering)

Co-ordinators : Dr. A. Deb

Lecture 1 - Introduction to Numerical Methods

Lecture 2 - Error Analysis

Lecture 3 - Introduction to Linear Systems - I

Lecture 4 - Linear Systems - II

Lecture 5 - Linear Systems - III

Lecture 6 - Linear Systems - Error Bounds

Lecture 7 - Error Bounds and Iterative Methods for Solving Linear Systems

Lecture 8 - Iterative Methods for Solving Linear Systems - I

Lecture 9 - Iterative Methods - II

Lecture 10 - Iterative Methods - III

Lecture 11 - Iterative Methods for Eigen Value Extraction

Lecture 12 - Solving Nonlinear Equations - I

Lecture 13 - Solving Nonlinear Equations - II

Lecture 14 - Solving Multi Dimensional Nonlinear Equations - I

Lecture 15 - Solving Multi Dimensional Nonlinear Equations - II

Lecture 16 - ARC Length and Gradient Based Methods

Lecture 17 - Gradient Based Methods

Lecture 18 - Conjugate Gradient Method - I

Lecture 19 - Conjugate Gradient Method - II

Lecture 20 - Nonlinear Conjugate Gradient and Introduction to PDEs

Lecture 21 - Eigenfunction Solutions for the Wave Equation

Lecture 22 - Analytical Methods for Solving the Wave Equation

Lecture 23 - Analytical Methods for Hyperbolic and Parabolic PDEs

Lecture 24 - Analytical Methods for Parabolic and Elliptic PDEs

Lecture 25 - Analytical Methods for Elliptic PDE\'s

Lecture 26 - Series Solutions for Elliptic PDE\'s and Introduction to Differential Operators

Lecture 27 - Differential Operators - I

Lecture 28 - Differential Operators - II

Lecture 29 - Differential Operators - III

Lecture 30 - Interpolation

Lecture 31 - Polynomial Fitting

Lecture 32 - Orthogonal Polynomials - I

Lecture 33 - Orthogonal Polynomials - II

Lecture 34 - Orthogonal Polynomials - III

Lecture 35 - Spline Functions

Lecture 36 - Orthogonal Basis Functions for Solving PDE\'s - I

Lecture 37 - Orthogonal Basis Functions for Solving PDE\'s - II

Lecture 38 - Integral Equations - I

Lecture 39 - Integral Equations - II

Lecture 40 - Integral Equations - III

NPTEL : Probability Methods in Civil Engineering (Civil Engineering)

Co-ordinators : Dr. Rajib Maity

Lecture 1 - Introduction - Role of Probability in Civil Engineering

Lecture 2 - Random Events and Probability Concept

Lecture 3 - Set Theory and Set Operations

Lecture 4 - Axioms of Probability

Lecture 5 - Probability of Events

Lecture 6 - Concept and Defination of Random Variables

Lecture 7 - Probability Distribution of Random Variables

Lecture 8 - CDF and Descriptors of Random Variables

Lecture 9 - Further Descriptors of Random Variables

Lecture 10 - Discrete Probability Distribution

Lecture 11 - Probability Distribution of Continuous RVs

Lecture 12 - Probability Distribution of Continuous RVs (Continued...1)

Lecture 13 - Probability Distribution of Continuous RVs (Continued...2)

Lecture 14 - Functions of Single Random Variables

Lecture 15 - Functions of Random Variables - Different Methods

Lecture 16 - Functions of Random Variables - Different Methods (Continued...)

Lecture 17 - Expectation and Moments of Functions of RV

Lecture 18 - Expectation and Moments of Functions of RV (Continued...)

Lecture 19 - Joint Probability Distribution

Lecture 20 - Marginal Probability Distribution

Lecture 21 - Conditional Probability Distribution

Lecture 22 - Conditional Probability Distribution (Continued...)

Lecture 23 - Properties of Multiple Random Variables

Lecture 24 - Properties of Multiple Random Variables (Continued...)

Lecture 25 - MGF of Multivariate RVs and Multivariate Probability Distributions

Lecture 26 - Multivariate Distribution and Functions of Multiple Random Variables

Lecture 27 - Functions of Multiple Random Variables (Continued...1)

Lecture 28 - Functions of Multiple Random Variables (Continued...2)

Lecture 29 - Introduction to Copulas

Lecture 30 - Introduction to Copulas (Continued...)

Lecture 31 - Probability Models using Normal Distribution

Lecture 32 - Probability Models using Log Normal and Exponential Distribution

Lecture 33 - Probability Models using Gamma and Extreme Value Distribution

Lecture 34 - Probability Models using Discrete Probability Distributions

Lecture 35 - Sampling Distribution and Parameter Estimation

Lecture 36 - Sampling Distribution and Parameter Estimation (Continued...)

Lecture 37 - Hypothesis Testing

Lecture 38 - Goodness - of - fit tests

Lecture 39 - Regression Analyses and Correlation

Lecture 40 - Regression Analyses and Correlation (Continued...)

NPTEL : Design of Reinforced Concrete Structures (Civil Engineering)

Co-ordinators : Prof. N. Dhang

Lecture 1 - Introduction - I

Lecture 2 - Materials

Lecture 3 - Different Methods of Design of Reinforced Concrete Structures

Lecture 4 - Working Stress Method

Lecture 5 - Working Stress Method (Continued...)

Lecture 6 - Limit State of Collapse Flexure - I

Lecture 7 - Limit State of Collapse Flexure - II

Lecture 8 - Design of Doubly Reinforced Beam Flexure - I

Lecture 9 - Design of Doubly Reinforced Beam Flexure - II

Lecture 10 - Design of Doubly Reinforced Beam Flexure

Lecture 11 - Limit State of Collapse Shear

Lecture 12 - Design for Shear

Lecture 13 - Design for Shear (Continued...)

Lecture 14 - Design of Slabs - Part I

Lecture 15 - Design of Slabs - Part II

Lecture 16 - Design of Slabs - Part III

Lecture 17 - Design of Slabs - Part IV

Lecture 18 - Design of Slabs - Part V

Lecture 19 - Design of Columns - Part I

Lecture 20 - Design of Columns - Part II

Lecture 21 - Design of Columns - Part III

Lecture 22 - Design of Columns - Part IV

Lecture 23 - Design of Columns - Part V

Lecture 24 - Design of Footings - Part I

Lecture 25 - Design of Footings - Part II

Lecture 26 - Design of Staircases

Lecture 27 - Design for Torsion - Part I

Lecture 28 - Design for Torsion - Part II

Lecture 29 - Design of RC Slender Columns

Lecture 30 - Deflection of RC Beams

NPTEL : Engineering Geology (Civil Engineering)

Co-ordinators : Dr. Debasis Roy

Lecture 1 - Introduction to Engineering Geology

Lecture 2 - Geologic Structures

Lecture 3 - Geologic Maps and Stratigraphic Sections

Lecture 4 - Remote Sensing in Engineering Geology

Lecture 5 - Physical Properties of Minerals

Lecture 6 - Crystallography and Optical Properties

Lecture 7 - Chemical Characteristics of Minerals

Lecture 8 - Origin And Types of Rocks

Lecture 9 - Origin And Types of Soils

Lecture 10 - Igneous Rocks

Lecture 11 - Sedimentary Rocks

Lecture 12 - Metamorphic Rocks

Lecture 13 - Weathering

Lecture 14 - Sediment Transport and Deposition

Lecture 15 - Introduction to Subsurface Exploration

Lecture 16 - Introduction to Subsurface Exploration

Lecture 17 - Sampling and Non - Intrusive Methods

Lecture 18 - Index Properties and Classification of Soils

Lecture 19 - Index Properties of Rock and Rock Mass

Lecture 20 - Stress-Strain Behavior of Soil and Rock - I

Lecture 21 - Stress-Strain Behavior of Soil and Rock - II

Lecture 22 - In-situ State of Stress

Lecture 23 - Geologic Considerations in Tunneling

Lecture 24 - Geologic Considerations in Dam Construction

Lecture 25 - Groundwater - Preliminaries

Lecture 26 - Groundwater Flow - I

Lecture 27 - Groundwater Flow - II

Lecture 28 - Groundwater Related Engineering Issues

Lecture 29 - Groundwater Over Utilization

Lecture 30 - Plate Tectonics

Lecture 31 - Plate Tectonics - 2 and Earthquake

Lecture 32 - Earthquake Hazard Assessment

Lecture 33 - Geologic Hazards - Seismicity and Volcanism

Lecture 34 - Geologic Hazards - Shoreline Processes

Lecture 35 - Geologic Hazards - Shoreline Processes

Lecture 36 - Geologic Hazards - Landslide Hazards - Zoning

Lecture 37 - Geologic Hazards Subsidence , Collapsible Soils

Lecture 38 - Preparation of Geologic Sections

Lecture 39 - Index testing of soil & rocks

Lecture 40 - Identification of minerals and rock samples

NPTEL : Introduction to Transportation Engineering (Civil Engineering)

Co-ordinators : Dr. K.S. Reddy, Dr. Bhargab Maitra

Lecture 1 - Transportation Engineering

Lecture 2 - Elements of Concern and Components

Lecture 3 - Traffic Stream Characteristics

Lecture 4 - Traffic Studies : Part - I

Lecture 5 - Traffic Studies : Part - II

Lecture 6 - Highway Capacity and Level of Service

Lecture 7 - Intersection Control and Signalization

Lecture 8 - Functional Classification, Design Elements

Lecture 9 - Cross Section Elements

Lecture 10 - Stopping Sight Distance And Decision Sight

Lecture 11 - Overtaking, Intermediate and Headlight Sight

Lecture 12 - Intersection Sight Distance - I

Lecture 13 - Intersection Sight Distance - II

Lecture 14 - Horizontal Alignment - I

Lecture 15 - Horizontal Alignment - II

Lecture 16 - Horizontal Alignment - III

Lecture 17 - Horizontal Alignment - IV

Lecture 18 - Horizontal Alignment - V

Lecture 19 - Horizontal Alignment - VI

Lecture 20 - Vertical Alignment - I

Lecture 21 - Vertical Alignment - II

Lecture 22 - Vertical Alignment - III

Lecture 23 - Highway Alignment

Lecture 24 - Principles of Pavement Design

Lecture 25 - Traffic Loading - I

Lecture 26 - Traffic Loading - II

Lecture 27 - Pavement Materials - I

Lecture 28 - Pavement Materials - II

Lecture 29 - Pavement Materials - III

Lecture 30 - Pavement Materials - IV

Lecture 31 - Pavement Materials - V

Lecture 32 - Design of Bituminous Mixes - I

Lecture 33 - Design of Bituminous Mixes - II

Lecture 34 - Analysis of Flexible Pavements

Lecture 35 - Analysis of Concrete Pavements

Lecture 36 - Flexible Pavement Design Indian Roads Congress

Lecture 37 - Flexible Pavement Design AASHTO Method - 1993

Lecture 38 - Concrete Pavement Design Indian Congress Method

Lecture 39 - Concrete Pavement Design PCA and AASHTO Methods

Lecture 40 - Pavement Evaluation and Rehabilitation

Lecture 41 - Overlay Design - IRC Method

NPTEL : Strength of Materials (Civil Engineering)

Co-ordinators : Prof. S.K. Bhattacharyya

Lecture 1 - Introduction - Strength of Materials

Lecture 2 - Analysis of Stress - I

Lecture 3 - Analysis of Stress - II

Lecture 4 - Analysis of Stress - III

Lecture 5 - Analysis of Stress - IV

Lecture 6 - Analysis of Stress - V

Lecture 7 - Analysis of Strain - I

Lecture 8 - Analysis of Strain - II

Lecture 9 - Analysis of Strain - III

Lecture 10 - Analysis of Strain - IV

Lecture 11 - Analysis of Strain - V

Lecture 12 - Analysis of Strain - VI

Lecture 13 - Analysis of Strain - VII

Lecture 14 - Analysis of Strain - VIII

Lecture 15 - Application of Stress/Strain

Lecture 16 - Application of Stress / Strain

Lecture 17 - Application of Stress / Strain

Lecture 18 - Torsion - I

Lecture 19 - Torsion - II

Lecture 20 - Torsion - III

Lecture 21 - Torsion - IV

Lecture 22 - Bending of Beams - I

Lecture 23 - Bending of Beams - II

Lecture 24 - Bending of Beams - III

Lecture 25 - Bending of Beams - IV

Lecture 26 - Stresses in Beams - I

Lecture 27 - Stresses in Beams - II

Lecture 28 - Stresses in Beams - III

Lecture 29 - Stresses in Beams - IV

Lecture 30 - Deflection of Beams - I

Lecture 31 - Deflection of Beams - II

Lecture 32 - Deflection of Beams - III

Lecture 33 - Deflection of Beams - IV

Lecture 34 - Combined Stresses - I

Lecture 35 - Combined Stresses - II

Lecture 36 - Combined Stresses - III

Lecture 37 - Stability of Columns - I

Lecture 38 - Stability of Columns - II

Lecture 39 - Springs - I

Lecture 40 - Springs - II

NPTEL : NOC:Probability Methods in Civil Engineering (Civil Engineering)

Co-ordinators : Dr. Rajib Maity

Lecture 1 - Random Events and Probability Concept

Lecture 2 - Set Theory and Set Operations

Lecture 3 - Axioms of Probability

Lecture 4 - Probability of Events

Lecture 5 - Concept and definition of Random variables

Lecture 6 - Probability distribution of random variables

Lecture 7 - CDF and Descriptors of Random Variables

Lecture 8 - Further Descriptors of Random Variables

Lecture 9 - Discrete Probability Distribution

Lecture 10 - Probability Distribution of Continuous RVs

Lecture 11 - Probability Distribution of Continuous RVs (Continued.....1)

Lecture 12 - Probability Distribution of Continuous RVs (Continued.....2)

Lecture 13 - Functions of Single Random Variables

Lecture 14 - Functions of Different Variables - Different Methods

Lecture 15 - Functions of Random Variables : Different Methods (Continued...)

Lecture 16 - Probability Models using Normal Distribution

Lecture 17 - Probability Models using Log Normal and Exponential Distribution

Lecture 18 - Probability Models using Gamma and Extreme Value Distribution

Lecture 19 - Probability Models using Discrete Probability Distributions

Lecture 20 - Sampling Distribution and Parameter Estimation

Lecture 21 - Sampling Distribution and Parameter Estimation (Continued...)

Lecture 22 - Hypothesis Testing

Lecture 23 - Goodness of Fit-Tests

Lecture 24 - Regression Analyses and Correlation

Lecture 25 - Regression Analyses and Correlation (Continued...)

NPTEL : NOC:Visual Semiotics for Visual Communication (Civil Engineering)

Co-ordinators : Prof. Mainak Ghosh

Lecture 1 - Visual Semantics for Visual Communication

Lecture 2 - Visual Semantics for Visual Communication (Continued...)

Lecture 3 - Visual Semantics for Visual Communication (Continued...)

Lecture 4 - Visual Semantics for Visual Communication (Continued...)

Lecture 5 - Introduction to Millimeter-Wave Technology (Continued...)

Lecture 6 - Visual Semantics for Visual Communication (Continued...)

Lecture 7 - Visual Semantics for Visual Communication (Continued...)

Lecture 8 - Visual Semantics for Visual Communication (Continued...)

Lecture 9 - Introduction to Millimeter-Wave Technology

Lecture 10 - Visual Semantics for Visual Communication (Continued...)

Lecture 11 - Visual Semantics for Visual Communication (Continued...)

Lecture 12 - Visual Semantics for Visual Communication (Continued...)

Lecture 13 - Conceptual Model and Affordances

Lecture 14 - Visual Semantics for Visual Communication (Continued...)

Lecture 15 - Visual Semantics for Visual Communication (Continued...)

Lecture 16 - Visual Semantics for Visual Communication (Continued...)

Lecture 17 - Visual Semantics for Visual Communication (Continued...)

Lecture 18 - Visual Semantics for Visual Communication (Continued...)

Lecture 19 - Visual Semantics for Visual Communication (Continued...)

Lecture 20 - Visual Semantics for Visual Communication (Continued...)

NPTEL : NOC:Life Cycle Assessment (Civil Engineering)

Co-ordinators : Prof. Brajesh Kumar Dubey

Lecture 1 - Life Cycle Assessment - Introduction

Lecture 2 - Life Cycle Assessment - Introduction

Lecture 3 - LCA and Sustainability

Lecture 4 - LCA and Environmental Systems

Lecture 5 - LCA and Water, Food and Energy

Lecture 6 - RISK Assement and LCA Frameworks

Lecture 7 - RISK Assessment - Toxicology

Lecture 8 - RISK Assessment Methods

Lecture 9 - RISK Assessment Methods (Continued...)

Lecture 10 - Environmental Risk Assessment

Lecture 11 - Environmental Data Collection and LCA Methodology

Lecture 12 - Environmental Data Collection and LCA Methodology (Continued...)

Lecture 13 - Environmental Data Collection and LCA Methodology (Continued...)

Lecture 14 - Environmental Data Collection and LCA Methodology (Continued...)

Lecture 15 - LCA Methodology

Lecture 16 - LCA - A Detailed Methodology

Lecture 17 - LCA - A Detailed Methodology (Continued...)

Lecture 18 - LCA Benefits and Drawbacks

Lecture 19 - History of LCA

Lecture 20 - The ISO Framework

Lecture 21 - Unit Process, Data and LCI Databases

Lecture 22 - Unit Process and System Boundary (Continued...)

Lecture 23 - Inventory Data and LCIA

Lecture 24 - LCIA

Lecture 25 - LCA Interpretation

Lecture 26 - ISO 14040

Lecture 27 - Key Points of a Good LCA and Example LCA

Lecture 28 - Chemical Release in Environment

Lecture 29 - Green Sustainable Materials

Lecture 30 - Green Sustainable Materials (Continued...)

Lecture 31 - Design for Sustainability

Lecture 32 - Design for Sustainability (Continued...)

Lecture 33 - Design for Sustainability (Continued...)

Lecture 34 - Sustainable Engineering Design Principles

Lecture 35 - Sustainable Engineering Design Principles (Continued...)

Lecture 36 - Summary and Case Studies

Lecture 37 - Summary and Case Studies (Continued...)

Lecture 38 - Summary and Case Studies (Continued...)

Lecture 39 - Tutorial I

Lecture 40 - Tutorial II

NPTEL : NOC:Integrated Waste Management for a Smart City (Civil Engineering)

Co-ordinators : Prof. Brajesh Kumar Dubey

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Municipal Solid Waste Chracteristics and Quantities

Lecture 8 - Municipal Solid Waste Chracteristics and Quantities (Continued...)

Lecture 9 - Municipal Solid Waste Chracteristics and Quantities (Continued...)

Lecture 10 - Municipal Solid Waste Chracteristics and Quantities (Continued...)

Lecture 11 - MSW Characteristics - Thermal Properties and Chemical Composition

Lecture 12 - Chemical Analysis Procedure

Lecture 13 - Chemical Analysis Procedure (Continued...)

Lecture 14 - Working with Data and Statistical Methods

Lecture 15 - Waste Management Rules 2016

Lecture 16 - Waste Management Rules 2016 (Continued...)

Lecture 17 - Swachh Bharat Mission and Smart Cities Program Overview

Lecture 18 - Storage of Solid Waste

Lecture 19 - MSW Collection System

Lecture 20 - MSW Collection System (Continued...)

Lecture 21 - Waste Collection and Transport

Lecture 22 - Waste Collection and Transport (Continued...)

Lecture 23 - Waste Collection and Transport (Continued...)

Lecture 24 - Waste Collection and Transport (Continued...)

Lecture 25 - Waste Collection and Transport (Continued...)

Lecture 26 - Collection System

Lecture 27 - Collection System (Continued...)

Lecture 28 - Review of MSW Management in Proposed Smart Cities

Lecture 29 - Biological Treatment of Waste

Lecture 30 - Biological Treatment of Waste (Continued...)

Lecture 31 - Biological Treatment of Waste (Continued...)

Lecture 32 - Biological Treatment of Waste (Continued...)

Lecture 33 - Biological Treatment of Waste (Continued...)

Lecture 34 - Thermal Treatment

Lecture 35 - Thermal Treatment (Continued...)

Lecture 36 - Thermal Treatment (Continued...)

Lecture 37 - Thermal Treatment (Continued...)

Lecture 38 - Thermal Treatment (Continued...)

Lecture 39 - Thermal Treatment (Continued...)

Lecture 40 - Landfill Disposal

Lecture 41 - Landfill Disposal (Continued...)

Lecture 42 - Landfill Disposal (Continued...)

Lecture 43 - Landfill Disposal (Continued...)

Lecture 44 - Landfill Disposal (Continued...)

Lecture 45 - Landfill Disposal (Continued...)

Lecture 46 - Landfill Disposal (Continued...)

Lecture 47 - Landfill Disposal (Continued...)

Lecture 48 - Construction and Demolition Waste Management

Lecture 49 - Construction and Demolition Waste Management (Continued...)

Lecture 50 - Construction and Demolition Waste Management (Continued...)

Lecture 51 - Construction and Demolition Waste Management (Continued...)

Lecture 52 - Construction and Demolition Waste Management (Continued...)

Lecture 53 - E-Waste Management

Lecture 54 - E-Waste Management (Continued...)

Lecture 55 - E-Waste Management (Continued...)

Lecture 56 - E-Waste Management (Continued...)

Lecture 57 - E-Waste Management (Continued...)

Lecture 58 - E-Waste Management (Continued...)

Lecture 59 - E-Waste Management (Continued...)

Lecture 60 - E-Waste Management (Continued...)

Lecture 61 - Tutorial - I

Lecture 62 - Tutorial - II

NPTEL : NOC:Computational Hydraulics (Civil Engineering)

Co-ordinators : Dr. Anirban Dhar

Lecture 1 - Introduction to Computational Hydraulics

Lecture 2 - Problem Definition and Governing Equations (GE)

Lecture 3 - Classification of Problems based on Initial Condition (IC) and/or Boundary Conditions (BC)

Lecture 4 - Classification of Differential Equations

Lecture 5 - Numerical Methods : Overview

Lecture 6 - Finite Difference Approximation

Lecture 7 - Ordinary Differential Equation : IVP

Lecture 8 - Ordinary Differential Equation : BVP

Lecture 9 - Partial Differential Equation : BVP

Lecture 10 - Partial Differential Equation : IBVP

Lecture 11 - Partial Differential Equation : Numerical Stability of IBVP

Lecture 12 - Partial Differential Equation : Numerical Stability of One Dimensional PDE

Lecture 13 - Finite Volume Method - Overview

Lecture 14 - Finite Volume Method - BVP

Lecture 15 - Finite Volume Method - IBVP

Lecture 16 - Finite Volume Method - Conservation Law

Lecture 17 - Upwind Approach

Lecture 18 - Godunov Approach

Lecture 19

Lecture 20

Lecture 21 - Mesh-Tree Method : Polynomial Interpolation Method

Lecture 22 - Mesh-Free Method : Moving Least Squares Method

Lecture 23 - Mesh-Free Method : Space-Time Moving Least Squares Method

Lecture 24 - Numerical Method : Matrix Structure and Scilab

Lecture 25 - Algebraic Equation : Gauss Elimination Method

Lecture 26 - Algebraic Equation : LU Decomposition Method

Lecture 27 - Algebraic Equation : Tri Diagonal Matrix Method

Lecture 28 - Algebraic Equation : Jacobis Method

Lecture 29 - Algebraic Equation : Gauss - Seidel Method

Lecture 30 - Algebraic Equation : Newton Raphson Method

Lecture 31 - One-Dimensional Flow

Lecture 32 - Steady Two-Dimensional Flow

Lecture 33 - Unsteady Two-Dimensional Flow using Finite Difference Method

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40 - Steady Channel Flow : Channel Network without reverse Flow

Lecture 41 - Steady Channel Flow : Channel Network without reverse Flow (Continued...)

Lecture 42 - Steady Channel Flow : Channel Network with reverse Flow

Lecture 43 - Steady Channel Flow : Channel Network with reverse Flow (Continued...)

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49 - Unsteady Flow in Pipes

Lecture 50 - Surface Water and Ground Water Interaction

Lecture 51 - Course Summary

NPTEL : NOC:Design of Steel Structures (Civil Engineering)

Co-ordinators : Prof. Damodar Maity

Lecture 1 - Introduction to Design of Steel Structures (Limit State Method)

Lecture 2 - Steel as a Structural Material

Lecture 3 - Limit State Design

Lecture 4 - Introduction to Connections

Lecture 5 - Introduction to Bolt Connections

Lecture 6 - Design of Ordinary Black Bolts

Lecture 7 - Worked out Examples on Design of Ordinary Black Bolts

Lecture 8 - Design of High Strength Friction Grip Bolts

Lecture 9 - Weld connection

Lecture 10 - Design of Fillet Welds

Lecture 11 - Design of Butt Welds

Lecture 12 - Design of Plug and Slot Weld

Lecture 13 - Eccentric Connection (Load Lying in Plane of Bolted Joint)

Lecture 14 - Design of Eccentric Connection (Load Lying in Plane of Bolted Joint)

Lecture 15 - Eccentric Connection (Load Lying in Plane of Welded Joint)

Lecture 16 - Eccentric Connection (Load Lying Perpendicular to Plane of Bolted Joint)

Lecture 17 - Design of Eccentric Connection (Load Lying Perpendicular to Plane of Bolted Joint)

Lecture 18 - Eccentric Connection (Load Lying Perpendicular to Plane of Welded Joint)

Lecture 19 - Tension Members and Net Area

Lecture 20 - Calculation of Net Area in Tension Members

Lecture 21 - Net area, Staggered bolt, Chain bolt, Staggered pitch, Deduction of area

Lecture 22 - Strength Calculation of Tension Members

Lecture 23 - Strength of Tension Members with Weld Connection

Lecture 24 - Steps for Design of Tension Members

Lecture 25 - Design Calculation for Tension Members

Lecture 26 - Design of Gusset Plate

Lecture 27 - Lug Angles

Lecture 28 - Splices in Tension Members

Lecture 29 - Compression Members

Lecture 30 - Design Strength of Compression Members

Lecture 31 - Compressive Strength

Lecture 32 - Compressive Strength of Angle Struts

Lecture 33 - Compressive Strength of Double Angles

Lecture 34 - Design of Compression Members

Lecture 35 - Design of Builtup Compression Members

Lecture 36 - Lacing Systems

Lecture 37 - Design of Lacing Systems

Lecture 38 - Connection Design of Lacing Systems

Lecture 39 - Design of Double Lacing System

Lecture 40 - Batten Plates

Lecture 41 - Design of Batten Plates using Bolt Connection

Lecture 42 - Design of Batten Plates using Weld Connection

Lecture 43 - Design of Column Splices

Lecture 44 - Design of Column Splices due to Shear

Lecture 45 - Introduction to Flexural Members: Beams

Lecture 46 - Failure Modes of Flexural Members

Lecture 47 - Laterally Supported Beams

Lecture 48 - Design of Laterally Supported Beams

Lecture 49 - Laterally Supported Beams with High Shear

Lecture 50 - Laterally Unsupported Beams

Lecture 51 - Strength Calculation of Laterally Unsupported Beams

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56

Lecture 57

Lecture 58 - Worked out Example for Gantry Girder

Lecture 59 - Slab Base

Lecture 60 - Design of Slab Base

Lecture 61 - Eccentrically Loaded Base Plate

Lecture 62 - Gusset Base

Lecture 63 - Design of Gusset Base

NPTEL : NOC:Reinforced Concrete Road Bridges (Civil Engineering)

Co-ordinators : Prof. Nirjhar Dhang

Lecture 1 - Introdudction

Lecture 2 - Classification of Bridges

Lecture 3 - General Features of Design

Lecture 4 - IRC Loading

Lecture 5 - Design Codes

Lecture 6 - Working Stress Method

Lecture 7 - Limit State Method of Design as per IS456:2000

Lecture 8 - Limit State Method of Design as per IRC 112:2011

Lecture 9 - Design of Slab Bridges - Part I

Lecture 10 - Design of Slab Bridges - Part II

Lecture 11 - Design of Slab Bridges - Part III

Lecture 12 - Design of Slab Bridges - Part IV

Lecture 13 - Design of Slab Bridges - Part V

Lecture 14 - Design of Slab Bridges - Part VI

Lecture 15 - Abutment

Lecture 16 - Design of RCC T Beam Bridge - Part I

Lecture 17 - Design of RCC T Beam Bridge - Part II

Lecture 18 - Design of RCC T Beam Bridge - Part III

Lecture 19 - Design of RCC T Beam Bridge - Part IV

Lecture 20 - Summary and Closure

NPTEL : NOC:Structural Analysis - I (Civil Engineering)

Co-ordinators : Prof. Amit Shaw

Lecture 1 - Introduction

Lecture 2 - Idealization of Structures, Threats and Responses

Lecture 3 - Static Equilibrium

Lecture 4 - Determinate and Indeterminate Structures

Lecture 5 - Review of Bending Moment and Shear Force Diagram of Beam

Lecture 6 - Tutorial - I

Lecture 7 - Analysis of Statically Determinate Structures: Truss

Lecture 8 - Analysis of Truss: Method of Joints

Lecture 9 - Analysis of Truss: Method of Joints (Continued...)

Lecture 10 - Analysis of Truss: Method of Sections

Lecture 11 - Analysis of Truss: Method of Sections (Continued...)

Lecture 12 - Analysis of Statically Determinate Structures: Method of Virtual Work

Lecture 13 - Analysis of Statically Determinate Structures: Method of Virtual Work (Continued...)

Lecture 14 - Analysis of Statically Determinate Structures: Method of Virtual Work (Continued...)

Lecture 15 - Analysis of Statically Determinate Structures: Method of Virtual Work (Continued...)

Lecture 16 - Analysis of Statically Determinate Structures: Method of Virtual Work (Continued...)

Lecture 17 - Deflection of Beams and Frames

Lecture 18 - Deflection of Beams and Frames (Continued...)

Lecture 19 - Deflection of Beams and Frames (Continued...)

Lecture 20 - Deflection of Beams and Frames (Continued...)

Lecture 21 - Deflection of Beams and Frames (Continued...)

Lecture 22 - Deflection of Beams and Frames (Continued...)

Lecture 23 - Deflection of Beams and Frames (Continued...)

Lecture 24 - Deflection of Beams and Frames (Continued...)

Lecture 25 - Deflection of Beams and Frames (Continued...)

Lecture 26 - Deflection of Beams and Frames (Continued...)

Lecture 27 - Deflection of Beams and Frames (Continued...)

Lecture 28 - Influence Line Diagram and moving Loads

Lecture 29 - Influence Line Diagram and moving Loads (Continued...)

Lecture 30 - Influence Line Diagram and moving Loads (Continued...)

Lecture 31 - Influence Line Diagram and moving Loads (Continued...)

Lecture 32 - Influence Line Diagram and moving Loads (Continued...)

Lecture 33 - Analysis of Statically Indeterminate Structures

Lecture 34 - Analysis of Statically Indeterminate Structures (Continued...)

Lecture 35 - Analysis of Statically Indeterminate Structures (Continued...)

Lecture 36 - Analysis of Statically Indeterminate Structures (Continued...)

Lecture 37 - Analysis of Statically Indeterminate Structures (Continued...)

Lecture 38 - Analysis of Statically Indeterminate Structures: Method of Consistent Deformations

Lecture 39 - Analysis of Statically Indeterminate Structures: Method of Consistent Deformations (Continued...)

Lecture 40 - Analysis of Statically Indeterminate Structures: Method of Consistent Deformations (Continued...)

Lecture 41 - Analysis of Statically Indeterminate Structures: Method of Consistent Deformations (Continued...)

Lecture 42 - Analysis of Statically Indeterminate Structures by Force Method

Lecture 43 - Analysis of Statically Indeterminate Structures by Force Method (Continued...)

Lecture 44 - Analysis of Statically Indeterminate Structures by Force Method (Continued...)

Lecture 45 - Analysis of Statically Indeterminate Structures by Force Method (Continued...)

Lecture 46 - Analysis of Statically Indeterminate Structures by Force Method (Continued...)

Lecture 47 - Analysis of Indeterminate Structures by Displacement Methods

Lecture 48 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 49 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 50 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 51 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 52 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 53 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 54 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 55 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 56 - Analysis of Indeterminate Structures by Displacement Methods (Continued...)

Lecture 57 - Direct Stiffness Method

Lecture 58 - Direct Stiffness Method (Continued...)

Lecture 59 - Direct Stiffness Method (Continued...)

Lecture 60 - Direct Stiffness Method (Continued...)

Lecture 61 - Direct Stiffness Method (Continued...)

NPTEL : NOC:Soil Mechanics, Geotechnical Engineering-I (Civil Engineering)

Co-ordinators : Prof. Dilip Kumar Baidya

Lecture 1 - Rock cycle

Lecture 2 - Soil Formation

Lecture 3 - Soil Classification

Lecture 4 - Soil Classification (Continued...)

Lecture 5 - Soil Classification (Continued...)

Lecture 6 - Three-phase diagram

Lecture 7 - Three-phase diagram (Continued...)

Lecture 8 - Permeability and seepage

Lecture 9 - Permeability and Seepage (Continued...)

Lecture 10 - Permeability and seepage (Continued...)

Lecture 11 - Permeability And Seepage

Lecture 12 - Permeability And Seepage (Continued...)

Lecture 13 - Permeability And Seepage (Continued...)

Lecture 14 - Compaction Of Soils

Lecture 15 - Compaction Of Soils (Continued...)

Lecture 16 - Deep Dynamic Compaction

Lecture 17 - Permeability/Compaction (Continued...)

Lecture 18 - Effective Stress

Lecture 19 - Effective Stress (Continued...)

Lecture 20 - Effective Stress Aplication

Lecture 21 - Vertical Stress Distribution

Lecture 22 - Boussinesq Point Load Formula

Lecture 23 - Vertical Stress For Distributed Load

Lecture 24 - Vertical Stress

Lecture 25 - Vertical Stress (Continued...)

Lecture 26 - Vertical Stress (Continued...)

Lecture 27 - Shear Strength

Lecture 28 - Shear Strength (Continued...)

Lecture 29 - Shear Strength (Continued...)

Lecture 30 - Shear Strength (Continued...)

Lecture 31 - Shear Strength (Continued...)

Lecture 32 - Shear Strength (Continued...)

Lecture 33 - Shear Strength (Continued...)

Lecture 34 - Shear Strength (Continued...)

Lecture 35 - Shear Strength (Continued...)

Lecture 36 - Shear Strength (Continued...)

Lecture 37 - Compressibility Of Soils

Lecture 38 - Compressibility Of Soils (Continued...)

Lecture 39 - Compressibility Of Soils (Continued...)

Lecture 40 - Compressibility Of Soils (Continued...)

Lecture 41 - Compressibility Of Soils (Continued...)

Lecture 42 - Compressibility Of Soils (Continued...)

Lecture 43 - Compressibility Of Soils (Continued...)

Lecture 44 - Compressibility And Settlement Of Soil

Lecture 45 - Compressibility And Settlement (Continued...)

Lecture 46 - Compressibility And Secondary Compression

Lecture 47 - Earth Pressure

Lecture 48 - Earth Pressure (Continued...)

Lecture 49 - Earth Pressure (Continued...)

Lecture 50 - Earth Pressure (Continued...)

Lecture 51 - Earth Pressure (Continued...)

Lecture 52 - Earth Pressure (Continued...)

Lecture 53 - Earth Pressure (Continued...)

Lecture 54 - Earth Pressure (Continued...)

Lecture 55 - Stability Of Slopes

Lecture 56 - Stability Of Slopes (Continued...)

Lecture 57 - Stability Of Slopes (Continued...)

Lecture 58 - Slope Stability

Lecture 59 - Slope Stabilty

Lecture 60 - Concluding Remarks

Lecture 61 - Live Session

NPTEL : NOC:Electronic Waste Management - Issues and Challenges (Civil Engineering)

Co-ordinators : Prof. Brajesh Kumar Dubey

Lecture 1 - E-Waste Overview

Lecture 2 - E-waste Overview

Lecture 3 - E-waste Overview

Lecture 4 - E-waste Management Overview

Lecture 5 - E-waste Management Overview

Lecture 6 - Environmental and Public Health Issues

Lecture 7 - Environmental and Public Health Issues (Continued...)

Lecture 8 - E-waste Health Risk Assessment

Lecture 9 - Environmental and Public Health Issues (Continued...)

Lecture 10 - Environmental and Public Health Issues (Continued...)

Lecture 11 - Recovery of Materials from E-Waste

Lecture 12 - Metal Recovery Process

Lecture 13 - Recovery of Metals from Electronic Waste

Lecture 14 - Recovery of Metals from Electronic Waste

Lecture 15 - Recovery of Metals from Electronic Waste

Lecture 16 - E-waste Management

Lecture 17 - E-waste Management

Lecture 18 - E-waste Management

Lecture 19 - Electronics and LCA

Lecture 20 - LCA applications for Electronics

Lecture 21 - Tutorial-I

Lecture 22 - Tutorial-II

NPTEL : NOC:Mineral Resources - Geology, Exploration, Economics and Environment (Civil Engineering)

Co-ordinators : Prof. M.K.Panigrahi

Lecture 1 - Introduction

Lecture 2 - Mineral Deposits in Space and Time

Lecture 3 - Mineral Deposits in Space and Time (Continued...)

Lecture 4 - Mineral Deposits in Time, Attributes of Mineral Deposits and Theories of Mineral Deposits

Lecture 5 - Classification of Mineral Deposits

Lecture 6 - Magmatic Processes

Lecture 7 - Magmatic Processes

Lecture 8 - Magmatic Processes

Lecture 9 - Magmatic Processes

Lecture 10 - Sedimentary Processes and Resultant Mineral Deposits

Lecture 11 - Sedimentary Processes and Resultant Deposits

Lecture 12 - Sedimentary Processes and Resultant Deposits

Lecture 13 - Sedimentary Processes and Resultant Deposits

Lecture 14 - Sedimentary Processes and Resultant Deposits

Lecture 15 - Morphology of Ore Deposits

Lecture 16 - Hydrothermal Processes

Lecture 17 - Hydrothermal Processe (Continued...)

Lecture 18 - Hydrothermal Processes

Lecture 19 - Hydrothermal Processes

Lecture 20 - Hydrothermal Processes

Lecture 21 - Hydrothermal Processes (Continued...)

Lecture 22 - Hydrothermal Processes (Continued...)

Lecture 23 - Hydrothermal Processes (Continued...)

Lecture 24 - Hydrothermal Systems

Lecture 25 - Hydrothermal Systems (Continued...)

Lecture 26 - Hydrothermal Processes and Resultant Deposits

Lecture 27 - Hydrothermal Processes and Resultant Deposits (Continued...)

Lecture 28 - Hydrothermal Processes and Resultant Mineralization

Lecture 29 - Indian Mineral Deposits

Lecture 30 - Indian Mineral Deposits (Continued...)

Lecture 31 - Indian Mineral Deposits (Continued...)

Lecture 32 - Mineral Exploration

Lecture 33 - Mineral Exploration (Continued...)

Lecture 34 - Mineral Exploration (Continued...)

Lecture 35 - Mineral Exploration (Continued...)

Lecture 36 - Mineral Exploration (Continued...)

Lecture 37 - Mineral Exploration (Continued...)

Lecture 38 - Mineral Exploration (Continued...)

Lecture 39 - Mineral Exploration (Continued...)

Lecture 40 - Mineral Exploration (Continued...)

Lecture 41 - Mineral Exploration (Continued...)

Lecture 42 - Mineral Exploration (Continued...)

Lecture 43 - Mineral Exploration (Continued...)

Lecture 44 - Mineral Exploration (Continued...)

Lecture 45 - Mineral Inventory Estimation

Lecture 46 - Mineral Inventory Estimation (Continued...)

Lecture 47 - Mineral Inventory Estimation (Continued...)

Lecture 48 - Mineral Inventory Estimation (Continued...)

Lecture 49 - Geostatistical Method of Mineral Inventory Estimation

Lecture 50 - Geostatistical Method of Mineral Inventory Estimation (Continued...)

Lecture 51 - Mineral Economics

Lecture 52 - Mineral Economics (Continued...)

Lecture 53 - Mineral Economics (Continued...)

Lecture 54 - Mineral Economics (Continued...)

Lecture 55 - Mineral Economics (Continued...)

Lecture 56 - Environmental Impact of Mineral Resource Exploitation

Lecture 57 - Environmental Impact of Mineral Resource Exploitation (Continued...)

Lecture 58 - Environmental Impact of Mineral Resource Exploitation (Continued...)

Lecture 59 - Environmental Impact of Mineral Resource Exploitation (Continued...)

Lecture 60 - Environmental Impact of Mineral Resource Exploitation (Continued...)

NPTEL : NOC:Introduction to Mineral Processing (Civil Engineering)

Co-ordinators : Prof. Arun Kumar Majumder

Lecture 1 - Importance of Mineral Processing

Lecture 2 - Importance to Mineral Processing (Continued...)

Lecture 3 - Importance of Mineral Processing (Continued...)

Lecture 4 - Importance of Mineral Processing (Continued...)

Lecture 5 - Importance of Mineral Processing (Continued...)

Lecture 6 - Particle Characterization

Lecture 7 - Particle Characterization (Continued...)

Lecture 8 - Particle Characterization (Continued...)

Lecture 9 - Particle Characterization (Continued...)

Lecture 10 - Particle Characterization (Continued...)

Lecture 11 - Particle Characterization (Continued...)

Lecture 12 - Sampling

Lecture 13 - Sampling (Continued...)

Lecture 14 - Plant Sampling

Lecture 15 - Plant Sampling (Continued...)

Lecture 16 - Comminution

Lecture 17 - Comminution (Continued...)

Lecture 18 - Comminution Fundamentals

Lecture 19 - Comminution Fundamentals (Continued...)

Lecture 20 - Crushers

Lecture 21 - Crushers (Continued...)

Lecture 22 - Crushers (Continued...)

Lecture 23 - Grinding

Lecture 24 - Grinding (Continued...)

Lecture 25 - Grinding (Continued...)

Lecture 26 - Grinding (Continued...)

Lecture 27 - Grinding (Continued...)

Lecture 28 - Industrial Screening

Lecture 29 - Industrial Screening (Continued...)

Lecture 30 - Industrial Screening (Continued...)

Lecture 31 - Industrial Screening (Continued...)

Lecture 32 - Industrial Screening (Continued...)

Lecture 33 - Industrial Screening (Continued...)

Lecture 34 - Industrial Screening (Continued...)

Lecture 35 - Movement of Solids in Fluids

Lecture 36 - Movement of Solids in Fluids (Continued...)

Lecture 37 - Movement of Solids in Fluids (Continued...)

Lecture 38 - Classifier

Lecture 39 - Classifier (Continued...)

Lecture 40 - Hydrocyclone

Lecture 41 - Hydrocyclone (Continued...)

Lecture 42 - Hydrocyclone (Continued...)

Lecture 43 - Hydrocyclone (Continued...)

Lecture 44 - Hydrocyclone (Continued...)

Lecture 45 - Mass Balancing

Lecture 46 - Mass Balancing (Continued...)

Lecture 47 - Closed-Circuit Grinding

Lecture 48 - Gravity Concentration

Lecture 49 - Gravity Concentration (Continued...)

Lecture 50 - Gravity Concentration (Continued...)

Lecture 51 - Gravity Concentration (Continued...)

Lecture 52 - Gravity Concentration (Continued...)

Lecture 53 - Flotation

Lecture 54 - Flotation (Continued...)

Lecture 55 - Flotation (Continued...)

Lecture 56 - Flotation Chemicals

Lecture 57 - Flotation Chemicals (Continued...)

Lecture 58 - Flotation Chemicals (Continued...)

Lecture 59 - Flotation Machines

Lecture 60 - Flotation Machines (Continued...)

Lecture 61 - Magnetic Separation

Lecture 62 - Electric Separation

Lecture 63 - Flow Sheets

Lecture 64 - Flow Sheets (Continued...)

NPTEL : NOC:Foundation Engineering (Civil Engineering)

Co-ordinators : Prof. Koushik Deb

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Shear Strength

Lecture 4 - Soil Exploration - Boring

Lecture 5 - Standard Penetration Test

Lecture 6 - Standard Penetration Test and Cone Penetration Test

Lecture 7 - Cone Penetration Test and Other In-Situ Tests

Lecture 8 - Types of Samples

Lecture 9 - Geophysical Exploration - I

Lecture 10 - Geophysical Exploration - II

Lecture 11 - Shallow Foundation - Bearing Capacity I

Lecture 12 - Shallow Foundation - Bearing Capacity II

Lecture 13 - Shallow Foundation - Bearing Capacity III

Lecture 14 - Shallow Foundation - Bearing Capacity IV

Lecture 15 - Shallow Foundation - Bearing Capacity V

Lecture 16 - Shallow Foundation - Settlement I

Lecture 17 - Shallow Foundation - Settlement II

Lecture 18 - Shallow Foundation - Settlement III

Lecture 19 - Shallow Foundation - Settlement IV

Lecture 20 - Shallow Foundation - Settlement V

Lecture 21 - Shallow Foundation - Design I

Lecture 22 - Shallow Foundation - Design II

Lecture 23 - Shallow Foundation - Design III

Lecture 24 - Shallow Foundation - Design IV

Lecture 25 - Shallow Foundation - Design V

Lecture 26 - Shallow Foundation - Design VI

Lecture 27 - Pile Foundation - I

Lecture 28 - Pile Foundation - II

Lecture 29 - Pile Foundation - III

Lecture 30 - Pile Foundation - IV

Lecture 31 - Pile Foundation - V

Lecture 32 - Pile Foundation - VI

Lecture 33 - Pile Foundation - VII

Lecture 34 - Pile Foundation - VIII

Lecture 35 - Pile Foundation - IX

Lecture 36 - Pile Foundation - X

Lecture 37 - Pile Foundation - XI

Lecture 38 - Pile Foundation - XII

Lecture 39 - Pile Foundation - XIII

Lecture 40 - Pile Foundation - XIV

Lecture 41 - Earth Pressure - I

Lecture 42 - Earth Pressure - II

Lecture 43 - Earth Pressure - III

Lecture 44 - Earth Pressure - IV

Lecture 45 - Earth Pressure - V

Lecture 46 - Earth Pressure - VI

Lecture 47 - Earth Pressure - VII

Lecture 48 - Earth Pressure and Retaining Wall

Lecture 49 - Retaining Wall - II

Lecture 50 - Retaining Wall - III

Lecture 51 - Retaining Wall - IV

Lecture 52 - Retaining Wall - V and Sheet Piles - I

Lecture 53 - Sheet Piles - II

Lecture 54 - Sheet Piles - III

Lecture 55 - Sheet Piles - IV

Lecture 56 - Sheet Piles - V

Lecture 57 - Sheet Piles - VI

Lecture 58 - Sheet Piles and Braced Excavation

Lecture 59 - Braced Excavation and Underground Conduits

Lecture 60 - Underground Conduits - II

NPTEL : NOC:Theory of Elasticity (Civil Engineering)

Co-ordinators : Prof. Biswanath Banjerjee, Prof. Amit Shaw

Lecture 1 - Introduction

Lecture 2 - Introduction to Tensor

Lecture 3 - Introduction to Tensor (Continued...)

Lecture 4 - Introduction to Tensor (Continued...)

Lecture 5 - Introduction to Tensor (Continued...)

Lecture 6 - Introduction to Tensor (Continued...)

Lecture 7 - Concept of Stress and Strain

Lecture 8 - Concept of Stress and Strain (Continued...)

Lecture 9 - Concept of Stress and Strain (Continued...)

Lecture 10 - Concept of Stress and Strain (Continued...)

Lecture 11 - Concept of Stress and Strain (Continued...)

Lecture 12 - Constitutive Relation - I

Lecture 13 - Constitutive Relation - I (Continued...)

Lecture 14 - Constitutive Relation - I (Continued...)

Lecture 15 - Constitutive Relation - I (Continued...)

Lecture 16 - Constitutive Relation - I (Continued...)

Lecture 17 - Constitutive Relation - II

Lecture 18 - Constitutive Relation - II (Continued...)

Lecture 19 - Constitutive Relation - II (Continued...)

Lecture 20 - Constitutive Relation - II (Continued...)

Lecture 21 - Constitutive Relation - II (Continued...)

Lecture 22 - Formulation of Boundary Value Problems

Lecture 23 - Formulation of Boundary Value Problems (Continued...)

Lecture 24 - Formulation of Boundary Value Problems (Continued...)

Lecture 25 - Formulation of Boundary Value Problems (Continued...)

Lecture 26 - Formulation of Boundary Value Problems (Continued...)

Lecture 27 - Solution of Boundary Value Problems

Lecture 28 - Solution of Boundary Value Problems (Continued...)

Lecture 29 - Solution of Boundary Value Problems (Continued...)

Lecture 30 - Solution of Boundary Value Problems (Continued...)

Lecture 31 - Solution of Boundary Value Problems (Continued...)

Lecture 32 - Solution of Boundary Value Problems (Continued...)

Lecture 33 - Problems in Flexure

Lecture 34 - Problems in Flexure (Continued...)

Lecture 35 - Problems in Flexure (Continued...)

Lecture 36 - Problems in Flexure (Continued...)

Lecture 37 - Problems in Flexure (Continued...)

Lecture 38 - Boundary Value Problems in Elasticity

Lecture 39 - Boundary Value Problems in Elasticity (Continued...)

Lecture 40 - Boundary Value Problems in Elasticity (Continued...)

Lecture 41 - Boundary Value Problems in Elasticity (Continued...)

Lecture 42 - Boundary Value Problems in Elasticity (Continued...)

Lecture 43 - Complex Variable Method

Lecture 44 - Complex Variable Method (Continued...)

Lecture 45 - Complex Variable Method (Continued...)

Lecture 46 - Complex Variable Method (Continued...)

Lecture 47 - Complex Variable Method (Continued...)

Lecture 48 - Complex Variable Method (Continued...)

Lecture 49 - Thermoelasticity

Lecture 50 - Thermoelasticity (Continued...)

Lecture 51 - Thermoelasticity (Continued...)

Lecture 52 - Thermoelasticity (Continued...)

Lecture 53 - Thermoelasticity (Continued...)

Lecture 54 - Photo-Elasticity

Lecture 55 - Photo-Elasticity (Continued...)

Lecture 56 - Photo-Elasticity (Continued...)

Lecture 57 - Photo-Elasticity (Continued...)

Lecture 58 - Photo-Elasticity (Continued...)

Lecture 59 - Introduction to Nonlinear Elasticity

Lecture 60 - Closure

NPTEL : NOC:Wastewater Treatment and Recycling (Civil Engineering)

Co-ordinators : Prof. Manoj Kumar Tiwari

Lecture 1 - Course Introduction

Lecture 2 - Sources and Types of Wastewater

Lecture 3 - Pollutants in Wastewater: Point and Non-point Sources

Lecture 4 - Wastewater Management: Concept of Treatment and Recycling

Lecture 5 - Wastewater Management: Issues and Challenges

Lecture 6 - Wastewater Generation and Quantity Estimation

Lecture 7 - Quantity Estimation of Sewage

Lecture 8 - Population Forecasting Methods

Lecture 9 - Quantity Estimation of Sewage Flow

Lecture 10 - Sewage Quantity Estimation: Practice Problems

Lecture 11 - Wastewater Characteristics: Quality Parameters

Lecture 12 - Wastewater Characteristics: Quality Parameters (Continued...)

Lecture 13 - Wastewater Characteristics: Quality Parameters (Continued...)

Lecture 14 - Wastewater Characteristics: Quality Parameters (Continued...)

Lecture 15 - Wastewater Characteristics: Practice Problems

Lecture 16 - Fate and Transport of Contaminants Discharged in River

Lecture 17 - Effects on DO and BOD Natural Purification in Rivers: Effects on DO and BOD

Lecture 18 - BOD and Variations in streams Receiving Waste water

Lecture 19 - Natural Purification: Practice Problems

Lecture 20 - Engineered Treatment of Waste water:Concept of mass balance

Lecture 21 - Mass Balance: Application in Specific Cases

Lecture 22 - Mass Balance in Reactors: Application and Practice Problems

Lecture 23 - Basic of Municipal Wastewater Treatment

Lecture 24 - Wastewater Treatment Units: Screening

Lecture 25 - Wastewater Treatment Units: Grit Removal and Equalization

Lecture 26 - Watsewater Treatment Units: Primary Sedimentation

Lecture 27 - Wastewater Treatment Units: Primary Sedimentation

Lecture 28 - Secondary Treatment Processes: Introduction to Biological Treatment of Wastewater

Lecture 29 - Biological Treatment of Wastewater: Microbial Growth and its Kinetics

Lecture 30 - Biological Treatment of Wastewater: Microbial Growth Kinetics

Lecture 31 - Biological Treatment of Wastewater: Activated Sludge Process

Lecture 32 - Biological Treatment of Wastewater: ASP, TF and RCB

Lecture 33 - Secondary Treatment Processes: Introduction to Anaerobic Treatment of Wastewater

Lecture 34 - Anaerobic Degradation Processes

Lecture 35 - Anaerobic Degradation: Characteristics and Applications

Lecture 36 - Anaerobic Treatment of Wastewater: UASB Reactor

Lecture 37 - Anaerobic Treatment of Wastewater: Other High Rate Anaerobic Processes

Lecture 38 - Introduction to Sludge Management

Lecture 39 - Wastewater Sludge: Quantity and Characteristics

Lecture 40 - Wastewater Sludge Processing and Treatment: Sludge Thickening

Lecture 41 - Wastewater Sludge Processing and Treatment: Sludge Stabilization and Conditioning

Lecture 42 - Wastewater Sludge Processing and Treatment: Dewatering, Hygienisation, Disposal/Reuse

Lecture 43 - Tertiary (Advanced) Treatment of Wastewater

Lecture 44 - Tertiary Treatment: Nutrients Removal

Lecture 45 - Tertiary Treatment: Adsorption and Ion Exchange

Lecture 46 - Tertiary Treatment: Membrane Processes

Lecture 47 - Tertiary Treatment: Disinfection and Chemical Treatments

Lecture 48 - Wastewater Treatment Systems: Options and Conventional Approach

Lecture 49 - Wastewater Treatment Systems: Integrated Systems: Wetlands

Lecture 50 - Alternate Wastewater Treatment Systems: SBR and SBBR

Lecture 51 - Alternate Wastewater Treatment Systems: MBR and MBBR

Lecture 52 - Concept of Wastewater Reuse and Recycling

Lecture 53 - Wastewater Reuse and Recycling Opportunities

Lecture 54 - Wastewater Reuse and Recycling Potential and Requirements

Lecture 55 - Wastewater Reuse and Recycling Regulatory Guidelines

Lecture 56 - Wastewater Reuse and Recycling: Centralized Vs Decentralized Recycling

Lecture 57 - Wastewater Reuse and Recycling: Challenges, Risks and Research Trends

Lecture 58 - Decision Making in Wastewater Reuse and Recycling

Lecture 59 - Public Acceptance for Recycled Water Use

Lecture 60 - Wastewater Reuse and Recycling: Global Practices and Case Studies

Lecture 61 - Course Summary

Lecture 62 - Course Summary (Continued...)

NPTEL : NOC:Fluid Inclusion in Mineral Principles, Methodology, Practice and Application (Civil Engineering)

Co-ordinators : Prof. M.K.Panigrahi

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Microthermometry

Lecture 7 - Microthermometry: Principles

Lecture 8 - Microthermometry: Principles (Continued...)

Lecture 9 - Microthermometry: Principles (Continued...)

Lecture 10 - Fluid Inclusion Petrography

Lecture 11 - Aqueous Fluid Inclusions

Lecture 12 - Aqueous Fluid Inclusions (Continued...)

Lecture 13 - Response to Heating Experiment

Lecture 14 - Aqueous Fluid Inclusions (Continued...)

Lecture 15 - Aqueous Fluid Inclusions (Continued...)

Lecture 16 - Pure Carbonic Inclusion

Lecture 17 - Pure Carbonic Inclusion (Continued...)

Lecture 18 - Microthermometry of Aqueous-Carbonic Inclusion

Lecture 19 - Microthermometry of Aqueous-Carbonic Inclusion (Continued...)

Lecture 20 - Microthermometry of Aqueous-Carbonic Fluid Inclusion

Lecture 21 - Application of Fluid Inclusion to Ore Environment

Lecture 22 - Application of Fluid Inclusion Studies to Ore Environment

Lecture 23 - Application of fluid Inclusion to Ore Forming Environments

Lecture 24 - Application of fluid Inclusion to Ore Forming Environments (Continued...)

Lecture 25 - Application of fluid Inclusion to Ore Forming Environments (Continued...)

Lecture 26 - Application of fluid Inclusion to Deformation, Metamorphism

Lecture 27 - Application of fluid Inclusion to Deformation, Metamorphism (Continued...)

Lecture 28 - Application of fluid Inclusion to Deformation, Metamorphism (Continued...)

Lecture 29 - Application of fluid Inclusion to Deformation, Metamorphism (Continued...)

Lecture 30 - Application of fluid Inclusion to Deformation, Metamorphism (Continued...)

Lecture 31 - Analysis of Fluid Inclusion

Lecture 32 - Analysis of Fluid Inclusion (Continued...)

Lecture 33 - Analysis of Fluid Inclusion (Continued...)

Lecture 34 - Analysis of Fluid Inclusion (Continued...)

Lecture 35 - Analysis of Fluid Inclusion (Continued...)

Lecture 36 - Computer Software for Fluid Inclusion Data

Lecture 37 - Computer Software for Fluid Inclusion Data (Continued...)

Lecture 38 - Computer Software for Fluid Inclusion Data (Continued...)

Lecture 39 - Review of the Course

Lecture 40 - Review of the Course (Continued...)

NPTEL : NOC:Matrix Method of Structural Analysis (Civil Engineering)

Co-ordinators : Prof. Biswanath Banjerjee, Prof. Amit Shaw

Lecture 1 - Introduction

Lecture 2 - Review of Structural Analysis - I

Lecture 3 - Review of Structural Analysis - I (Continued...)

Lecture 4 - Review of Structural Analysis - I (Continued...)

Lecture 5 - Review of Structural Analysis - I (Continued...)

Lecture 6 - Review of Structural Analysis - I (Continued...)

Lecture 7 - Review of Structural Analysis - I (Continued...)

Lecture 8 - Review of Structural Analysis - I (Continued...)

Lecture 9 - Review of Structural Analysis - I (Continued...)

Lecture 10 - Review of Structural Analysis - I (Continued...)

Lecture 11 - Matrix Algebra Review

Lecture 12 - Matrix Algebra Review (Continued...)

Lecture 13 - Matrix Algebra Review (Continued...)

Lecture 14 - Matrix Algebra Review (Continued...)

Lecture 15 - Matrix Algebra Review (Continued...)

Lecture 16 - Matrix Method of Analysis of Trusses

Lecture 17 - Matrix Method of Analysis of Trusses (Continued...)

Lecture 18 - Matrix Method of Analysis of Trusses (Continued...)

Lecture 19 - Matrix Method of Analysis of Trusses (Continued...)

Lecture 20 - Matrix Method of Analysis of Trusses (Continued...)

Lecture 21 - Matrix Method of Analysis: Beams

Lecture 22 - Matrix Method of Analysis: Beams (Continued...)

Lecture 23 - Matrix Method of Analysis: Beams (Continued...)

Lecture 24 - Matrix Method of Analysis: Beams (Continued...)

Lecture 25 - Matrix Method of Analysis: Beams (Continued...)

Lecture 26 - Matrix Method of Analysis: Frame (2D)

Lecture 27 - Matrix Method of Analysis: Frame (2D) (Continued...)

Lecture 28 - Matrix Method of Analysis: Frame (2D) (Continued...)

Lecture 29 - Matrix Method of Analysis: Frame (2D) (Continued...)

Lecture 30 - Matrix Method of Analysis: Frame (2D) (Continued...)

Lecture 31 - Computer Implementation

Lecture 32 - Computer Implementation (Continued...)

Lecture 33 - Analysis of 3D Truss

Lecture 34 - Analysis of 3D Truss (Continued...)

Lecture 35 - Analysis of Beam

Lecture 36 - Introduction to Finite Element Method

Lecture 37 - Introduction to Finite Element Method (Continued...)

Lecture 38 - Introduction to Finite Element Method (Continued...)

Lecture 39 - Introduction to Finite Element Method (Continued...)

Lecture 40 - Introduction to Finite Element Method (Continued...)

Lecture 41 - Introduction to Finite Element Method (Continued...)

Lecture 42 - Introduction to Finite Element Method (Continued...)

NPTEL : NOC:Plastic Waste Management (Civil Engineering)

Co-ordinators : Prof. Brajesh Kumar Dubey

Lecture 1 - Plastics - What is Plastic

Lecture 2 - Plastics - Types

Lecture 3 - Plastics - Types (Continued...)

Lecture 4 - Plastics - Uses and Global Statistics

Lecture 5 - Plastics - Global Statistics

Lecture 6 - Plastic Waste Sources

Lecture 7 - Plastic Waste Sources (Continued...)

Lecture 8 - Plastic Waste Sources and Production

Lecture 9 - Global Sources

Lecture 10 - Global and Indian data

Lecture 11 - Plastic Waste Management Rules 2016 (India)

Lecture 12 - Plastic Waste Management Rules (Continued...)

Lecture 13 - Plastic Waste Management Rules (Continued...)

Lecture 14 - Plastic Waste Management Rules (Continued...)

Lecture 15 - Global Rules and Regulations

Lecture 16 - Plastic Bans including China Sword Policy Implication on Global Plastic Waste Management

Lecture 17 - Plastic Bans - Global Examples

Lecture 18 - Plastic Bans - China Sword Policy

Lecture 19 - Plastic Bans - China Sword Policy Impacts

Lecture 20 - Plastic Bans - Impact on Global Plastic Waste Management

Lecture 21 - Impact of Plastic Pollution on Marine Life

Lecture 22 - Impact of Plastic Pollution on Marine Life (Continued...)

Lecture 23 - Plastic Pollution Impacts on Marine and Wildlife

Lecture 24 - Plastic Pollution : Health and Environmental Impact

Lecture 25 - Plastic Pollution : Health and Environmental Impact (Continued...)

Lecture 26 - Plastic Waste Management Practices : Recycling and Waste Plastics

Lecture 27 - Plastic Waste Management : Mechanical and Feedstock Recycling

Lecture 28 - Plastic Waste Management : Feedstock Recycling - Pyrolysis and Waste to Energy

Lecture 29 - Plastic Waste Management : Landfilling, Other Applications

Lecture 30 - Use of Waste Plastics in Road Construction

Lecture 31 - Possible Alternate Materials to Plastics - Greener Alternatives

Lecture 32 - Biodegradable Plastics

Lecture 33 - Greener Plastic Products

Lecture 34 - Biobased Plastic Products

Lecture 35 - How to Quantify Something is Green

Lecture 36 - Plastics Resource Recovery and Circular Economy

Lecture 37 - Plastics Resource Recovery and Intro to Circular Economy

Lecture 38 - Plastics and Circular Economy

Lecture 39 - Plastics and Circular Economy - Case Studies

Lecture 40 - Plastics and Circular Economy - Case Studies (Continued...)

NPTEL : NOC:Geotechnical Engineering-II Foundation Engineering (Civil Engineering)

Co-ordinators : Prof. Dilip Kumar Baidya

Lecture 1 - Quick Review of Soil Mechanics

Lecture 2 - Quick Review of Soil Mechanics (Continued...)

Lecture 3 - Quick Review of Soil Mechanics (Continued...)

Lecture 4 - Quick Review of Soil Mechanics (Continued...)

Lecture 5 - Quick Review of Soil Mechanics (Continued...)

Lecture 6 - Foundation Engineering Introduction

Lecture 7 - Foundation Engineering Introduction (Continued...)

Lecture 8 - Foundation Engineering Introduction (Continued...)

Lecture 9 - Shallow Foundation and Bearing Capacity

Lecture 10 - Shallow Foundation and Bearing Capacity (Continued...)

Lecture 11 - Shallow Foundation and Bearing Capacity (Continued...)

Lecture 12 - Shallow Foundation

Lecture 13 - Shallow Foundation (Continued...)

Lecture 14 - Shallow Foundation (Continued...)

Lecture 15 - Shallow Foundation (Continued...)

Lecture 16 - Shallow Foundation (Continued...)

Lecture 17 - Settlement of Foundation

Lecture 18 - Settlement of Foundation (Continued...)

Lecture 19 - Settlement of Foundation (Continued...)

Lecture 20 - Settlement of Foundation (Continued...)

Lecture 21 - Settlement of Foundation (Continued...)

Lecture 22 - Settlement of Foundation (Continued...)

Lecture 23 - Geotechnical Investigation

Lecture 24 - Geotechnical Investigation (Continued...)

Lecture 25 - Geotechnical Investigation (Continued...)

Lecture 26 - Geotechnical Investigation (Continued...)

Lecture 27 - Geotechnical Investigation (Continued...)

Lecture 28 - Earth Pressure Theories

Lecture 29 - Earth Pressure Theories (Continued...)

Lecture 30 - Earth Pressure Theories (Continued...)

Lecture 31 - Earth Pressure Theories (Continued...)

Lecture 32 - Earth Pressure Theories (Continued...)

Lecture 33 - Stability analysis of earth retaining wall

Lecture 34 - Stability analysis of earth retaining wall (Continued...)

Lecture 35 - Stability analysis of earth retaining wall (Continued...)

Lecture 36 - Stability of earth retaining wall

Lecture 37 - Pile foundation

Lecture 38 - Pile foundation (Continued...)

Lecture 39 - Pile foundation (Continued...)

Lecture 40 - Pile foundation (Continued...)

Lecture 41 - Pile foundation (Continued...)

Lecture 42 - Pile foundation (Continued...)

Lecture 43 - Pile foundation (Continued...)

Lecture 44 - Pile foundation (Continued...)

Lecture 45 - Pile foundation (Continued...)

Lecture 46 - Pile foundation (Continued...)

Lecture 47 - Sheet pile wall

Lecture 48 - Sheet pile wall (Continued...)

Lecture 49 - Anchor bulkhead

Lecture 50 - Anchor bulkhead (Continued...)

Lecture 51 - Deep excavation

Lecture 52 - Deep excavation (Continued...)

Lecture 53 - Introduction to machine foundation

Lecture 54 - Introduction to machine foundation (Continued...)

Lecture 55 - Introduction to machine foundation (Continued...)

Lecture 56 - Introduction to machine foundation (Continued...)

Lecture 57 - Introduction to machine foundation (Continued...)

Lecture 58 - Introduction to machine foundation (Continued...)

Lecture 59 - Introduction to machine foundation (Continued...)

Lecture 60 - Summary

NPTEL : NOC:Mass, Momentum and Energy Balances in Engineering Analysis (Civil Engineering)

Co-ordinators : Prof. Pavitra Sandilya

Lecture 1 - Introduction

Lecture 2 - Preliminaries

Lecture 3 - Balance Equations Preliminaries - I

Lecture 4 - Tutorial 1 - Balance Equations Preliminaries - I

Lecture 5 - Balance Equations Preliminaries - II

Lecture 6 - Tutorial 2 - Balance Equations Preliminaries - II

Lecture 7 - Macroscopic Balances - I

Lecture 8 - Macroscopic Balances - II

Lecture 9 - Macroscopic Balances - III

Lecture 10 - Tutorial 3 - Macroscopic Balances

Lecture 11 - Tutorial 4 - Macroscopic Balances

Lecture 12 - Tutorial 5 - Systems with chemical reactions

Lecture 13 - Tutorial 6 - Material balance involving chemical reactions

Lecture 14 - Tutorial 7 - Energy interactions in reacting systems Energy interactions in reacting systems

Lecture 15 - Tutorial 8 - Energy interactions in reacting systems

Lecture 16 - Solution of Macroscopic Balance Equations - I

Lecture 17 - Solution of Macroscopic Balance Equations - II

Lecture 18 - Tutorial 9 - Solution of Macroscopic Balance Equations - I

Lecture 19 - Tutorial 10 - Solution of Macroscopic Balance Equations - II

Lecture 20 - Mathematical Solution of Macroscopic Balance Equations

Lecture 21 - Mathematical Solution of Macroscopic Balance Equations

Lecture 22 - Numerical Solution of Macroscopic Balance Equations

Lecture 23 - Numerical evaluation of integrations in macroscopic balance equations

Lecture 24 - Microscopic Balances - I

Lecture 25 - Microscopic Balances - II

Lecture 26 - Microscopic Balances - III

Lecture 27 - Microscopic Balances - IV

Lecture 28 - Microscopic Balances - V

Lecture 29 - Microscopic Balances - VI

Lecture 30 - Microscopic Balances - VII

Lecture 31 - Microscopic Balance Illustrations - I

Lecture 32 - Microscopic Balance Illustrations - II

Lecture 33 - Microscopic Balance Illustrations - III

Lecture 34 - Microscopic Balance Illustrations - IV

Lecture 35 - Microscopic Balance Illustrations - V

Lecture 36 - Matrix Techniques - I

Lecture 37 - Matrix Techniques - II

Lecture 38 - Regression

Lecture 39 - Interpolation

Lecture 40 - Illustration of Interpolation

Lecture 41 - Illustration of Regression

Lecture 42 - Tutorial on macroscopic energy balance

Lecture 43 - Selective Mathematical Concepts in Transport Phenomena

NPTEL : NOC:Soil Structure Interaction (Civil Engineering)

Co-ordinators : Prof. Koushik Deb

Lecture 1 - Introduction

Lecture 2 - Bearing Capacity of Soil

Lecture 3 - Bearing Capacity of Soil (Continued...)

Lecture 4 - Bearing Capacity of Soil (Continued...)

Lecture 5 - Settlement of Shallow Foundation

Lecture 6 - Design of Shallow Foundation

Lecture 7 - Design of Shallow Foundation (Continued...)

Lecture 8 - Design of Shallow Foundation (Continued...)

Lecture 9 - Soil-Structure Interaction for Shallow Foundation : Concept of Subgrade Modulus

Lecture 10 - Soil-Structure Interaction for Shallow Foundation : Concept of Subgrade Modulus (Continued...)

Lecture 11 - Soil-Structure Interaction for Shallow Foundation : Concept of Subgrade Modulus (Continued...)

Lecture 12 - Soil-Structure Interaction for Shallow Foundation : Concept of Subgrade Modulus (Continued...)

Lecture 13 - Different Foundation Models

Lecture 14 - Different Foundation Models (Continued...)

Lecture 15 - Different Foundation Models (Continued...)

Lecture 16 - Different Foundation Models (Continued...)

Lecture 17 - Different Foundation Models (Continued...)

Lecture 18 - Beams on Elastic Foundation

Lecture 19 - Beams on Elastic Foundation (Continued...)

Lecture 20 - Beams on Elastic Foundation (Continued...)

Lecture 21 - Beams on Elastic Foundation (Continued...)

Lecture 22 - Beams on Elastic Foundation (Continued...)

Lecture 23 - Beams on Elastic Foundation (Continued...)

Lecture 24 - Beams on Elastic Foundation (Continued...)

Lecture 25 - Beams on Elastic Foundation (Continued...)

Lecture 26 - Beams on Elastic Foundation (Continued...)

Lecture 27 - Beams on Elastic Foundation (Continued...)

Lecture 28 - Beams on Elastic Foundation (Continued...)

Lecture 29 - Beams on Elastic Foundation (Continued...)

Lecture 30 - Beams on Elastic Foundation (Continued...)

Lecture 31 - Beams on Elastic Foundation (Continued...)

Lecture 32 - Beams on Elastic Foundation (Continued...)

Lecture 33 - Beams on Elastic Foundation (Continued...)

Lecture 34 - Beams on Elastic Foundation (Continued...)

Lecture 35 - Beams on Elastic Foundation (Continued...)

Lecture 36 - Beams on Elastic Foundation (Continued...)

Lecture 37 - Beams on Elastic Foundation (Continued...)

Lecture 38 - Beams on Elastic Foundation (Continued...)

Lecture 39 - Beams on Elastic Foundation (Continued...)

Lecture 40 - Beams on Elastic Foundation (Continued...)

Lecture 41 - Plates on Elastic Foundation

Lecture 42 - Plates on Elastic Foundation (Continued...)

Lecture 43 - Plates on Elastic Foundation (Continued...)

Lecture 44 - Plates on Elastic Foundation (Continued...)

Lecture 45 - Use of Finite Difference Method for Soil Structure Interaction Problems

Lecture 46 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 47 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 48 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 49 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 50 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 51 - Use of Finite Difference Method for Soil Structure Interaction Problems (Continued...)

Lecture 52 - Soil Structure Interaction for Pile Foundation

Lecture 53 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 54 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 55 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 56 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 57 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 58 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 59 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 60 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 61 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 62 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 63 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 64 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 65 - Soil Structure Interaction for Pile Foundation (Continued...)

Lecture 66 - Soil Structure Interaction for Pile Foundation (Continued...)

NPTEL : NOC:Water Supply Engineering (Civil Engineering)

Co-ordinators : Prof. Manoj Kumar Tiwari

Lecture 1 - Backgroung and Course Introduction

Lecture 2 - Water Sources and Availability

Lecture 3 - Water Uses

Lecture 4 - Water Supply Key Issues and Concerns

Lecture 5 - Urban water services and water supply systems

Lecture 6 - Urban water services and water supply systems

Lecture 7 - Components of Water Demand

Lecture 8 - Fluctuations in Water Demand

Lecture 9 - Concept of Design Period and Design Population Need to Forecast Population Population Forecasting Methods

Lecture 10 - Demand Forecasting and Design Capacities

Lecture 11 - Water Sources and Collection of Water

Lecture 12 - Surface Water Intakes

Lecture 13 - Surface Water Intakes Systems

Lecture 14 - Groundwater Intake

Lecture 15 - Well Interferences, Well losses and Efficiency

Lecture 16 - Raw water Conveyance and Pumping

Lecture 17 - Practice Problems

Lecture 18 - Raw Water Storage

Lecture 19 - Treated Water Storage

Lecture 20 - Placement, Design and Construction of Storage Reservoirs

Lecture 21 - Practice Problems on Reservoir Capacity Estimation

Lecture 22 - Water Quality and Water Pollutants

Lecture 23 - Water Quality Parameters

Lecture 24 - Philosophy of Water Treatment

Lecture 25 - Water Treatment Units Screening and Aeration

Lecture 26 - Water Treatment Units Sedimentation

Lecture 27 - Practice Problems On Sedimentation

Lecture 28 - Coagulation and Flocculation: Theory

Lecture 29 - Coagulation and Flocculation: Selection and Application

Lecture 30 - Coagulation and Flocculation: Design Operation and Process Control

Lecture 31 - Filtration Theory and Slow Sand Filters

Lecture 32 - Rapid Sand Filter: Filter Media and Components

Lecture 33 - Rapid Sand Filters and Pressure Filters

Lecture 34 - Practice Problems Coagulation Flocculation and Filtration

Lecture 35 - Disinfection Basic

Lecture 36 - Chlorination

Lecture 37 - Other Disinfection Method: Ozone and UV Disinfection

Lecture 38 - Sluge Management

Lecture 39 - Advanced and Alternate Treatment Systems

Lecture 40 - Advanced Oxidation Processes and Membrane Process

Lecture 41 - Practice Problems

Lecture 42 - Basic of Water Distribution System

Lecture 43 - Water Distribution Networks

Lecture 44 - Analysis of Water Distribution Networks

Lecture 45 - Problems onPipe Flow and Water Distribution Network

Lecture 46 - Water Losses in Water Distribution System

Lecture 47 - Water Balance for Water Loss Assessment and Performance Indicators

Lecture 48 - Water Loss Detection and Control

Lecture 49 - Practice Problems on Water Audit and Water Loss Estimation

Lecture 50 - Continuous (24*7) water supply systems

Lecture 51 - District metered area (DMA) for zoning in water distribution networks

Lecture 52 - Software for water distribution networks design and analysis

Lecture 53 - Demonstration on EPANET and GEMS

Lecture 54 - Concept of smart water supply systems

Lecture 55 - Smart Metering and sensing devices

Lecture 56 - IoT and Automation in Water Supply

Lecture 57 - Example of Automation and Smart Water Supply Systems

Lecture 58 - Economics of Water Supply Systems

Lecture 59 - Capital and Operational Cost of Water Supply System

Lecture 60 - Pricing Waters

Lecture 61 - Pricing Waters (Continued...)

Lecture 62 - Case studies and Practice Problem on Water Pricing

NPTEL : NOC:Geo Spatial Analysis in Urban Planning (Civil Engineering)

Co-ordinators : Prof. Saikat Kumar Paul

Lecture 1 - Introduction to Geographic Information System

Lecture 2 - Introduction to Coordinate System and Geographic Projections

Lecture 3 - Geometric Transformation

Lecture 4 - Vector Data Model

Lecture 5 - Raster Data Model

Lecture 6 - Method of Spatial Analysis

Lecture 7 - Vector Data Analysis

Lecture 8 - Vector Data Analysis (Continued...)

Lecture 9 - Raster Data Analysis

Lecture 10 - Raster Operations, Terrain Visualization and Classification

Lecture 11 - Attribute Data Management and Data Exploration

Lecture 12 - Spatial Interpolation

Lecture 13 - Spatial Interpolation

Lecture 14 - Network Analysis

Lecture 15 - Service or Trade Area Analysis in an Urban Area

Lecture 16 - Service or Trade Area Analysis in an Urban Area (Continued...)

Lecture 17 - Landscape metrics and its applications

Lecture 18 - Urban sprawl characterization using Landscape Metrics

Lecture 19 - Multi-Criteria Decision Analysis

NPTEL : NOC:Hydraulic Engineering (Civil Engineering)

Co-ordinators : Prof. Mohammad Saud Afzal

Lecture 1 - Basics of fluid mechanics - I

Lecture 2 - Basics of fluid mechanics - I (Continued...)

Lecture 3 - Basics of fluid mechanics - I (Continued...)

Lecture 4 - Basics of fluid mechanics - I (Continued...)

Lecture 5 - Basics of fluid mechanics - I (Continued...)

Lecture 6 - Basics of fluid mechanics - II

Lecture 7 - Basics of fluid mechanics - II (Continued...)

Lecture 8 - Basics of fluid mechanics - II (Continued...)

Lecture 9 - Basics of fluid mechanics - II (Continued...)

Lecture 10 - Basics of fluid mechanics - II (Continued...)

Lecture 11 - Basics of fluid mechanics - II (Continued...)

Lecture 12 - Laminar and turbulent flow

Lecture 13 - Laminar and turbulent flow (Continued...)

Lecture 14 - Laminar and turbulent flow (Continued...)

Lecture 15 - Laminar and turbulent flow (Continued...)

Lecture 16 - Laminar and turbulent flow (Continued...)

Lecture 17 - Boundary Layer Theory

Lecture 18 - Boundary Layer Theory (Continued...)

Lecture 19 - Boundary Layer Theory (Continued...)

Lecture 20 - Boundary Layer Theory (Continued...)

Lecture 21 - Boundary Layer Theory (Continued...)

Lecture 22 - Boundary Layer Theory (Continued...)

Lecture 23 - Dimensional Analysis and Hydraulic Similitude

Lecture 24 - Dimensional Analysis and Hydraulic Similitude (Continued...)

Lecture 25 - Dimensional Analysis and Hydraulic Similitude (Continued...)

Lecture 26 - Dimensional Analysis and Hydraulic Similitude (Continued...)

Lecture 27 - Dimensional Analysis and Hydraulic Similitude (Continued...)

Lecture 28 - Introduction to Open Channel Flow and Uniform Flow

Lecture 29 - Introduction to Open Channel Flow and Uniform Flow (Continued...)

Lecture 30 - Introduction to Open Channel Flow and Uniform Flow (Continued...)

Lecture 31 - Introduction to Open Channel Flow and Uniform Flow (Continued...)

Lecture 32 - Introduction to Open Channel Flow and Uniform Flow (Continued...)

Lecture 33 - Introduction to Open Channel Flow and Uniform Flow (Continued...)

Lecture 34 - Non-uniform flow and hydraulic jump

Lecture 35 - Non-uniform flow and hydraulic jump (Continued...)

Lecture 36 - Non-uniform flow and hydraulic jump (Continued...)

Lecture 37 - Non-uniform flow and hydraulic jump (Continued...)

Lecture 38 - Pipe flow

Lecture 39 - Pipe flow (Continued...)

Lecture 40 - Pipe flow (Continued...)

Lecture 41 - Pipe flow (Continued...)

Lecture 42 - Pipe flow (Continued...)

Lecture 43 - Pipe networks

Lecture 44 - Pipe networks (Continued...)

Lecture 45 - Pipe networks (Continued...)

Lecture 46 - Pipe networks (Continued...)

Lecture 47 - Pipe networks (Continued...)

Lecture 48 - Viscous fluid flow

Lecture 49 - Viscous fluid flow (Continued...)

Lecture 50 - Viscous fluid flow (Continued...)

Lecture 51 - Viscous fluid flow (Continued...)

Lecture 52 - Viscous fluid flow (Continued...)

Lecture 53 - Viscous fluid flow (Continued...)

Lecture 54 - Computational fluid dynamics

Lecture 55 - Computational fluid dynamics (Continued...)

Lecture 56 - Computational fluid dynamics (Continued...)

Lecture 57 - Computational fluid dynamics (Continued...)

Lecture 58 - Computational fluid dynamics (Continued...)

Lecture 59 - Introduction to wave mechanics

Lecture 60 - Introduction to wave mechanics (Continued...)

Lecture 61 - Introduction to wave mechanics (Continued...)

Lecture 62 - Introduction to wave mechanics (Continued...)

Lecture 63 - Introduction to wave mechanics (Continued...)

NPTEL : NOC:Introduction to Multimodal Urban Transportation Systems (Civil Engineering)

Co-ordinators : Prof. Arkopal Kishore Goswami

Lecture 1 - Overview of urban transportation: Urbanization and Transport

Lecture 2 - Overview of urban transportation: Key issues in urban transportation

Lecture 3 - Overview of urban transportation: Challenges in urban transportation

Lecture 4 - Overview of urban transportation: Travel demand modelling overview

Lecture 5 - Overview of urban transportation: Vehicular Level of Service (LOS) overview

Lecture 6 - Public Transportation: Introduction to public transportation

Lecture 7 - Public Transportation: Basic operating elements of public transportation

Lecture 8 - Public Transportation: Basic operating elements of public transportation (Continued...)

Lecture 9 - Public Transportation: Bus Transportation

Lecture 10 - Public Transportation: Bus Transportation (Continued...)

Lecture 11 - Public Transportation: Financing public transportation

Lecture 12 - Public Transportation: Transit marketing

Lecture 13 - Public Transportation: Rail transportation

Lecture 14 - Public Transportation: Intermediate Public Transportation

Lecture 15 - Public Transportation: Measuring performance of transit systems

Lecture 16 - Public Transportation: Advanced operation concepts of public transportation

Lecture 17 - Public Transportation: Bus and Rail Transit Capacity

Lecture 18 - Public Transportation: Bus and Rail Transit Capacity (Continued...)

Lecture 19 - Public Transportation: Station Capacity

Lecture 20 - Public Transportation: Transit Stop Location

Lecture 21 - Non-motorised Transportation (NMT) Planning: Introduction to NMT Systems

Lecture 22 - Non-motorised Transportation (NMT) Planning: Assessing existing NMT scenario

Lecture 23 - Non-motorised Transportation (NMT) Planning: Data collection and analysis in NMT Planning

Lecture 24 - Non-motorised Transportation (NMT) Planning: Complementarity and Selection of Interventions

Lecture 25 - Non-motorised Transportation (NMT) Planning: Alternative Selection through Economic & Financial Analysis

Lecture 26 - Non-Motorised Transportation (NMT) Planning: Basic NMT Characteristics

Lecture 27 - Non-Motorised Transportation (NMT) Planning: Pedestrian Data Collection and Flow Characteristics

Lecture 28 - Non-Motorised Transportation (NMT) Planning: Pedestrian Flow models

Lecture 29 - Non-Motorised Transportation (NMT) Planning: Pedestrian flow characteristics on facilities

Lecture 30 - Non-Motorised Transportation (NMT) Planning: Pedestrian Level of Service (PLOS) based on Flow models

Lecture 31 - Non-Motorised Transportation (NMT) Planning: Other types of Pedestrian Level of Service (PLOS)

Lecture 32 - Non-Motorised Transportation (NMT) Planning: HCM 2010 Methodology for PLOS

Lecture 33 - Non-Motorised Transportation (NMT) Planning: HCM 2010 Methodology for PLOS (Continued...)

Lecture 34 - Non-Motorised Transportation (NMT) Planning: Bicycle Facilities and Level of Service (BLOS)

Lecture 35 - Non-Motorised Transportation (NMT) Planning: BLOS and Bicycle Compatibility Index (BCI)

Lecture 36 - Non-Motorised Transportation (NMT) Planning: NMT Design Principles

Lecture 37 - Non-Motorised Transportation (NMT) Planning: Design of Pedestrian Infrastructure

Lecture 38 - Non-Motorised Transportation (NMT) Planning: Design of Pedestrian Infrastructure (Continued...)

Lecture 39 - Non-Motorised Transportation (NMT) Planning: Design of Cycling Infrastructure

Lecture 40 - Non-Motorised Transportation (NMT) Planning: Design of Cycling Infrastructure (Continued...)

Lecture 41 - Urban Transport and Sustainability: Travel Demand Management (TDM) overview

Lecture 42 - Urban Transport and Sustainability: Push measures cases

Lecture 43 - Urban Transport and Sustainability: Pull measure cases

Lecture 44 - Urban Transport and Sustainability: Parking Studies

Lecture 45 - Urban Transport and Sustainability: Transit Oriented Development (TOD)

Lecture 46 - Urban Transport and Sustainability: Introduction to Intelligent Transportation Systems (ITS)

Lecture 47 - Urban Transport and Sustainability: ITS components, applications and communication

Lecture 48 - Urban Transport and Sustainability: ITS Architecture

Lecture 49 - Urban Transport and Sustainability: Electronic Toll Collection (ETC)

Lecture 50 - Urban Transport and Sustainability: Public Bicycle Sharing (PBS) System with ITS

Lecture 51 - Urban Transport and Sustainability: Multimodal transportation (MMT) environment

Lecture 52 - Urban Transport and Sustainability: Multimodal Level of Service (MMLOS)

Lecture 53 - Urban Transport and Sustainability: Multimodal Level of Service (MMLOS) (Continued...)

Lecture 54 - Urban Transport and Sustainability: Design of multimodal transfer facilities

Lecture 55 - Urban Transport and Sustainability: Park & Ride (P&R) Facility Planning

Lecture 56 - Urban Transport and Sustainability: An Introduction to Pedestrian Road Safety and associated Risk Factors

Lecture 57 - Urban Transport and Sustainability: Road crash estimation and elements of predictive methods

Lecture 58 - Urban Transport and Sustainability: Predicting Vehicle-Pedestrian and Vehicle-Bicycle conflicts

Lecture 59 - Urban Transport and Sustainability: Environmental Concerns of Urban Transport

Lecture 60 - Urban Transport and Sustainability: Sustainable strategies for Urban Transportation

NPTEL : NOC:Advanced Foundation Engineering (Civil Engineering)

Co-ordinators : Prof. Kousik Deb

Lecture 1 - Introduction and Soil Exploration - I

Lecture 2 - Soil Exploration - II

Lecture 3 - Soil Exploration - III

Lecture 4 - Soil Exploration - IV

Lecture 5 - Soil Exploration - V

Lecture 6 - Soil Exploration - VI

Lecture 7 - Shallow Foundation : Bearing Capacity - I

Lecture 8 - Shallow Foundation : Bearing Capacity - II

Lecture 9 - Shallow Foundation : Bearing Capacity - III

Lecture 10 - Shallow Foundation : Bearing Capacity - IV

Lecture 11 - Shallow Foundation : Bearing Capacity - V

Lecture 12 - Shallow Foundation : Bearing Capacity - VI

Lecture 13 - Shallow Foundation : Bearing Capacity - VII

Lecture 14 - Shallow Foundation : Bearing Capacity - VIII

Lecture 15 - Shallow Foundation : Bearing Capacity - IX

Lecture 16 - Shallow Foundation : Bearing Capacity - X

Lecture 17 - Shallow Foundation : Bearing Capacity - XI

Lecture 18 - Shallow Foundation : Bearing Capacity - XII

Lecture 19 - Shallow Foundation : Bearing Capacity - XIII

Lecture 20 - Shallow Foundation : Bearing Capacity - XIV

Lecture 21 - Shallow Foundation : Bearing Capacity - XV

Lecture 22 - Shallow Foundation : Bearing Capacity - XVI

Lecture 23 - Shallow Foundation : Settlement - I

Lecture 24 - Shallow Foundation : Settlement - II

Lecture 25 - Shallow Foundation : Settlement - III

Lecture 26 - Shallow Foundation : Settlement - IV

Lecture 27 - Beams on Elastic Foundation - I

Lecture 28 - Beams on Elastic Foundation - II

Lecture 29 - Beams on Elastic Foundation - III

Lecture 30 - Beams on Elastic Foundation - IV

Lecture 31 - Beams on Elastic Foundation - V

Lecture 32 - Beams on Elastic Foundation - VI

Lecture 33 - Beams on Elastic Foundation - VII

Lecture 34 - Beams on Elastic Foundation - VIII

Lecture 35 - Beams on Elastic Foundation - IX

Lecture 36 - Design of Shallow Foundation - I

Lecture 37 - Design of Shallow Foundation - II

Lecture 38 - Design of Shallow Foundation - III

Lecture 39 - Design of Shallow Foundation - IV

Lecture 40 - Design of Shallow Foundation - V

Lecture 41 - Pile Foundation : Under Compressive Load - I

Lecture 42 - Pile Foundation : Under Compressive Load - II

Lecture 43 - Pile Foundation : Under Compressive Load - III

Lecture 44 - Pile Foundation : Under Compressive Load - IV

Lecture 45 - Pile Foundation : Under Compressive Load - V

Lecture 46 - Pile Foundation : Under Compressive Load - VI

Lecture 47 - Pile Foundation : Under Compressive Load - VII

Lecture 48 - Pile Foundation : Under Compressive Load - VIII

Lecture 49 - Pile Foundation : Under Compressive Load - IX

Lecture 50 - Pile Foundation : Under Compressive Load - X

Lecture 51 - Pile Foundation : Under Lateral Load and Uplift - I

Lecture 52 - Pile Foundation : Under Lateral Load and Uplift - II

Lecture 53 - Pile Foundation : Under Lateral Load and Uplift - III

Lecture 54 - Pile Foundation : Under Lateral Load and Uplift - IV

Lecture 55 - Pile Foundation : Under Lateral Load and Uplift - V

Lecture 56 - Pile Foundation : Under Lateral Load and Uplift - VI

Lecture 57 - Pile Foundation : Under Lateral Load and Uplift - VII

Lecture 58 - Pile Foundation : Under Lateral Load and Uplift - VIII

Lecture 59 - Pile Foundation : Under Lateral Load and Uplift - IX

Lecture 60 - Well Foundation - I

Lecture 61 - Well Foundation - II

Lecture 62 - Well Foundation - III

Lecture 63 - Well Foundation - IV

Lecture 64 - Well Foundation - V

Lecture 65 - Well Foundation - VI

Lecture 66 - Well Foundation - VII

Lecture 67 - Well Foundation - VIII

Lecture 68 - Well Foundation - IX

Lecture 69 - Foundations on Difficult Soils - I

Lecture 70 - Foundations on Difficult Soils - II

NPTEL : NOC:Urban Transport Systems Planning (Civil Engineering)

Co-ordinators : Prof. Bhargab Maitra

Lecture 1 - Urbanization, Urban Transportation and Transportation Demand

Lecture 2 - Travel Behaviour, Transportation Externalities and Present Scenario of Urban Transportation

Lecture 3 - Approaches for Mitigating Externalities, Need for Transportation Planning and Transport Planning Morphology

Lecture 4 - Transport Planning Morphology

Lecture 5 - Hierarchical Level of Urban Transport Planning and Interrelationship of Transport Problems and Models

Lecture 6 - Traditional Travel Demand Forecasting Process

Lecture 7 - Traditional Travel Demand Forecasting Process, Specification, Calibration, Validation and Forecasting

Lecture 8 - Information Needs for Travel Demand Forecasting: Study Area, Urban Activities, Transportation System

Lecture 9 - Information Needs for Travel Demand Forecasting: Travel Information

Lecture 10 - Data Collection and Techniques

Lecture 11 - Introduction and Basic Considerations of Trip Generation

Lecture 12 - Trip Classifications and Factors Affecting Trip Generation

Lecture 13 - Modelling Approaches and Step-Wise Approach of Multiple Regression Analysis

Lecture 14 - Step-Wise Approach of Multiple Regression Analysis and Examples

Lecture 15 - Examples, Common Mistakes and Zonal Based Models of Multiple Regression Analysis

Lecture 16 - Zonal and Household Based Regression Models

Lecture 17 - Cross Classification Analysis: Model Structure and Calibration

Lecture 18 - Cross Classification Analysis: Model Calibration

Lecture 19 - Cross Classification Analysis: Model Application, Advantages and Dis-Advantages

Lecture 20 - Matching Productions and Attractions; Stability of Trip Generation Models

Lecture 21 - Basic Considerations and Trip Distribution Matrices

Lecture 22 - Methods for Trip Distribution, Uniform Growth Factor Method and Average Growth Factor Method

Lecture 23 - Detroit Method and Fratar Model

Lecture 24 - Furness Method

Lecture 25 - Synthetic Methods, Measures of Travel Resistance and Gravity Model

Lecture 26 - Singly Constrained Gravity Model

Lecture 27 - Bureau of Public Roads Calibration Procedure

Lecture 28 - Doubly Constrained Gravity Model

Lecture 29 - Intervening Opportunities Model

Lecture 30 - Competing Opportunities Model and Linear Programming Approach

Lecture 31 - Factors Influencing Mode Choice and Aggregate Modal Split Models

Lecture 32 - Disaggregate Mode Choice Models - I

Lecture 33 - Disaggregate Mode Choice Models - II

Lecture 34 - Disaggregate Mode Choice Models - III

Lecture 35 - Disaggregate Mode Choice Models - IV

Lecture 36 - Disaggregate Mode Choice Models - V

Lecture 37 - Logit Choice Models - I

Lecture 38 - Logit Choice Models - II

Lecture 39 - Logit Choice Models - III

Lecture 40 - Logit Choice Models - IV

Lecture 41 - Introduction to Traffic Assignment

Lecture 42 - Network Algorithms - I

Lecture 43 - Network Algorithms - II

Lecture 44 - Network Algorithms - III

Lecture 45 - Static assignment models, User Equilibrium

Lecture 46 - User Equilibrium Assignment and System Optimum Assignment

Lecture 47 - Deterministic Traffic Assignment - I

Lecture 48 - Deterministic Traffic Assignment - II

Lecture 49 - Stochastic Traffic Assignment - I

Lecture 50 - Stochastic Traffic Assignment - II and Dynamic Traffic Assignment

Lecture 51 - Land Use and Transportation - I

Lecture 52 - Land Use and Transportation - II

Lecture 53 - Land Use and Transportation - III

Lecture 54 - Land Use and Transportation - IV

Lecture 55 - Urban Goods Movement - I

Lecture 56 - Urban Goods Movement - II

Lecture 57 - Urban Goods Movement - III

Lecture 58 - Urban Goods Movement - IV

Lecture 59 - Activity Based Modelling

Lecture 60 - Big Data, GIS and SDI

NPTEL : NOC:Structural Reliability (Civil Engineering)

Co-ordinators : Prof. Baidurya Bhattacharya

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Introduction - Part 3

Lecture 4 - Introduction - Part 4

Lecture 5 - Introduction - Part 5

Lecture 6 - Introduction - Part 6

Lecture 7 - Introduction - Part 7

Lecture 8 - Introduction - Part 8

Lecture 9 - Review of Probability Theory - Part 1

Lecture 10 - Review of Probability Theory - Part 2

Lecture 11 - Review of Probability Theory - Part 3

Lecture 12 - Review of Probability Theory - Part 4

Lecture 13 - Review of Probability Theory - Part 5

Lecture 14 - Review of Probability Theory - Part 6

Lecture 15 - Review of Probability Theory - Part 7

Lecture 16 - Review of Probability Theory - Part 8

Lecture 17 - Review of Probability Theory - Part 9

Lecture 18 - Review of Random Variables - Part 1

Lecture 19 - Review of Random Variables - Part 2

Lecture 20 - Review of Random Variables - Part 3

Lecture 21 - Review of Random Variables - Part 4

Lecture 22 - Review of Random Variables - Part 5

Lecture 23 - Review of Random Variables - Part 6

Lecture 24 - Review of Random Variables - Part 7

Lecture 25 - Review of Random Variables - Part 8

Lecture 26 - Review of Random Variables - Part 9

Lecture 27 - Review of Random Variables - Part 10

Lecture 28 - Review of Random Variables - Part 11

Lecture 29 - Review of Random Variables - Part 12

Lecture 30 - Common Probability Distributions - Part 1

Lecture 31 - Common Probability Distributions - Part 2

Lecture 32 - Common Probability Distributions - Part 3

Lecture 33 - Common Probability Distributions - Part 4

Lecture 34 - Common Probability Distributions - Part 5

Lecture 35 - Common Probability Distributions - Part 6

Lecture 36 - Common Probability Distributions - Part 7

Lecture 37 - Common Probability Distributions - Part 8

Lecture 38 - Common Probability Distributions - Part 9

Lecture 39 - Common Probability Distributions - Part 10

Lecture 40 - Common Probability Distributions - Part 11

Lecture 41 - Common Probability Distributions - Part 12

Lecture 42 - Common Probability Distributions - Part 13

Lecture 43 - Common Probability Distributions - Part 14

Lecture 44 - Common Probability Distributions - Part 15

Lecture 45 - Common Probability Distributions - Part 16

Lecture 46 - Common Probability Distributions - Part 17

Lecture 47 - Common Probability Distributions - Part 18

Lecture 48 - Common Probability Distributions - Part 19

Lecture 49 - Common Probability Distributions - Part 20

Lecture 50 - Joint Probability Distributions - Part 1

Lecture 51 - Joint Probability Distributions - Part 2

Lecture 52 - Joint Probability Distributions - Part 3

Lecture 53 - Joint Probability Distributions - Part 4

Lecture 54 - Joint Probability Distributions - Part 5

Lecture 55 - Joint Probability Distributions - Part 6

Lecture 56 - Joint Probability Distributions - Part 7

Lecture 57 - Joint Probability Distributions - Part 8

Lecture 58 - Joint Probability Distributions - Part 9

Lecture 59 - Joint Probability Distributions - Part 10

Lecture 60 - Joint Probability Distributions - Part 11

Lecture 61 - Joint Probability Distributions - Part 12

Lecture 62 - Joint Probability Distributions - Part 13

Lecture 63 - Joint Probability Distributions - Part 14

Lecture 64 - Joint Probability Distributions - Part 15

Lecture 65 - Joint Probability Distributions - Part 16

Lecture 66 - Joint Probability Distributions - Part 17

Lecture 67 - Joint Probability Distributions - Part 18

Lecture 68 - Joint Probability Distributions - Part 19

Lecture 69 - Monte Carlo Simlulations - Part 1

Lecture 70 - Monte Carlo Simlulations - Part 2

Lecture 71 - Monte Carlo Simlulations - Part 3

Lecture 72 - Monte Carlo Simlulations - Part 4

Lecture 73 - Monte Carlo Simlulations - Part 5

Lecture 74 - Monte Carlo Simlulations - Part 6

Lecture 75 - Monte Carlo Simlulations - Part 7

Lecture 76 - Monte Carlo Simlulations - Part 8

Lecture 77 - Monte Carlo Simlulations - Part 9

Lecture 78 - Monte Carlo Simlulations - Part 10

Lecture 79 - Monte Carlo Simlulations - Part 11

Lecture 80 - Monte Carlo Simlulations - Part 12

Lecture 81 - Monte Carlo Simlulations - Part 13

Lecture 82 - Monte Carlo Simlulations - Part 14

Lecture 83 - History Definition and Scope - Part 1

Lecture 84 - History Definition and Scope - Part 2

Lecture 85 - History Definition and Scope - Part 3

Lecture 86 - History Definition and Scope - Part 4

Lecture 87 - History Definition and Scope - Part 5

Lecture 88 - History Definition and Scope - Part 6

Lecture 89 - Reliability Problem Formulatio - Part 1

Lecture 90 - Reliability Problem Formulatio - Part 2

Lecture 91 - Reliability Problem Formulatio - Part 3

Lecture 92 - Reliability Problem Formulatio - Part 4

Lecture 93 - Reliability Problem Formulatio - Part 5

Lecture 94 - Reliability Problem Formulatio - Part 6

Lecture 95 - Reliability Problem Formulatio - Part 7

Lecture 96 - Reliability Problem Formulatio - Part 8

Lecture 97 - Representation of systems - Part 1

Lecture 98 - Representation of systems - Part 2

Lecture 99 - Representation of systems - Part 3

Lecture 100 - Representation of systems - Part 4

Lecture 101 - Representation of systems - Part 5

Lecture 102 - Representation of systems - Part 6

Lecture 103 - Representation of systems - Part 7

Lecture 104 - Representation of systems - Part 8

Lecture 105 - Representation of systems - Part 9

Lecture 106 - Representation of systems - Part 10

Lecture 107 - Representation of systems - Part 11

Lecture 108 - Representation of systems - Part 12

Lecture 109 - Representation of systems - Part 13

Lecture 110 - Representation of systems - Part 14

Lecture 111 - Representation of systems - Part 15

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Lecture 113 - Representation of systems - Part 17

Lecture 114 - Representation of systems - Part 18

Lecture 115 - Representation of systems - Part 19

Lecture 116 - Representation of systems - Part 20

Lecture 117 - Representation of systems - Part 21

Lecture 118 - Representation of systems - Part 22

Lecture 119 - Representation of systems - Part 23

Lecture 120 - Time Dependent Component Reliability - Part 1

Lecture 121 - Time Dependent Component Reliability - Part 2

Lecture 122 - Component Reliability - Time Dependent - Part 1

Lecture 123 - Component Reliability - Time Dependent - Part 2

Lecture 124 - Component Reliability - Time Dependent - Part 3

Lecture 125 - Component Reliability - Time Dependent - Part 4

Lecture 126 - Component Reliability - Time Dependent - Part 5

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Lecture 129 - Component Reliability - Time Dependent - Part 8

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Lecture 135 - Component Reliability - Time Defined - Part 14

Lecture 136 - Component Reliability - Time Defined - Part 15

Lecture 137 - Component Reliability - Time Defined - Part 16

Lecture 138 - Component Reliability - Time Defined - Part 17

Lecture 139 - Component Reliability - Time Defined - Part 18

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Lecture 142 - Component Reliability - Time Defined - Part 21

Lecture 143 - Component Reliability - Time Defined - Part 22

Lecture 144 - Component Reliability - Time Defined - Part 23

Lecture 145 - System Reliability - Time Defined - Part 1

Lecture 146 - System Reliability - Time Defined - Part 2

Lecture 147 - System Reliability - Time Defined - Part 3

Lecture 148 - System Reliability - Time Defined - Part 4

Lecture 149 - System Reliability - Time Defined - Part 5

Lecture 150 - System Reliability - Time Defined - Part 6

Lecture 151 - System Reliability - Time Defined - Part 7

Lecture 152 - System Reliability - Time Defined - Part 8

Lecture 153 - Capacity Demand Component Reliability - Part 1

Lecture 154 - Capacity Demand Component Reliability - Part 2

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Lecture 156 - Capacity Demand Component Reliability - Part 4

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Lecture 164 - Capacity Demand Component Reliability - Part 12

Lecture 165 - Capacity Demand Component Reliability - Part 13

Lecture 166 - Capacity Demand Component Reliability - Part 14

Lecture 167 - Capacity Demand Component Reliability - Part 15

Lecture 168 - Capacity Demand Component Reliability - Part 16

Lecture 169 - Capacity Demand Component Reliability - Part 17

Lecture 170 - Capacity Demand Component Reliability - Part 18

Lecture 171 - Capacity Demand Component Reliability - Part 19

Lecture 172 - Capacity Demand Component Reliability - Part 20

Lecture 173 - Capacity Demand Component Reliability - Part 21

Lecture 174 - Capacity Demand Component Reliability - Part 22

Lecture 175 - Capacity Demand Component Reliability - Part 23

Lecture 176 - Capacity Demand Component Reliability - Part 24

Lecture 177 - Capacity Demand Component Reliability - Part 25

Lecture 178 - Capacity Demand Component Reliability - Part 26

Lecture 179 - Capacity Demand Component Reliability - Part 27

Lecture 180 - Capacity Demand Component Reliability - Part 28

Lecture 181 - Capacity Demand Component Reliability - Part 29

Lecture 182 - Capacity Demand Component Reliability - Part 30

Lecture 183 - Capacity Demand Component Reliability - Part 31

Lecture 184 - Capacity Demand Component Reliability - Part 32

Lecture 185 - Capacity Demand Component Reliability - Part 33

Lecture 186 - Capacity Demand Component Reliability - Part 34

Lecture 187 - Capacity Demand Component Reliability - Part 35

Lecture 188 - Capacity Demand Component Reliability - Part 36

Lecture 189 - Capacity Demand Component Reliability - Part 37

Lecture 190 - Capacity Demand Component Reliability - Part 38

Lecture 191 - Capacity Demand Component Reliability - Part 39

Lecture 192 - Capacity Demand Time Component Reliability - Part 1

Lecture 193 - Capacity Demand Time Component Reliability - Part 2

Lecture 194 - Capacity Demand Time Component Reliability - Part 3

Lecture 195 - Capacity Demand Time Component Reliability - Part 4

Lecture 196 - Capacity Demand Time Component Reliability - Part 5

Lecture 197 - Capacity Demand Time Component Reliability - Part 6

Lecture 198 - Capacity Demand Time Component Reliability - Part 7

Lecture 199 - Capacity Demand Time Component Reliability - Part 8

Lecture 200 - Capacity Demand Time Component Reliability - Part 9

Lecture 201 - Capacity Demand Time Component Reliability - Part 10

Lecture 202 - Capacity Demand Time Component Reliability - Part 11

Lecture 203 - Capacity Demand Time Component Reliability - Part 12

Lecture 204 - Capacity Demand Time Component Reliability - Part 13

Lecture 205 - Capacity Demand Time Component Reliability - Part 14

Lecture 206 - Capacity Demand Time Component Reliability - Part 15

Lecture 207 - Capacity Demand Time Component Reliability - Part 16

Lecture 208 - Capacity Demand Time Component Reliability - Part 17

Lecture 209 - Capacity Demand Time Component Reliability - Part 18

Lecture 210 - Capacity Demand Systems Reliability - Part 1

Lecture 211 - Capacity Demand Systems Reliability - Part 2

Lecture 212 - Capacity Demand Systems Reliability - Part 3

Lecture 213 - Capacity Demand Systems Reliability - Part 4

Lecture 214 - Capacity Demand Systems Reliability - Part 5

Lecture 215 - Capacity Demand Systems Reliability - Part 6

Lecture 216 - Capacity Demand Systems Reliability - Part 7

Lecture 217 - Capacity Demand Systems Reliability - Part 8

Lecture 218 - Capacity Demand Systems Reliability - Part 9

Lecture 219 - Capacity Demand Systems Reliability - Part 10

Lecture 220 - Capacity Demand Systems Reliability - Part 11

Lecture 221 - Capacity Demand Systems Reliability - Part 12

Lecture 222 - Capacity Demand Systems Reliability - Part 13

Lecture 223 - Capacity Demand Systems Reliability - Part 14

Lecture 224 - Capacity Demand Systems Reliability - Part 15

Lecture 225 - Reliability Based Design Codes - Part 1

Lecture 226 - Reliability Based Design Codes - Part 2

Lecture 227 - Reliability Based Design Codes - Part 3

Lecture 228 - Reliability Based Design Codes - Part 4

Lecture 229 - Reliability Based Design Codes - Part 5

Lecture 230 - Reliability Based Design Codes - Part 6

Lecture 231 - Reliability Based Partial Safety Factors - Part 1

Lecture 232 - Reliability Based Partial Safety Factors - Part 2

Lecture 233 - Reliability Based Partial Safety Factors - Part 3

Lecture 234 - Reliability Based Design Code Development - Part 1

Lecture 235 - Reliability Based Design Code Development - Part 2

Lecture 236 - Reliability Based Design Code Development - Part 3

Lecture 237 - Reliability Based Design Code Development - Part 4

Lecture 238 - Target Reliabilities - Part 1

Lecture 239 - Target Reliabilities - Part 2

Lecture 240 - Target Reliabilities - Part 3

Lecture 241 - Target Reliabilities - Part 4

Lecture 242 - Target Reliabilities - Part 5

Lecture 243 - Target Reliabilities - Part 6

Lecture 244 - Target Reliabilities - Part 7

Lecture 245 - Target Reliabilities - Part 8

Lecture 246 - Target Reliabilities - Part 9

Lecture 247 - Target Reliabilities - Part 10

Lecture 248 - Target Reliabilities and General Conclusions - Part 1

Lecture 249 - Target Reliabilities and General Conclusions - Part 2

Lecture 250 - Target Reliabilities and General Conclusions - Part 3

Lecture 251 - Target Reliabilities and General Conclusions - Part 4

Lecture 252 - Target Reliabilities and General Conclusions - Part 5

NPTEL : NOC:Ground Improvement (Civil Engineering)

Co-ordinators : Prof. Dilip Kumar Baidya

Lecture 1 - Need for Ground Improvement

Lecture 2 - Ground Improvement Methods

Lecture 3 - Ground Improvement Methods (Continued...)

Lecture 4 - GI Methods and Classification

Lecture 5 - Excavation and Replacement, the simplest GI method

Lecture 6 - Shallow Densification

Lecture 7 - Shallow densification (Continued...)

Lecture 8 - Quality Control and Quality Assurance

Lecture 9 - Application Problem

Lecture 10 - Application Problem on Excavation and Replacement

Lecture 11 - Deep Dynamic Compaction

Lecture 12 - Deep Dynamic Compaction (Continued...)

Lecture 13 - Deep Dynamic Compaction (Continued...)

Lecture 14 - Deep Dynamic Compaction (Continued...)

Lecture 15 - Deep Dynamic Compaction (Continued...)

Lecture 16 - Rapid Impact Compaction

Lecture 17 - Rapid Impact Compaction (Continued...)

Lecture 18 - Rapid Impact Compaction (Continued...)

Lecture 19 - Vibro compaction

Lecture 20 - Vibro compaction (Continued...)

Lecture 21 - Design Steps

Lecture 22 - Design Parameters and Procedure

Lecture 23 - Application Problem and Quality Control

Lecture 24 - Deep Replacement

Lecture 25 - Deep Replacement (Continued...)

Lecture 26 - Drainage

Lecture 27 - Dewatering

Lecture 28 - Dewatering (Continued...)

Lecture 29 - Dewatering Design Principle

Lecture 30 - Design Example

Lecture 31 - Preconsolidation

Lecture 32 - Preconsolidation (Continued...)

Lecture 33 - Preconsolidation (Continued...)

Lecture 34 - Preconsolidation (Continued...)

Lecture 35 - Preconsolidation (Continued...)

Lecture 36 - Grouting

Lecture 37 - Grouting (Continued...)

Lecture 38 - Grouting (Continued...)

Lecture 39 - Grouting (Continued...)

Lecture 40 - Grouting (Continued...)

Lecture 41 - Grouting (Continued...)

Lecture 42 - Chemical Stabilisation

Lecture 43 - Chemical Stabilisation (Continued...)

Lecture 44 - Chemical Stabilisation (Continued...)

Lecture 45 - Chemical Stabilisation (Continued...)

Lecture 46 - Soil Nailing

Lecture 47 - Soil Nailing (Continued...)

Lecture 48 - Soil Nailing (Continued...)

Lecture 49 - Soil Nailing (Continued...)

Lecture 50 - Soil Nailing (Continued...)

Lecture 51 - Geosynthetics in Ground Improvement

Lecture 52 - Geosynthetics in Ground Improvement

Lecture 53 - Geosynthetics in Ground Improvement

Lecture 54 - Geosynthetics in Ground Improvement

Lecture 55 - Geosynthetics in Ground Improvement

Lecture 56 - Geosynthetics in Ground Improvement (Continued...)

Lecture 57 - Geosynthetics in Ground Improvement (Continued...)

Lecture 58 - Geosynthetics in Ground Improvement (Continued...)

Lecture 59 - Geosynthetics in Ground Improvement (Continued...)

Lecture 60 - Summary and Concluding Remarks

NPTEL : NOC:Remote Sensing of Leaf Area Index and Primary Productivity (Civil Engineering)

Co-ordinators : Prof. MD Behera

Lecture 1 - Introduction

Lecture 2 - Leaf Area Index - Definition and Basics

Lecture 3 - Leaf Area Index - Field Measurements

Lecture 4 - Remote Sensing - Story of Matter and Energy Interactions

Lecture 5 - Remote Sensing - Optical Properties of Leaf and Canopy

Lecture 6 - LAI- Optical RS Methods: Empirical Transfer Functions

Lecture 7 - LAI Estimation - RS Methods: Model Inversion

Lecture 8 - LAI Estimation - LiDAR and Micowave RS Methods

Lecture 9 - LAI- Global Data Products

Lecture 10 - LAI Products - Challenges and Future Prospects

Lecture 11 - RS of Primary Productivity - Introduction and Overview

Lecture 12 - RS of Primary Productivity - VIs and LUE

Lecture 13 - RS of Primary Productivity - Process Based Models

Lecture 14 - RS of Primary Productivity Methods - SIF

Lecture 15 - RS of Primary Productivity Methods - LST, ML, Inversion/Passive RS

Lecture 16 - LAI Applications: Phenology, Climate and LSMs

Lecture 17 - RS of Primary Productivity - Uncertainities and Challenges - LUE

Lecture 18 - LAI Applications: Indian Examples

Lecture 19 - Primary Productivity Applications: Indian Examples

Lecture 20 - Primary Productivity Applications: Indian Examples and Way Forward

NPTEL : NOC:Rock Mechanics and Tunneling (Civil Engineering)

Co-ordinators : Prof. Debarghya Chakraborty

Lecture 1 - Objective, scope, and associated problems

Lecture 2 - Rock Engineering Application Areas (Continued...) and Discontinuities in rock

Lecture 3 - Discontinuities in rock (Continued...) and classification of rock

Lecture 4 - Classification of rock based on origin (Continued...)

Lecture 5 - Stereographic projection Stereonet Example

Lecture 6 - Stereographic projection Stereonet Example (Continued...)

Lecture 7 - Rock coring

Lecture 8 - Rock coring (Continued...)

Lecture 9 - Rock coring (Continued...) and Geophysical Methods

Lecture 10 - Geophysical Methods (Continued...)

Lecture 11 - Geophysical Methods (Continued...)

Lecture 12 - Introduction, Physical properties

Lecture 13 - Physical properties (Continued...)

Lecture 14 - Physical properties (Continued...)

Lecture 15 - Mechanical Properties

Lecture 16 - Mechanical Properties (Continued...)

Lecture 17 - Laboratory Testing Methods

Lecture 18 - Laboratory Testing Methods (Continued...)

Lecture 19 - Laboratory Testing Methods (Continued...)

Lecture 20 - Laboratory Testing Methods (Continued...)

Lecture 21 - In-situ Testing Methods

Lecture 22 - Rock mass classification

Lecture 23 - Rock mass classification (Continued...)

Lecture 24 - Rock mass classification (Continued...)

Lecture 25 - Rock mass classification (Continued...)

Lecture 26 - Rock mass classification (Continued...)

Lecture 27 - Analysis of Stresses

Lecture 28 - Analysis of Stresses (Continued...)

Lecture 29 - Analysis of Stresses (Continued...)

Lecture 30 - Analysis of Stresses (Continued...) and Stress-Strain Relationship

Lecture 31 - Introduction to rock and rock mass failure

Lecture 32 - Mohr-Coulomb (MC) Failure Criterion

Lecture 33 - Griffith Crack Theory and Empirical Failure Criteria for Rock

Lecture 34 - Empirical Failure Criteria for Rock (Continued...)

Lecture 35 - Equivalent Mohr-Coulomb (MC) Parameters

Lecture 36 - Failure Criterion in Deviatoric Plane

Lecture 37 - Slopes

Lecture 38 - Slopes (Continued...)

Lecture 39 - Slopes (Continued...)

Lecture 40 - Slopes (Continued...)

Lecture 41 - Underground excavations

Lecture 42 - Foundations

Lecture 43 - Foundations (Continued...)

Lecture 44 - Foundations (Continued...)

Lecture 45 - Foundations (Continued...)

Lecture 46 - Rock support systems

Lecture 47 - Shapes and usages

Lecture 48 - Methods of construction

Lecture 49 - Methods of construction (Continued...)

Lecture 50 - Methods of construction (Continued...)

Lecture 51 - Problems associated with tunnels and Tunneling in various subsoil conditions and rocks

Lecture 52 - Methods to determine stresses around openings: Kirsch equation

Lecture 53 - Methods to determine stresses around openings: Kirsch equation (Continued...)

Lecture 54 - Methods to determine stresses around openings: Kirsch equation contdand Greenspanâ€™s method

Lecture 55 - Basic Concepts for Lined, Unlined, and Pressure Tunnels

Lecture 56 - Basic Concepts for Lined, Unlined, and Pressure Tunnels (Continued...)

Lecture 57 - Improvement of rock mass response

Lecture 58 - Improvement of rock mass response (Continued...)

Lecture 59 - Improvement of rock mass response (Continued...)

Lecture 60 - Improvement of rock mass response (Continued...)

Lecture 61 - Improvement of rock mass response (Continued...)

NPTEL : NOC:Retrofitting and Rehabilitation of Civil Infrastructure (Civil Engineering)

Co-ordinators : Prof. Swati Maitra, Prof. Sriman Bhattacharya

Lecture 1 - Introduction

Lecture 2 - Causes of Deterioration

Lecture 3 - Materials Related Distresses

Lecture 4 - Materials Related Distresses (Continued...)

Lecture 5 - Other Distresses in Concrete

Lecture 6 - Load Associated Distresses

Lecture 7 - Identification of Distresses

Lecture 8 - Semi-destructive Testing

Lecture 9 - Non-destructive Tests

Lecture 10 - Non-destructive Tests (Continued...)

Lecture 11 - Other Tests

Lecture 12 - Considerations for Repair and Retrofitting

Lecture 13 - Repair Techniques

Lecture 14 - Repair Techniques (Continued...)

Lecture 15 - Repair Techniques (Continued...)

Lecture 16 - Strengthening of Structural Components

Lecture 17 - Strengthening of Structural Components (Continued...)

Lecture 18 - Introduction to Composites, Types and Characteristics

Lecture 19 - Properties of Fibers, Resins and FRP Composite

Lecture 20 - Micromechanics of Composites

Lecture 21 - Micromechanics of Composites (Continued...)

Lecture 22 - Manufacturing of FRP Composites

Lecture 23 - FRPC in Flexural Strengthening of Structural Members - I

Lecture 24 - FRPC in Flexural Strengthening of Structural Members - II

Lecture 25 - FRPC in Shear Strengthening of Structural Members

Lecture 26 - FRPC in Axial Strengthening of Structural Members - I

Lecture 27 - FRPC in Axial Strengthening of Structural Members - II

Lecture 28 - Near Surface Mounted FRP Reinforcement

Lecture 29 - FRPC in Strengthening of Beam-Column Joints

Lecture 30 - Anchorage Systems for FRP Strengthening

Lecture 31 - Installation of FRP

Lecture 32 - Design Considerations

Lecture 33 - Design Approach for Flexural Strengthening

Lecture 34 - Design of Flexural Strengthening

Lecture 35 - Design Approach for Shear Strengthening

Lecture 36 - Design of Shear Strengthening

Lecture 37 - Design Approach for Axial Strengthening

Lecture 38 - Design of Axial Strengthening

Lecture 39 - Concepts of Concrete Overlay

Lecture 40 - Distresses in Existing Pavement

Lecture 41 - Evaluation of Pavement

Lecture 42 - Design Considerations for Concrete Overlay

Lecture 43 - Construction of Concrete Overlay

Lecture 44 - Introduction

Lecture 45 - Retrofitting Steps

Lecture 46 - Review of Materials and Test Methods

Lecture 47 - Review of Analysis Method

Lecture 48 - Some aspects of Seismic Retrofitting

Lecture 49 - Introduction

Lecture 50 - A Few Retrofitting Techniques

Lecture 51 - A Few Seismic Retrofitting Techniques

Lecture 52 - Introduction

Lecture 53 - Retrofitting steps and Techniques

Lecture 54 - Retrofitting Techniques for Structural Elements

Lecture 55 - Retrofitting Techniques for structural elements (Continued...)

Lecture 56 - Retrofitting Techniques for structural elements (Continued...)

Lecture 57 - Retrofitting Techniques for structural elements (Continued...)

Lecture 58 - Seismic Strengthening of structural elements

Lecture 59 - Introduction and Overview

Lecture 60 - Retrofitting of Structural Members

Lecture 61 - Introduction

Lecture 62 - A case study of Retrofitting

Lecture 63 - A case study of Retrofitting (Continued...)

NPTEL : NOC:Surface Water Hydrology (Civil Engineering)

Co-ordinators : Prof. Rajib Maity

Lecture 1 - Introduction

Lecture 2 - Hydrologic Cycle and its Different Components

Lecture 3 - Hydrological System Concept

Lecture 4 - Surface Water Resources of India

Lecture 5 - Hydrology and Climate Change

Lecture 6 - Different Forms of Precipitation and Indian Monsoon

Lecture 7 - Measurement and Analysis of Precipitation

Lecture 8 - Precipitation Data Quality and Presentation

Lecture 9 - Areal Precipitation and Frequency Analysis

Lecture 10 - Analysis of Precipitation: IDF and PMP

Lecture 11 - Introduction to Evaporation and Evaporimeters

Lecture 12 - Estimation of Evaporation and Control Measures

Lecture 13 - Evapotranspiration

Lecture 14 - Initial Loss and Infiltration Process

Lecture 15 - Modelling of Infiltration Capacity

Lecture 16 - Infiltration Indices

Lecture 17 - Measurement of Flow Velocity

Lecture 18 - Area-Velocity and Moving-Boat Methods

Lecture 19 - Dilution Technique, Electromagnetic and Ultrasonic Methods

Lecture 20 - Indirect Streamflow Measurement

Lecture 21 - Stage-Discharge Relationship and Rating Curve

Lecture 22 - Introduction and Catchment Characteristics

Lecture 23 - Estimation of Runoff Volume: Empirical Models

Lecture 24 - Estimation of Runoff Volume: Conceptual Models

Lecture 25 - Flow Characteristic Curves and Estimation of Reservoir Storage

Lecture 26 - Concept of Droughts and Environmental Flows

Lecture 27 - Basics of Hydrographs

Lecture 28 - Base Flow Separation, DRH and ERH

Lecture 29 - Introduction to Unit Hydrographs

Lecture 30 - Unit Hydrograph to Direct Runoff Hydrograph

Lecture 31 - Derivation of Unit Hydrograph

Lecture 32 - Unit Hydrograph of Different Durations: Method of Superposition

Lecture 33 - Unit Hydrograph of Different Durations: Method of S-Curve

Lecture 34 - More on Unit Hydrographs

Lecture 35 - Synthetic Unit Hydrograph

Lecture 36 - Instantaneous Unit Hydrograph

Lecture 37 - Introduction to Floods and Rational Method

Lecture 38 - Flood Peak Discharge and Catchment Characteristics

Lecture 39 - Estimation of Peak Flood Flow

Lecture 40 - Flood Control and its Status in India

Lecture 41 - Introduction to Flood Routing

Lecture 42 - Reservoir Routing: Modified Pulâ€™s Method

Lecture 43 - Reservoir Routing: Goodrich Method and Runge-Kutta Method

Lecture 44 - Channel Routing: Parameters of Muskingum Method

Lecture 45 - Channel Routing: Muskingum Method and Hydraulic Flood Routing

Lecture 46 - Concept of Routing in IUH Development and Clarkâ€™s Method

Lecture 47 - Nashâ€™s Conceptual Model

Lecture 48 - Basic Concepts of Probability and Statistics

Lecture 49 - Types of Data Series and Concept of Return Period

Lecture 50 - Introduction to Frequency Analysis

Lecture 51 - Parametric Methods of Frequency Analysis

Lecture 52 - Frequency Analysis with Extreme Value Type-I Distribution

Lecture 53 - Confidence Interval and Standard Error in the Frequency Estimates

Lecture 54 - Various Issues behind Frequency Analysis

Lecture 55 - Basics of Hydrologic Design

Lecture 56 - Risk Analysis to Determine Return Period

Lecture 57 - Hydro-economic Analysis to Determine Return Period

Lecture 58 - Uncertainty in Hydrologic Analysis

Lecture 59 - Estimated Limiting Storm and Design Flood

Lecture 60 - Design Storm

Lecture 61 - Hydrologic Design of Reservoirs: Introduction and Determination of Storage Capacity

Lecture 62 - Determination of Storage Capacity and Models in Reservoir Design

NPTEL : NOC:Traffic Engineering (Civil Engineering)

Co-ordinators : Prof. Bhargab Maitra

Lecture 1 - Traffic Engineering Objectives and Role of Transportation Demand and Land-Use

Lecture 2 - Mobility and Accessibility, Traffic Engineering Elements and Components of Traffic

Lecture 3 - Road Users

Lecture 4 - Vehicles, Roadways and Traffic Control Devices

Lecture 5 - Traffic Signs, Delineators and Signals

Lecture 6 - Traffic Facilities and Traffic Stream Parameters

Lecture 7 - Traffic Volumes and Time Headways

Lecture 8 - Traffic Density and Relationships among Macroscopic Parameters

Lecture 9 - Single Regime Traffic Stream Models

Lecture 10 - Multi-Regime Models and Characteristics of Interrupted Flow

Lecture 11 - Analysis of Shock Waves - I

Lecture 12 - Analysis of Shock Waves - II

Lecture 13 - Analysis of Shock Waves - III

Lecture 14 - Queueing Analysis - I

Lecture 15 - Queueing Analysis - II

Lecture 16 - Basic Concepts

Lecture 17 - Analysis of Basic Freeway and Multi-Lane Highway Segments (as per HCM, 2016) - I

Lecture 18 - Analysis of Basic Freeway and Multi-Lane Highway Segments (as per HCM, 2016) - II

Lecture 19 - Analysis of Basic Freeway and Multi-Lane Highway Segments (As per HCM, 2016) - III

Lecture 20 - Analysis of Two-Lane Highway Segments (As per HCM, 2016) - I

Lecture 21 - Analysis of Two-Lane Highway Segments (As per HCM, 2016) - II

Lecture 22 - Analysis of Urban street Segments (As per HCM, 2016) - I

Lecture 23 - Analysis of Urban street Segments (As per HCM, 2016) - II

Lecture 24 - Analysis of Urban street Segments (As per HCM, 2016) - III

Lecture 25 - Analysis of Single, Intermediate and Two-Lane Roads (As per Indo HCM, 2017)

Lecture 26 - Analysis of Multi Lane Highways (As per Indo HCM, 2017)

Lecture 27 - Intersection Control and Critical Aspects of Operation - I

Lecture 28 - Intersection Control and Critical Aspects of Operation - II

Lecture 29 - Intersection Control and Critical Aspects of Operation - III

Lecture 30 - Intersection Control and Critical Aspects of Operation - IV

Lecture 31 - Intersection Control and Critical Aspects of Operation - V

Lecture 32 - Delay as a Performance Measure

Lecture 33 - Pre-Timed Signal Design - I

Lecture 34 - Pre-Timed Signal Design - II

Lecture 35 - Operational Analysis of Signalized Intersection - I

Lecture 36 - Operational Analysis of Signalized Intersection - II

Lecture 37 - Operational Analysis of Signalized Intersection - III

Lecture 38 - Operational Analysis of Signalized Intersection - IV

Lecture 39 - Actuated Signals

Lecture 40 - Signal Coordination - I

Lecture 41 - Signal Coordination - II

Lecture 42 - Signal Coordination - III

Lecture 43 - Oversaturated Signals and Mitigation Strategies

Lecture 44 - Car Following Theory - I

Lecture 45 - Car Following Theory - II

Lecture 46 - Car Following Theory - III

Lecture 47 - Car Following Theory - IV

Lecture 48 - Traffic Simulation - I

Lecture 49 - Traffic Simulation - II

Lecture 50 - Traffic Simulation - III

Lecture 51 - Introduction to Traffic Control and Management

Lecture 52 - Access Management

Lecture 53 - Demand Management

Lecture 54 - Bus Priority Treatments

Lecture 55 - Emerging Traffic Management Measures

Lecture 56 - Parking Management - I

Lecture 57 - Parking Management - II

Lecture 58 - Parking Management - III

Lecture 59 - Introduction to Road Safety

Lecture 60 - Road Safety Engineering and Crash Data

Lecture 61 - Blackspot Analysis

Lecture 62 - Crash Data Analysis

Lecture 63 - Road Safety Audit

Lecture 64 - Safe System Approach

Lecture 65 - Road Safety Countermeasures

Lecture 66 - Speed Management Measures

NPTEL : NOC:Bridge Engineering (Civil Engineering)

Co-ordinators : Prof. Piyali Sengupta

Lecture 1 - Components, Materials, Forms, Evolutions and Classifications of Bridges

Lecture 2 - Site Selection, Subsoil Exploration and Traffic Projections for Bridges

Lecture 3 - Hydraulic Characteristics, Economical Span and Choice of Bridge Type

Lecture 4 - Standard Specifications for Road Bridges

Lecture 5 - Standard Specifications for Rail Bridges

Lecture 6 - Design of Slab Culverts

Lecture 7 - Design of T-Beam and Slab Bridge

Lecture 8 - Voided Slab Bridges, Skew Slab Culverts and Curved Bridge Decks

Lecture 9 - Design of Box Culverts

Lecture 10 - Design of Pipe Culverts

Lecture 11 - Design of Steel Truss Bridges

Lecture 12 - Design Example of Steel Truss Bridges

Lecture 13 - Design of Plate Girder Bridges

Lecture 14 - Design Example of Plate Girder Bridges

Lecture 15 - Masonry Arch Bridges

Lecture 16 - Concrete Arch Bridges

Lecture 17 - Suspension Bridges

Lecture 18 - Cable-Stayed Bridges

Lecture 19 - Balanced Cantilever Bridges

Lecture 20 - Prestressed Concrete Bridges

Lecture 21 - Composite Bridges

Lecture 22 - Rigid Frame Bridges

Lecture 23 - Continuous Girder Bridges

Lecture 24 - Design Example of Continuous Girder Bridges

Lecture 25 - Bridge Piers

Lecture 26 - Bridge Abutments

Lecture 27 - Pile Foundations for Bridges

Lecture 28 - Well and Pneumatic Caisson Foundations for Bridges

Lecture 29 - Bridge Bearings

Lecture 30 - Bridge Joints

Lecture 31 - Bridge Appurtenances

Lecture 32 - Bridge Construction

Lecture 33 - Maintenance and Rehabilitation of Bridges

Lecture 34 - Rebuilding of Bridges

Lecture 35 - Dynamic Response of Bridge Decks

Lecture 36 - Seismic Design of Highway Bridges

Lecture 37 - Seismic Design of Railway Bridges

Lecture 38 - Lessons from Bridge Failures

Lecture 39 - Fatigue and Fracture of Bridges

Lecture 40 - Use of Shape memory Alloys in Bridges

Lecture 41 - Use of Engineered Cementitious Composite (ECC) in Bridges

Lecture 42 - 3D Printing of Bridges

Lecture 43 - High Speed Railway Bridges

NPTEL : NOC:Elastic Stability of Structures (Civil Engineering)

Co-ordinators : Prof. Sarat Kumar Panda

Lecture 1 - Basic concepts of buckling and introduction to equilibrium approach

Lecture 2 - Introduction to energy and imperfection approach

Lecture 3 - Introduction to different types of buckling

Lecture 4 - Weighted residual methods in structual mechanics

Lecture 5 - Weighted residual methods in structual mechanics (Continued...)

Lecture 6 - Introduction to the strong and weak forms of GDE

Lecture 7 - Variational method: Derivation of Euler Lagrange equation

Lecture 8 - Delta opeator in variational method for finding GDE and Boundary conditions

Lecture 9 - Euler lagrange equation for functional having different dependent variables

Lecture 10 - Brachistochrone problem

Lecture 11 - Rayleigh-Ritz method

Lecture 12 - Extension of Rayleigh-Ritz method and Galerkinâ€™s method

Lecture 13 - Single DOF stability model

Lecture 14 - Single DOF stability model and model having imperfection

Lecture 15 - Large deflection theory for stability analysis of rigid body stability models

Lecture 16 - Two DOF rigid body stability models

Lecture 17 - Snap through stability model and model of imperfect geometry

Lecture 18 - Weak form solution for hinged-hinged and fixed-fixed column

Lecture 19 - Weak form solution for fixed-free and fixed-hinged column

Lecture 20 - Strong form solution for hinged-hinged column

Lecture 21 - Strong form solution for fixed-fixed and fixed-free column

Lecture 22 - Critical load for column with elastic support

Lecture 23 - Boundary conditions for column with general case of elastically supported ends

Lecture 24 - Critical load for portal frame with column hinged at base

Lecture 25 - Critical load for portal frame with column fixed at base

Lecture 26 - Element stiffness matrix for beam-column

Lecture 27 - Stability analysis of frames by matrix stiffness method

Lecture 28 - Critical load of Euler column: Large deflection theory

Lecture 29 - Critical load of Euler column with initial imperfection

Lecture 30 - Load deflection curve for beam-column: GDE approach

Lecture 31 - Load deflection curve for beam-column: Energy approach

Lecture 32 - General expression of elastic curve for beam-column

Lecture 33 - Beam-column with several lateral and continuous loads

Lecture 34 - Bending of beam-column by end couples

Lecture 35 - Three moment equation for continuous beam-column

Lecture 36 - Moment equation for continuous beam-column with intermediate column

Lecture 37 - Beam-column on Elastic Foundation

Lecture 38 - St Venant Torsion and Non-uniform Torsion

Lecture 39 - Torsional Buckling

Lecture 40 - Torsional Buckling and Torsional Flexural Buckling

Lecture 41 - Torsional Flexural Buckling of Column Having Different Boundary Conditions

Lecture 42 - Rayleigh-Ritz method for Torsional Flexural Buckling of Column

Lecture 43 - Introduction to Plate Buckling and Small Deflection Theory

Lecture 44 - Governing Differential Equation of Plate Buckling Using Small Deflection Theory

Lecture 45 - Governing Differential Equation of Plate Buckling Using Small Deflection Theory (Continued...)

Lecture 46 - Critical Load of Plate Using Equilibrium Approach

Lecture 47 - Critical Load of Plate Using Energy Approach

Lecture 48 - Critical Load of Plates with Different End Conditions: Energy Approach and Galerkin's

Lecture 49 - F-w Formulation For Plate Buckling

Lecture 50 - Critical load and Post Buckling Behaviour of Plate Using F-w Formulation

Lecture 51 - Governing Differential Equation of Shell Buckling by Using Small Deflection Theory

Lecture 52 - Governing Differential Equation of Shell Buckling by Using Small Deflection Theory (Continued...)

Lecture 53 - Governing Differential Equation of Shell Buckling: Donnell's Equation

Lecture 54 - Solution of Donnell's Equation for Finding Critical Load

Lecture 55 - Governing Differential Equation of Shell Buckling by Using Finite Deflection Theory

Lecture 56 - Post Buckling Behaviour of an Imperfect Axially Compressed Cylindrical Shell Panel

Lecture 57 - Governing Differential Equation for the deflection curve of a thin bar

Lecture 58 - Critical load of a two-hinged and fixed-fixed circular arch

Lecture 59 - Inelastic Buckling Analysis of Column

Lecture 60 - Inelastic Buckling Analysis of Column (Continued...)

NPTEL : NOC:Radiogenic Isotope Geology (Civil Engineering)

Co-ordinators : Prof. R. Anand

Lecture 1 - Fundamentals

Lecture 2 - Nuclear Stability and Decay

Lecture 3 - Radioactive Decay and Growth

Lecture 4 - Geochronometry: Mass Spectrometry

Lecture 5 - Geochronometry: Mass Spectrometry (Continued...)

Lecture 6 - Geochronometry: Isotope dilution analysis

Lecture 7 - Geochronometry: Sample processing

Lecture 8 - K-Ar Method of Dating

Lecture 9 - K-Ar Method of Dating (Continued...)

Lecture 10 - Ar-Ar Method of Dating

Lecture 11 - Ar-Ar Method of Dating (Continued...)

Lecture 12 - Rb-Sr Method of Dating

Lecture 13 - Rb-Sr Method of Dating (Continued...)

Lecture 14 - Sm-Nd Method of Dating

Lecture 15 - Sm-Nd Method of Dating (Continued...)

Lecture 16 - Re-Os Method of Dating

Lecture 17 - Lu-Hf Method of Dating

Lecture 18 - U-Th-Pb Geochronology

Lecture 19 - U-Th-Pb Geochronology (Continued...)

Lecture 20 - U-Th-Pb Geochronology (Continued...)

Lecture 21 - Isotope Geology of Pb

Lecture 22 - Isotope Geology of Pb (Continued...)

Lecture 23 - Processing and Presentation of Raw Isotope Geochemical Data

Lecture 24 - Processing and Presentation of Raw Isotope Geochemical Data (Continued...)

Lecture 25 - Application of Sr, Nd, Pb and Hf Isotopes in Petrogenetic Studies

Lecture 26 - Application of Sr, Nd, Pb and Hf Isotopes in Petrogenetic Studies (Continued...)

Lecture 27 - U-series disequilibrium method of dating

Lecture 28 - U-series disequilibrium method of dating

Lecture 29 - Fission-Track dating

Lecture 30 - Cosmogenic radionuclides and their applications

Lecture 31 - Cosmogenic radionuclides and their applications

Lecture 32 - Cosmogenic radionuclides and their applications

Lecture 33 - Extinct radionuclides and cosmochronology

Lecture 34 - Extinct radionuclides and cosmochronology (Continued...)

Lecture 35 - Extinct radionuclides and cosmochronology

NPTEL : NOC:Availability and Management of Groundwater Resources (Civil Engineering)

Co-ordinators : Prof. Prasoon Kumar Singh

Lecture 1 - Hydrological cycle, Need for conservation of Groundwater Resources

Lecture 2 - Hydrological cycle, Need for conservation of Groundwater Resources (Continued...)

Lecture 3 - Hydrological cycle, Need for conservation of Groundwater Resources (Continued...)

Lecture 4 - Hydrological cycle, Need for conservation of Groundwater Resources (Continued...)

Lecture 5 - Hydrological cycle, Need for conservation of Groundwater Resources (Continued...)

Lecture 6 - Geological formation as Aquifer

Lecture 7 - Geological formation as Aquifer (Continued...)

Lecture 8 - Geological formation as Aquifer (Continued...)

Lecture 9 - Geological formation as Aquifer (Continued...)

Lecture 10 - Introduction about Vadose and Saturated Zone

Lecture 11 - Vadose and Saturated Zone (Continued...)

Lecture 12 - Vadose and Saturated Zone (Continued...)

Lecture 13 - Vadose and Saturated Zone (Continued...)

Lecture 14 - Vadose and Saturated Zone (Continued...)

Lecture 15 - Confined and Unconfined Aquifer and their parameters

Lecture 16 - Confined and Unconfined Aquifer and their parameters (Continued...)

Lecture 17 - Confined and Unconfined Aquifer and their Parameters (Continued...)

Lecture 18 - Confined and Unconfined Aquifer and their Parameters (Continued...)

Lecture 19 - Confined and Unconfined Aquifer and their parameters (Continued...)

Lecture 20 - Porosity, Permeability, Transmissivity and Storage Coefficient

Lecture 21 - Porosity, Permeability, Transmissivity and Storage Coefficient (Continued...)

Lecture 22 - Porosity, Permeability, Transmissivity and Storage Coefficient (Continued...)

Lecture 23 - Porosity, permeability, transmissivity and storage coefficient

Lecture 24 - Porosity, permeability, transmissivity and storage coefficient (Continued...)

Lecture 25 - Law of groundwater movement, Darcy's law and application (Continued...)

Lecture 26 - Law of groundwater movement, Darcy's law and application (Continued...)

Lecture 27 - Law of groundwater movement, Darcy's law and application (Continued...)

Lecture 28 - Law of groundwater movement, Darcy's law and application (Continued...)

Lecture 29 - Law of groundwater movement, Darcy's law and application (Continued...)

Lecture 30 - Estimation of Subsurface Runoff, Types of Wells, Well Hydraulics

Lecture 31 - Estimation of Subsurface Runoff, Types of Wells, Well Hydraulics (Continued...)

Lecture 32 - Estimation of Subsurface Runoff, Types of Wells, Well Hydraulics (Continued...)

Lecture 33 - Estimation of Subsurface Runoff, Types of Wells, Well Hydraulics (Continued...)

Lecture 34 - Estimation of Subsurface Runoff, Types of Wells, Well Hydraulics (Continued...)

Lecture 35 - Measurement of rainfall, Index of wetness, Infiltration rate

Lecture 36 - Measurement of rainfall, Index of wetness, Infiltration rate (Continued...)

Lecture 37 - Measurement of rainfall, Index of wetness, Infiltration rate (Continued...)

Lecture 38 - Measurement of rainfall, Index of wetness, Infiltration rate (Continued...)

Lecture 39 - Measurement of rainfall, Index of wetness, Infiltration rate (Continued...)

Lecture 40 - Estimation of Total Annual Replenishable Natural Groundwater Recharge

Lecture 41 - Estimation of Total Annual Replenishable Natural Groundwater Recharge (Continued...)

Lecture 42 - Estimation of Total Annual Replenishable Natural Groundwater Recharge (Continued...)

Lecture 43 - Estimation of Total Annual Replenishable Natural Groundwater Recharge (Continued...)

Lecture 44 - Estimation of Total Annual Replenishable Natural Groundwater Recharge (Continued...)

Lecture 45 - Groundwater resources planning and management

Lecture 46 - Groundwater Resources Planning and Management (Continued...)

Lecture 47 - Groundwater Resources Planning and Management (Continued...)

Lecture 48 - Groundwater Resources Planning and Management (Continued...)

Lecture 49 - Groundwater Resources Planning and Management (Continued...)

Lecture 50 - Rainwater Harvesting and Artificial Groundwater Recharge

Lecture 51 - Rainwater Harvesting and Artificial Groundwater Recharge (Continued...)

Lecture 52 - Rainwater Harvesting and Artificial Groundwater Recharge (Continued...)

Lecture 53 - Rainwater Harvesting and Artificial Groundwater Recharge (Continued...)

Lecture 54 - Rainwater Harvesting and Artificial Groundwater Recharge (Continued...)

Lecture 55 - Impact of climate change on water resources

Lecture 56 - Impact of climate change on water resources (Continued...)

Lecture 57 - Impact of climate change on water resources (Continued...)

Lecture 58 - Impact of climate change on water resources (Continued...)

Lecture 59 - Impact of climate change on water resources (Continued...)

Lecture 60 - Impact of climate change on water resources (Continued...)

NPTEL : NOC:Soil Dynamics (Civil Engineering)

Co-ordinators : Prof. Paramita Bhattacharya

Lecture 1 - Introduction and Theory of Vibrations

Lecture 2 - Theory of Vibrations

Lecture 3 - Single Degree of Freedom System (SDOF) - Part 1

Lecture 4 - Single Degree of Freedom System (SDOF) - Part 2

Lecture 5 - Single Degree of Freedom System (SDOF) - Part 3

Lecture 6 - Single Degree of Freedom System (SDOF) - Part 4

Lecture 7 - Single Degree of Freedom System (SDOF) - Part 5

Lecture 8 - Single Degree of Freedom System (SDOF) - Part 6

Lecture 9 - Single Degree of Freedom System (SDOF) - Part 7

Lecture 10 - Single Degree of Freedom System (SDOF) - Part 8

Lecture 11 - Single Degree of Freedom System (SDOF) - Part 9

Lecture 12 - Multiple Degree of Freedom System (MDOF) - Part 1

Lecture 13 - Multiple Degree of Freedom System (MDOF) - Part 2

Lecture 14 - Multiple Degree of Freedom System (MDOF) - Part 2

Lecture 15 - Multiple Degree of Freedom System (MDOF) - Part 3

Lecture 16 - Multiple Degree of Freedom System (MDOF) - Part 5

Lecture 17 - Wave Propagation in An Elastic Rod

Lecture 18 - Wave Propagation in An Elastic Rod of Finite Length

Lecture 19 - Wave Propagation in An Infinite Elastic Medium

Lecture 20 - Wave Propagation in An Infinite and Semi-Infinite Elastic Medium

Lecture 21 - Determination of Dynamic Properties of Soils (Laboratory Tests) - Part 1

Lecture 22 - Determination of Dynamic Properties of Soils (Laboratory Tests) - Part 2

Lecture 23 - Determination of Dynamic Properties of Soils (Laboratory Tests) - Part 3

Lecture 24 - Determination of Dynamic Properties of Soils (Laboratory Tests) - Part 4

Lecture 25 - Determination of Dynamic Properties of Soils (Laboratory Tests) - Part 5

Lecture 26 - Determination of Dynamic Properties of Soils (Seismic Reflection Survey)

Lecture 27 - Determination of Dynamic Properties of Soils (Seismic Reflection Survey)

Lecture 28 - Determination of Dynamic Properties of Soils (Seismic Refraction Survey-Inclined Layering)

Lecture 29 - Determination of Dynamic Properties of Soils (Numerical Problems on Seismic Reflection

Lecture 30 - Determination of Dynamic Properties of Soils (Block Vibration Test)

Lecture 31 - Liquefaction of Soils - Part 1

Lecture 32 - Liquefaction of Soils - Part 2

Lecture 33 - Liquefaction of Soils - Part 3

Lecture 34 - Liquefaction of Soils - Part 4

Lecture 35 - Liquefaction of Soils - Part 5

Lecture 36 - Machine Foundations (Design Criteria)

Lecture 37 - Analysis of Machine Foundations (Elastic Half Space Method) - Part 1

Lecture 38 - Analysis of Machine Foundations (Elastic Half Space Method) - Part 2

Lecture 39 - Analysis of Machine Foundations (Elastic Half Space Method) - Part 3

Lecture 40 - Analysis of Machine Foundations (Elastic Half Space Method) - Part 4

Lecture 41 - Analysis of Machine Foundations (Linear Elastic Weightless Spring Method - Part 1)

Lecture 42 - Analysis of Machine Foundations (For Reciprocating Machines) - Part 2

Lecture 43 - Analysis of Machine Foundations (For Reciprocating Machines) - Part 3

Lecture 44 - Analysis of Machine Foundations (For Reciprocating Machines) - Part 4

Lecture 45 - Analysis of Machine Foundations (For Impact Type Machines) - Part 1

Lecture 46 - Analysis of Machine Foundations (For Impact Type Machines) - Part 2

Lecture 47 - Analysis of Machine Foundations (For Rotary Machines) - Part 1

Lecture 48 - Analysis of Machine Foundations (For Rotary Machines) - Part 2

Lecture 49 - Analysis of Machine Foundations (For Rotary Machines) - Part 3

Lecture 50 - Analysis of Machine Foundations (For Rotary Machines) - Part 3 (Continued...)

Lecture 51 - Analysis of Pile Foundation Under Dynamic Loading - Part I

Lecture 52 - Analysis of Pile Foundation Under Dynamic Loading - Part II

Lecture 53 - Analysis of Pile Foundation Under Dynamic Loading - Part III

Lecture 54 - Analysis of Pile Foundation Under Dynamic Loading - Part IV

Lecture 55 - Analysis of Pile Foundation Under Dynamic Loading - Part V

Lecture 56 - Isolation of Vibration - Part 1

Lecture 57 - Isolation of Vibration - Part 2

Lecture 58 - Isolation of Vibration - Part 3

Lecture 59 - Isolation of Vibration - Part 4

Lecture 60 - Summary

NPTEL : NOC:Geotechnical Earthquake Engineering (Civil Engineering)

Co-ordinators : Prof. Kousik Deb

Lecture 1 - Introduction

Lecture 2 - Causes of Earthquake

Lecture 3 - Seismic Waves

Lecture 4 - Seismic Waves (Continued...)

Lecture 5 - Size of Earthquake

Lecture 6 - Size of Earthquake (Continued...)

Lecture 7 - Introduction

Lecture 8 - Measurement of Ground Motion

Lecture 9 - Ground Motion Parameters

Lecture 10 - Ground Motion Parameters (Continued...)

Lecture 11 - Ground Motion Parameters (Continued...)

Lecture 12 - Ground Motion Parameters (Continued...)

Lecture 13 - Ground Motion Parameters (Continued...)

Lecture 14 - Estimation of Ground Motion Parameters

Lecture 15 - Examples

Lecture 16 - Examples (Continued...)

Lecture 17 - Examples (Continued...)

Lecture 18 - Field Tests

Lecture 19 - Field Tests (Continued...)

Lecture 20 - Field Tests (Continued...)

Lecture 21 - Field Tests (Continued...)

Lecture 22 - Field Tests (Continued...)

Lecture 23 - Field Tests (Continued...)

Lecture 24 - Field Tests (Examples)

Lecture 25 - Field Tests (Continued...)

Lecture 26 - Field Tests (Continued...)

Lecture 27 - Laboratory and Model Tests

Lecture 28 - Stress-Strain Behavior of Cyclically Loaded Soils

Lecture 29 - Stress-Strain Behavior of Cyclically Loaded Soils (Continued...)

Lecture 30 - Stress-Strain Behavior of Cyclically Loaded Soils (Continued...)

Lecture 31 - Linear Approach

Lecture 32 - Linear Approach (Continued...)

Lecture 33 - Equivalent Linear and Non Linear Approach

Lecture 34 - Evaluation of Liquefaction Resistance of Soils

Lecture 35 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 36 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 37 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 38 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 39 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 40 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 41 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 42 - Evaluation of Liquefaction Resistance of Soils (Continued...)

Lecture 43 - Liquefaction Susceptibility Criteria for Silts and Clays

Lecture 44 - Liquefaction Susceptibility Criteria for Silts and Clays (Continued...)

Lecture 45 - Liquefaction Susceptibility Criteria for Silts and Clays (Continued...)

Lecture 46 - Liquefaction Susceptibility Criteria for Silts and Clays (Continued...)

Lecture 47 - Settlement of Sand due to Earthquake Shaking

Lecture 48 - Settlement of Sand due to Earthquake Shaking (Continued...)

Lecture 49 - Seismic or Liquefaction Hazard Mitigation

Lecture 50 - Seismic or Liquefaction Hazard Mitigation (Continued...)

Lecture 51 - Seismic or Liquefaction Hazard Mitigation (Continued...)

Lecture 52 - Seismic or Liquefaction Hazard Mitigation (Continued...)

Lecture 53 - Seismic or Liquefaction Hazard Mitigation (Continued...)

Lecture 54 - Seismic slope stability analysis: Pseudostatic Analysis

Lecture 55 - Seismic slope stability analysis: Pseudostatic Analysis (Continued...)

Lecture 56 - Seismic slope stability analysis: Newmark Sliding Block Analysis

Lecture 57 - Seismic slope stability analysis: Newmark Sliding Block Analysis (Continued...)

Lecture 58 - Seismic design of retaining walls

Lecture 59 - Seismic design of retaining walls (Continued...)

Lecture 60 - Seismic design of retaining walls (Continued...)

Lecture 61 - Seismic design of retaining walls (Continued...)

Lecture 62 - Seismic design of retaining walls (Continued...)

Lecture 63 - Seismic design of retaining walls (Continued...)

Lecture 64 - Seismic design of retaining walls (Continued...)

Lecture 65 - Seismic design of retaining walls (Continued...)

Lecture 66 - Seismic design of retaining walls (Continued...)

Lecture 67 - Seismic design of retaining walls (Continued...)

Lecture 68 - Seismic design of retaining walls (Continued...)

Lecture 69 - Seismic design of retaining walls (Continued...)

NPTEL : NOC:Earthquake Seismology (Civil Engineering)

Co-ordinators : Dr. Mohit Agrawal

Lecture 1 - Introduction

Lecture 2 - Waves on a String

Lecture 3 - Stress

Lecture 4 - Strain tensor and Constitutive equations

Lecture 5 - Equations of Motion

Lecture 6 - Wavenumber vector, Slowness, P-and S-wave Polarization

Lecture 7 - Seismic spectrum, Seismogram rotation, Spherical Waves

Lecture 8 - Energy in the Plane Wave, Potentials at an Interface

Lecture 9 - Boundary Conditions, Types Of Interfaces, Ray Theory, Reflection/Transmission

Lecture 10 - Snell's law, Transmission and Reflection Coefficients, Fermat's Principle, Huygen's

Lecture 11 - Precritical, Critical, and Postcritical waves, reflection and transmission coefficients

Lecture 12 - Surface waves

Lecture 13 - Rayleigh Waves

Lecture 14 - Love waves

Lecture 15 - Dispersion

Lecture 16 - Dispersion example in the Earth and Tsunamis

Lecture 17 - Normal modes

Lecture 18 - Torsional and Spheroidal Modes

Lecture 19 - Solving numerical problems

Lecture 20 - Refraction seismology

Lecture 21 - Refraction seismology (Continued...)

Lecture 22 - Reflection seismology (Continued...)

Lecture 23 - Earth as a constant velocity Distribution

Lecture 24 - Multi Channel Data Geometry

Lecture 25 - Seismic waves in spherical earth

Lecture 26 - Velocity distribution

Lecture 27 - Body waves

Lecture 28 - Core Phases

Lecture 29 - Velocity structure of upper mantle and lower mantle

Lecture 30 - Anisotropic earth structure

Lecture 31 - Anisotropic earth structure (Continued...)

Lecture 32 - Attenuation and Anelasticity

Lecture 33 - Attenuation and Anelasticity (Continued...)

Lecture 34 - Attenuation and Anelasticity (Continued...)

Lecture 35 - Composition of the mantle and core

Lecture 36 - Composition of the mantle and core (Continued...)

Lecture 37 - Composition of the mantle and core (Continued...)

Lecture 38 - Composition of the mantle and core (Continued...)

Lecture 39 - Earthquakes, focal mechanisms, moment tensors

Lecture 40 - Earthquakes, focal mechanisms, moment tensors (Continued...)

Lecture 41 - Earthquakes, focal mechanisms, moment tensors (Continued...)

Lecture 42 - Earthquakes, focal mechanisms, moment tensors (Continued...)

Lecture 43 - Earthquakes, focal mechanisms, moment tensors (Continued...)

Lecture 44 - Brief on Earthquake geodesy

Lecture 45 - Brief on Earthquake geodesy (Continued...)

Lecture 46 - Brief on Earthquake geodesy (Continued...)

Lecture 47 - Brief on Earthquake geodesy (Continued...)

Lecture 48 - Source parameters, Earthquake statistics

Lecture 49 - Source parameters, Earthquake statistics (Continued...)

Lecture 50 - Source parameters, Earthquake statistics (Continued...)

Lecture 51 - Source parameters, Earthquake statistics (Continued...)

Lecture 52 - Source parameters, Earthquake statistics (Continued...)

Lecture 53 - Seismology and Plate tectonics, Spreading centers, Subduction zones

Lecture 54 - Seismology and Plate tectonics, Spreading centers, Subduction zones (Continued...)

Lecture 55 - Seismology and Plate tectonics, Spreading centers, Subduction zones (Continued...)

Lecture 56 - Numerical Problems in Seismology

Lecture 57 - Numerical Problems in Seismology (Continued...)

NPTEL : NOC:Engineering Geology (Civil Engineering)

Co-ordinators : Prof. R. K. Dubey

Lecture 1 - Introduction and significance

Lecture 2 - Enginnering geological ground, concept and categorization

Lecture 3 - Geomaterial: Rock, rock material and rock strata, concept of stress, deformation ...

Lecture 4 - Stress-strain behaviour and mechanical parameters of rocks

Lecture 5 - Geomorphology of river valley and mountainous regions and landforms

Lecture 6 - Different types of water and distribution of water, different type of rocks and ...

Lecture 7 - Surface and subsurface water and their interaction with geoground

Lecture 8 - Weathering processes and classification

Lecture 9 - Chemical weathering and impact of weathering

Lecture 10 - Weatherability and weathering indices

Lecture 11 - Characteristic of rocks and rock strata and some physical property

Lecture 12 - Common physical attributes of geomaterials

Lecture 13 - Engineering properties of rocks

Lecture 14 - Geotechnical characteristic of joint and approach for rock mass classification

Lecture 15 - Rock mass classification

Lecture 16 - About construction materials and dimensional stone

Lecture 17 - Crushed stone and suitability of rocks as construction materials

Lecture 18 - Aggregate and deleterious materials

Lecture 19 - Pozzolan and soil

Lecture 20 - Cement-aggregate reaction

Lecture 21 - Concept and classification of dams

Lecture 22 - Classification of dams based on materials used

Lecture 23 - Classification of dam based on design and function

Lecture 24 - Arch dams and classification dams based on use and function and technical ...

Lecture 25 - Forces acting on dam and engineering geological characteristics for dam construction

Lecture 26 - About tunnels and classification of tunnels

Lecture 27 - Tunnelling methods

Lecture 28 - Treatments

Lecture 29 - Anchoring of rock strata : grouting

Lecture 30 - Anchoring of rock strata : rock bolting

Lecture 31 - Categorization of major geological structures affecting stability of engineering ...

Lecture 32 - Major geological structures Fold, Faults, joints

Lecture 33 - Major geological structures: sedimentary structures, unconformity and effect ...

Lecture 34 - Effects of beddings, folds, faults, joints and unconformity on stability of dams

Lecture 35 - Effects of beddings, folds, faults, joints and unconformity on ground control ...

Lecture 36 - Rock-load/ground pressure, factors affecting ground pressure

Lecture 37 - Methods for determination of rock load: empirical approaches

Lecture 38 - Methods for determination of rock load: empirical, semi-empirical approaches

Lecture 39 - Methods for determination of rock load: Structural defect and rock-support ...

Lecture 40 - Unified approach, support system, and mechanics of rock bolt working

Lecture 41 - About road and highway features and pavement

Lecture 42 - Stress distributions and engineering geological facets of new road/highway alignments

Lecture 43 - About bridges, classifications and working mechanism

Lecture 44 - Engineering geological facets of bridges and material quality

Lecture 45 - Building, building foundation and foundation strata

Lecture 46 - Landslide

Lecture 47 - Landslide Hazards Zonation, causes and mitigation

Lecture 48 - Slope stability aspects of landslide

Lecture 49 - Earthquakes

Lecture 50 - Induced seismicity

Lecture 51 - Sea, seacoast, features and agents

Lecture 52 - Wave propagations and concept of surf zones and breaking of waves

Lecture 53 - Waves propagation in different depth and wave mechanics

Lecture 54 - Erosion induced and deposition assisted sea landforms

Lecture 55 - Sea shore hazards, mitigation and protective structures

Lecture 56 - Energy and introductory aspects of geothermal energy

Lecture 57 - Geothermal resources and enhanced geothermal systems

Lecture 58 - Geotechnical facets of gas hydrate

Lecture 59 - Engineering geological facets of CBM and shale gas

Lecture 60 - Engineering geological aspect of carbon capture, usage and storage (CCUS)

NPTEL : NOC:Industrial Wastewater Treatment (Civil Engineering)

Co-ordinators : Prof Alok Sinha, Prof S K Gupta

Lecture 1 - Sources and characteristics of industrial wastewater

Lecture 2 - Sources and characteristics of industrial wastewater

Lecture 3 - Wastewater Management

Lecture 4 - Design Aspects of Equalization Tank

Lecture 5 - Neutralization and Proportioning

Lecture 6 - Ion Exchange Process

Lecture 7 - Ion Exchange Process

Lecture 8 - Ion Exchange Process

Lecture 9 - Adsorption Process

Lecture 10 - Adsorption Process

Lecture 11 - Gas Transfer and Air Stripping (Ammonia Removal)

Lecture 12 - Gas Transfer and Air Stripping (Ammonia Removal)

Lecture 13 - Advanced oxidation processes

Lecture 14 - Advanced oxidation processes

Lecture 15 - Advanced oxidation processes

Lecture 16 - Advanced oxidation processes

Lecture 17 - Membrane processes for wastewater treatment

Lecture 18 - Membrane processes for wastewater treatment

Lecture 19 - Membrane processes for wastewater treatment

Lecture 20 - Membrane processes for wastewater treatment

Lecture 21 - Coagulation, Precipitation and Heavy Metal Removal

Lecture 22 - Coagulation, Precipitation and Heavy Metal Removal

Lecture 23 - Coagulation, Precipitation and Heavy Metal Removal

Lecture 24 - Coagulation, Precipitation and Heavy Metal Removal

Lecture 25 - Coagulation, Precipitation and Heavy Metal Removal

Lecture 26 - Treatment and disposal of sludge

Lecture 27 - Treatment and disposal of sludge

Lecture 28 - Treatment and disposal of sludge

Lecture 29 - Treatment and disposal of sludge

Lecture 30 - Treatment and disposal of sludge

Lecture 31 - Treatment of wastewater produced from Distillery and Dairy Industries

Lecture 32 - Treatment of wastewater produced from Distillery and Dairy Industries

Lecture 33 - Treatment of wastewater produced from Distillery and Dairy Industries

Lecture 34 - Treatment of wastewater produced from Distillery and Dairy Industries

Lecture 35 - Treatment of wastewater produced from Distillery and Dairy Industries

Lecture 36 - Treatment of wastewater produced from Tannery and Pulp and Paper

Lecture 37 - Treatment of wastewater produced from Tannery and Pulp and Paper

Lecture 38 - Treatment of wastewater produced from Tannery and Pulp and Paper

Lecture 39 - Treatment of wastewater produced from Tannery and Pulp and Paper

Lecture 40 - Treatment of wastewater produced from Tannery and Pulp and Paper

Lecture 41 - Treatment of wastewater produced from Textile and Dye and Fertilizers

Lecture 42 - Treatment of wastewater produced from Textile and Dye and Fertilizers

Lecture 43 - Treatment of wastewater produced from Textile and Dye and Fertilizers

Lecture 44 - Treatment of wastewater produced from Textile and Dye and Fertilizers

Lecture 45 - Treatment of wastewater produced from Textile and Dye and Fertilizers

Lecture 46 - Treatment of wastewater produced from Refineries and Iron and Steel (Coke Ovens)

Lecture 47 - Treatment of wastewater produced from Refineries and Iron and Steel (Coke Ovens)

Lecture 48 - Treatment of wastewater produced from Refineries and Iron and Steel (Coke Ovens)

Lecture 49 - Treatment of wastewater produced from Refineries and Iron and Steel (Coke Ovens)

Lecture 50 - Treatment of wastewater produced from Refineries and Iron and Steel (Coke Ovens)

Lecture 51 - Treatment of wastewater produced from Pharmaceutical industry

Lecture 52 - Treatment of wastewater produced from Pharmaceutical industry

Lecture 53 - Treatment of wastewater produced from Pharmaceutical industry

Lecture 54 - Treatment of wastewater produced from Pharmaceutical industry

Lecture 55 - Treatment of wastewater produced from Pharmaceutical industry

Lecture 56 - Mine Wastewater including Acid Mine Drainage and Industrial Complexing

Lecture 57 - Mine Wastewater including Acid Mine Drainage and Industrial Complexing

Lecture 58 - Mine Wastewater including Acid Mine Drainage and Industrial Complexing

Lecture 59 - Mine Wastewater including Acid Mine Drainage and Industrial Complexing

Lecture 60 - Mine Wastewater including Acid Mine Drainage and Industrial Complexing

NPTEL : NOC:Geoengineering (Civil Engineering)

Co-ordinators : Prof. R. K. Dubey

Lecture 1 - Introduction, definition and phase relations, components, advances, and relevance

Lecture 2 - Concept of force, load and stress

Lecture 3 - Stress-strain behaviour, modulus, and Poissonâ€™s ratio

Lecture 4 - Engineering properties of geoground/geomaterial

Lecture 5 - Strength failure criteria of geomaterial (rock)

Lecture 6 - Classification of water

Lecture 7 - Geoground, surface and groundwater interaction

Lecture 8 - Impact of water on geoground (rock)

Lecture 9 - Impact of water on geoground (soil)

Lecture 10 - Impact of water on ground, durability of geoground/geomaterial (soil)

Lecture 11 - Types of infrastructures, components and elements of building

Lecture 12 - Forces acting on building foundation strata/layers

Lecture 13 - Types of foundations and footings

Lecture 14 - Ground-foundation interaction, differential settlement, and basic of retaining walls

Lecture 15 - Retaining walls and earth pressures

Lecture 16 - Elements and classification of underground space structures

Lecture 17 - Excavation methods for underground space structures : Basic of drilling and blasting

Lecture 18 - Excavation methods underground space :underground :underground and blasting techniques

Lecture 19 - Excavation methods for underground space structures :tunnel boring machine (TBN)

Lecture 20 - Subsidence and ground control problems in underground spaces

Lecture 21 - In situ stress, damage zone and concept of ground pressure

Lecture 22 - Approaches for estimation of ground pressure : empirical and semi-empirical methods

Lecture 23 - Approaches for estimation of ground pressure : semi-empirical and other methods

Lecture 24 - Grout, Grouting and groutability

Lecture 25 - Anchoring of rock strata and support system and bolting

Lecture 26 - Characteristics of geoground in cold region

Lecture 27 - Behaviour of geoground in cold region (Mechanical attributes of snow)

Lecture 28 - Behaviour of geoground in cold region (Mechanical attributes ice and ice mixed soils)

Lecture 29 - Ground control issues and facets of glaciated slopes

Lecture 30 - Mitigation engineering structures

Lecture 31 - Geotechnical implication in mineral exploration

Lecture 32 - Geotechnical issues related to extraction of mineral resources

Lecture 33 - Mine fire and related geotechnical issues

Lecture 34 - Groundwater occurrences and exploration

Lecture 35 - 05:Geotechnical facets of groundwater extraction and saltwater intrusion

Lecture 36 - Concept, resources and classification of energy

Lecture 37 - Geoengineering view of geothermal energy

Lecture 38 - Concept and sources of green energy and associated geotechnical challenges

Lecture 39 - Water energy and geoengineering issues

Lecture 40 - Classification energy source reservoirs

Lecture 41 - Radioactive and strategic minerals gas hydrates as energy geotechnical constraints

Lecture 42 - Classification of energy source reservoirs and concept geomechanical characterization

Lecture 43 - Geomechanical characterization of hydrocarbon reservoir

Lecture 44 - Geomechanical characterization of Coal bed methane and shale gas reservoirs

Lecture 45 - Geomechanical characterization of geothermal reservoir

Lecture 46 - Climate change scenario

Lecture 47 - Impact of climate change

Lecture 48 - Nuclear power and generation of waste and related issues

Lecture 49 - Geotechnical facets of carbon dioxide capture and sequestration

Lecture 50 - Geotechnical issues and solutions in nuclear waste disposal

Lecture 51 - Mass wasting and landslide hazards zonation

Lecture 52 - Slope stability analysis of natural and engineered slopes

Lecture 53 - Earthquake hazards analysis and mitigation

Lecture 54 - Induced seismicity

Lecture 55 - Volcanic hazards, assessment and mitigation

Lecture 56 - Quaternary land forms and active neotectonics

Lecture 57 - River hydraulics and associate problems, geotechnical applications

Lecture 58 - Linking of river and expected geotechnical issues and possible measures

Lecture 59 - Seashore and wave dynamics

Lecture 60 - Wave dynamics, hazards, geotechnical issues and mitigation

NPTEL : Advanced Structural Analysis (Civil Engineering)

Co-ordinators : Prof. Devdas Menon

Lecture 1 - Review of Basic Structural Analysis - I

Lecture 2 - Review of Basic Structural Analysis - I

Lecture 3 - Review of Basic Structural Analysis - I

Lecture 4 - Review of Basic Structural Analysis - I

Lecture 5 - Review of Basic Structural Analysis - I

Lecture 6 - Review of Basic Structural Analysis - I

Lecture 7 - Review of Basic Structural Analysis - II

Lecture 8 - Review of Basic Structural Analysis - II

Lecture 9 - Review of Basic Structural Analysis - II

Lecture 10 - Review of Basic Structural Analysis - II

Lecture 11 - Review of Basic Structural Analysis - II

Lecture 12 - Review of Basic Structural Analysis - II

Lecture 13 - Review of Basic Structural Analysis - II

Lecture 14 - Review of Basic Structural Analysis - II

Lecture 15 - Review of Basic Structural Analysis - II

Lecture 16 - Review of Basic Structural Analysis - II

Lecture 17 - Basic Matrix Concepts

Lecture 18 - Basic Matrix Concepts

Lecture 19 - Basic Matrix Concepts

Lecture 20 - Basic Matrix Concepts

Lecture 21 - Basic Matrix Concepts

Lecture 22 - Matrix Analysis of Structures with Axial Elements

Lecture 23 - Matrix Analysis of Structures with Axial Elements

Lecture 24 - Matrix Analysis of Structures with Axial Elements

Lecture 25 - Matrix Analysis of Structures with Axial Elements

Lecture 26 - Matrix Analysis of Structures with Axial Elements

Lecture 27 - Matrix Analysis of Beams and Grids

Lecture 28 - Matrix Analysis of Beams and Grids

Lecture 29 - Matrix Analysis of Beams and Grids

Lecture 30 - Matrix Analysis of Beams and Grids

Lecture 31 - Matrix Analysis of Beams and Grids

Lecture 32 - Matrix Analysis of Beams and Grids

Lecture 33 - Matrix Analysis of Plane and Space Frames

Lecture 34 - Matrix Analysis of Plane and Space Frames

Lecture 35 - Matrix Analysis of Plane and Space Frames

Lecture 36 - Matrix Analysis of Plane and Space Frames

Lecture 37 - Matrix Analysis of Plane and Space Frames

Lecture 38 - Analysis of elastic instability and second-order effects

Lecture 39 - Analysis of elastic instability and second-order effects

Lecture 40 - Analysis of elastic instability and second-order effects

Lecture 41 - Life beyond Structures & Analysis

NPTEL : Finite Element Analysis (Civil Engineering)

Co-ordinators : Dr. B.N. Rao

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Geosynthetics and Reinforced Soil Structures (Civil Engineering)

Co-ordinators : Dr. K. Rajagopal

Lecture 1 - Introduction & Need for Geosynthetics

Lecture 2 - Types and Functions of Geosynthetics

Lecture 3 - Polymers in Geosynthetics and Manufacturing Techniques

Lecture 4 - Strength Analysis of Reinforced Soils - I

Lecture 5 - Strength Analysis of Reinforced Soils - II

Lecture 6 - Testing of Geosynthetics - I

Lecture 7 - Testing of Geosynthetics - II

Lecture 8 - Testing of Geosynthetics - III

Lecture 9 - Different Types of Soil Retaining Structures

Lecture 10 - Construction Aspects of Geosynthetic Reinforced Soil Retaining Walls

Lecture 11 - Design Codes for Reinforced Soil Retaining Walls

Lecture 12 - External Stability Analysis of Reinforced Soil Retaining Walls

Lecture 13 - Seismic Loads and Internal Stability Analysis of Reinforced Soil Walls

Lecture 14 - Testing Requirements for Reinforced Soil Retaining Walls

Lecture 15 - Design Example of Reinforced Soil Retaining Walls - I

Lecture 16 - Design Example of Reinforced Soil Retaining Walls - II

Lecture 17 - Design Example of Reinforced Soil Retaining Walls - III

Lecture 18 - Design Example of Reinforced Soil Retaining Walls - IV

Lecture 19 - Case Study of Construction of Very High Tiered Reinforced Soil Walls

Lecture 20 - Controlled Yielding to Reduce Lateral Earth Pressures on Rigid Walls

Lecture 21 - Geosynthetic Reinforced Soil Embankments - I

Lecture 22 - Geosynthetic Reinforced Soil Embankments - II

Lecture 23 - Two-Part Wedge Analysis of Reinforced Soil Embankments

Lecture 24 - Soil Embankments Supported on Geocell Mattresses

Lecture 25 - Accelerated Pre-Consolidation of Soft Clay Soils Using Geosynthetics

Lecture 26 - Geosynthetic Reinforced Pile Systems for High Embankments

Lecture 27 - Geosynthetic Encasement for Stronger and Stiffer Stone Columns

Lecture 28 - Response of Footings Resting on Reinforced Foundation Soils

Lecture 29 - Bearing Capacity Analysis of Footings Resting on Reinforced Foundation Soils

Lecture 30 - Design and Construction of Container Yards Using Geosynthetics

Lecture 31 - Geosynthetics in Flexible Pavements - I

Lecture 32 - Geosynthetics in Flexible Pavements - II

Lecture 33 - Geosynthetics in Flexible Pavements and Carbon Foot Print Analysis

Lecture 34 - Filtration of Soils Using Geosynthetics

Lecture 35 - Drainage Applications of Geosynthetics

Lecture 36 - Erosion Control of Soils Using Geosynthetics

Lecture 37 - Sustainable Infrastructure Development & Natural Geosynthetics

Lecture 38 - Introduction to Geosynthetics in Landfills

Lecture 39 - Case Study of the Construction of Airport Runway at Pakyong, Sikkim Using Geosynthetics (Guest Lecture)

Lecture 40 - Landfill Engineering Systems (Guest Lecture)

NPTEL : Modern Construction Materials (Civil Engineering)

Co-ordinators : Dr. Ravindra Gettu

Lecture 1 - Prologue

Lecture 2 - The Science, Engineering and Technology of Materials An Introduction - I

Lecture 3 - The Science, Engineering and Technology of Materials An Introduction - II

Lecture 4 - Review of Atomic Bonding - I

Lecture 5 - Review of Atomic Bonding - II

Lecture 6 - Structure of Solids - I

Lecture 7 - Structure of Solids - II

Lecture 8 - Structure of Solids - III

Lecture 9 - Movement of Atoms in Solids

Lecture 10 - Development of Microstructure - I

Lecture 11 - Development of Microstructure - II

Lecture 12 - Surface Properties

Lecture 13 - Response to Stress - Part 1

Lecture 14 - Response to Stress - Part 2

Lecture 15 - Response to Stress - Part 3

Lecture 16 - Failure Theories

Lecture 17 - Fracture Mechanics - Part 1

Lecture 18 - Fracture Mechanics - Part 2

Lecture 19 - Rheology of Liquids and Solids

Lecture 20 - Thermal Properties

Lecture 21 - Review of Construction Materials

Lecture 22 - Wood and Wood Products - 1

Lecture 23 - Wood and Wood Products - 2

Lecture 24 - Wood and Wood Products - Guest Lecture

Lecture 25 - Polymers

Lecture 26 - Fibre Reinforced Polymer - 1

Lecture 27 - Fibre Reinforced Polymer - 2

Lecture 28 - Metals - Part 1

Lecture 29 - Metals - Part 2

Lecture 30 - Metals - Part 3

Lecture 31 - Bituminous Material - Part 1

Lecture 32 - Bituminous Material - Part 2

Lecture 33 - Concrete - Part 1

Lecture 34 - Concrete - Part 2

Lecture 35 - Concrete - Part 3

Lecture 36 - Concrete - Part 4

Lecture 37 - Concrete - Part 5

Lecture 38 - Glass - Guest Lecture

Lecture 39 - Social Perception - Guest Lecture

Lecture 40 - Water Proofing - Guest Lecture

Lecture 41 - Floor Finishes - Guest Lecture

Lecture 42 - Anchors - Guest Lecture

NPTEL : Urban transportation planning (Civil Engineering)

Co-ordinators : Dr. V. Thamizh Arasan

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Course Outline

Lecture 5 - Conceptual Aspects

Lecture 6 - Conceptual Aspects (Continued...)

Lecture 7 - Conceptual Aspects (Continued...)

Lecture 8 - Conceptual Aspects (Continued...)

Lecture 9 - Trip Generation Analysis

Lecture 10 - Trip Generation Analysis (Continued...)

Lecture 11 - Trip Generation Analysis (Continued...)

Lecture 12 - Trip Generation Analysis (Continued...)

Lecture 13 - Modal Split Analysis

Lecture 14 - Modal Split Analysis (Continued...)

Lecture 15 - Modal Split Analysis (Continued...)

Lecture 16 - Modal Split Analysis (Continued...)

Lecture 17 - Modal Split Analysis (Continued...)

Lecture 18 - Modal Split Analysis (Continued...)

Lecture 19 - Modal Split Analysis (Continued...)

Lecture 20 - Trip Distribution Analysis

Lecture 21 - Trip Distribution Analysis (Continued...)

Lecture 22 - Trip Distribution Analysis (Continued...)

Lecture 23 - Trip Distribution Analysis (Continued...)

Lecture 24 - Trip Distribution Analysis (Continued...)

Lecture 25 - Trip Distribution Analysis (Continued...)

Lecture 26 - Trip Distribution Analysis (Continued...)

Lecture 27 - Route Assignment

Lecture 28 - Route Assignment (Continued...)

Lecture 29 - Route Assignment (Continued...)

Lecture 30 - Route Assignment (Continued...)

Lecture 31 - Transportation Surveys

Lecture 32 - Transportation Surveys (Continued...)

Lecture 33 - Transportation Surveys (Continued...)

Lecture 34 - Transport Related Land-Use Models

Lecture 35 - Transport Related Land-Use Models (Continued...)

Lecture 36 - Transport Related Land-Use Models (Continued...)

Lecture 37 - Urban Structure

Lecture 38 - Urban Structure (Continued...)

Lecture 39 - Urban Goods Movement

Lecture 40 - Urban Goods Movement (Continued...)

NPTEL : Mechanics of Solids (Civil Engineering)

Co-ordinators : Prof. M.S. Sivakumar

Lecture 1 - Planar Rigid Body

Lecture 2 - Degrees of freedom

Lecture 3 - Equations of Equilibrium

Lecture 4 - Planar rigid body Statics - Example 1

Lecture 5 - Rigid Body Statics - Example 2

Lecture 6 - Structural Systems with rigid bodies

Lecture 7 - Types of 1-D Structural Elements

Lecture 8 - Trusses - Axial members

Lecture 9 - Analysis of Truss Systems

Lecture 10 - Stability of Structural systems

Lecture 11 - Trusses - additional discussions

Lecture 12 - Trusses - Method of Sections

Lecture 13 - Beams - Example 1

Lecture 14 - Beams - BMD & SFD

Lecture 15 - Beams - loading, shear and BM relationships

Lecture 16 - Virtual work method

Lecture 17 - Virtual displacements

Lecture 18 - Finding virtual displacements

Lecture 19 - Virtual Work Method - Example 1

Lecture 20 - Virtual Work Method - Example 2

Lecture 21 - Static Friction - an understanding

Lecture 22 - Belt Friction

Lecture 23 - Friction : Solving Problems

Lecture 24 - General concepts - rigid bodies

Lecture 25 - Motion of a rigid body = a translation + a rotation

Lecture 26 - Motion of a point of the rigid body

Lecture 27 - Motion of one point on a rigid body relative to another

Lecture 28 - Understanding rotational motion r_dot = w x r

Lecture 29 - Kinematics velocity and acceleration

Lecture 30 - Understanding Coriolis Acceleration

Lecture 31 - Kinematics - Solving problems

Lecture 32 - Equations of motion of a rigid body

Lecture 33 - Tips and Techniques 1/2

Lecture 34 - Tips and Techniques 2/2

Lecture 35 - Solving Problems 1/4

Lecture 36 - Solving Problems 2/4

Lecture 37 - Solving Problems 3/4

Lecture 38 - Solving Problems 4/4

Lecture 39 - Engineering Statics - Solving problems

NPTEL : Pre-stressed Concrete Structures (Civil Engineering)

Co-ordinators : Prof. Devdas Menon, Dr. Amlan Kumar Sengupta

Lecture 1 - Prestressing System

Lecture 2 - Types of Prestressing

Lecture 3 - Prestressing System and Devices (Pre-Tensioning)

Lecture 4 - Prestressing System and Devices (Post-Tensioning)

Lecture 5 - Concrete - Part-1

Lecture 6 - Concrete, Grout - Part-2

Lecture 7 - Prestressing Steel

Lecture 8 - Losses in Prestress

Lecture 9 - Friction & Anchorage Slip

Lecture 10 - Creep,Shrinkage & Relaxation Losses

Lecture 11 - Analysis of Members

Lecture 12 - Analysis of Members Under Flexure

Lecture 13 - Cracking Moment,Kern Point and Pressure Line

Lecture 14 - Analysis of Rectangular sections

Lecture 15 - Analysis of Flanged Sections

Lecture 16 - Analysis of Partially Prestressed Section

Lecture 17 - Design of Members

Lecture 18 - Design of Members for Flexure (Type1 Members)

Lecture 19 - Design of Members for Flexure (Type1 & Type3)

Lecture 20 - Choice of Sections and Determination of Limiting

Lecture 21 - Magnel`s Graphical Method

Lecture 22 - Detailing Requirements

Lecture 23 - Analysis and Design for Shear and Torsion

Lecture 24 - Design for Shear - Part-1

Lecture 25 - Design for Shear - Part-2

Lecture 26 - Analysis of Torsion

Lecture 27 - Analysis of Torsion - Part-1

Lecture 28 - Analysis of Torsion - Part-2

Lecture 29 - Calculations of Deflection and Crack Width

Lecture 30 - Transmission of Prestress

Lecture 31 - Post-tensioned Members

Lecture 32 - Cantilever Beams

Lecture 33 - Continuous Beams - Part-1

Lecture 34 - Continuous Beams - Part-2

Lecture 35 - Composite Sections

Lecture 36 - One-Way Slabs

Lecture 37 - Two-Way Slabs - Part-1

Lecture 38 - Two-Way Slabs - Part-2

Lecture 39 - compression Members

Lecture 40 - Circular Prestressing, Conclusion

NPTEL : Water and Waste Water Engineering (Civil Engineering)

Co-ordinators : Prof. B.S. Murty, Prof. C. Venkobachar, Prof. Ligy Philip

Lecture 1 - Introduction To Water & Waste Water Engineering

Lecture 2 - Water & Waste Water Quality Enhancement

Lecture 3 - Water & Waste Water Quantity Estimation

Lecture 4 - Water & Waste Water Quantity Estimation (Continued...)

Lecture 5 - Water & Waste Water Characteristics

Lecture 6 - Water & Waste Water Characteristics (Continued...)

Lecture 7 - Water Treatment System Unit Operations

Lecture 8 - Sedimentation

Lecture 9 - Sedimentation (Continued...)

Lecture 10 - Coagulation & Flocculation

Lecture 11 - Coagulation & Flocculation (Continued...)

Lecture 12 - Softening

Lecture 13 - Filtration

Lecture 14 - Filtration (Continued...)

Lecture 15 - Disinfection

Lecture 16 - Introduction To Domestic Waste Water Treatment

Lecture 17 - Physical Unit Processes For Waste Water Treatment

Lecture 18 - Introduction To Microbiology

Lecture 19 - Microbiology - (Continued...)

Lecture 20 - Waste Water Treatment Reactor Analysis

Lecture 21 - Biological Unit Processes - Activated Sludge Process

Lecture 22 - Activated Sludge Process - Modification

Lecture 23 - Activated Sludge Process (Continued...)

Lecture 24 - Aeration,Nitrification And Denitrification

Lecture 25 - Natural Waste Water Treatment Systems: Ponds & Lagoons

Lecture 26 - Attached Growth Aerobic Process: Trickling Filters And Rotating Biological Contractors

Lecture 27 - Anaerobic Treatment

Lecture 28 - Anaerobic Process-UASB Reactor (Continued...)

Lecture 29 - UASB- Continued & Sludge Treatment

Lecture 30 - Sludge Treatment (Continued...)

Lecture 31 - Sludge Treatment (Continued...) & Waste Water Disposal

Lecture 32 - Waste Water Disposal And Reuse

Lecture 33 - Advanced Waste Water Treatment

Lecture 34 - Adsorption

Lecture 35 - Ion Exchange, Advanced Oxidation Process

Lecture 36 - Industrial Waste Water Treatment

Lecture 37 - Water Distribution Networks

Lecture 38 - Sanitary sewerage systems

Lecture 39 - Storm water sewerage systems

Lecture 40 - Intake Structures And Pumping Installations

NPTEL : NOC:Sustainable River Basin Management (Civil Engineering)

Co-ordinators : Dr. Franziska Steinbruch

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Project Planning and Control (Civil Engineering)

Co-ordinators : Dr. Koshy Varghese

Lecture 1 - What is Project Management? Is Project Management an Art/Science ?

Lecture 2 - Objectives of a Project, Scientific Way of Managing of Objectives

Lecture 3 - Course Scope and Plan, Questions and Discussions

Lecture 4 - Construction Industry and National Growth

Lecture 5 - Project Stakeholders, Project Phases, Project Organization

Lecture 6 - Project Scheduling Levels (Scheduling Engineer Responsibilities)

Lecture 7 - Time Management - Overview

Lecture 8 - Basics of Work Breakdown Structure (WBS)

Lecture 9 - Tools for Time Management

Lecture 10 - Gantt / Bar Chart - History, Representation, Progress Monitoring, Uses, Steps to draw a Bar Chart

Lecture 11 - Develop a Bar Chart (Exercise)

Lecture 12 - Bar Charts for Resource Usage, Pros and Cons

Lecture 13 - Duration Estimation - Types, Inputs, Methods, Parametric Estimation

Lecture 14 - Factors influencing Productivity, Example for Ideal Productivity, Factored Productivity and Working Time Factor

Lecture 15 - Piling Activity Example, Applicability of different methods to Estimate Activity Duration

Lecture 16 - Summary of Key Topics, Types of Networks

Lecture 17 - Networks - Introduction, Techniques

Lecture 18 - Representing Results in a Bar Chart, AON Example-2

Lecture 19 - Introduction to Floats, Types of Floats and Example-1 Discussion

Lecture 20 - Example 4, Usage of Floats for Project Decisions

Lecture 21 - Two-Span Bridge : Activity Identification and Duration Estimation (Continued...)

Lecture 22 - Two-Span Bridge : Activity Identification and Duration Estimation

Lecture 23 - Two-Span Bridge : Activity- Duration- Predecessors

Lecture 24 - Review Network Analysis Concepts, Apply Network Analysis to Two-Span Bridge (Continued...)

Lecture 25 - Two-Span Bridge : Network Analysis

Lecture 26 - Two-Span Bridge : Resource Constraints in Network Logic

Lecture 27 - Fast-Tracking vs Crashing, Relationship between Activity Direct Cost and Activity Duration - Assumptions

Lecture 28 - Time-Cost trade-off : ABCD Example Project, Steps for Crashing

Lecture 29 - Time-Cost trade-off : Class Exercise-2

Lecture 30 - Time-Cost trade-off : Problem-3, Tabulation Approach

Lecture 31 - Incorporating Factors such as Bonus and Penalty; Problem-4

Lecture 32 - What is Resource?, Influence of Resources on Schedule, Two-Span Bridge Example, Resource Decisions; ABCD Example Project; Resource Over-Allocation; Example-2

Lecture 33 - Projects and Resources, Example of Two Resources, Exercise, Two-Span Bridge Example

Lecture 34 - Review Problem-1; Problem-2 (Cash Resource); Resolving Over-Allocation

Lecture 35 - Problem 1 - Two Resources; Resolving Resource Allocation Problems

Lecture 36 - Resource Profile Requirements

Lecture 37 - Resource Leveling - Example Network

Lecture 38 - Minimum Moment Concept

Lecture 39 - Applying Improvement Factor - Illustration

Lecture 40 - Introduction to Precedence Diagramming Method (PDM)

Lecture 41 - PDM network representation and its issues, Network Calculation

Lecture 42 - PDM Â– Problem #1

Lecture 43 - Issues in PDM, Negative Lags, Problem #2 Solution

Lecture 44 - PDM Â– Analysis with non-continuous duration, Floats

Lecture 45 - Defining Relationship (Based on Construction Method) - Simple Shed

Lecture 46 - Project Monitoring & Control Â– Typical Project Time Monitoring Process, Levels and Frequency of updates

Lecture 47 - Project Control Process, Daily Progress Report, Macro Level Update- Data Need, Standard Progress Reports

Lecture 48 - Application: Two Span Bridge Â– ES Schedule

Lecture 49 - Review of Key Issues in Project Monitoring, Earned Value Concept Through Examples

Lecture 50 - Basic Earned Value Definitions and Terminology, Summary

Lecture 51 - Uncertainty in Project Schedules

Lecture 52 - PERT Background & Assumptions, Stepwise Procedure

Lecture 53 - PERT Example Problem, Summary

Lecture 54 - Course Conclusion

Lecture 55 - Emerging Trends / Tools in Project Planning

Lecture 56 - Industry Perspective Â– Prof. N. Raghavan

Lecture 57 - Final Exam Pattern, Acknowledgements

NPTEL : NOC:Structural Dynamics (Civil Engineering)

Co-ordinators : Prof. Ramancharala Pradeep Kumar

Lecture 1 - Module 1: Introduction of Structural Dynamics

Lecture 2 - Module 2: Types of Analysis

Lecture 3 - Module 3: Degrees of Freedom

Lecture 4 - Module 4: Vibrations of SDOF Systems

Lecture 5 - Module 5: Methods Solution of Equilibrium Equation

Lecture 6 - Module 6: UnDamped free Vibration

Lecture 7 - What is MATLAB?

Lecture 8 - Getting Started with MATLAB Online

Lecture 9 - MATLAB Variables

Lecture 10 - MATLAB as a Calculator

Lecture 11 - MATLAB Functions

Lecture 12 - Creating Vectors

Lecture 13 - Creating Uniformly Spaced Vectors (Colon Operator)

Lecture 14 - Creating Uniformly Spaced Vectors (LINSPACE)

Lecture 15 - Accessing Elements of a Vector

Lecture 16 - Calculations with Vectors

Lecture 17 - Creating Matrices

Lecture 18 - Matrix Creation Functions

Lecture 19 - Accessing Elements of a Matrix

Lecture 20 - Matrix Multiplication

Lecture 21 - Logical Operators

Lecture 22 - Writing a FOR Loop

Lecture 23 - If - Else Statements

Lecture 24 - While Loop

Lecture 25 - Line Plots

Lecture 26 - Annotating Graphs

Lecture 27 - Exploring Figures in MATLAB Online

Lecture 28 - Damped Free Vibration

Lecture 29 - Types of Damping

Lecture 30 - Logarithmic Decrement

Lecture 31 - Dynamic Equilibrium Equation Using Energy Method

Lecture 32 - Module 1: UnDamped Forced Vibration

Lecture 33 - Module 2: Damped Forced Vibration

Lecture 34 - Module 3: Relationship between Rd, Rv & Ra

Lecture 35 - Module 4: Resonant Frequency & Half Power Band Width

Lecture 36 - Module 5: Transmissibility

Lecture 37 - Module 1: Response to Arbitrary Force

Lecture 38 - Module 2: Special Cases in Arbitrary Force

Lecture 39 - Module 3: Fourier Transformation

Lecture 40 - Module 1: Numerical Methods

Lecture 41 - Module 2: Methods Based on Interpolation of Excitation

Lecture 42 - Module 3: Central Difference Method

Lecture 43 - Module 4: Numerical Methods based on Variation of Acceleration: NewmarkÂ's Method

Lecture 44 - Central Difference Method (Tutorial)

Lecture 45 - Module 1: Response Spectrum

Lecture 46 - Module 2: Special Cases of Response Spectrum

Lecture 47 - Module 3: Development of Tripartite Plot

Lecture 48 - Module 1: Multi-Degree of Freedom System

Lecture 49 - Module 2: Multi-Degree of Freedom System: Solution of Equilibrium Equation

Lecture 50 - Module 3: Multi-Degree of Freedom System: Modal Orthogonality

Lecture 51 - Module 4: Approximate Methods For Finding Natural Frequency

Lecture 52 - Tutorial 01: Generation of Mass Matrix

Lecture 53 - Tutorial 2: Eigen vector and Modal Orthogonality

Lecture 54 - Module 1: Time History Analysis

Lecture 55 - Module 2: Response Spectrum Analysis

Lecture 56 - Module 1: Three Dimensional Dynamic Analysis

Lecture 57 - Module 2: Generation of Elastic Design Response Spectra

Lecture 58 - W09T01: Centre of Mass & Centre of Stiffness

Lecture 59 - Module 1: Vibration of Continuous Systems

Lecture 60 - Module 2: Example Problem on Continuous system

Lecture 61 - Module 3: Theory of Seismometer

Lecture 62 - Module 1: Dynamics of Non Structural Elements

Lecture 63 - Module 2: Non Structural Elements Example

Lecture 64 - W11T: Non Structural Elements

Lecture 65 - Module 1: Classical and Non-classical Damping

Lecture 66 - Module 2: Vibration Control

Lecture 67 - Module 3: Base Isolation

Lecture 68 - Module 4: Tuned Mass Damper

NPTEL : NOC:Mechanics of Materials (Civil Engineering)

Co-ordinators : Dr. U. Saravanan

Lecture 1 - Why this course?

Lecture 2 - Concepts and equations in this course

Lecture 3 - Objectives and prerequisite

Lecture 4 - Linear Algebra

Lecture 5 - Vector Algebra

Lecture 6 - Representation of Vector

Lecture 7 - Concept of Force

Lecture 8 - Definition of a body

Lecture 9 - Motion and Displacement field

Lecture 10 - Traction

Lecture 11 - Properties of traction

Lecture 12 - Defnition of stress tensor and linear function

Lecture 13 - Tensor Algebra

Lecture 14 - Meaning of components of the stress tensor

Lecture 15 - Transformation of stress components

Lecture 16 - Mohr's Circle derivaion

Lecture 17 - Example 1: Construction of Mohr's circle

Lecture 18 - Example 2: Extremum normal and shear stress

Lecture 19 - Example 3: Transformation of stress components

Lecture 20 - Uniaxial stress

Lecture 21 - Hydrostatic, pure shear and deviatoric stress

Lecture 22 - Biaxial and Plane state of stress

Lecture 23 - Extreme stress for 3D stresses

Lecture 24 - Extremum shear stress

Lecture 25 - Stresses in the Octahedral plane

Lecture 26 - 2D Equilibrium equations

Lecture 27 - 3D Equilibrium equations

Lecture 28 - Stretch ratio and strain

Lecture 29 - Curves and arc Length

Lecture 30 - Gradient

Lecture 31 - Deformation and displacement Gradient

Lecture 32 - Right Cauchy Green Deformation tensor

Lecture 33 - Homogeneous deformation

Lecture 34 - Engineering strain

Lecture 35 - Change in Angle

Lecture 36 - Transformation of strain components/ Strain Rosette

Lecture 37 - Compatibility condition

Lecture 38 - Constitutive relation

Lecture 39 - Young's Modulus and Poisson's Ratio

Lecture 40 - Shear Modulus

Lecture 41 - Bulk Modulus

Lecture 42 - Restriction on material parameters

Lecture 43 - Thermal strain

Lecture 44 - Strain energy, load potential and total potential

Lecture 45 - Stepped shaft subjected to axial force

Lecture 46 - Inhomogeneous bar subjected to axial force

Lecture 47 - Stepped shaft subjected to raise in temperature

Lecture 48 - Traction in member subjected to bending

Lecture 49 - Governing equilibrium equations

Lecture 50 - Displacement field

Lecture 51 - Bending equation

Lecture 52 - Radius of curvature

Lecture 53 - Shear force and bending moment diagram

Lecture 54 - Variation of axial stress

Lecture 55 - Deflected shape and rotation of cross section

Lecture 56 - Expression to find shear stress

Lecture 57 - Finding centroid of a cross section

Lecture 58 - Parallel axis theorem and its application

Lecture 59 - Vertical shear stress in I section

Lecture 60 - Horizontal shear stress in I section

Lecture 61 - Connection design

Lecture 62 - Definition of shear center

Lecture 63 - Shear center of Channel section

Lecture 64 - Expression to find shear center

Lecture 65 - Shear force and bending moment diagram

Lecture 66 - Deflected shape and rotation of cross section

Lecture 67 - Finding allowable load

Lecture 68 - Modified bending equation

Lecture 69 - Bending of a composite beam

Lecture 70 - Connection design

Lecture 71 - Moment of Intertia about arbitrarily oriented axis

Lecture 72 - Example: Angle section

Lecture 73 - Bending equation for bending about principal axis

Lecture 74 - Bending equation about arbitrary axis

Lecture 75 - Neutral axis

Lecture 76 - Load not about principal axis

Lecture 77 - Load about principal axis

Lecture 78 - Displacement field

Lecture 79 - Torsion equation

Lecture 80 - Example problems

Lecture 81 - Expression relating angle of twist with torsion and shear stress

Lecture 82 - Example problems: Open sections

Lecture 83 - Thin walled closed sections

Lecture 84 - Example problems: Thin walled sections

Lecture 85 - Cylindrical polar coordinate system

Lecture 86 - Displacement field

Lecture 87 - Governing differential equation and solution

Lecture 88 - Example problems : Thick walled cylindrical vessel

Lecture 89 - Thin walled pressure vessels

Lecture 90 - General Principals

Lecture 91 - Different failure modes

Lecture 92 - Tresca Condition

Lecture 93 - vonMises condition

Lecture 94 - Maximum normal stress or rankine condition

Lecture 95 - Mohr - Columb condition

Lecture 96 - Drucker-Prager Condition

Lecture 97 - General Concepts

Lecture 98 - Euler critical load for simply supported column

Lecture 99 - Euler critical load for column with any boundary condition

Lecture 100 - Secant formula

Lecture 101 - Pressure vessel and failure theory

Lecture 102 - Determination of maximum load carrying capacity of a simple truss

NPTEL : NOC:Advanced Concrete Technology (Civil Engineering)

Co-ordinators : Prof. Manu Santhanam

Lecture 0 - Introduction to course

Lecture 1 - Cement Production - Part 1

Lecture 2 - Cement Production - Part 2

Lecture 3 - Cement Composition - Part 1

Lecture 4 - Cement Composition - Part 2

Lecture 5 - Cement Classification - Part 1

Lecture 6 - Cement Classification - Part 2

Lecture 7 - Cement Chemistry - Part 1

Lecture 8 - Cement Chemistry - Part 2

Lecture 9 - Cement Chemistry - Part 3

Lecture 10 - Cement Chemistry - Part 4

Lecture 11 - Cement Chemistry - Part 5

Lecture 12 - Aggregates for concrete - Part 1

Lecture 13 - Aggregates for concrete - Part 2

Lecture 14 - Chemical admixtures - Part 1

Lecture 15 - Chemical admixtures - Part 2

Lecture 16 - Chemical admixtures - Part 3

Lecture 17 - Chemical admixtures - Part 4

Lecture 18 - Chemical admixtures - Part 5

Lecture 19 - Mineral admixtures - Part 1

Lecture 20 - Mineral admixtures - Part 2

Lecture 21 - Mineral admixtures - Part 3

Lecture 22 - Mineral admixtures - Part 4

Lecture 23 - Mineral admixtures - Part 5

Lecture 24 - Mineral admixtures - Part 6

Lecture 25 - Mineral admixtures - Part 7

Lecture 26 - Mixture proportioning

Lecture 27 - Fresh concrete - Part 1

Lecture 28 - Fresh concrete - Part 2

Lecture 29 - Fresh properties - Part 3

Lecture 30 - Introduction to Harden concrete properties

Lecture 31 - Post peak response and Fibre reinforced concrete

Lecture 32 - Shrinkage: Mechanism and Behaviours

Lecture 33 - Creep: Mechanism and Behaviours

Lecture 34 - Shrinkage: Plastic Shrinkage

Lecture 35 - Shrinkage: Drying Shrinkage

Lecture 36 - Introduction to Durability

Lecture 37 - Performance based specifications for durable concrete

Lecture 38 - Durability issues in concrete - Part 1

Lecture 39 - Durability issues in concrete - Part 2

Lecture 40 - Durability issues in concrete - Part 3

Lecture 41 - Durability issues in concrete - Part 4

Lecture 42 - Durability issues in concrete - Part 5

Lecture 43 - Durability issues in concrete - Part 6

NPTEL : NOC:Glass in Buildings: Design and Application (Civil Engineering)

Co-ordinators : Prof. K.N. Satyanarayana

Lecture 1 - Introduction

Lecture 2 - Float Process for Manufacturing Glass - Part 1

Lecture 3 - Float Process for Manufacturing Glass - Part 2

Lecture 4 - Coatings on Glass - Need and Types - Part 2

Lecture 5 - Coatings on Glass - Need and Types - Part 2

Lecture 6 - Glass Design for Safety, Sustainability and Aesthetic - Part 1

Lecture 7 - Glass Design for Safety, Sustainability and Aesthetic - Part 2

Lecture 8 - Structural Control and Design for Energy Efficiency - Part I

Lecture 9 - Structural Control and Design for Energy Efficiency - Part II

Lecture 10 - Structural Control and Design for Energy Efficiency - Part III

Lecture 11 - Structural Control and Design for Energy Efficiency - Part IV

Lecture 12 - Structural Control and Design for Energy Efficiency - Part V

Lecture 13 - Design Tools for Glass Selection - Part I

Lecture 14 - Design Tools for Glass Selection - Part II

Lecture 15 - Modeling the Building Envelope - Part I

Lecture 16 - Modeling the Building Envelope - Part II

Lecture 17 - Modeling the Building Envelope - Part III

Lecture 18 - Innovations in Glass Future Facades - Part I

Lecture 19 - Innovations in Glass Future Facades - Part II

Lecture 20 - Standards Related to Glass

Lecture 21 - Introduction to Useful Daylighting in Buildings

Lecture 22 - Fundamentals of Daylighting - Part I

Lecture 23 - Fundamentals of Daylighting - Part II

Lecture 24 - Daylighting Strategies - Techniques - Part I - Video 1

Lecture 25 - Daylighting Strategies - Techniques - Part I - Video 2

Lecture 26 - Daylighting Strategies - Techniques - Part II - Video 1

Lecture 27 - Daylighting Strategies - Techniques - Part II - Video 2

Lecture 28 - Daylighting Strategies - Techniques - Part II - Video 3

Lecture 29 - ECBC and Green Building Requirements

Lecture 30 - Introduction to Daylight Simulation

Lecture 31 - Daylighting Controls - Part I

Lecture 32 - Daylighting Controls - Part II

Lecture 33 - Acheving Acoustics Through Glass

Lecture 34 - Glass Processing Overview - Part I

Lecture 35 - Glass Processing Overview - Part II

Lecture 36 - Interior Glazing Program - Part I

Lecture 37 - Interior Glazing Program - Part II

Lecture 38 - Interior Glazing Applications-Shower Enclosure - Part I

Lecture 39 - Interior Glazing Applications-Shower Enclosure - Part II

Lecture 40 - Interior Glazing Applications-Shower Enclosure - Part III

Lecture 41 - Interior Glazing Applications-Shower Enclosure - Part IV

Lecture 42 - Glass in Passive Fire Protection - Part I

Lecture 43 - Glass in Passive Fire Protection - Part II

Lecture 44 - Glass in Passive Fire Protection - Part III

Lecture 45 - Glazing Choices for Project Segment - Part I

Lecture 46 - Glazing Choices for Project Segment - Part II

Lecture 47 - National Building Code 2016 - Part I

Lecture 48 - National Building Code 2016 - Part II

Lecture 49 - National Building Code 2016 - Part III

Lecture 50 - National Building Code 2016 - Part IV

Lecture 51 - Facade Fundamentals - Part I

Lecture 52 - Facade Fundamentals - Part II

Lecture 53 - Facade Fundamentals - Part III

Lecture 54 - Facade Fundamentals - Part IV

Lecture 55 - Glass Application on Facades - Part I

Lecture 56 - Glass Application on Facades - Part II

Lecture 57 - Glass Application on Facades - Part III

Lecture 58 - Energy Efficiency Facade System

Lecture 59 - Structural Design of Facades - Part I

Lecture 60 - Structural Design of Facades - Part II

Lecture 61 - Silicone for Structural Glazing - Part - I

Lecture 62 - Silicone for Structural Glazing - Part - II

Lecture 63 - Silicone for Structural Glazing - Part - III

Lecture 64 - Facade Factory Operations - Part I

Lecture 65 - Facade Factory Operations - Part II

Lecture 66 - Performance Testing for Facades - Part I

Lecture 67 - Performance Testing for Facades - Part II

Lecture 68 - The Role of Windows in Building Design - Part I

Lecture 69 - The Role of Windows in Building Design - Part II

Lecture 70 - Standards Related to Glass II

Lecture 71 - FAQs about usage of Glass in Buildings

Lecture 72 - Case Study of a Different Concept of Facade

Lecture 73 - Case Studies-Envelope Design and Its Impact - Part I

Lecture 74 - Case Studies-Envelope Design and Its Impact - Part II

Lecture 75 - A Case Study of Building Envelope in the context of Environmentally Sustainable Design - Part I

Lecture 76 - A Case Study of Building Envelope in the context of Environmentally Sustainable Design - Part II

Lecture 77 - Sustainable Building and Facades - Part I

Lecture 78 - Sustainable Building and Facades - Part II

Lecture 79 - Building Envelope Design for Sustainable Buildings

Lecture 80 - Building Envelope Design

Lecture 81 - Case Study for Building Envelop Design - Part I

Lecture 82 - Case Study for Building Envelop Design - Part II

Lecture 83 - Case study-Commercial Buildings - Part I

Lecture 84 - Case study-Commercial Buildings - Part II

Lecture 85 - Case study-Commercial Buildings - Part III

Lecture 86 - Case Study-The Untold Truth of the Unbuilt - Part I

Lecture 87 - Case Study-The Untold Truth of the Unbuilt - Part II

NPTEL : NOC:Glass Processing Technology (Civil Engineering)

Co-ordinators : Prof. K.N. Satyanarayana

Lecture 1 - Introduction

Lecture 2 - Glass as Building Material - Part I

Lecture 3 - Glass as Building Material - Part II

Lecture 4 - Float Glass Manufacturing - Part I

Lecture 5 - Float Glass Manufacturing - Part II

Lecture 6 - Glass Coating Technology - Part I

Lecture 7 - Glass Coating Technology - Part II

Lecture 8 - Safety in Industries - Part I

Lecture 9 - Safety in Industries - Part II

Lecture 10 - Safety in Glass Handling - Part I

Lecture 11 - Safety in Glass Handling - Part II

Lecture 12 - Process Flow- PPE

Lecture 13 - Serviceability-Sales - Production Planning in Solutions Business - Part I

Lecture 14 - Serviceability-Sales - Production Planning in Solutions Business - Part II

Lecture 15 - Serviceability-Sales - Production Planning in Solutions Business - Part III

Lecture 16 - Environment and Eco packaging

Lecture 17 - Glass Warehouse Management - Part I

Lecture 18 - Glass Warehouse Management - Part II

Lecture 19 - Cutting and Snapping

Lecture 20 - Pre-Processing-Drilling - Part I

Lecture 21 - Pre-Processing-Drilling - Part II

Lecture 22 - Grinding and Fabrication

Lecture 23 - Pre-Processing - Washing

Lecture 24 - Tempering - Part I

Lecture 25 - Tempering - Part II

Lecture 26 - Tempering - Part III

Lecture 27 - Tempering - Part IV

Lecture 28 - Tempering - Part V

Lecture 29 - Tempering - Part VI

Lecture 30 - Tempering - Part VII

Lecture 31 - Lamination - Part I

Lecture 32 - Lamination - Part II

Lecture 33 - Lamination - Part III

Lecture 34 - Insulating Glass Unit - Part I

Lecture 35 - Insulating Glass Unit - Part II

Lecture 36 - Insulating Glass Unit - Part III

Lecture 37 - Insulating Glass Unit - Part IV

Lecture 38 - Insulating Glass Unit - Part V

Lecture 39 - Insulating Glass Unit - Part VI

Lecture 40 - Insulating Glass Unit - Part VII

Lecture 41 - Insulating Glass Unit - Part VIII

Lecture 42 - Insulating Glass Unit - Part IX

Lecture 43 - Silicone Sealant for Insulated Glass - Part I

Lecture 44 - Silicone Sealant for Insulated Glass - Part II

Lecture 45 - Insulating Glass Unit - Part X

Lecture 46 - Insulating Glass Unit - Part XI

Lecture 47 - Insulating Glass Unit - Part XII

Lecture 48 - Processing Standards and Checks

Lecture 49 - Quality Testing - Part I

Lecture 50 - Quality Testing - Part II

Lecture 51 - Quality Testing - Part III

Lecture 52 - Quality Testing - Part IV - Video 1

Lecture 53 - Quality Testing - Part IV - Video 2

Lecture 54 - Quality Testing - Part V

Lecture 55 - Quality Testing - Part VI

Lecture 56 - Quality Testing - Part VII

Lecture 57 - Heat soaking - Part I

Lecture 58 - Heat soaking - Part II

Lecture 59 - Ceramic Printing on Glass - Part I

Lecture 60 - Ceramic Printing on Glass - Part II

Lecture 61 - Ceramic Printing on Glass - Part III

Lecture 62 - Ceramic Printing on Glass - Part IV

Lecture 63 - Glass Breakage Reasons

Lecture 64 - Internal Process Loss - Part I

Lecture 65 - Internal Process Loss - Part II

Lecture 66 - Internal Process Loss - Part III

Lecture 67 - Root Cause Analysis - Part I

Lecture 68 - Root Cause Analysis - Part II

Lecture 69 - Post Manufacturing Expenses

Lecture 70 - 5S in Glass Processing

Lecture 71 - Introduction to Quality Management System - Part I

Lecture 72 - Introduction to Quality Management System - Part II

Lecture 73 - Glass Processing - Applications, Innovations and Futuristic Trends - Part I

Lecture 74 - Glass Processing - Applications, Innovations and Futuristic Trends - Part II

Lecture 75 - Sustainability on Glass Processing

NPTEL : NOC:Advanced Topics in the Science and Technology of Concrete (Civil Engineering)

Co-ordinators : Prof. Manu Santhanam, Dr. Ravindra Gettu

Lecture 1 - Calcium sulfoaluminate cement-based binder: Properties and application

Lecture 2 - Micro-structural characterisation of cementitious materials - Part 1

Lecture 3 - Micro-structural characterisation of cementitious materials - Part 2

Lecture 4 - Micro-structural characterisation of cementitious materials - Part 3

Lecture 5 - Interview with Prof Karen Scrivener

Lecture 6 - Performance of Fiber reinforced materials

Lecture 7 - Ultra-High performance concrete (UHPC): Material design and properties - Part 1

Lecture 8 - Ultra-High performance concrete (UHPC): Material design and properties - Part 2

Lecture 9 - Closed-Loop testing - Part 1

Lecture 10 - Closed-Loop testing - Part 2

Lecture 11 - Uni-axial tensile test of textile reinforced concrete (TRC) panel

Lecture 12 - Fiber reinforced concrete: Notched beam flexural test

Lecture 13 - Strain softening response of concrete Under uniaxial compression

Lecture 14 - Tension test of 7-wire steel strand

Lecture 15 - Bond Test of Strand-concrete System

Lecture 16 - Interview with Prof. S. P. Shah

Lecture 17 - Introduction to concrete durability

Lecture 18 - Sulphate attack of concrete

Lecture 19 - Development and performance approach for durability and service life production for structures

Lecture 20 - Colorimetric test to assess carbonation resistance in concrete

Lecture 21 - Experiments on durability index: Rapid chloride permeability test, Oxygen permeability test, and Water Sorptivity test

Lecture 22 - Prof. Mark Alexander

Lecture 23 - Chloride induced corrosion and service life of reinforced concrete structures - Part 1

Lecture 24 - Chloride induced corrosion and service life of reinforced concrete structures - Part 2

Lecture 25 - Corrosion control and cathodic protection of steel reinforcement: Past, present, and future

Lecture 26 - LCA of cement and concrete - Part 1

Lecture 27 - LCA of cement and concrete - Part 2

Lecture 28 - 8. Chloride threshold testing using linear polarization resistance (LPR) and electrochemical impedance spectroscopy (EIS)

Lecture 29 - Interview with Prof George Sergi

NPTEL : NOC:Infrastructure Planning and Managements (Civil Engineering)

Co-ordinators : Dr. Ashwin Mahalingam

Lecture 1 - Introduction to infrastructure and the Transportation sector - Part 1A

Lecture 2 - Introduction to infrastructure and the Transportation sector - Part 1B

Lecture 3 - Introduction to infrastructure and the Transportation sector - Part 1C

Lecture 4 - Introduction to infrastructure and the Transportation sector - Part 1D

Lecture 5 - Introduction to Power and Telecom sectors - Part 2A

Lecture 6 - Introduction to Power and Telecom sectors - Part 2B

Lecture 7 - Urban and Rural Infrastructure - Part 1A

Lecture 8 - Urban and Rural Infrastructure - Part 1B

Lecture 9 - Urban and Rural Infrastructure - Part 1C

Lecture 10 - Phases and Players in Infrastructure Planning and Managements - Part 2A

Lecture 11 - Phases and Players in Infrastructure Planning and Managements - Part 2B

Lecture 12 - Infrastructure Economics and Finance

Lecture 13 - Public-Private Partnership for Infrastructure

Lecture 14 - Public-Private Partnership for Infrastructure - Case Studies - Part 1

Lecture 15 - Public-Private Partnership for Infrastructure - Case Studies - Part 2

Lecture 16 - Public-Private Partnership for Infrastructure - Case Studies - Part 3

Lecture 17 - Risks and Challenges in Infrastructure - Part 1

Lecture 18 - Risks and Challenges in Infrastructure - Part 2

Lecture 19 - Risks and Challenges in Infrastructure - Part 3

Lecture 20 - Economic Risk in Infrastructure - Part 1

Lecture 21 - Economic Risk in Infrastructure - Part 2

Lecture 22 - Political Risk in Infrastructure - Part 1

Lecture 23 - Political Risk in Infrastructure - Part 2

Lecture 24 - Social Environmental Risk in Infrastructure - Part 1

Lecture 25 - Social Environmental Risk in Infrastructure - Part 2

Lecture 26 - Actor Mapping and Social Network Analysis - Part 1

Lecture 27 - Actor Mapping and Social Network Analysis - Part 2

Lecture 28 - Fair Process and Negotiations - Part 1

Lecture 29 - Fair Process and Negotiations - Part 2

Lecture 30 - Design Thinking - Part 1

Lecture 31 - Design Thinking - Part 2

Lecture 32 - Sustainable Development and Socio - Economic Analysis - Part 1

Lecture 33 - Sustainable Development and Socio - Economic Analysis - Part 2

Lecture 34 - Public Sector Governance - Part 1

Lecture 35 - Public Sector Governance - Part 2

Lecture 36 - Flexibilities and Options on Projects - Part 1

Lecture 37 - Flexibilities and Options on Projects - Part 2

Lecture 38 - Module Flexibilities in Projects - Part 1

Lecture 39 - Module Flexibilities in Projects - Part 2

Lecture 40 - Case Study on PPP Project - Delhi Airport

Lecture 41 - Case Study on PPP Project - Tirupur Water Supply

Lecture 42 - Polycentric Governance and Incomplete Design - Part 1

Lecture 43 - Polycentric Governance and Incomplete Design - Part 2

Lecture 44 - Successful Project Delivery Strategies - Part 1

Lecture 45 - Successful Project Delivery Strategies - Part 2

Lecture 46 - Guest Lecture by K Venkatesh

Lecture 47 - Guest Lecture by Kavitha Selvaraj

NPTEL : NOC:Design of Masonry Structures (Civil Engineering)

Co-ordinators : Prof. Arun Menon

Lecture 1 - Introductory - Part I

Lecture 2 - Introductory - Part II

Lecture 3 - Introductory - Part III

Lecture 4 - Introductory - Part IV

Lecture 5 - Masonry Materials and Properties - Part I

Lecture 6 - Masonry Materials and Properties - Part II

Lecture 7 - Masonry Materials and Properties - Part III

Lecture 8 - Masonry Materials and Properties - Part IV

Lecture 9 - Masonry Materials and Properties - Part V

Lecture 10 - Masonry Materials and Properties - Part VI

Lecture 11 - Strength and Behaviour of Masonry - Part I

Lecture 12 - Strength and Behaviour of Masonry - Part II

Lecture 13 - Strength and Behaviour of Masonry - Part III

Lecture 14 - Strength and Behaviour of Masonry - Part IV

Lecture 15 - Strength and Behaviour of Masonry - Part V

Lecture 16 - Strength and Behaviour of Masonry - Part VI

Lecture 17 - Strength and Behaviour of Masonry - Part VII

Lecture 18 - Strength and Behaviour of Masonry - Part VIII

Lecture 19 - Strength and Behaviour of Masonry - Part IX

Lecture 20 - Strength and Behaviour of Masonry - Part X

Lecture 21 - Strength and Behaviour of Masonry - Part XI

Lecture 22 - Design of Masonry Components and Systems - Part I

Lecture 23 - Design of Masonry Components and Systems - Part II

Lecture 24 - Design of Masonry Components and Systems - Part III

Lecture 25 - Design of Masonry Components and Systems - Part IV

Lecture 26 - Design of Masonry Components and Systems - Part V

Lecture 27 - Design of Masonry Components and Systems - Part VI

Lecture 28 - Design of Masonry Components and Systems - Part VII

Lecture 29 - Design of Masonry Components and Systems - Part VIII

Lecture 30 - Design of Masonry Components and Systems - Part IX

Lecture 31 - Design of Masonry Components and Systems - Part X

Lecture 32 - Design of Masonry Components and Systems - Part XI

Lecture 33 - Design of Masonry Components and Systems - Example I

Lecture 34 - Design of Masonry Components and Systems - Example II

Lecture 35 - Design of Masonry Components and Systems - Example III

Lecture 36 - Special Topics - Confined Masonry

Lecture 37 - Special Topics - Masonry Infill in RC Frames

Lecture 38 - Special Topics - Assessment of Existing Masonry Structures - Part I

Lecture 39 - Special Topics - Assessment of Existing Masonry Structures - Part II

Lecture 40 - Special Topics - Assessment of Existing Masonry Structures - Part III

NPTEL : NOC:Characterization of Construction Materials (Civil Engineering)

Co-ordinators : Prof. Manu Santhanam, Prof. Piyush Chaunsali

Lecture 1 - Characterization of Construction Materials: An Introduction - Part 1

Lecture 2 - Characterization of Construction Materials: An Introduction - Part 2

Lecture 3 - Structure of Contruction Materials: An Overview - Part 1

Lecture 4 - Structure of Contruction Materials: An Overview - Part 2

Lecture 5 - Structure of Contruction Materials: An Overview - Part 3

Lecture 6 - Structure of Contruction Materials: An Overview - Part 4

Lecture 7 - Calorimetry: Introduction and types of Calorimeters - Part 1

Lecture 8 - Calorimetry: Introduction and types of Calorimeters - Part 2

Lecture 9 - Calorimetry: Sample preparation, Practical note and Heat of hydration - Part 1

Lecture 10 - Calorimetry: Sample preparation, Practical note and Heat of hydration - Part 2

Lecture 11 - Calorimetry: Applications of calorimetry - Part 1

Lecture 12 - X Ray diffraction: Introduction to X Rays and crystallography - Part 1

Lecture 13 - X Ray diffraction: Introduction to X Rays and crystallography - Part 2

Lecture 14 - X Ray diffraction: Crystal systems and History of XRD - Part 1

Lecture 15 - X Ray diffraction: Crystal systems and History of XRD - Part 2

Lecture 16 - X Ray diffraction: Diffractogram

Lecture 17 - X Ray diffraction: Diffractogram - Calculations - Part 1

Lecture 18 - X Ray diffraction: Diffractogram - Calculations - Part 2

Lecture 19 - X Ray Diffraction: Qualitative Phase Analysis - Part 1

Lecture 20 - X Ray Diffraction: Qualitative Phase Analysis - Part 2

Lecture 21 - X Ray Diffraction: Sample Preparation and Application in study of cements - Part 1

Lecture 22 - X Ray Diffraction: Sample Preparation and Application in study of cements - Part 2

Lecture 23 - Thermal Analysis - Part 1

Lecture 24 - Thermal Analysis - Part 2

Lecture 25 - Application of thermal analysis to study construction materials - Part 1

Lecture 26 - Application of thermal analysis to study construction materials - Part 2

Lecture 27 - Surface Area Measurement: Sampling and particle size distribution - Part 1

Lecture 28 - Surface Area Measurement: Sampling and particle size distribution - Part 2

Lecture 29 - Surface Area Measurement: Different techniques - Part 1

Lecture 30 - Surface Area Measurement: Different techniques - Part 2

Lecture 31 - Surface Area Measurement: calculation and applications

Lecture 32 - Optical and Scanning Microscopy- Introduction and specimen preperation - Part 1

Lecture 33 - Optical and Scanning Microscopy- Introduction and specimen preperation - Part 2

Lecture 34 - Optical and Scanning Microscopy- Features and functions - Part 1

Lecture 35 - Optical and Scanning Microscopy- Features and functions - Part 2

Lecture 36 - Types of optical microsopy - Part 1

Lecture 37 - Types of optical microsopy - Part 2

Lecture 38 - Scanning electron microscope Part 1- Parts and Functioning - Part 1

Lecture 39 - Scanning electron microscope Part 1- Parts and Functioning - Part 2

Lecture 40 - Scanning electron microscope Part 2- Working Principles - Part 1

Lecture 41 - Scanning electron microscope Part 2- Working Principles - Part 2

Lecture 42 - Scanning electron microscope Part 3 - Analysis of cementitious systems 1 - Part 1

Lecture 43 - Scanning electron microscope Part 3 - Analysis of cementitious systems 1 - Part 2

Lecture 44 - Scanning electron microscope Part 4 - Analysis of cementitious system 2 - Part 1

Lecture 45 - Scanning electron microscope Part 4 - Analysis of cementitious system 2 - Part 2

Lecture 46 - Application of characterization techniques to assess composite binder with limestone-calcined clay: what, why and how? - Part 1

Lecture 47 - Application of characterization techniques to assess composite binder with limestone-calcined clay: what, why and how? - Part 2

Lecture 48 - Image analysis - Introduction and image mapping - Part 1

Lecture 49 - Image analysis - Introduction and image mapping - Part 2

Lecture 50 - Image analysis - Basic operations - Part 1

Lecture 51 - Image analysis - Basic operations - Part 2

Lecture 52 - Spectroscopy Techniques - Part 1 AAS, AES - Part 1

Lecture 53 - Spectroscopy Techniques - Part 1 AAS, AES - Part 2

Lecture 54 - Spectroscopy Techniques - Part 2 UV and IR spectroscopy - Part 1

Lecture 55 - Spectroscopy Techniques - Part 2 UV and IR spectroscopy - Part 2

Lecture 56 - Spectroscopy Techniques - Part 3 FTIR and NMR spectroscopy - Part 1

Lecture 57 - Spectroscopy Techniques - Part 3 FTIR and NMR spectroscopy - Part 2

Lecture 58 - Spectrocopy techniques - Part 4 Principle of NMR spectroscopy

Lecture 59 - Porosity and pore structure - Intoduction, significance of pore distribution

Lecture 60 - Porosity and pore structure - Woking of mercury intrusion porosimeter - Part 1

Lecture 61 - Porosity and pore structure - Woking of mercury intrusion porosimeter - Part 2

Lecture 62 - Electrical Impedance analysis - Principle and different methods - Part 1

Lecture 63 - Electrical Impedance analysis - Principle and different methods - Part 2

Lecture 64 - Electrical Impedance analysis - Deliverables and Interpretation - Part 1

Lecture 65 - Electrical Impedance analysis - Deliverables and Interpretation - Part 2

Lecture 66 - Electrochemical testing (Corrosion) using Electrochemical Impedance Spectroscopy (EIS) - Part 1

Lecture 67 - Electrochemical testing (Corrosion) using Electrochemical Impedance Spectroscopy (EIS) - Part 2

NPTEL : NOC:Introduction to Civil Engineering Profession (Civil Engineering)

Co-ordinators : Dr. Ravindra Gettu, Prof. Subhadeep Banerjee

Lecture 1 - What is Civil Engineering - Part 1

Lecture 2 - What is Civil Engineering - Part 2

Lecture 3 - Structural Conservation of Built Heritage

Lecture 4 - Introduction to Environmental Engineering

Lecture 5 - Interesting Environmental Projects

Lecture 6 - Hydraulic and Water Resources Engineering

Lecture 7 - Geotechnical Engineering

Lecture 8 - Construction Materials and Methods

Lecture 9 - Infrastructure Management

Lecture 10 - Structural Engineering - 1

Lecture 11 - Structural Engineering - 2

Lecture 12 - Structural Engineering - Analysis and Design

Lecture 13 - Structural Modeling

Lecture 14 - Scope for Highway Engineers in Civil Engineering Profession - 1

Lecture 15 - Scope for Highway Engineers in Civil Engineering Profession - 2

Lecture 16 - Introduction to Civil Engineering Profession

Lecture 17 - Hydrology and Water Security

Lecture 18 - An Overview of Computational Science and Engineering

Lecture 19 - Sustainability

Lecture 20 - The Big Picture

NPTEL : NOC:Maintenance and Repair of Concrete Structures (Civil Engineering)

Co-ordinators : Prof. Radhakrishna G. Pillai

Lecture 1 - Prologue

Lecture 2 - Corrosion of embedded metal; Significance and fundamentals of corrosion

Lecture 3 - Corrosion of embedded metal; Carbonation-induced and chloride-induced corrosion

Lecture 4 - Corrosion of embedded metal; Types of reinforcement - Bare steels

Lecture 5 - TM - Ring Test For Assessing The Quality of TMT/QST Steel Rebars

Lecture 6 - Corrosion of embedded metal; Types of reinforcement - Metallic and non metallic coated rebars

Lecture 7 - Corrosion in prestressed concrete

Lecture 8 - Deterioration of cementitious systems - Introduction, sulphate attack, biofouling and acid attack

Lecture 9 - Deterioration of cementitious systems - frost attack, freeze-thaw and alkali-silica reaction

Lecture 10 - Deterioration of cementitious systems - Shrinkage and Creep

Lecture 11 - Deterioration of cementitious systems - Fire attack, abrasion and erosion

Lecture 12 - Condition assessment of concrete structures: Exposure conditions, visual inspection, on-site Concrete testing

Lecture 13 - Condition assessment of concrete structures: Testing of concerete in laboratory

Lecture 14 - Condition assessmennt of concrete structures; mechanical and corrosion testing of rebars

Lecture 15 - Strategies and materials for surface repair

Lecture 16 - Strategies and materials for surface repair

Lecture 17 - Strategies and materials for surface repair

Lecture 18 - Surface preparation and protective treatment

Lecture 19 - Surface preparation and Protective treatments

Lecture 20 - Surface preparation and Protective treatments

Lecture 21 - Surface preparation and Protective treatments

Lecture 22 - Surface preparation and Protective treatments

Lecture 23 - Coatings on concrete infrastructures

Lecture 24 - Waterproofing of concrete structures - 1

Lecture 25 - Waterproofing of concrete structures - 2

Lecture 26 - Structural Strengthening and Stabilization - Load effects and Introduction to S&S

Lecture 27 - Structural Strengthening and Stabilization - Beams and Slabs

Lecture 28 - Structural Strengthening and Stabilization - Columns and Walls

Lecture 29 - Structural strengthening - 4 (Joints and connections)

Lecture 30 - Injection Grouts for concrete repair

Lecture 31 - Structural repair of prestressed concrete systems

Lecture 32 - Case studies on structural repair (Right methodologies and systematic approach / case studies)

Lecture 33 - Cathodic Protection in Concrete Structures - Laboratory and field studies

Lecture 34 - Service life estimation - 1

Lecture 35 - Service life estimation - 2

NPTEL : NOC:Mechanical Characterization of Bituminous Materials (Civil Engineering)

Co-ordinators : Dr. J. Murali Krishnan, Prof. M. R. Nivitha, Prof. Neethu Roy, Prof. A. Padmarekha

Lecture 1 - Mechanical Characterization of Bituminous Materials-Introduction - Part 1

Lecture 2 - Mechanical Characterization of Bituminous Materials-Introduction - Part 2

Lecture 3 - Linear Viscoelastic Response - Part 1

Lecture 4 - Linear Viscoelastic Response - Part 2

Lecture 5 - Linear Viscoelastic Response - Part 3

Lecture 6 - Linear Viscoelastic Response - Part 4

Lecture 7 - Linear Viscoelastic Response - Part 5

Lecture 8 - Small Amplitude Oscillatory Shear - Part 1

Lecture 9 - Small Amplitude Oscillatory Shear - Part 2

Lecture 10 - Small Amplitude Oscillatory Shear - Part 3

Lecture 11 - Small Amplitude Oscillatory Shear - Part 4

Lecture 12 - Time temperature superposition principle - Part 1

Lecture 13 - Time temperature superposition principle - Part 2

Lecture 14 - Master curve models

Lecture 15 - Asphalt Usage and Processing - Part 1

Lecture 16 - Asphalt Usage and Processing - Part 2

Lecture 17 - Chemical composition of bitumen - Part 1

Lecture 18 - Chemical composition of bitumen - Part 2

Lecture 19 - Chemical composition of bitumen - Part 3

Lecture 20 - Chemical composition of bitumen - Part 4

Lecture 21 - Chemical composition of bitumen - Part 5

Lecture 22 - Aging of Bituminous Binders and Mixtures - Part I

Lecture 23 - Aging of Bituminous Binders and Mixtures - Part II

Lecture 24 - Aging of Bituminous Binders and Mixtures - Part III

Lecture 25 - Dynamic Shear Rheometer - Part I

Lecture 26 - Dynamic Shear Rheometer - Part II

Lecture 27 - Viscosity Grading - Part 1

Lecture 28 - Viscosity Grading - Part 2

Lecture 29 - Performance Grading - Part 1

Lecture 30 - Performance Grading - Part 2

Lecture 31 - PG-Theoretical Basis

Lecture 32 - Low-temperature PG

Lecture 33 - Modifiers for Bitumen - Part 1

Lecture 34 - Modifiers for Bitumen - Part 2

Lecture 35 - Modifiers for Bitumen - Part 3

Lecture 36 - Modifiers for Bitumen - Part 4

Lecture 37 - Mixing and Compaction Temperature - Part 1

Lecture 38 - Mixing and Compaction Temperature - Part 2

Lecture 39 - Mixing and Compaction Temperature - Part 3

Lecture 40 - Dynamic Modulus of Bituminous Mixtures - Part 1

Lecture 41 - Dynamic Modulus of Bituminous Mixtures - Part 2

Lecture 42 - Resilient Modulus of Bituminous Mixtures - Part 1

Lecture 43 - Resilient Modulus of Bituminous Mixtures - Part 2

Lecture 44 - Rutting Characterisation - Different approaches

Lecture 45 - Dry Rut Wheel Testing of Bituminous Mixtures

Lecture 46 - Laboratory investigation for rutting of bituminous mixtures - Part 1

Lecture 47 - Laboratory investigation for rutting of bituminous mixtures - Part 2

Lecture 48 - Fatigue of Bituminous mixtures - Part 1

Lecture 49 - Fatigue of Bituminous mixtures - Part 2

Lecture 50 - Fatigue of Bituminous mixtures - Part 3

Lecture 51 - Fatigue of Bituminous mixtures - Part 4

Lecture 52 - Fatigue of Bituminous mixtures - Part 5

Lecture 53 - Introduction to curve fitting using Matlab - Part 1

Lecture 54 - Introduction to curve fitting using Matlab - Part 2

Lecture 55 - MSCR Analysis using Matlab

Lecture 56 - Summary

NPTEL : NOC:Colloids and Surfaces (Chemical Engineering)

Co-ordinators : Prof. Basavaraj Madivala Gurappa

Lecture 1 - Introduction and motivation

Lecture 2 - Colloidal dispersions, terminology and classification

Lecture 3 - Stability in colloids

Lecture 4 - Source, synthesis and characterisation of colloids

Lecture 5 - Characterisation of colloidal particles - I

Lecture 6 - Characterisation of colloidal particles - II

Lecture 7 - Introduction to forces acting on an individual colloidal particle

Lecture 8 - Introduction to interaction between colloidal particles

Lecture 9 - Application of Brownian force: Measument of diffusivity and size

Lecture 10 - Radiation used to study colloidal systems

Lecture 11 - Radiation used to study colloidal systems

Lecture 12 - Molecular origin of Van der waals forces

Lecture 13 - Vanderwaal interactions between particles

Lecture 14 - Problem on scaling of Vanderwaal interactions

Lecture 15 - Calculation of Vanderwaal's forces between semi-infinite blocks and Hamaker constant - I

Lecture 16 - Calculation of Vanderwaal's forces between semi-infinite blocks and Hamaker constant - II

Lecture 17 - Theories of Vanderwaal forces based on bulk properties and calculation of Hamaker constant using bulk properties

Lecture 18 - Effect of medium on Vanderwaal's interactions - I

Lecture 19 - Effect of medium on Vanderwaal's interactions - II

Lecture 20 - Colloid Polymer mixtures

Lecture 21 - Colloid polymer mixtures: colloid-solvent interactions and colloid-polymer interactions

Lecture 22 - Colloid polymer mixtures: Depletion flocculation

Lecture 23 - Colloid polymer mixtures: Depletion stabilisation

Lecture 24 - Depletion interactions

Lecture 25 - Steric interactions/osmotic repulsion

Lecture 26 - Tutorial problem on depletion interactions

Lecture 27 - Colloidal Interactions: Introduction to electrostatic interactions/electrical double layer interactions

Lecture 28 - Introduction to models of electrical double layer: Helmholtz model/capacitor model

Lecture 29 - Review and summary of Helmholtz model (or capacitor model) of electrical double layer

Lecture 30 - Models of electrical double layer: Diffuse double layer model/Gouy-Chapman model

Lecture 31 - Potential distribution near planar surfaces: Derivation of the Poisson-Boltzmann equation

Lecture 32 - Potential distribution near planar surfaces: Solution to the linearised Poisson-Boltzmann equation

Lecture 33 - Potential distribution near spherical surfaces: Solution to linearised Poisson-Boltzmann equation

Lecture 34 - Comparison of Capacitor model and Diffuse double layer model

Lecture 35 - Models of electrical double layer: Gouy Chapman Theory - I

Lecture 36 - Models of electrical double layer: Gouy Chapman Theory - II

Lecture 37 - Structure of Electrical double layer

Lecture 38 - Force of Repulsion between interacting surfaces

Lecture 39 - Potential Energy of repulsion between Planar double layers and DLVO Theory

Lecture 40 - Zeta Potential and Electrophoretic mobility of an ion

Lecture 41 - Electrokinetic Phenomena

Lecture 42 - Relation between Electrophoretic mobility and Zeta potential - I

Lecture 43 - Relation between Electrophoretic mobility and Zeta potential - II

Lecture 44 - Colloidal particles at interfaces:Introduction

Lecture 45 - Characterization of Particles at interface

Lecture 46 - Experimental Observations -Concept of Electrostatic interactions and Stability at interfaces

Lecture 47 - Implications from Surface energy balances and Estimation of energy required for detachment

Lecture 48 - Colloidal interactions at interface

NPTEL : NOC:Polymers: Concepts, Properties, Uses and Sustainability (Chemical Engineering)

Co-ordinators : Dr. Abhijit P. Deshpande

Lecture 1 - Why are polymers so common?

Lecture 2 - Polymers: Molecular structure

Lecture 3 - Process, structure, property

Lecture 4 - Biopolymers

Lecture 5 - Molecular weight and distribution

Lecture 6 - Polymerization

Lecture 7 - Macromolecular nature

Lecture 8 - Renewable sources for polymers

Lecture 9 - Polymerization/depolymerization

Lecture 10 - States of interest

Lecture 11 - Application based terms

Lecture 12 - Reuse and repurpose

Lecture 13 - Molecular conformations

Lecture 14 - Size, mobility and flexibility

Lecture 15 - Polyelectrolytes

Lecture 16 - Structures in biopolymers

Lecture 17 - Amorphous/crystalline states - 1

Lecture 18 - Amorphous/crystalline states - 2

Lecture 19 - Orientation

Lecture 20 - Interactions

Lecture 21 - Kinetics of crystallization

Lecture 22 - Glass transition - 1

Lecture 23 - Glass transition - 2

Lecture 24 - States in environment

Lecture 25 - Liquid crystalline polymers

Lecture 26 - Copolymers - 1

Lecture 27 - Copolymers - 2

Lecture 28 - Blends - 1

Lecture 29 - Blends - 2

Lecture 30 - Microstructure in polymers

Lecture 31 - Composites

Lecture 32 - Stress strain response

Lecture 33 - Additives for polymeric systems

Lecture 34 - Blends/composites in recycling

Lecture 35 - Physical/chemical crosslinking

Lecture 36 - Mechanical properties - I

Lecture 37 - Mechanical properties - II

Lecture 38 - Physical and chemical aging

Lecture 39 - Solutions: properties

Lecture 40 - Conducting polymers

Lecture 41 - Dielectric response - I

Lecture 42 - Dielectric response - II

Lecture 43 - Plasticity

Lecture 44 - Properties of composites

Lecture 45 - Viscoelasticity: introduction

Lecture 46 - Thermal response

Lecture 47 - Viscoelasticity: characterization

Lecture 48 - Viscoelasticity: simple models

Lecture 49 - Dynamic Mechanical analysis

Lecture 50 - Damping Applications

Lecture 51 - Time Temperature superposition

Lecture 52 - Impact and energy absorption

Lecture 53 - Testing for applications

Lecture 54 - Properties of blends

Lecture 55 - Biomimetic polymers

Lecture 56 - Advanced mechanics

Lecture 57 - Viscoelastic response: examples

Lecture 58 - Polymer packaging

Lecture 59 - Porous polymers/membranes

Lecture 60 - Polymer at interfaces

Lecture 61 - Diffusion in polymers

Lecture 62 - Compatibilizers

Lecture 63 - Biopolymer applications

Lecture 64 - Adhesives and Paints

Lecture 65 - Dissolution and recovery

Lecture 66 - Polymerization kinetics

Lecture 67 - Polymerization reactors

Lecture 68 - Polymer processing - I

Lecture 69 - Polymer processing - II

Lecture 70 - Polymer processing - III

Lecture 71 - Flow simulations

Lecture 72 - Processing for recycling

Lecture 73 - Recycle, up-down cycling - I

Lecture 74 - Recycle, up-down cycling - II

Lecture 75 - Flow behaviour - rheology

Lecture 76 - Crosslinking

Lecture 77 - Conversion of polymers

Lecture 78 - Rheology and entanglement

Lecture 79 - Rheological models

Lecture 80 - Rheology and processing

Lecture 81 - Absorption and leaching

Lecture 82 - Swelling of polymers

Lecture 83 - Viscosity for polymer processing

Lecture 84 - Microplastics, aerosols, sediments

Lecture 85 - Biodegradation of polymers

Lecture 86 - Biodegradable polymers - 1

Lecture 87 - Biodegradable polymers - 2

NPTEL : NOC:Basic Construction Materials (Civil Engineering)

Co-ordinators : Prof. Radhakrishna G. Pillai, Prof. Manu Santhanam

Lecture 1 - Introduction to Construction Materials - Part 1

Lecture 2 - Introduction to Construction Materials - Part 2

Lecture 3 - Introduction to Construction Materials - Part 3

Lecture 4 - Materials Engineering Concepts - Part 1

Lecture 5 - Materials Engineering Concepts - Part 2

Lecture 6 - Materials Engineering Concepts - Part 3

Lecture 7 - Materials Engineering Concepts - Part 4

Lecture 8 - Materials Engineering Concepts - Part 5

Lecture 9 - Materials Engineering Concepts - Part 6

Lecture 10 - Materials Engineering Concepts - Part 7

Lecture 11 - Nature of Materials - Part 1

Lecture 12 - Nature of Materials - Part 2

Lecture 13 - Nature of Materials - Part 3

Lecture 14 - Nature of Materials - Part 5

Lecture 15 - Nature of Materials - Part 6

Lecture 16 - Nature of Materials - Part 6

Lecture 17 - Nature of Materials - Part 7

Lecture 18 - Stone, Brick and Mortar 1 - Part 1

Lecture 19 - Stone, Brick and Mortar 1 - Part 2

Lecture 20 - Stone, Brick and Mortar 1 - Part 3

Lecture 21 - Stone, Brick and Mortar 1 - Part 4

Lecture 22 - Stone, Brick and Mortar 2 - Part 1

Lecture 23 - Stone, Brick and Mortar 2 - Part 2

Lecture 24 - Cement and Concrete 1 - Part 1

Lecture 25 - Cement and Concrete 1 - Part 2

Lecture 26 - Cement and Concrete 1 - Part 3

Lecture 27 - Cement and Concrete 2 - Part 1

Lecture 28 - Cement and Concrete 2 - Part 2

Lecture 29 - Cement and Concrete 3 - Part 1

Lecture 30 - Cement and Concrete 3 - Part 2

Lecture 31 - Cement and Concrete 4 - Part 1

Lecture 32 - Cement and Concrete 4 - Part 2

Lecture 33 - Metals - 1 - Part 1

Lecture 34 - Metals - 1 - Part 2

Lecture 35 - Metals - 2 - Part 1

Lecture 36 - Metals - 2 - Part 2

Lecture 37 - Metals - 3 - Part 1

Lecture 38 - Metals - 3 - Part 2

Lecture 39 - Metals - 4

Lecture 40 - Metals - 5 - Part 1

Lecture 41 - Metals - 5 - Part 2

Lecture 42 - Polymers and Composites - Part 1

Lecture 43 - Polymers and Composites - Part 2

Lecture 44 - Polymers and Composites - Part 3

Lecture 45 - Pavement Materials 1 - Part 1

Lecture 46 - Pavement Materials 1 - Part 2

Lecture 47 - Pavement Materials 2 - Part 1

Lecture 48 - Pavement Materials 2 - Part 2

Lecture 49 - Wood and wood products - Part 1

Lecture 50 - Wood and wood products - Part 2

Lecture 51 - Glass

NPTEL : NOC:Introduction to Lean Construction (Civil Engineering)

Co-ordinators : Prof. Koshy Varghese, Prof. N Raghavan

Lecture 1 - Course Contents, Long-term Goals, Structure and Module 1 Topics

Lecture 2 - Pedagogy, Approach, Institutions, Instructors, Audience and Pre-requisites

Lecture 3 - ILCE, Conferences, Resources, Further Work Possible

Lecture 4 - Lean Implementation in India from ILCE Directors and other Talks/Testimonials

Lecture 5 - Status of Lean Implementation in India through Industry Panel Discussion with ILCE Directors

Lecture 6 - History of Lean and other Management Philosophies; Toyota Production System (TPS); What is Lean?

Lecture 7 - Lean Construction Timeline; Lean Project Delivery vs LC; Project Management vs LC

Lecture 8 - Key Lean Concepts#1 (Wastes)

Lecture 9 - Key Lean Concepts#1 (Value, Value Stream, Flow, Pull, Perfection)

Lecture 10 - Key Lean Concepts#2 (Continuous Improvement, Collaborative working, Production System, Lean Culture)

Lecture 11 - Key Lean Tools#1 (Productivity Measurement System, Work Sampling, Value Stream Mapping)

Lecture 12 - Lean Overview - Key Lean Tools#2 (5S, CPS/ LPS, Big Room Approach)

Lecture 13 - Lean Overview - Future module

Lecture 14 - Productivity Measurement and Improvement, Construction Productivtiy, Productivity levels

Lecture 15 - What is Productivity, Production?; Illustration

Lecture 16 - Productivity and Production Impact; Visualizing Activity Productivity and Production Performance

Lecture 17 - Profit, ROCE, Influences on Operational Productivity; Operational view vs. System view, Summary

Lecture 18 - Outline, Planning and monitoring levels; Productivity Measurement System

Lecture 19 - Measuring Output - Level of Effort (LOE)

Lecture 20 - Productivity and Production Calculations: daily, weekly, cumulative

Lecture 21 - Productivity and Production Calculations: Performance Evaluation

Lecture 22 - Productivity and Production Calculations: Workhour Forecast and Analysis of Trends

Lecture 23 - Factors Influencing Productivity, Productivity Improvement Approach, Summary

Lecture 24 - Sampling/ Surveying Techniques - Data Sources in Construction

Lecture 25 - Construction Activity with Workers doing VA/ NVAN/ NVA; WS vs PMS; Work Sampling

Lecture 26 - Sampling basics, Sampling in construction

Lecture 27 - Steps to Conduct a Work Sampling Study; WS Outcomes

Lecture 28 - Illustration of Tour-based Work Sampling Approach

Lecture 29 - Illustration of Crew-based Work Sampling Approach

Lecture 30 - Explore relationship between WS Categories and Productivity; Summary

Lecture 31 - Sampling/ Surveying Techniques - Foreman delay survey

Lecture 32 - Sampling/ Surveying Techniques - Foreman delay survey - Implementation

Lecture 33 - Foreman delay survey - Illustrations; Comparison - PMS vs WS vs FDS - discussion

Lecture 34 - Value Stream, Value Stream Mapping (VSM), System vs Process, References

Lecture 35 - Illustration: Value and Value Stream in Food Delivery

Lecture 36 - Value, Value Stream, VSM/PM, Language, Basic VSM - current state and future state

Lecture 37 - Key steps for VSM, Work: Degrees of Granularity, Measurement Metrics

Lecture 38 - VSM - Example 1 (Reinforcement)

Lecture 39 - VSM - Example 2 (Blockwork); Summary

Lecture 40 - Flow Process Chart, Symbols, Process mapping - steps and timing, Measurement metrics

Lecture 41 - Process mapping - Illustration: Reinforcement shifting

Lecture 42 - VSM vs PM; Process Flow chart - variations; Swim-lane diagrams; Summary

Lecture 43 - Understand the Basics of 5S, Explanations and 5S Steps

Lecture 44 - Understand Each -S- in Detail - Sort, Set in Order, Shine

Lecture 45 - Understand Each -S- in Detail - Standardize, Sustain

Lecture 46 - 5S: Key Points, Benefits, Signs of a 5S Site

Lecture 47 - Experiment 5S with Yourself First, Project Implementation, Facilitations, Why 5S May Fail?, Recap

Lecture 48 - Understand the Applications of 5S through Case Studies_2 cases

Lecture 49 - Understand the Applications of 5S through Case Studies_3 cases

Lecture 50 - Understand the Applications of 5S through Case Study - Ms Diamond Barretto (Godrej Construction)

Lecture 51 - Current Project Performance, Workflow Variation, Traditional PM vs Lean Production Management

Lecture 52 - Some Key Lean Concepts, Focusing on frontline Execution, CPS - Collaborative Planning System

Lecture 53 - CPS Process, Overall Schedules (Master Schedule,Phase Schedule,LAP, Weekly Plan),Constraint Analysis

Lecture 54 - Collaborative -Pull- Planning, Percentage Plan Completed (PPC), Daily Huddle, Variance Analysis, RCA

Lecture 55 - Lean Work Structuring

Lecture 56 - Impact of PPC on Productivity, Key aspects,Advantages,The Necessary Conditions,Blocks - CPS,Summary

Lecture 57 - COLPLASSE: Look-Ahead Plan, Constraint Analysis, Weekly Plan, Summary

Lecture 58 - Lean Project Delivery System, Conclusion

Lecture 59 - Understand the Applications of CPS/LPS through Case Studies

Lecture 60 - CPS/LPS implementation in Construction Projects through a Panel of Experts - Part 1

Lecture 61 - CPS/LPS implementation in Construction Projects through a Panel of Experts - Part 2

Lecture 62 - CPS/LPS implementation in Construction Projects through a Panel of Experts - Part 3

Lecture 63 - Introduction of Big Room Approach, Some Requirements for Efficient Working, Virtual BR Meetings

Lecture 64 - Big Room Approach through Case Studies

Lecture 65 - Big Room Approach - Implementation case from URC Construction

Lecture 66 - Future Construction Site, Lean Tools and Processes, Automation strategies and impact, Programming

Lecture 67 - Document Management, Workflow Process, Communication/Collab./Authen., Sensing

Lecture 68 - Mechanisation/ Robots, Visualization, AI/ Analytics, BIM, CPS/ IOT/ Industry 4.0, Digital Twin

Lecture 69 - Challenges and Causes, Problem?, Lean, BIM?, Traditional vs BIM, Tools/Technology providers

Lecture 70 - BIM uses; Metrics

Lecture 71 - BIM and Lean, Implementation Framework, BIM Execution Plan, Evidence Cases, Key takeaway

Lecture 72 - How to Start Practicing Lean Tools in Project Sites-1: Work Sampling

Lecture 73 - How to Start Practicing Lean Tools in Project Sites-1: VSM

Lecture 74 - How to Start Practicing Lean Tools in Project Sites-1: 5S

Lecture 75 - How to Start Practicing Lean Tools in Project Sites-1: CPS/ LPS

Lecture 76 - How to Start Practicing Lean Tools in Project Sites-1: Big Room Approach

Lecture 77 - Acknowledgement

NPTEL : NOC:Design of Connections in Steel Structures (Civil Engineering)

Co-ordinators : Prof. Anil Agarwal

Lecture 1 - Bolts: dimensions and material

Lecture 2 - Bolts: installation techniques and clearances

Lecture 3 - Design of Bearing type bolts in shear: Basic design principle

Lecture 4 - Correction factors for bolts for long joints, long grip lengths, and thick packing plate

Lecture 5 - Design of friction grip bolts in shear and design of bolts in tension

Lecture 6 - Structural Welding Process

Lecture 7 - Groove/Butt Welds

Lecture 8 - Fillet Welds - 1

Lecture 9 - Fillet Welds - 2

Lecture 10 - Weld symbols, defects, and filler material

Lecture 11 - Design of groove welds

Lecture 12 - Design of fillet welds - 1

Lecture 13 - Design of fillet welds - 2

Lecture 14 - Design example of a bolt group

Lecture 15 - Design example of a weld group

Lecture 16 - Simple and rigid frame connections

Lecture 17 - Design of double angle connections

Lecture 18 - Design of seated angle connections

Lecture 19 - End-plate rigid connection: Introduction

Lecture 20 - End-plate connection: Design example

Lecture 21 - Welded-flange rigid connection

Lecture 22 - Ductile detailed beam-column connections - 1

Lecture 23 - Ductile detailed beam-column connections - 2

NPTEL : NOC:Analysis and Design of Bituminous Pavements (Civil Engineering)

Co-ordinators : A. Padmarekha, J. Murali Krishnan, M. R. Nivitha, Neethu Roy

Lecture 1 - Pavement Cross-sections and Pavement Design Process

Lecture 2 - Pavement Design Factors - I

Lecture 3 - Pavement Design Factors - II

Lecture 4 - Stresses and Strains in Bituminous Pavements - I

Lecture 5 - Stresses and Strains in Bituminous Pavements - II

Lecture 6 - Numerical Problems in One-layer Theory

Lecture 7 - Numerical Problems in Two-layer Theory

Lecture 8 - Introduction to KENLAYER

Lecture 9 - KENLAYER - 1

Lecture 10 - KENLAYER - 2

Lecture 11 - KENLAYER - 3

Lecture 12 - KENLAYER - 4

Lecture 13 - Traffic Analysis - ESWL - Part 1

Lecture 14 - Traffic Analysis - ESWL - Part 2

Lecture 15 - Traffic Analysis - EALF

Lecture 16 - Traffic Analysis - ESAL using VDF

Lecture 17 - Traffic Analysis - ESAL using TF

Lecture 18 - Traffic Analysis - Examples

Lecture 19 - Traffic Analysis - Load Spectra Factor

Lecture 20 - Modulus for Design - CBR

Lecture 21 - Modulus for Design - Resilient modulus (Granular material)

Lecture 22 - Modulus for Design - Resilient modulus (Bituminous material)

Lecture 23 - Modulus for Design - Dynamic Modulus

Lecture 24 - Environmental Effect - Part 1

Lecture 25 - Environmental Effect - Part 2

Lecture 26 - Environmental Effect - Part 3

Lecture 27 - Environmental Effect - Part 4

Lecture 28 - Enhanced Integrated Climatic Model - Part 1

Lecture 29 - Enhanced Integrated Climatic Model - Part 2

Lecture 30 - Climate Consideration in Design Procedures

Lecture 31 - Reliability in Pavement Design - Part 1

Lecture 32 - Reliability in Pavement Design - Part 2

Lecture 33 - Reliability in Pavement Design - Part 3

Lecture 34 - Reliability in Pavement Design - Part 4

Lecture 35 - Reliability in Pavement Design - Part 5

Lecture 36 - Reliability in Pavement Design - Part 6

Lecture 37 - Distress Transfer Function - Fatigue Cracking

Lecture 38 - Rutting and Low-Temperature Cracking

Lecture 39 - KENLAYER - Nonlinear Analysis

Lecture 40 - KENLAYER - Damage Analysis

Lecture 41 - IRC design steps

Lecture 42 - Design Input and IITPAVE software

Lecture 43 - Pavement design with granular base

Lecture 44 - Pavement design with CTB

Lecture 45 - Pavement design with RAP Base

Lecture 46 - Overview of Mechanistic-Empirical Pavement Design Methods - IRC

Lecture 47 - Overview of Mechanistic-Empirical Pavement Design Methods - South Africa - Part I

Lecture 48 - Overview of Mechanistic-Empirical Pavement Design Methods - South Africa - Part II

Lecture 49 - Overview of Mechanistic-Empirical Pavement Design Methods - South Africa - Part III

Lecture 50 - Overview of Mechanistic-Empirical Pavement Design Methods - Australia - Part I

Lecture 51 - Overview of Mechanistic-Empirical Pavement Design Methods - Australia - Part II

Lecture 52 - Overview of Mechanistic-Empirical Pavement Design Methods - AASHTO - Part I

Lecture 53 - Overview of Mechanistic-Empirical Pavement Design Methods - AASHTO - Part II

Lecture 54 - Summary of the course and design projects

NPTEL : NOC:FEM and Constitutive Modelling in Geomechanics (Civil Engineering)

Co-ordinators : Prof. K Rajagopal

Lecture 1 - Introductory lecture and course outline

Lecture 2 - Matrix algebra and Gauss elimination method

Lecture 3 - Development of equilibrium equations for 1-d systems

Lecture 4 - Development of equilibrium equations for 2-d bar elements and truss structures

Lecture 5 - Development of equilibrium equations for beam elements

Lecture 6 - Virtual work and principle of stationary potential energy

Lecture 7 - Introduction to Rayleigh-Ritz Method

Lecture 8 - Use of GEOFEM finite element program - Part I

Lecture 9 - Use of GEOFEM finite element program - Part II

Lecture 10 - Stresses and strains in continuum

Lecture 11 - 2-dimensional approximations of continuum

Lecture 12 - Analysis of continuum systems

Lecture 13 - 3-node Constant Strain Triangle

Lecture 14 - Classical methods for developing shape functions

Lecture 15 - Numerical integration techniques

Lecture 16 - Isoparametric Elements - Part I

Lecture 17 - Isoparametric Elements - Part II

Lecture 18 - Isoparametric calculations for stiffness and load vectors

Lecture 19 - Force vector due to surface traction

Lecture 20 - Patch test and Finite Element Modelling

Lecture 21 - GEOFEM - Part III

Lecture 22 - In situ earth pressures, construction and excavation sequences

Lecture 23 - Joint and interface element modelling

Lecture 24 - Modelling of interfaces - Joint Elements

Lecture 25 - Mapped infinite elements for semi-infinite soil medium

Lecture 26 - Some observations of soil behaviour and stress invariants

Lecture 27 - Nonlinear analysis technique - 1

Lecture 28 - Nonlinear analysis technique - 2

Lecture 29 - Nonlinear analysis technique - 3

Lecture 30 - Bilinear elastic models

Lecture 31 - Nonlinear elastic and hyperbolic models

Lecture 32 - Modified hyperbolic model and determination of material parameters

Lecture 33 - Stress correction procedures in finite element analysis

Lecture 34 - Numerical examples on working with modified hyperbolic models

Lecture 35 - Some Limit solutions in geotechnical engineering

Lecture 36 - Elastic - Plastic Constitutive Matrix

Lecture 37 - Nonassociated Elastic - Plastic Joint Element

Lecture 38 - Introduction to consolidation and dynamic analysis

Lecture 39 - Cam Clay models

Lecture 40 - Modified cam clay models

Lecture 41 - FEM in Geotechnical applications

Lecture 42 - Soil behaviour and An Introduction to the Existing Soil Models

Lecture 43 - Simulation of soil liquefaction using FLAC

Lecture 44 - Mitigation of soil liquefaction using granular columns

NPTEL : NOC:The Evolution of the Earth and life (Civil Engineering)

Co-ordinators : Prof. Devapriya Chattopadhyay

Lecture 1 - Course Structure

Lecture 2 - Introduction to Google Earth

Lecture 3 - How Does Earth Science Work ?

Lecture 4 - What is a Mineral

Lecture 5 - Minerals and Rock Cycle

Lecture 6 - Continental Drift

Lecture 7 - Plate Tectonics

Lecture 8 - What are Igneous Rocks ?

Lecture 9 - Compositional Variation of Igneous Rocks

Lecture 10 - Why Does the Rock Melt ?

Lecture 11 - Igneous Activity and Plate Tectonics

Lecture 12 - Igneous Structures

Lecture 13 - Volcanoes

Lecture 14 - Discussion on Posted Questions

Lecture 15 - What are Metamorphic Rocks

Lecture 16 - Types of Metamorphism

Lecture 17 - Metamorphism and Plate Tectonics

Lecture 18 - Weathering and Erosion

Lecture 19 - Detrital Sedimentary Rocks

Lecture 20 - Chemical and Organic Sedimentary Rocks

Lecture 21 - Sedimentary Environment and Plate Tectonics

Lecture 22 - Discussion on Conceptual Questions

Lecture 23 - Discussion on Posted Questions

Lecture 24 - Diversity of Life

Lecture 25 - Why Do Groups Change ?

Lecture 26 - Nature of Paleontological Data

Lecture 27 - Introduction to PaleoDB

Lecture 28 - Relative Age

Lecture 29 - Correlation

Lecture 30 - Attempts to Estimate Absolute Age

Lecture 31 - Radiometric Dating

Lecture 32 - Rocks Full of Life

Lecture 33 - Discussion on Posted Questions_3

Lecture 34 - The Beginning

Lecture 35 - The Formation of the Planets and Moon

Lecture 36 - The Formation of the Continents

Lecture 37 - The Formation of the Atmosphere and Ocean

Lecture 38 - Origin of Life: Initial Ideas

Lecture 39 - Origin of Life: Which Biomolecules Came First ?

Lecture 40 - Origin of Life: Where did it all Start ?

Lecture 41 - Evidence of Early Life

Lecture 42 - Proterozoic Events and Life

Lecture 43 - Discussion on Posted Questions_4

Lecture 44 - Cambrian Earth and Life

Lecture 45 - Cambrian Explosion

Lecture 46 - Journey to Land: Fishes and Tetrapods

Lecture 47 - Journey to Land: Transitional Forms

Lecture 48 - Appearance of Amniotes

Lecture 49 - Dinosaurs

Lecture 50 - Dinosaurs Footprints

Lecture 51 - Appearance of Feathers

Lecture 52 - Mass Extinctions and Their Impact

Lecture 53 - K-Pg Extinction: Patterns

Lecture 54 - K-Pg Extinction: Mechanisms

Lecture 55 - Paleoclimatic Reconstruction

Lecture 56 - Cenozoic Climate

Lecture 57 - Recovery from K-Pg: Paleogene Event

Lecture 58 - Who are Whales ?

Lecture 59 - Discussion on Posted Questions_5

Lecture 60 - Development of Bipedality

Lecture 61 - Early Hominids

Lecture 62 - Megafaunal Extinction

Lecture 63 - Recent Extinctions

Lecture 64 - Anthropocene and Future

Lecture 65 - Discussion on Posted Questions_6

NPTEL : NOC:Advanced Reinforced Concrete Design (Civil Engineering)

Co-ordinators : Prof S. Suriya Prakash

Lecture 1 - Introduction-Overview of RCC - Part 1

Lecture 2 - Introduction-Overview of RCC - Part 2

Lecture 3 - Introduction to Design Concepts and Philosophies - Part 1

Lecture 4 - Introduction to Design Concepts and Philosophies - Part 2

Lecture 5 - Materials Short Term Properties - Part 1

Lecture 6 - Materials Short Term Properties - Part 2

Lecture 7 - Materials Short Term Properties - Part 3

Lecture 8 - Materials Short Term Properties - Part 4

Lecture 9 - Materials Long Term Properties - Part 1

Lecture 10 - Materials Long Term Properties - Part 2

Lecture 11 - Materials Rebar Properties

Lecture 12 - Durability - Overview

Lecture 13 - Durability - Effect of Chemical actions

Lecture 14 - Durability - Effect of Physical,mechanical and corrosion

Lecture 15 - Durability - Design approaches and code provisions

Lecture 16 - Axial Behaviour - Introduction

Lecture 17 - Axial Behaviour of Reinforced Concrete

Lecture 18 - Axial Behaviour - Effect of Compressive Strength

Lecture 19 - Flexure Behaviour - Background to flexural theory

Lecture 20 - Flexure Behaviour - Moment curvature analysis-procedure

Lecture 21 - Flexure Behaviour - Example-Moment curvature of singly reinforced section

Lecture 22 - Flexure Behaviour - Effect of increasing reinforcement on Moment curvature behaviour

Lecture 23 - Flexure Behaviour - Effect of compressive strength on Moment curvatureÃ¸ behaviour

Lecture 24 - Flexure Behaviour - Effect of axial Compression on Moment curvature behaviour - Part 1

Lecture 25 - Flexure Behaviour - Effect of axial Compression on Moment curvature behaviour - Part 2

Lecture 26 - Flexure Behaviour - Effect of Compression steel on Moment curvature behaviour - Part 1

Lecture 27 - Flexure Behaviour - Effect of Compression steel on Moment curvature behaviour - Part 2

Lecture 28 - Flexure Behaviour - Analysis and Design of Singly Reinforced Sections using IS Code - Part 1

Lecture 29 - Flexure Behaviour - Analysis and Design of Singly Reinforced Sections using IS Code - Part 2

Lecture 30 - Flexure Behaviour - Examples in Flexure using IS Code Provisions

Lecture 31 - Flexure Behaviour - Analysis and Design of Doubly Reinforced Sections using IS Code

Lecture 32 - Flexure Behaviour - Analysis and Design of Flanged Sections using ISÃ, CodeÃ, Provisions

Lecture 33 - Shear Behaviour of RC elements - Part 1

Lecture 34 - Shear Behaviour of RC elements - Part 2

Lecture 35 - Shear Behaviour of RC elements - Part 3

Lecture 36 - Shear Behaviour - Shear Design using IS 456 Provisions

Lecture 37 - Shear Behaviour - Examples for Shear Design using IS 456 Provisions

Lecture 38 - Shear Behaviour - Torsional Behaviour of RC elements - Part 1

Lecture 39 - Shear Behaviour - Torsional Behaviour of RC elements - Part 2

Lecture 40 - Shear Behaviour - Torsional Behaviour of RC elements - Part 3

Lecture 41 - Shear Behaviour - Torsion Design of RC Beams using IS 456 Provisions

Lecture 42 - Compression behaviour of RC Columns - Intro and Types - Part 1

Lecture 43 - Compression behaviour of RC Columns - Short vs Slender and Effective length - Part 2

Lecture 44 - Compression behaviour of RC Columns - Lateral Flexibility and Example - Part 3

Lecture 45 - Compression behaviour of RC Columns IS Code Provisions - Part 1

Lecture 46 - Compression behaviour of RC Columns Confinement and Tied Vs Spiral Confined Columns - Part 2

Lecture 47 - Compression behaviour of RC Columns - P-M Interaction : Theory

Lecture 48 - Compression behaviour of RC Columns - P-M Interaction : Example as per IS 456

Lecture 49 - Compression behaviour of Design of RC Columns for Biaxial Bending - Part 1

Lecture 50 - Compression behaviour of Design of RC Columns for Biaxial Bending - Part 2

Lecture 51 - Compression behaviour of Slender Column Design: Theory - Part 1

Lecture 52 - Compression behaviour of Slender Column Design: Example as per IS 456 - Part 2

Lecture 53 - Serviceability - Introduction to Deflection of RC Beam Part - 1

Lecture 54 - Serviceability - Introduction to Deflection of RC Beam Part - 2

Lecture 55 - Serviceability - Long term deflection and IS code Provisions

Lecture 56 - Serviceability - Numerical Example for the calculation of Deflection of RC beam

Lecture 57 - Crack width calculation - Theory - Part 1

Lecture 58 - Crack width Calculation - Example - Part 2

Lecture 59 - Serviceability - Design for Bond - Theory - Part 1

Lecture 60 - Serviceability - Design for Bond - Theory - Part 2

Lecture 61 - Serviceability - Design example for Bond and Splicing - Part 3

Lecture 62 - Two way slabs - Background

Lecture 63 - Two way slabs - Design Methods

Lecture 64 - Two way slabs - Direct Design Method - Part 1

Lecture 65 - Two way slabs - Direct Design Method - Part 2

Lecture 66 - Two way slabs - Equivalent Frame Method - Part 1

Lecture 67 - Two way slabs - Equivalent Frame Method (Example) - Part 2

NPTEL : NOC:Admixtures and Special Concretes (Civil Engineering)

Co-ordinators : Prof. Manu Santhanam

Lecture 1 - Overview of Cement Chemistry and concrete performance: Cement history and production

Lecture 2 - Overview of Cement Chemistry and concrete performance: Quality control and composition

Lecture 3 - Overview of Cement Chemistry: Composition of Cement and Classification of Cement

Lecture 4 - Overview of Cement Chemistry: Hydration of Cement

Lecture 5 - Overview of Concrete Performance: Curing and Hardened Concrete

Lecture 6 - Overview of Concrete Performance: Basics of Hardened Concrete

Lecture 7 - Chemical Admixtures: Introduction

Lecture 8 - Chemical Admixtures: Water reducers - Part 1

Lecture 9 - Chemical Admixtures: Water reducers - Part 2

Lecture 10 - Chemical Admixtures: Water reducers - Part 3

Lecture 11 - Chemical Admixtures: Water reducers - Part 4

Lecture 12 - Chemical Admixtures: Water reducers - Part 5

Lecture 13 - Chemical Admixtures: Water reducers - Part 6

Lecture 14 - Chemical Admixtures: Set controllers

Lecture 15 - Chemical Admixtures: Set controllers - Accelerators

Lecture 16 - Chemical Admixtures: Set controllers - Retarders

Lecture 17 - Chemical Admixtures: Standards

Lecture 18 - Chemical Admixtures: Air entrainers - Part 1

Lecture 19 - Chemical Admixtures: Air entrainers - Part 2

Lecture 20 - Chemical Admixtures: Understanding Concrete Rheology - Part 1

Lecture 21 - Chemical Admixtures: Understanding Concrete Rheology - Part 2

Lecture 22 - Chemical Admixtures: Viscosity Modifying Agents (VMA)

Lecture 23 - Chemical Admixtures: Mechanism of corrosion

Lecture 24 - Chemical Admixtures: Corrosion inhibitors, Shrinkage reducing admixtures

Lecture 25 - Chemical Admixtures: Other specialty admixtures

Lecture 26 - Chemical Admixtures: Curing compounds

Lecture 27 - Mineral Admixtures: Introduction

Lecture 28 - Mineral Admixtures: Types, Composition and Particle size distribution

Lecture 29 - Mineral Admixtures: Microstructure of SCMs and Pozzolonic reactions

Lecture 30 - Mineral Admixtures: Pozzolonic activity

Lecture 31 - Mineral Admixtures: Electrical Conductivity method, Frattini test and Lime saturation method

Lecture 32 - Mineral Admixtures: Strength Activity test, Lime reactivity test, Mixture Proportioning and R3 test

Lecture 33 - Mineral Admixtures: Flyash - Part 1: Introduction

Lecture 34 - Mineral Admixtures: Flyash - Part 2: Classification and structure

Lecture 35 - Mineral Admixtures: Flyash - Part 3: Effects on fresh concrete

Lecture 36 - Mineral Admixtures: Flyash - Part 4: Effects on hardened concrete

Lecture 37 - Mineral Admixtures: Silica fume - Part 1: Introduction

Lecture 38 - Mineral Admixtures: Silica fume - Part 2: Effects on fresh and hardened concrete

Lecture 39 - Mineral Admixtures: Silica fume - Part 3: Effects on Microstructure + GGBS - Part 1 : Introduction

Lecture 40 - Mineral Admixtures: GGBS - Part 2 : Properties

Lecture 41 - Mineral Admixtures: GGBS - Part 3 : Hydration of slag and Durability of slag cements

Lecture 42 - Mineral Admixtures: Metakaolin

Lecture 43 - Mineral Admixtures: LC3 - Part 1 : Introduction

Lecture 44 - Mineral Admixtures: LC3 - Part 2 : Comparision with other SCMs

Lecture 45 - Mineral Admixtures: LC3 - Part 3 : Durability Performance

Lecture 46 - Mineral Admixtures: Agricultural ashes - Part 1 : Sugarcane bagasse ash

Lecture 47 - Mineral Admixtures: Agricultural ashes - Part 2 : Rice husk ash

Lecture 48 - Mineral Admixtures: Calorimeter

Lecture 49 - Mineral Admixtures: Pore solution analysis

Lecture 50 - Mineral Admixtures: CASH analysis in blended system and Life cycle assessment of concrete - Part 1

Lecture 51 - Life cycle assessment of concrete - Part 2

Lecture 52 - Life cycle assessment of concrete - Part 3

Lecture 53 - Special concretes - High strength concrete - Definition, design and concept of particle packing

Lecture 54 - Special concretes - High strength concrete - Particle packing models

Lecture 55 - Special concretes - High strength concrete - Mix designs, strength and durability

Lecture 56 - Special concretes - High strength concrete - Design attributes, fresh and hardened properties

Lecture 57 - Special concretes - High strength concrete - Stress:strain relationships, applications

Lecture 58 - Special concretes - Ultra high performance concrete - Design principles, strength, durability

Lecture 59 - Special concretes: Self compacting concrete -Introduction, design requirements and plastic shrinkage

Lecture 60 - Special concretes: Self compacting concrete - Segregation and laboratory tests

Lecture 61 - Special concretes - Self Compacting Concrete - Workability test methods, classifications and issues

Lecture 62 - Special concretes - Self Compacting Concrete - Design principles, mix designs, concrete properties

Lecture 63 - Special concretes - Mass concrete - Introduction, materials, thermal cracking

Lecture 64 - Special concretes - Mass concrete - Design guidelines, temperature differential measurement

Lecture 65 - Special concretes - Mass concrete - Temperature differential measurement, Design

Lecture 66 - Special concretes - Mass concrete - Temperature monitoring, nomogram, minimizing restraints

Lecture 67 - Special concretes - Mass concrete - Heat modelling

Lecture 68 - Special concretes - Lightweight concrete - Introduction, classifications

Lecture 69 - Special concretes - Lightweight concrete - Foamed concrete, lightweight aggregates

Lecture 70 - Special concretes - Lightweight concrete - Light weigh aggregates, aerated concrete

Lecture 71 - Special concretes - High density concrete - Heavy weight aggregates, design, case stud

Lecture 72 - Special concretes - Concrete for 3D printing - Introduction, classification, printing process

Lecture 73 - Special concretes - Concrete for 3D printing - Developments, advantages, case study

Lecture 74 - Special concretes - Concrete for 3D printing - Critical parameters, yield stress

Lecture 75 - Special concretes - Concrete for 3D printing - Mix design approach, admixtures

Lecture 76 - Special concretes - Concrete for 3D printing - Failure modes, buildability, early-age beahaviour

NPTEL : NOC:Advanced Topics in Science and Technology of Concrete (Civil Engineering)

Co-ordinators : Prof. Ravindra Gettu, Prof. Manu Santhanam

Lecture 1 - Aggregates and their effects on concrete properties - Part 1

Lecture 2 - Aggregates and their effects on concrete properties - Part 2

Lecture 3 - An overview of recycled concrete aggregates (RCA): sources and types - Part 1

Lecture 4 - An overview of recycled concrete aggregates (RCA): sources and types - Part 2

Lecture 5 - Recycled Concrete Aggregate (RCA): Availability, Collection, and Processing Methods - Part 1

Lecture 6 - Recycled Concrete Aggregate (RCA): Availability, Collection, and Processing Methods - Part 2

Lecture 7 - Recycled Concrete Aggregates: Properties and Performance - Part 1

Lecture 8 - Recycled Concrete Aggregates: Properties and Performance - Part 2

Lecture 9 - Recycled Concrete Aggregates: Properties and Performance - Part 3

Lecture 10 - Recycled Concrete Aggregates: Properties and Performance - Part 4

Lecture 11 - Recycled Concrete Aggregates: Properties and Performance - Part 5

Lecture 12 - Effect of moisture condition on the microstructure and design of RCA concrete - Part 1

Lecture 13 - Effect of moisture condition on the microstructure and design of RCA concrete - Part 2

Lecture 14 - Overview and generation of recycled concrete fines

Lecture 15 - Utilisation of recycled concrete fines

Lecture 16 - Recycled Concrete Aggregates: Properties, Design, and Standards

Lecture 17 - Environmental impact and life cycle assessment (LCA) - Part 1

Lecture 18 - Environmental impact and life cycle assessment (LCA) - Part 2

Lecture 19 - Construction supply chains - Part 1

Lecture 20 - Construction supply chains - Part 2

Lecture 21 - Recycled concrete aggregates market: problems and prospects - Part 1

Lecture 22 - Recycled concrete aggregates market: problems and prospects - Part 2

NPTEL : NOC:An Introduction to Climate Dynamics, Variability and Monitoring (Civil Engineering)

Co-ordinators : Prof. Sayak Banerjee

Lecture 1 - Introduction to Climate Dynamics, Variability and Monitoring - Part 1

Lecture 2 - Introduction to Climate Dynamics, Variability and Monitoring - Part 2

Lecture 3 - Climatic Variables of the Atmosphere

Lecture 4 - Atmospheric Layers; Troposphere; Temperature Lapse Rate

Lecture 5 - Atmospheric Structure and Composition

Lecture 6 - Atmospheric Gas Concentration and introduction to Atmospheric Pressure

Lecture 7 - Atmospheric Pressure and Mass

Lecture 8 - How to Measure Vertical Variation of Pressure

Lecture 9 - Fundamentals of Atmospheric Humidity and Weather Variables

Lecture 10 - Advanced Atmospheric Humidity Concepts Contours and Key Relationships

Lecture 11 - Virtual Temperature and Atmospheric Stability Concepts

Lecture 12 - Understanding Atmospheric Stability Adiabatic Relations and Lapse Rate

Lecture 13 - Potential Temperature, Adiabatic Lapse Rate of Moist Air, Three Possible Stability Relationships

Lecture 14 - Derivation of Potential Temperature, Deriving the Expression for Saturated Adiabatic Lapse Rate

Lecture 15 - Temperature Variation With Changes in Vertical Pressure

Lecture 16 - Temperature Gradient of Dry and Saturated Air Parcel, Earth Sun Relationship

Lecture 17 - Fundamentals of Earth'S Climate System Latitude, Longitude, and Temperature Dynamics

Lecture 18 - Understanding Earth'S Seasons Axial Tilt, Solstice, and Equinox Dynamics

Lecture 19 - Mean Emission Temperature of Earth and the Greenhouse Effect - Part 1

Lecture 20 - Mean Emission Temperature of Earth and the Greenhouse Effect - Part 2

Lecture 21 - Mean Emission Temperature of Earth and the Greenhouse Effect - Part 3

Lecture 22 - Net Radiative Flux Imbalance Annual Averaged and Seasonal

Lecture 23 - Derivation of Beam Spreading Effect, Derivation of the Greenhouse Effect

Lecture 24 - Derivation of Analysing the Atmosphere of Venus, Radiation Fluxes

Lecture 25 - Principles of Electromagnetic Radiation Spectral Intensity, Irradiance, and Material Interactions

Lecture 26 - Blackbody Radiation Relations

Lecture 27 - Atmospheric Absorption and Radiative Transfer

Lecture 28 - 28 Radiative Transfer in the Atmosphere Key Concepts

Lecture 29 - Infrared Radiative Transfer in the Earth'S Atmosphere

Lecture 30 - Radiative Flux and Optical Depth

Lecture 31 - Introduction to Atmospheric Heating and Heat Balance

Lecture 32 - Advanced Atmospheric Heating and Heat Balance

Lecture 33 - Temperature Distribution for a Continuously Stratified Atmosphere in Radiative Equilibrium - Part 1

Lecture 34 - Temperature Distribution for a Continuously Stratified Atmosphere in Radiative Equilibrium - Part 2

Lecture 35 - Temperature Distribution and Greenhouse Effect in a Continuously Stratified Atmosphere

Lecture 36 - Atmospheric Circulation Systems - Basic Concepts

Lecture 37 - Atmospheric Circulation Systems - Coriolis Forces

Lecture 38 - Atmospheric Circulation Systems - Pressure Forces

Lecture 39 - Atmospheric Circulation Systems - Frictional Forces and Surface Level Winds

Lecture 40 - Atmospheric Circulation Systems - High Level Winds

Lecture 41 - Seasonal Shifts - Advanced Concepts

Lecture 42 - The Ocean and the Climate

Lecture 43 - Ocean Salinity and Mixing Layer

Lecture 44 - Importance of Mixing Layer and Wind Driven Surface Current

Lecture 45 - Ocean Circulation and Deep Oceanic thermohaline Circulation

Lecture 46 - Coupled Ocean Atmosphere Variability

Lecture 47 - Global Temperature Model, Radiative Forcing and Zero Dimensional Energy Balance Model

Lecture 48 - Zero Dimensional Energy Balance Model (Continued...)

Lecture 49 - Energy Balance Model and Temperature Responce to Radiative Forcing

Lecture 50 - Temperature Responce to Radiative Forcing (Continued...)

Lecture 51 - Planck Feedback or Blackbody Radiative Feedback, Simple Radiative Balance Model

Lecture 52 - Indirect Feedback: Water Vapour Feedback and Spectral Outgoing Longwave Radiation

Lecture 53 - Absorption of Outgoing Longwave Radiation By Atmospheric CO2

Lecture 54 - Introduction to Principles of Measurement and Instrumentation - Part 1

Lecture 55 - Introduction to Principles of Measurement and Instrumentation - Part 2

Lecture 56 - Introduction to Principles of Measurement and Instrumentation - Part 3

Lecture 57 - Automatic Weather Stations, Temperature Measurements and Humidity Measurements

Lecture 58 - Humidity Measurements and Pressure Measurements

Lecture 59 - Wind Measurements Techniques

Lecture 60 - Radiation and Temperature Measurements - Part 1

Lecture 61 - Radiation and Temperature Measurements - Part 2

Lecture 62 - Radiation and Precipitation Measurements

Lecture 63 - Upper Air Measurements

Lecture 64 - Remote Sensing: Climatological Applications

Lecture 65 - Types of Satellite Orbit and its Remote Sensing Applications, VNIR Imaging through Electro Optic

Lecture 66 - Spatial and Spectral Resolution of Satellite Imagery and Application of VNIR Imaging in Climatology

Lecture 67 - Application of VNIR Imaging in Climatology and Thermal Infrared Imaging Systems

Lecture 68 - Cloud Detection, Nadir Viewing, Limb Sounding, Solar Occultation

Lecture 69 - Ground Based Atmospheric Remote Sounding

NPTEL : NOC:Indoor Air Pollution: Sources, Effects, Monitoring, Control and Modeling (Civil Engineering)

Co-ordinators : Prof. Asif Qureshi

Lecture 1 - Introduction and Common Air Pollutants

Lecture 2 - Sources of indoor air pollutants - 1

Lecture 3 - Sources of indoor air pollutants - 2

Lecture 4 - Sources of indoor air pollutants - 3

Lecture 5 - Methods to estimate emissions

Lecture 6 - Mass balance

Lecture 7 - Mass balance Simple Examples

Lecture 8 - Residence times and Fractional losses

Lecture 9 - Multi-room (multi-box) models

Lecture 10 - Examples

Lecture 11 - Outdoor air as source to indoor air. Introduction

Lecture 12 - Outdoor air as source to indoor air. Infiltration, health

Lecture 13 - Indoor-Outdoor relationship

Lecture 14 - Air exchange and ventilation rates

Lecture 15 - Health-based ventialtion framework

Lecture 16 - Aerosol Basics

Lecture 17 - Aerosol Deposition

Lecture 18 - Coagulation, condensation and evaporation processes

Lecture 19 - Aerosol sources and aerosol properties

Lecture 20 - Indoor air chemistry: basics of chemical kinetics

Lecture 21 - Indoor air chemistry: some key reactions

Lecture 22 - Surface reactions

Lecture 23 - Examples

Lecture 24 - Bioaerosols in the Indoor Atmosphere: Introduction

Lecture 25 - Bioaerosols in the Indoor Atmosphere: Sources

Lecture 26 - Indoor bioaerosols and health impacts

Lecture 27 - Environmental factors and bioaerosols

Lecture 28 - Indoor air exposure risk assessment - principles

Lecture 29 - Calculation of daily dose

Lecture 30 - TIme-activity and inhalation risk assessment

Lecture 31 - Examples

Lecture 32 - Indoor air pollution monitoring of physico-chemical pollutants: Introduction and sampling methods

Lecture 33 - Indoor air pollution sampling and instruments

Lecture 34 - Indoor air pollutants analysis - 1

Lecture 35 - Indoor air pollutants analysis - 2

Lecture 36 - Indoor bioaerosol sampling methods - 1

Lecture 37 - Indoor bioaerosol sampling methods - 2

Lecture 38 - Methods for bioaerosol analysis - 1

Lecture 39 - Methods for bioaerosol analysis - 2

Lecture 40 - Guest lecture: Case study on comparison of two methdos for indoor bioaerosol sampling and analysis

Lecture 41 - Indoor Air Pollution/Quality in the Indian Context

Lecture 42 - Indoor Air Quality in India - Case studies 1

Lecture 43 - Indoor Air Quality in India - Case studies 2

Lecture 44 - Guest lecture: Case study on bioaerosols in Indian indoor environment

Lecture 45 - Indoor Air Quality in India - Overview and Gaps

Lecture 46 - Indoor air quality guidelines and control: Introduction

Lecture 47 - IAQ guidelines and control: Ventilation

Lecture 48 - IAQ control methods

Lecture 49 - Introduction to Contam

Lecture 50 - Indoor air pollution effects: sick building syndrome

Lecture 51 - Managing indoor air quality

Lecture 52 - Air pollution control methods

Lecture 53 - Modeling Example

NPTEL : Foundation Engineering (Civil Engineering)

Co-ordinators : Prof. Priti Maheswari, Prof. N.K. Samadhiya, Prof. Mahendra Singh

Lecture 1 - Shallow Foundation - 1

Lecture 2 - Shallow Foundation - 2

Lecture 3 - Shallow Foundation - 3

Lecture 4 - Shallow Foundation - 4

Lecture 5 - Shallow Foundation - 5

Lecture 6 - Shallow Foundation - 6

Lecture 7 - Shallow Foundation - 7

Lecture 8 - Lateral Earth pressure Theories Retaining Walls - 1

Lecture 9 - Lateral Earth pressure Theories Retaining Walls - 2

Lecture 10 - Lateral Earth pressure Theories Retaining Walls - 3

Lecture 11 - Lateral Earth Pressure Theories Retaining Walls - 4

Lecture 12 - Lateral Earth Pressure Theories Retaining Walls - 5

Lecture 13 - Pile Foundations - 1

Lecture 14 - Pile Foundations - 2

Lecture 15 - Pile Foundations - 3

Lecture 16 - Pile Foundations - 4

Lecture 17 - Pile Foundations - 5

Lecture 18 - Pile Foundations - 6

Lecture 19 - Pile Foundations - 7

Lecture 20 - Machine Foundations - 1

Lecture 21 - Machine Foundations - 2

Lecture 22 - Machine Foundations - 3

Lecture 23 - Machine Foundations - 4

Lecture 24 - Well Foundations - 1

Lecture 25 - Well Foundations - 2

Lecture 26 - Well Foundations - 3

Lecture 27 - Foundation Engineering - 1

Lecture 28 - Foundation Engineering - 2

Lecture 29 - Foundation Engineering - 3

Lecture 30 - Foundation Engineering - 4

Lecture 31 - Foundation Engineering - 5

Lecture 32 - Foundation Engineering - 6

Lecture 33 - Foundation Engineering - 7

Lecture 34 - Foundation Engineering - 8

Lecture 35 - Foundation Engineering - 9

Lecture 36 - Foundation Engineering - 10

Lecture 37 - Foundation Engineering - 11

Lecture 38 - Foundation Engineering - 12

Lecture 39 - Foundation Engineering - 13

Lecture 40 - Foundation Engineering - 14

NPTEL : Modern Surveying Techniques (Civil Engineering)

Co-ordinators : Prof. S.K. Ghosh

Lecture 1 - Geographic Information System An Introduction

Lecture 2 - Introduction to Global Positioning System

Lecture 3 - GPS Positioning Methods

Lecture 4 - GPS Solutions and Errors

Lecture 5 - GPS Application

Lecture 6 - Remote Sensing Introduction

Lecture 7 - Electromagnetic Spectrum

Lecture 8 - Sensors and Platform

Lecture 9 - Sensors and Platform

Lecture 10 - Image Interpretation

Lecture 11 - Statistical Evaluation of RS Data

Lecture 12 - Rectification and Restoration

Lecture 13 - Image Enhancement

Lecture 14 - Image Transformation

Lecture 15 - Orthogonal Transformation

Lecture 16 - Image Classification (Supervised Classification)

Lecture 17 - Image Classification (Unsupervised Classification)

Lecture 18 - Spatial Filtering-Noise Removal

Lecture 19 - Spatial Filtering-Edge Removal

Lecture 20 - Photogramatic-Basic concepts of a single photography

Lecture 21 - Stereoscopy-Basic concepts

Lecture 22 - Stereoscopy-Geometry of overlaping photograph

Lecture 23 - Terrestrial Photogrammetry

Lecture 24 - Digital Elevation Model-Basic Concepts

Lecture 25 - Digital Elevation Model-Data Input and Stamping

Lecture 26 - Digital Elevation Model-Surface representation and analysis

Lecture 27 - GIS-Introductory Concepts

Lecture 28 - GIS-Data Input

Lecture 29 - Data Verification and Editing

Lecture 30 - GIS Data Model

Lecture 31 - GIS Data Base

Lecture 32 - Spatial Analysis

Lecture 33 - Map Overlay and Spatial Correlation

Lecture 34 - Application to Drought Management

Lecture 35 - GIS base planning model for educational facilities in rural areas

Lecture 36 - Application extraction of building attributes

Lecture 37 - Zonal based tourism planning

Lecture 38 - Zonal Planning using remote sensing

Lecture 39 - Municipal GIS for assassment of property tax

Lecture 40 - Application of remote sensing

NPTEL : Transportation Engineering II (Civil Engineering)

Co-ordinators : Prof. Rajat Rastogi

Lecture 1 - Introduction to Railway Engineering

Lecture 2 - Gauges and Permanent Way

Lecture 3 - Wheel and Axles, Coning of Wheels

Lecture 4 - Track Resistances, Hauling Capacity

Lecture 5 - Track Modulus, Stresses in Track

Lecture 6 - Stresses in Components of Track

Lecture 7 - Rails

Lecture 8 - Creep in Rails

Lecture 9 - Wears & Failures in Rails

Lecture 10 - Jointed or Welded rails

Lecture 11 - Sleepers

Lecture 12 - Ballast

Lecture 13 - Fastenings

Lecture 14 - Geometric Design - Alignment of Track

Lecture 15 - Horizontal Curve and Super elevation

Lecture 16 - Speeds on Track

Lecture 17 - Transition Curve & Widening of Track

Lecture 18 - Vertical Curve & Gradients

Lecture 19 - Turnouts - Components

Lecture 20 - Crossing and Design of Turnout

Lecture 21 - Track Junctions and Designs

Lecture 22 - Signals - Part 1

Lecture 23 - Signals - Part 2

Lecture 24 - Train Control Systems

Lecture 25 - Interlocking of Track

Lecture 26 - High Speed Tracks

Lecture 27 - Introduction of Air Transport

Lecture 28 - Aircraft Characteristics

Lecture 29 - Aircraft Controls, Airport Site&Size Selection

Lecture 30 - Airport Obstructions

Lecture 31 - Runway Orientation

Lecture 32 - Runway Length

Lecture 33 - Runway Geometric

Lecture 34 - Taxiway

Lecture 35 - Exit Taxiway

Lecture 36 - Aprons and Aircraft Parking

Lecture 37 - Terminal Area and Building

Lecture 38 - Terminal Planning and Hangers

Lecture 39 - Visual Aids-Markings

Lecture 40 - Visual Aids-Lighting and Signage

NPTEL : NOC:Introduction to Geographic Information Systems (Civil Engineering)

Co-ordinators : Dr.Arun K.Saraf

Lecture 1 - What is Geographic Information Systems ?

Lecture 2 - Different components of GIS

Lecture 3 - Different types of vector data and concept of topology

Lecture 4 - Raster data models and comparisons with vector

Lecture 5 - TIN data model and comparisons with raster

Lecture 6 - Non-spatial data (attributes) and their type

Lecture 7 - Raster data compression techniques

Lecture 8 - Spatial database systems and their types

Lecture 9 - Pre-processing of spatial datasets

Lecture 10 - Geo-referencing

Lecture 11 - Different map projections

Lecture 12 - Spatial interpolation techniques

Lecture 13 - Digital Elevation Models and different types of resolutions

Lecture 14 - Quality assessment of freely available DEMS

Lecture 15 - GIS analysis - Part 1

Lecture 16 - GIS analysis - Part 2 (Overlaying Operations)

Lecture 17 - GIS analysis - Part 3 (Buffer Analysis)

Lecture 18 - Classification Methods

Lecture 19 - Errors in GIS and Key elements of maps

Lecture 20 - Limitations of GIS

NPTEL : NOC:Principles and Applications of Building Science (Civil Engineering)

Co-ordinators : Dr. E. Rajasekar

Lecture 1 - Solar Geometry

Lecture 2 - Climate Classification

Lecture 3 - Thermal Comfort in Built Environment - 1

Lecture 4 - Thermal Comfort in Built Environment - 2

Lecture 5 - Thermal Adaptation

Lecture 6 - Bioclimatic Assessment

Lecture 7 - Thermal Performance of Building Envelop

Lecture 8 - Thermal Performance of Building Envelop - Indices and Measures (1/2)

Lecture 9 - Thermal Performance of Building Envelop - Indices and Measures (2/2)

Lecture 10 - Glazing and Shading Systems

Lecture 11 - Shading Analysis

Lecture 12 - Energy Efficiency and Simulation

Lecture 13 - Building Acoustics - Basics

Lecture 14 - Sound Propagation

Lecture 15 - Acoustic Quality Indicators (1/2)

Lecture 16 - Acoustic Quality Indicators (2/2)

Lecture 17 - Acoustic Design Considerations

Lecture 18 - Acoustic Materials

Lecture 19 - Lighting - Basics

Lecture 20 - Lighting Â– Design Concepts

NPTEL : NOC:GPS Surveying (Civil Engineering)

Co-ordinators : Dr.Jayanta Kumar Ghosh

Lecture 1 - Introduction (GPS Surveying and Applications)

Lecture 2 - GPS System

Lecture 3 - GPS Signal (Civilian Perspective)

Lecture 4 - GPS Receiver

Lecture 5 - GPS Software

Lecture 6 - GPS Position

Lecture 7 - GPS Positioning (Principle and Methods)

Lecture 8 - Field demonstration of GPS Positioning Method

Lecture 9 - GPS Observables (Types, Errors and Quality)

Lecture 10 - Errors in GPS Observables (Systematics Errors)

Lecture 11 - GPS Data Pre-Processing - I

Lecture 12 - GPS Data Pre-Processing - II

Lecture 13 - GPS Data Processing - I

Lecture 14 - GPS Data Processing - II

Lecture 15 - Quality Assessment of GPS Surveying

Lecture 16 - Procedure of GPS Surveying - I

Lecture 17 - Procedure of GPS Surveying - II

Lecture 18 - Procedure of GPS Surveying - III

Lecture 19 - GPS Field Surveying

Lecture 20 - GPS Data Processing

NPTEL : NOC:Digital Land Surveying And Mapping (Civil Engineering)

Co-ordinators : Prof. Jayanta Kumar Ghosh

Lecture 1 - Introduction and Applications

Lecture 2 - Fundamentals and Operations

Lecture 3 - Overview of Digital Land Surveying

Lecture 4 - Introduction of GPS

Lecture 5 - GPS Signal (Civilian Perspective)

Lecture 6 - GPS User Segment

Lecture 7 - GPS Positioning of Control Point

Lecture 8 - Demonstration of GPS Receivers, Software and Positioning of Control Point

Lecture 9 - GPS Position

Lecture 10 - Principle of GPS Positioning and GPS Observables

Lecture 11 - Errors in GPS Observables

Lecture 12 - GPS Data Pre-processing: Differencing

Lecture 13 - GPS Data Pre-processing: Point Positioning

Lecture 14 - GPS Data Processing: Baseline Processing

Lecture 15 - GPS Data Processing: Network Adjustment

Lecture 16 - Quality Assessment of GPS Surveying

Lecture 17 - Introduction to Total Station

Lecture 18 - Parts of Total Station

Lecture 19 - Accessories of Total Station

Lecture 20 - Handling and Setting of Total Station

Lecture 21 - Measurement of Distance

Lecture 22 - Measurement of Distance Using TS

Lecture 23 - Measurement of Horizontal Angle Using TS

Lecture 24 - Measurement of Vertical Angle and Height Using TS

Lecture 25 - Errors in Total Station

Lecture 26 - Other Errors in Total Station

Lecture 27 - Errors and Quality of Surveying Measurements

Lecture 28 - Error Propagation and Survey Specifications

Lecture 29 - Basics of Vertical Representation

Lecture 30 - Contouring

Lecture 31 - Mapping Fundamentals

Lecture 32 - Mapping Basics

Lecture 33 - Mapping Software

Lecture 34 - Automated Mapping

Lecture 35 - Working Steps

Lecture 36 - Establishment of Control Point

Lecture 37 - Detailing of Digital Land Surveying

Lecture 38 - Demonstration of Digital Land Survey Detailing

Lecture 39 - Data Preparation and Map Making

Lecture 40 - Overview of the Course

NPTEL : NOC:Digital Image Processing of Remote Sensing Data (Civil Engineering)

Co-ordinators : Dr.Arun K.Saraf

Lecture 1 - Remote-sensing Image and How it is represented

Lecture 2 - Different Techniques of Image Acquisition

Lecture 3 - Why is Digital Image processing Important ?

Lecture 4 - Image characteristics and Different Resolutions in Remote Sensing

Lecture 5 - Electromagnetic spectrum, solar reflection, and thermal emission

Lecture 6 - Color Representation and Transformations

Lecture 7 - Image histograms and statistics

Lecture 8 - Geo-referencing Techniques

Lecture 9 - Image Enhancement Techniques part 1

Lecture 10 - Image Enhancement Techniques part 2

Lecture 11 - Multispectral Transform, Scatter Plot, Principal Component Analysis and Decorrelation Stretch

Lecture 12 - Spatial Filtering Techniques

Lecture 13 - Frequency Domain Fourier Transformation

Lecture 14 - Basic Image Compression Techniques and Different Image File Formats

Lecture 15 - Image Classification Techniques

Lecture 16 - Principles of Image Interpretation

Lecture 17 - SAR Interferometry (InSAR) Techniques

Lecture 18 - Image Merging and Image Mosaicing Techniques

Lecture 19 - Application of Image Analysis

Lecture 20 - Limitations and Future of Digital Image Processing

NPTEL : NOC:Applied Environmental Microbiology (Civil Engineering)

Co-ordinators : Dr. Gargi Singh

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Cell Structure - I

Lecture 4 - Cell Structure - II

Lecture 5 - Central Dogma - I

Lecture 6 - Central Dogma - II

Lecture 7 - Microbial Energetics - I

Lecture 8 - Microbial Energetics - II

Lecture 9 - Microbial Energetics - III

Lecture 10 - Microbial Energetics - IV

Lecture 11 - Microbial Metabolism - I

Lecture 12 - Microbial Metabolism - II

Lecture 13 - Functional Diversity of Bacteria - I

Lecture 14 - Functional Diversity of Bacteria - II

Lecture 15 - Functional Diversity of Bacteria - III

Lecture 16 - Microbial Ecosystem - I

Lecture 17 - Microbial Ecosystem - II

Lecture 18 - Microbial Ecosystem - III

Lecture 19 - Microbial Ecosystem - IV

Lecture 20 - Microbial Ecosystem - V

Lecture 21 - Environmental Genomics - I

Lecture 22 - Environmental Genomics - II

Lecture 23 - Environmental Genomics - III

Lecture 24 - Environmental Genomics - IV

Lecture 25 - Environmental Genomics - V

Lecture 26 - Microbial Symbiosis - I

Lecture 27 - Microbial Symbiosis - II

Lecture 28 - Virus - I

Lecture 29 - Virus - II

Lecture 30 - Applied Environmental Microbiology

Lecture 31 - Techniques in Environmental Microbiology - I

Lecture 32 - Techniques in Environmental Microbiology - II

Lecture 33 - Bioremediation - I

Lecture 34 - Bioremediation - II

Lecture 35 - Bioremediation - III

Lecture 36 - Wastewater Microbiology - I

Lecture 37 - Wastewater Microbiology - II

Lecture 38 - Built Microbiology

Lecture 39 - Exposomes - I

Lecture 40 - Exposomes - II

Lecture 41 - Drinking Water Microbiology - I

Lecture 42 - Drinking Water Microbiology - II

Lecture 43 - Drinking Water Microbiology - III

Lecture 44 - Drinking Water Microbiology - IV

Lecture 45 - Drinking Water Microbiology - V

Lecture 46 - Solid Waste Microbiology - I

Lecture 47 - Solid Waste Microbiology - II

Lecture 48 - Solid Waste Microbiology - III

Lecture 49 - Antimicrobial Resistance - I

Lecture 50 - Antimicrobial Resistance - II

Lecture 51 - Epidemiology - I

Lecture 52 - Epidemiology - II

Lecture 53 - Biosensors - I

Lecture 54 - Biosensors - II

Lecture 55 - Biosensors - III

Lecture 56 - Bioinformatics - I

Lecture 57 - Bioinformatics - II

Lecture 58 - Bioinformatics - III

Lecture 59 - Bioinformatics - IV

Lecture 60 - Bioinformatics - V

NPTEL : NOC:Digital Elevation Models and Applications (Civil Engineering)

Co-ordinators : Prof. Arun K. Saraf

Lecture 1 - Concept of Digital Elevation Model and How It Is Represented

Lecture 2 - Various Techniques to Generate Digital Elevation Model - 1

Lecture 3 - Various Techniques to Generate Digital Elevation Model - 2

Lecture 4 - Various Techniques to Generate Digital Elevation Model - 3

Lecture 5 - Importance of Spatial Resolution With DEMs

Lecture 6 - How To Assess Quality of DEM?

Lecture 7 - Integration of DEMs With Satellite Data

Lecture 8 - Common Derivatives of DEMs- Slope and Aspect

Lecture 9 - Triangulated Irregular Network (TIN) and Its Derivatives

Lecture 10 - Shaded Relief Models and Thier Applications

Lecture 11 - DEMs Derivatives - 1

Lecture 12 - DEMs Derivatives - 2

Lecture 13 - DEMs Derivatives - 3

Lecture 14 - DEMs Derivatives - 4

Lecture 15 - DEM Based Surface Hydrologic Modelling - 1

Lecture 16 - DEM Based Surface Hydrologic Modelling - 2

Lecture 17 - DEM and DAM Simulation and Its Application In Ground Water Hydrology

Lecture 18 - Applications of DEMs In Solar and Wind Energy Potential Estimations

Lecture 19 - Applications of DEMs in Viewshed and Flood Hazard Mapping

Lecture 20 - DEMs Sources, Limitations and Future of Digital Elevation Models

NPTEL : NOC:Environmental Engineering-Chemical Processes (Civil Engineering)

Co-ordinators : Prof. Bhanu Prakash Vellanki

Lecture 1 - Introduction, Fundamentals of Equilibrium and Kinetics

Lecture 2 - Equilibrium-Process Feasibility, Gibbs Energy-Standard Condition

Lecture 3 - Gibbs Free Energy-Non Standard Conditions - I

Lecture 4 - Gibbs Free Energy-Non Standard Conditions - II

Lecture 5 - Phase Equilibrium

Lecture 6 - Component Balance

Lecture 7 - Reaction Kinetics

Lecture 8 - Rate of Reaction - I

Lecture 9 - Rate of Reaction - II, Types of Reactors

Lecture 10 - Mass Balance on different types of Reactors

Lecture 11 - Material Balance for Complex Reactions

Lecture 12 - Material Balance for Reversible Reactions

Lecture 13 - Determination of Kinetic Equations

Lecture 14 - Acid-Base Reactions

Lecture 15 - Acid Dissociation Constant, Strength of Acid

Lecture 16 - Ionization Fractions

Lecture 17 - Introduction to VMINTEQ

Lecture 18 - Estimation of pH using VMINTEQ

Lecture 19 - Mixing Problems

Lecture 20 - Inverse Dose Problems

Lecture 21 - logC-pH Diagram

Lecture 22 - Carbonate System: Closed System

Lecture 23 - Carbonate System: Open System

Lecture 24 - VMINTEQ: Application of Gases, Acid-Base Titration

Lecture 25 - VMINTEQ: Titration and Multisweeep, Buffer: Introduction

Lecture 26 - VMINTEQ: Buffer System, Buffer Intensity: Introduction

Lecture 27 - Buffer Intensity: Monoprotic and Diprotic Acids

Lecture 28 - Alkalinity: Introduction

Lecture 29 - Alkalinity: Theoretical and Practical Definition

Lecture 30 - Acidity and its Applications

Lecture 31 - Alkalinity and Acidity: Applications

Lecture 32 - Mixing of Two Solutions and Conservative Quantities - I

Lecture 33 - Mixing of Two Solutions and Conservative Quantities - II

Lecture 34 - Carbonate and Non-Carbonate Alkalinity

Lecture 35 - Anaerobic Digester: Acid Formation and Neutralization

Lecture 36 - Aqueous Complexes: Applications in Toxicity Reduction

Lecture 37 - Aqueous Complexes: Solubility, Rate Constants and Strength of Ligands

Lecture 38 - Aqueous Complexes of Aluminium (Al)

Lecture 39 - Aqueous Complexes of Mercury (Hg)

Lecture 40 - Precipitation and Dissolution: Introduction and Applications

Lecture 41 - Applications of Precipitation and Dissolution

Lecture 42 - Different Stages in Precipitation, Equilibrium of Precipitation - I

Lecture 43 - Equilibrium of Precipitation - II

Lecture 44 - Examples Related to Equilibrium of Precipitation

Lecture 45 - Other Examples of Equilibrium of Precipitation

Lecture 46 - Solubility and Competitive Precipitation

Lecture 47 - Predominance Area Diagram and Introduction to Redox Processes

Lecture 48 - Redox Reactions and its Applications

Lecture 49 - Balancing of Redox and Development of Half Reaction

Lecture 50 - Kinetics of Redox Processes

Lecture 51 - Equilibrium of Redox - I

Lecture 52 - Equilibrium of Redox - II and Reaction Feasibility

Lecture 53 - Reaction Feasibility Based on Pe - I

Lecture 54 - Reaction Feasibility Based on Pe - II

Lecture 55 - Effect of Complexation on Redox

Lecture 56 - Effect of Complexation and Solid Phase on Redox

Lecture 57 - Reaction Feasibility based on Eh

Lecture 58 - Introduction to Electrochemical cell (Ecell)

Lecture 59 - Applications of Ecell

Lecture 60 - logC-Pe and pH-Pe Diagram

NPTEL : NOC:Environmental Remediation of Contaminated Sites (Civil Engineering)

Co-ordinators : Prof. Bhanu Prakash Vellanki, Prof. Thomas Boving

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Course Outline

Lecture 4 - Introduction to hazardous waste laws and risk assessment

Lecture 5 - The major aspects of Risk Assessment

Lecture 6 - Risk Characterization

Lecture 7 - Risk Assessment - Deterministic approach

Lecture 8 - Risk Assessment - Stochastic Approach

Lecture 9 - Hazardous Waste laws - The TCLP Test

Lecture 10 - Hazardous rules and regulations

Lecture 11 - Remediation of contaminated GW-Plume Containment

Lecture 12 - Remediation of contaminated GW-Javendel et alÃ¢â‚¬â„¢s approach

Lecture 13 - Remediation of contaminated GW by Pump and Treat - I

Lecture 14 - Remediation of contaminated GW by Pump and Treat - II

Lecture 15 - Remediation of contaminated GW- Calculation of remediation time and introduction to source control

Lecture 16 - Permeable Reactive Barriers - I

Lecture 17 - Permeable Reactive Barriers - II

Lecture 18 - Permeable Reactive Barriers - III

Lecture 19 - Design of Permeable Reactive Barriers

Lecture 20 - Case Study on Permeable Reactive Barriers - I

Lecture 21 - Case Study on Permeable Reactive Barriers - II

Lecture 22 - Case Study- PRB (Utah)

Lecture 23 - Case Study (Utah) (Continued...)

Lecture 24 - Mechanism of natural attenuation and the affecting factors

Lecture 25 - Introduction to natural attenuation and its types

Lecture 26 - Pathways of Contaminant Transport and Rate of Degradation of Contaminant

Lecture 27 - Rate of Degradation of Contaminant when advection is considered

Lecture 28 - Rate of Degradation of Contaminant when both diffusion and advection are considered

Lecture 29 - Example of Rate of Degradation in natural attenuation

Lecture 30 - Case study: Natural Attenuation

Lecture 31 - Results of Case Study: Natural Attenuation

Lecture 32 - Introduction of Soil/Sediments contamination with some examples

Lecture 33 - Case Study: Soil/Sediments Contamination and remediation by Excavation and Disposal

Lecture 34 - Hazardous waste disposal site/TSDF

Lecture 35 - Different type of fluxes through containment barrier

Lecture 36 - Introduction to Solidification and Stabilisation and Case Study

Lecture 37 - Different contaminant reactions during solidification and stabilisation

Lecture 38 - Diffusion of contaminant through solidified form

Lecture 39 - Calculations for fractions of binders, admixtures, waste and water used in solidification

Lecture 40 - Discussion of TCLP approach in solidification and its examples

Lecture 41 - Discussion of TCLP approach (contd.) and Cost estimation of Solidification

Lecture 42 - Case Study: Solidification and Stabilization

Lecture 43 - Chemical Treatment

Lecture 44 - Case Study: In-Situ Chemical Oxidation - Part I

Lecture 45 - Case Study: In-Situ Chemical Oxidation - Part II

Lecture 46 - Case Study: In-Situ Chemical Oxidation - Part III

Lecture 47 - Surfactant Extraction - Part I

Lecture 48 - Surfactant Extraction - Part II

Lecture 49 - Case Study: Surfactant Extraction - Part I

Lecture 50 - Case Study: Surfactant Extraction - Part II

Lecture 51 - Soil Vapor Extraction - Part I

Lecture 52 - Soil Vapor Extraction - Part II

Lecture 53 - Bioremediation - Part I

Lecture 54 - Bioremediation - Part II

Lecture 55 - Case Study: Bioremediation

Lecture 56 - Case Study: Soil Vapor Extraction - Part I

Lecture 57 - Case Study: Soil Vapor Extraction - Part II

Lecture 58 - Phyto-remediation

Lecture 59 - Conceptual Site Model

Lecture 60 - Adaptive Design in Remediation Engineering

Lecture 61 - Solubilization Theory - Part I

Lecture 62 - Solubilization Theory - Part II

Lecture 63 - Enhanced Aquifer Flushing Technologies

NPTEL : NOC:Global Navigation Satellite Systems and Applications (Civil Engineering)

Co-ordinators : Prof. Arun K. Saraf

Lecture 1 - Introduction to Global Navigation Satellite System (GNSS)

Lecture 2 - How position is determined by the GNSS? - Part I

Lecture 3 - How position is determined by the GNSS? - Part II

Lecture 4 - How position is determined by the GNSS? - Part III

Lecture 5 - NAVSTAR - Global Positioning System

Lecture 6 - Global Navigation Satellite System (GLONASS)

Lecture 7 - BeiDou Navigation Satellite System (BDS)

Lecture 8 - Indian Regional Navigation Satellite System (IRNSS)

Lecture 9 - GALILEO

Lecture 10 - Quasi-Zenith Satellite System (QZSS)

Lecture 11 - Differential Global Navigation Satellite System (DGNSS)

Lecture 12 - Real-Time Kinematic (RTK)

Lecture 13 - Satellite Based Augmentation System (SBAS)

Lecture 14 - GNSS Errors

Lecture 15 - GNSS Correction Methods

Lecture 16 - Why altitude estimated by GNSS receivers is not very accurate

Lecture 17 - Global Navigation Satellite Systems (GNSS) Applications - I

Lecture 18 - Global Navigation Satellite Systems (GNSS) Applications - II

Lecture 19 - GNSS: Current Trends and Future

Lecture 20 - GNSS: Opportunities in India

NPTEL : NOC:Geomorphology (Civil Engineering)

Co-ordinators : Prof. Pitambar Pati

Lecture 1 - Introduction to Geomorphology and Concept of Time Scale in a Geomorphic System

Lecture 2 - Process of Landform Development

Lecture 3 - Energy Flow in Geomorphic System and Role of Uniformitarianism Vs Catastrophism

Lecture 4 - Landform Development - Equilibrium and Evolution

Lecture 5 - Process Geomorphology - I

Lecture 6 - Process Geomorphology - II

Lecture 7 - Weathering and soil Formation Introduction - I

Lecture 8 - Weathering and soil Formation Introduction - II

Lecture 9 - Weathering and Soil Formation (Types of Weathering)

Lecture 10 - Weathering and Soil Formation (Mechanical Weathering)

Lecture 11 - Weathering and Soil Formation (Mechanical and Chemical Weathering)

Lecture 12 - Weathering and Soil Formation (Chemical and Biological Weathering)

Lecture 13 - Weathering of Silicate rocks and Weathering Products

Lecture 14 - Factors of Weathering

Lecture 15 - Soil Formation

Lecture 16 - Soil Formation Processes

Lecture 17 - Soil Classification

Lecture 18 - Mass Wasting

Lecture 19 - Classification of Mass Wasting - I

Lecture 20 - Classification of Mass Wasting - II

Lecture 21 - Hill Slope Evolution - I

Lecture 22 - Hill Slope Evolution - II

Lecture 23 - Arid Zone Geomorphology

Lecture 24 - Landforms in Dry Region

Lecture 25 - Pediment Evolution

Lecture 26 - Aeolian Processes and Landforms - I

Lecture 27 - Aeolian Processes and Landforms - II

Lecture 28 - Wind Erosional Landforms - I

Lecture 29 - Wind Erosional Landforms - II

Lecture 30 - Dune Classification - I

Lecture 31 - Dune Classification - II

Lecture 32 - Coastal Geomorphology - I

Lecture 33 - Coastal Geomorphology and Landforms

Lecture 34 - Coastal Geomorphology - II

Lecture 35 - Coastal Geomorphology - III

Lecture 36 - Shoreline Platform

Lecture 37 - Coastal Geomorphology - IV

Lecture 38 - Coastal Geomorphology - V

Lecture 39 - Coastal Geomorphology - VI

Lecture 40 - Coastal Geomorphology - VII

Lecture 41 - Coastal Geomorphology - VIII

Lecture 42 - Coastal Geomorphology - IX

Lecture 43 - Tectonic Geomorphology

Lecture 44 - Fluvial Process

Lecture 45 - Fluvial Process - I

Lecture 46 - Fluvial Process - II

Lecture 47 - Fluvial Process - III

Lecture 48 - Fluvial Process - IV

Lecture 49 - Fluvial Process - V and Drainage Analysis

Lecture 50 - Fluvial Process - VI and Drainage Analysis

Lecture 51 - Fluvial Geomorphology River System - I

Lecture 52 - Fluvial Geomorphology River System - II

Lecture 53 - Glacial Geomorphology - I

Lecture 54 - Glacial Geomorphology - II (Valley Glacier)

Lecture 55 - Glacial Geomorphology - III

Lecture 56 - Glacial Geomorphology - IV (Geomorphic Changes by Glacier)

Lecture 57 - Exploration Geomorphology in Oil field Sandbody Geometry - I

Lecture 58 - Exploration Geomorphology in Oil Field Sandbody Geometry - II

Lecture 59 - Seismic Geomorphology - I

Lecture 60 - Seismic Geomorphology - II

NPTEL : NOC:Remote Sensing Essentials (Civil Engineering)

Co-ordinators : Dr.Arun K.Saraf

Lecture 1 - Rudiments of Remote Sensing and Advantages

Lecture 2 - Historical Perspective of development of remote sensing technology

Lecture 3 - EM spectrum, solar reflection and thermal emission

Lecture 4 - Interaction of EM radiation with atmosphere including atmospheric scattering, absorption and emission

Lecture 5 - Interaction mechanisms of EM radiation with ground, spectral response curves

Lecture 6 - Laws of Radiation and their relevance in Remote Sensing

Lecture 7 - Basis of remote sensing image representation

Lecture 8 - Various Remote Sensing Platforms

Lecture 9 - Multi-spectral scanners and imaging devices

Lecture 10 - Significant characteristics of LANDSAT, SPOT, Sentinel sensors

Lecture 11 - Prominent characteristics of IRS, Cartosat, ResourceSat sensors

Lecture 12 - Unmanned Aerial Vehicle/Drone

Lecture 13 - Passive Microwave Remote Sensing

Lecture 14 - Image characteristics and different resolutions in Remote Sensing

Lecture 15 - Different techniques of Image acquisition

Lecture 16 - Importance of digital image processing

Lecture 17 - Digital Image Processing Software

Lecture 18 - Basic image enhancement techniques

Lecture 19 - Colour representations and transformtions

Lecture 20 - Image Histograms and statistics

Lecture 21 - Atmospheric errors and corrections

Lecture 22 - Geometric transformations/Geo-referencing Technique

Lecture 23 - Digital Image Processing Software Demonstration - 1

Lecture 24 - Image enhancement techniques - 1

Lecture 25 - Image enhancement techniques - 2

Lecture 26 - Digital Image Processing Software Demonstration - 2

Lecture 27 - Spatial Filtering Techniques, Band rationing and PCA

Lecture 28 - Frequency Doman Fourier Transformation

Lecture 29 - Digital Image Processing Software Demonstration - 3

Lecture 30 - Unsupervised image classification and density slicing techniques

Lecture 31 - Supervised image classification techniques and limitations

Lecture 32 - Digital Image Processing Software Demonstration - 4

Lecture 33 - LiDAR Technique and applications

Lecture 34 - Mosaicking, subsets, sub-sampling techniques and applications

Lecture 35 - False Topographic Phenomena and correction techniques - 1

Lecture 36 - False Topographic Phenomena and correction techniques - 2

Lecture 37 - High Spatial Resolution Satellite Images and limitations

Lecture 38 - Basic Image Compression techniques and different image file formats

Lecture 39 - Hyperspectral Remote Sensing

Lecture 40 - Digital Image vs Digital Photograph

Lecture 41 - NDVI and other indices

Lecture 42 - Active Microwave Remote Sensing - 1

Lecture 43 - Active Microwave Remote Sensing - 2

Lecture 44 - Radar Images interpretation and applications

Lecture 45 - SAR Interferometry (InSAR) Technique - 1

Lecture 46 - SAR Interferometry (InSAR) Technique - 2

Lecture 47 - Principles of image interpretation

Lecture 48 - Image interpretation of different geological landforms, rock types and structures

Lecture 49 - Remote Sensing of Moon and Mars

Lecture 50 - Google Earth and its Applications

Lecture 51 - Integrated applications of RS and GIS in groundwater studies - 1

Lecture 52 - Integrated applications of RS and GIS in groundwater studies - 2

Lecture 53 - Applications of Remote Sensing in Earthquake Studies - 1

Lecture 54 - Applications of Remote Sensing in Earthquake Studies - 2

Lecture 55 - Different sources of free satellite images

Lecture 56 - Limitations of Remote Sensing Techniques

NPTEL : NOC:Earthquake Resistant Design of Foundations (Civil Engineering)

Co-ordinators : Prof. B. K. Maheshwari

Lecture 1 - Introduction

Lecture 2 - Shallow Foundations: General Requirements

Lecture 3 - Shallow Foundations: Bearing Capacity

Lecture 4 - Shallow Foundations: Settlement

Lecture 5 - Shallow Foundations: Numerical Examples

Lecture 6 - Combined Footings

Lecture 7 - Raft Foundations: General Requirements

Lecture 8 - Raft Foundations: Methods of Analysis

Lecture 9 - Footings under Dynamic Loads: Eccentric and Inclined Loads, A New Method

Lecture 10 - Footings under Dynamic Loads: Design Procedure and Example on a New Method

Lecture 11 - Footings under Dynamic Loads: Analytical Approaches

Lecture 12 - Footings under Dynamic Loads: Numerical on Analytical Approaches

Lecture 13 - Pile Foundations subjected to Static Vertical Load

Lecture 14 - Pile Foundations: Group Action of Piles and Numerical

Lecture 15 - Pile Foundations under Lateral Loads: Conventional and Elastic Methods

Lecture 16 - Pile Foundations under Lateral Loads: Elastic Method for Cohesionless Soils

Lecture 17 - Pile Foundations under Lateral Loads: Elastic Method for Cohesive Soils including degradation of modulus of subgrade reaction (k)

Lecture 18 - Pile Foundations under Lateral Loads: Numerical Examples

Lecture 19 - Dynamic Analysis of Piles under Vertical and Horizontal Vibrations

Lecture 20 - Dynamic Analysis of Piles under Horizontal Vibration: Continue with Numerical Example

Lecture 21 - Seismic Response of Pile Foundations - 1

Lecture 22 - Seismic Response of Pile Foundations - 2

Lecture 23 - Combined Pile-Raft Foundations (CPRF) - General

Lecture 24 - Geotechnical and Seismic Analyses of CPRF

Lecture 25 - Design of Piles in Liquefiable Soils - 1

Lecture 26 - Design of Piles in Liquefiable Soils - 2

Lecture 27 - Introduction to Well Foundations

Lecture 28 - Lateral Stability of Well Foundations

Lecture 29 - Lateral Stability, Construction and Sinking of Well Foundation

Lecture 30 - Titling and Shifting of Wells, Numerical Problems

Lecture 31 - Introduction to Soil-Structure Interaction

Lecture 32 - Effects of Soil-Structure Interaction

Lecture 33 - SGM and Wave Propagation

Lecture 34 - Dispersion, Attenuation of Waves and Damping

Lecture 35 - Ground Response Analysis (GRA)

Lecture 36 - Soil-Pile Interaction (SPI)

Lecture 37 - Raft Foundations â€“ Numerical Examples

Lecture 38 - Foundations on Slopes - 1

Lecture 39 - Foundations on Slopes - 2

Lecture 40 - Codal Provisions

NPTEL : NOC:Geographic Information Systems (Civil Engineering)

Co-ordinators : Prof. Arun K. Saraf

Lecture 1 - What is Geographic Information Systems ?

Lecture 2 - Essential Components of GIS

Lecture 3 - Different types of vector data

Lecture 4 - Concept of topology

Lecture 5 - Demonstration through GIS software

Lecture 6 - Raster data model and comparisons with vector

Lecture 7 - TIN data model and comparisons with raster

Lecture 8 - Non-spatial data (attributes) and their types

Lecture 9 - Vector data compression techniques

Lecture 10 - Demonstration through GIS software

Lecture 11 - Raster data compression techniques - 1

Lecture 12 - Raster data compression techniques - 2

Lecture 13 - Georeferencing

Lecture 14 - Pre-processing of spatial datasets - 1

Lecture 15 - Demonstration through GIS software

Lecture 16 - Pre-processing of spatial datasets - 2

Lecture 17 - Pre-processing of spatial datasets - 3

Lecture 18 - Spatial Interpolation Techniques - 1

Lecture 19 - Spatial Interpolation Techniques - 2

Lecture 20 - GIS ANALYSIS - 1

Lecture 21 - GIS Analysis - 2

Lecture 22 - GIS Analysis - 3

Lecture 23 - GIS Analysis - 4

Lecture 24 - GIS Analysis - 5

Lecture 25 - Demonstration through GIS software

Lecture 26 - GIS Analysis - 6

Lecture 27 - GIS Analysis - 7

Lecture 28 - Attributes Classification Methods

Lecture 29 - Special database systems and their types - 1

Lecture 30 - Demonstration through GIS software

Lecture 31 - Spatial database systems and their types - 2

Lecture 32 - Concept of NoData in Raster

Lecture 33 - Different map projections

Lecture 34 - Concept of digital elevation model (DEM) and how it is represented

Lecture 35 - Demonstration through GIS software

Lecture 36 - Various techniques to generate digital elevation model - 1

Lecture 37 - Various techniques to generate digital elevation model - 2

Lecture 38 - Various techniques to generate digital elevation model - 3

Lecture 39 - Digital Elevation Models and different types of resolutions

Lecture 40 - Demonstration through GIS software

Lecture 41 - How to assess quality of a DEM?

Lecture 42 - Integration of DEMs with satellite data

Lecture 43 - Demonstration through GIS software...

Lecture 44 - Common derivatives of DEMs - Slope and aspect - 1

Lecture 45 - Common derivatives of DEMs - Slope and aspect - 2

Lecture 46 - Common derivatives of DEMs - Slope and aspect - 3

Lecture 47 - Demonstration through GIS software

Lecture 48 - DEMs derivatives - 1

Lecture 49 - DEMs derivatives - 2

Lecture 50 - DEMs derivatives - 3

Lecture 51 - DEMs derivatives - 4

Lecture 52 - Shaded relief models and their applications

Lecture 53 - DEM based Surface Hydrologic Modelling - 1

Lecture 54 - DEM based Surface Hydrologic Modelling - 2

Lecture 55 - DEMs and Dam Simulation and its application in groundwater hydrology

Lecture 56 - Applications of DEMs in Viewshed and Flood Hazard Mapping

Lecture 57 - Applications of DEMs in solar and wind energy potential estimations

Lecture 58 - DEMs Sources, limitations and future of Digital Elevation Models

Lecture 59 - Errors in GIS and key elements of maps

Lecture 60 - Limitations of GIS

NPTEL : NOC:Water and Waste Water Treatment (Civil Engineering)

Co-ordinators : Prof. Bhanu Prakash Vellanki

Lecture 1 - Importance of water and wastewater treatment

Lecture 2 - Life expectancy and real-world scenario

Lecture 3 - Course outline

Lecture 4 - Review of fundamentals

Lecture 5 - Mass balance

Lecture 6 - Mass Balance: Batch reactor, CSTR, and Plug flow reactors

Lecture 7 - Mass balance: Comparison of CSTR and Plug flow reactor

Lecture 8 - Mass Balance: Non ideal system and Water quality parameters

Lecture 9 - Water quality: DO and ways to measure it

Lecture 10 - Water quality: Nutrients in water

Lecture 11 - Water quality: Total suspended solids and Pathogens

Lecture 12 - Wastewater treatment plant: basic principals

Lecture 13 - Wastewater treatment plant: Preliminary treatment

Lecture 14 - Wastewater treatment plant: Sedimentation and basics

Lecture 15 - Sedimentation: Discrete and Flocculant settling

Lecture 16 - Design of primary settling tank

Lecture 17 - Biological treatment: BOD and Nutrient removal

Lecture 18 - Analysis of biological removal process(ASP)

Lecture 19 - Activated sludge process: Material balance for aeration basin

Lecture 20 - Oxygen transfer: types and basic principals

Lecture 21 - Relevance of F/M ratio and Design Parameters of Activated Sludge Process

Lecture 22 - Sludge Bulking and Activated Sludge Variations

Lecture 23 - Sequencing Batch Reactor

Lecture 24 - Nitrogen Removal - I

Lecture 25 - Nitrogen Removal - II and Phosphorus Removal - I

Lecture 26 - Phosphorus Removal - II

Lecture 27 - Secondary Clarifiers and Attached Growth System

Lecture 28 - Disinfection

Lecture 29 - Chlorination Disinfection

Lecture 30 - Disinfection By-products (DBPs) and Disinfectant Removal

Lecture 31 - Water demand

Lecture 32 - Water Quality Parameters

Lecture 33 - Overview of Water Treatment

Lecture 34 - Physico-Chemical treatment

Lecture 35 - Coagulation - I

Lecture 36 - Coagulation - II

Lecture 37 - Rapid Mixing

Lecture 38 - Flocculation - I

Lecture 39 - Flocculation - II

Lecture 40 - Flocculent settling

Lecture 41 - Filtration

Lecture 42 - Depth filtration

Lecture 43 - Design of Sand filter and Surface filtration

Lecture 44 - Disinfection

Lecture 45 - Hardness - I

Lecture 46 - Hardness - II

Lecture 47 - Lime-Soda softening - I

Lecture 48 - Lime-Soda softening - II

Lecture 49 - Recarbonation

Lecture 50 - Types of Softening Basin and Adsorption

Lecture 51 - Adsorption

Lecture 52 - Adsorption Isotherms

Lecture 53 - Ion Exchange

Lecture 54 - Nanofiltration and RO

Lecture 55 - Aeration: Removal of Fe and Mn

Lecture 56 - Residual Management

Lecture 57 - Sludge Thickening

Lecture 58 - Stabilization of Sludge

Lecture 59 - Anaerobic and Aerobic digestion of sludge

Lecture 60 - Conditioning, Dewatering and Disposal of Sludge

NPTEL : NOC:Rock Engineering (Civil Engineering)

Co-ordinators : Prof. Priti Maheshwari

Lecture 1 - Introduction

Lecture 2 - Minerals and Rock Classes

Lecture 3 - Mineral Identification Procedure

Lecture 4 - Rock Identification Procedure

Lecture 5 - Geological Structures and Discontinuities

Lecture 6 - Spherical Representation of Geological Data - 1

Lecture 7 - Spherical Representation of Geological Data - 2

Lecture 8 - Spherical Representation of Geological Data - 3

Lecture 9 - Application of Graphical Representation of Geological Data

Lecture 10 - Laboratory Testing of Rocks - Sampling

Lecture 11 - Laboratory testing of Rocks - Preperations and UCS

Lecture 12 - Factors Influencing UCS and Modes of Failure in Compression

Lecture 13 - Failure Mechanism and Post-Failure Behaviour in Compression, Indirect Method for UCS

Lecture 14 - Indirect Method for UCS, Brazilian Test, Schnidt Rebound Hardness Test

Lecture 15 - Sound Velocity Test, Slake Durability Test, Swelling Pressure and Free Swell Test and Void Index Test

Lecture 16 - Shear Tests - 1

Lecture 17 - Shear Tests - 2

Lecture 18 - Engineering Classification of Intact Rocks, Concept of Rock Mass, RQD

Lecture 19 - Concept of Rock Mass, Factors Affecting Discontinuities

Lecture 20 - Factors Affecting Discontinuities

Lecture 21 - Classification of Rock Mass: Rock Mass Rating (RMR) - 1

Lecture 22 - Classification of Rock Mass: Rock Mass Rating (RMR) - 2

Lecture 23 - Classification of Rock Mass: Rock Mass Quality (Q-system) - 1

Lecture 24 - Classification of Rock Mass: Rock Mass Quality (Q-system) - 2

Lecture 25 - Classification of Rock Mass: Geological Strength Index (GSI)

Lecture 26 - Strength Criteria for Isotropic and Anisotropic Rock - 1

Lecture 27 - Strength Criteria for Isotropic and Anisotropic Rocks -2, Mohrâ€™s Failure Theory

Lecture 28 - Mohr-Coulomb Failure Criterion

Lecture 29 - Mohr-Coulomb Failure Criterion, Coulomb Navier Failure Criterion

Lecture 30 - Concept of Instantaneous c and Ï†: Balmer Approach

Lecture 31 - Empirical Failure Criteria: Basics of Regression Analysis

Lecture 32 - Hoek and Brown Criterion (1980)

Lecture 33 - Parameters of Failure Criteria

Lecture 34 - Failure Criteria for Rock Mass

Lecture 35 - Tunneling: Underground Excavations

Lecture 36 - Tunneling: Ground Conditions

Lecture 37 - Elastic Stress Distribution Around Circular Tunnels - 1

Lecture 38 - Elastic Stress Distribution Around Circular Tunnels - 2

Lecture 39 - Elastic Analysis of Circular Tunnels - Displacements

Lecture 40 - Thick Wall Cylinder in Biaxial Stress Field

Lecture 41 - Elasto-Plastic Stress Distribution Around Circular Tunnel

Lecture 42 - Underground Excavation Failure Mechanisms

Lecture 43 - Structurally Controlled Failure: Roof Failure

Lecture 44 - Structurally Controlled Failure: Sidewall Failures - 1

Lecture 45 - Structurally Controlled Failure: Sidewall Failures - 2

Lecture 46 - Rock Mass Support Interaction Analysis - 1

Lecture 47 - Rock Mass Support Interaction Analysis - 2

Lecture 48 - Rock Slope Stability

Lecture 49 - Rock Slope Stability - Plane Failure

Lecture 50 - Rock Slope Stability - Wedge Failure

Lecture 51 - Rock Slope Stability - Circular Failure

Lecture 52 - Rock Slope Stability - Toppling Failure - 1

Lecture 53 - Rock Slope Stability - Toppling Failure - 2

Lecture 54 - Rock Slope Stability - Toppling Failure - 3

Lecture 55 - Rock Slope Stabilization

Lecture 56 - Foundations on Weak Rocks

Lecture 57 - Ultimate Bearing Capacity Using Bellâ€™s Approach

Lecture 58 - Bearing Capacity from Classification Approaches and Based on UCS

Lecture 59 - Bearing Capacity Based on Plate Load test; Treatment of Foundations

Lecture 60 - Dam Foundation Problems

NPTEL : NOC:Finite Element Method and Computational Structural Dynamics (Civil Engineering)

Co-ordinators : Prof. Manish Shrikhande

Lecture 1 - Introduction to Scientific Computations - I

Lecture 2 - Introduction to Scientific Computations - II

Lecture 3 - Basic Concepts of Linear Algebra

Lecture 4 - Polynomial Interpolation and Numerical Quadrature - I

Lecture 5 - Polynomial Interpolation and Numerical Quadrature - II

Lecture 6 - Polynomial Interpolation and Numerical Quadrature - III

Lecture 7 - Polynomial Interpolation and Numerical Quadrature - IV

Lecture 8 - Mathematical Modelling and Approximate Solutions - I

Lecture 9 - Mathematical Modelling and Approximate Solutions - II

Lecture 10 - Mathematical Modelling and Approximate Solutions - III

Lecture 11 - Approximation via Variational Principles

Lecture 12 - Introduction to the Finite Element Concept

Lecture 13 - Finite Elements of C^0 Continuity in 1-D - I

Lecture 14 - Finite Elements of C^0 Continuity in 1-D - II

Lecture 15 - Finite Elements of C^0 Continuity in 1-D - III

Lecture 16 - Finite Elements of C^0 Continuity in 1-D - IV

Lecture 17 - Finite Elements of C^1 Continuity in 1-D - I

Lecture 18 - Finite Elements of C^1 Continuity in 1-D - II

Lecture 19 - Finite Elements of C^0 Continuity in 2-D and 3-D - I

Lecture 20 - Finite Elements of C^0 Continuity in 2-D and 3-D - II

Lecture 21 - Finite Elements of C^0 Continuity in 2-D and 3-D - III

Lecture 22 - Finite Elements of C^0 Continuity in 2-D and 3-D - IV

Lecture 23 - Finite Elements of C^0 Continuity in 2-D and 3-D - V

Lecture 24 - Finite Elements of C^0 Continuity in 2-D and 3-D - VI

Lecture 25 - Finite Elements of C^0 Continuity in 2-D and 3-D - VII

Lecture 26 - Finite Elements of C^0 Continuity in 2-D and 3-D - VIII

Lecture 27 - Finite Elements of C^0 Continuity in 2-D and 3-D - IX

Lecture 28 - Finite Elements of C^0 Continuity in 2-D and 3-D - X

Lecture 29 - Finite Elements of C^0 Continuity in 2-D and 3-D - XI

Lecture 30 - Finite Elements of C^0 Continuity in 2-D and 3-D - XII

Lecture 31 - Mapped Elements - I

Lecture 32 - Mapped Elements - II

Lecture 33 - Mapped Elements - III

Lecture 34 - Mapped Elements - IV

Lecture 35 - Mapped Elements - V

Lecture 36 - Variational Crimes

Lecture 37 - The Patch Test

Lecture 38 - Finite Elements for Plates and Shells - I

Lecture 39 - Finite Elements for Plates and Shells - II

Lecture 40 - Finite Elements for Plates and Shells - III

Lecture 41 - The Time Dimension and Dynamic Effects - I

Lecture 42 - The Time Dimension and Dynamic Effects - II

Lecture 43 - Solution of Linear Simultaneous Equations - I

Lecture 44 - Solution of Linear Simultaneous Equations - II

Lecture 45 - Solution of Linear Simultaneous Equations - III

Lecture 46 - Solution of Linear Simultaneous Equations - IV

Lecture 47 - The Algebraic Eigenvalue Problem - I

Lecture 48 - The Algebraic Eigenvalue Problem - II

Lecture 49 - The Algebraic Eigenvalue Problem - III

Lecture 50 - The Algebraic Eigenvalue Problem - IV

Lecture 51 - Time Marching - I

Lecture 52 - Time Marching - II

Lecture 53 - Time Marching - III

Lecture 54 - Discrete Fourier Transform - I

Lecture 55 - Discrete Fourier Transform - II

Lecture 56 - Discrete Fourier Transform - III

Lecture 57 - Discrete Fourier Transform - IV

Lecture 58 - Discrete Fourier Transform - V

Lecture 59 - Discrete Fourier Transform - VI

Lecture 60 - Discrete Fourier Transform - VII

NPTEL : NOC:Sustainable Transportation systems (Civil Engineering)

Co-ordinators : Prof. Bhola Ram Gurjar

Lecture 1 - Introduction to Transportation Systems - I

Lecture 2 - Introduction to Transportation Systems - II

Lecture 3 - Concept of Sustainability

Lecture 4 - Current Scenario of Transportation in India

Lecture 5 - Climate Change: Indicators and Impacts

Lecture 6 - Impacts of Transportation Systems - I

Lecture 7 - Impacts of Transportation Systems - II

Lecture 8 - Impacts of Transportation Systems - III

Lecture 9 - Impacts of Transportation Systems - IV

Lecture 10 - Impacts of Transportation Systems - V

Lecture 11 - Introduction to Environment Impact Assessment (EIA)

Lecture 12 - EIA Processes - I

Lecture 13 - EIA Processes - II

Lecture 14 - Methodologies of EIA

Lecture 15 - EIA Process in India

Lecture 16 - Global practices in EIA process

Lecture 17 - EIA Case Study - I

Lecture 18 - EIA Case Study - II

Lecture 19 - EIA Case Study - III

Lecture 20 - EIA Case Study - IV

Lecture 21 - EIA Case Study - V

Lecture 22 - Introduction of Land use

Lecture 23 - Land use Planning and Zoning

Lecture 24 - Transit Oriented Development (TOD)

Lecture 25 - TOD Implementation

Lecture 26 - TOD Case study-I: Section of Delhi Metro

Lecture 27 - TOD Case study-II: TOD planning for Belgrade, Serbia

Lecture 28 - TOD Case study-III: Naya Raipur

Lecture 29 - Introduction to Sustainable Transport Planning

Lecture 30 - Sustainable Transport Planning and Approaches-I: The Traditional Transport Planning Process

Lecture 31 - Sustainable Transport Planning and Approaches-II: The Contemporary Planning Process

Lecture 32 - Sustainable Transport Planning and Approaches-III: Management Strategies

Lecture 33 - Life Cycle Assessment (LCA): An Introduction

Lecture 34 - Life Cycle Assessment: Theory and Practice

Lecture 35 - LCA Case Study

Lecture 36 - Material Flow Analysis (MFA)

Lecture 37 - Material Flow Analysis: Case Study

Lecture 38 - Concept of Circular Economy

Lecture 39 - Circular Economy in Transport Sector

Lecture 40 - Modelling of Transport Emissions - I

Lecture 41 - Modelling of Transport Emissions - II

Lecture 42 - Dispersion Models for Transport Emissions

Lecture 43 - Traffic Noise Emission Models

Lecture 44 - Initiatives and Policies for Environmental Sustainability

Lecture 45 - National Clean Air Programme and Transport Sector

Lecture 46 - Decarbonizing the Transport Sector

Lecture 47 - Alternate Fuels and Sustainable Transportation

Lecture 48 - Electric Vehicles and Sustainability

Lecture 49 - Emerging Transport Technology - Hyperloop

Lecture 50 - Case Study-I: Bus Rapid Transit System (BRTS)

Lecture 51 - Case Study-II: Mass Rapid Transit (MRT) Systems

Lecture 52 - Case Study-III: Sustainability in Airports

Lecture 53 - Case Study-IV: Sustainable Water Transport

Lecture 54 - Case Study-V: Non-Motorized Transport (NMT)

Lecture 55 - openLCA - An LCA Tool

Lecture 56 - openLCA Application - Case Study

Lecture 57 - Material Flow Analysis Tool - STAN

Lecture 58 - Sustainability Indicators

Lecture 59 - Sustainable Transport Appraisal Rating (STAR)

Lecture 60 - Measuring Sustainability

NPTEL : NOC:Air Pollution and Control (Civil Engineering)

Co-ordinators : Prof. Bhola Ram Gurjar

Lecture 1 - Introduction to Air Pollution - I

Lecture 2 - Introduction to Air Pollution - II

Lecture 3 - Impact of Air Pollution on Human Health

Lecture 4 - Impact of Air Pollution on Vegetation and Animals

Lecture 5 - Impact of Air Pollution on Building Materials and Structures

Lecture 6 - Impact of Air Pollution on Atmosphere, Soil and Water Bodies

Lecture 7 - Sources and Classification of Air Pollutants

Lecture 8 - Atmospheric Formation and Fate of Air Pollutants

Lecture 9 - Meteorological Parameters and Air Pollution

Lecture 10 - Atmospheric Stability and Lapse Rates

Lecture 11 - Atmospheric Stability and Plume Behaviour

Lecture 12 - Boundary Layer, Mixing Height, Stack Height and Plume Rise

Lecture 13 - Status of Air Quality Monitoring in India

Lecture 14 - Air Quality Index (AQI)

Lecture 15 - Introduction to Air Quality Modelling

Lecture 16 - Gaussian Dispersion Model for Point Source

Lecture 17 - Gaussian Dispersion Model for Line Source and Area Source

Lecture 18 - Determination of Concentration of Pollutants using Gaussian Dispersion Model

Lecture 19 - Assimilative Capacity of an Airshed

Lecture 20 - Emission Inventory

Lecture 21 - Transport Emission Inventory

Lecture 22 - Emission Inventory for Industrial Sector

Lecture 23 - Emission Inventory for Agriculture Sector

Lecture 24 - Emission Inventory for Residential and Commercial Sectors

Lecture 25 - Application of Remote Sensing/Satellite-Based Data in Air Quality Management

Lecture 26 - Emission Inventory: Case Study

Lecture 27 - Methods of Source Apportionment

Lecture 28 - Source apportionment using Receptor Modeling

Lecture 29 - Indoor Air Quality: An Introduction

Lecture 30 - Specific Sources and Types of Indoor Air Pollutants

Lecture 31 - Health Impacts Due to Indoor Air Pollution

Lecture 32 - Assessment of Exposure to Indoor Air Pollution

Lecture 33 - Indoor Air Quality Modelling

Lecture 34 - Technologies to Mitigate Indoor Air Pollution

Lecture 35 - Personal Exposure to Fine Particles: A Case Study

Lecture 36 - Indoor Air Quality in Nursery Buildings, UAE â€“ Case Study

Lecture 37 - Global and Regional Environmental Issues - Ozone Depletion

Lecture 38 - Global and Regional Environmental Issues - Global Warming

Lecture 39 - Global and Regional Environmental Issues - Climate Change

Lecture 40 - Global and Regional Environmental Issues - Acid Rain

Lecture 41 - Introduction to Air Pollution Control

Lecture 42 - Air Pollution Control Devices - Part 1

Lecture 43 - Air Pollution Control Devices - Part 2

Lecture 44 - Air Pollution Control Devices - Part 3

Lecture 45 - Air Pollution Control Devices - Part 4

Lecture 46 - Tutorial-II - Practice Examples on Particulate Emission Control Devices

Lecture 47 - Tutorial-III - Practice Examples on Gaseous Emission Control Devices

Lecture 48 - Air Quality Standards

Lecture 49 - Air Pollution Legislations and Regulations

Lecture 50 - National Policies for Managing the Ambient Air Quality (AAQ)

Lecture 51 - International Environmental Treaties to Reduce Air Pollution and GHG Emissions

Lecture 52 - Impact of Lockdown on Air Quality

Lecture 53 - Sector Wise Mitigation Measures to Control Air Pollution

Lecture 54 - Challenges and the Way Forward

Lecture 55 - Sampling and Analysis of PM10 in Ambient Air

Lecture 56 - Sampling and Analysis of PM2.5 in Ambient Air

Lecture 57 - Sampling and Analysis of SO2 and NO2 in Ambient Air

Lecture 58 - Stack Emission Monitoring using Isokinetic Sampling

Lecture 59 - Indoor Air Quality Assessment using Multi Gas Monitor

Lecture 60 - Sampling and Analysis of PM10 and PM2.5 using Spectrometer

NPTEL : NOC:Underground Space Technology (Civil Engineering)

Co-ordinators : Prof. Priti Maheshwari

Lecture 1 - Basics of Rock Engineering: Introduction

Lecture 2 - Basics of Rock Engineering: coring, sampling, UCS of intact rock

Lecture 3 - Basics of Rock Engineering: Tensile strength and shear strength of intact rock

Lecture 4 - Basics of Rock Engineering: Classification of intact rocks, concept of rock mass, RQD

Lecture 5 - Basics of Rock Engineering: Classification of rock mass - 1

Lecture 6 - Basics of Rock Engineering: Classification of rock mass: Q-system and GSI

Lecture 7 - Basics of Rock Engineering: Failure criteria for rocks - 1

Lecture 8 - Basics of Rock Engineering: Empirical failure criteria

Lecture 9 - Tunneling: Underground excavations

Lecture 10 - Tunneling: Ground conditions

Lecture 11 - Planning of and exploration for underground construction projects

Lecture 12 - Underground excavation failure mechanisms

Lecture 13 - Application of stereographic projection method: roof failure

Lecture 14 - Application of stereographic projection method: sidewall failures - 1

Lecture 15 - Application of stereographic projection method: sidewall failures - 2

Lecture 16 - Elastic stress distribution around circular tunnels - 1

Lecture 17 - Elastic stress distribution around circular tunnels - 2

Lecture 18 - Elastic analysis of circular tunnels-displacements

Lecture 19 - Thick wall cylinder in biaxial stress field

Lecture 20 - Stress distribution around non-circular openings in elastic ground conditions - 1

Lecture 21 - Stress distribution around non-circular openings in elastic ground conditions - 2

Lecture 22 - Stress distribution under different in-situ stress conditions: design principles

Lecture 23 - Stress distribution for multiple openings

Lecture 24 - Openings in laminated rocks - 1

Lecture 25 - Openings in laminated rocks - 2

Lecture 26 - Openings in laminated rocks - 3

Lecture 27 - Openings in laminated rocks - 4

Lecture 28 - Elasto-plastic analysis of tunnels: Tresca yield criterion - 1

Lecture 29 - Elasto-plastic analysis of tunnels: Tresca yield criterion - 2

Lecture 30 - Elasto-plastic analysis of tunnels: Mohr-Coulomb criterion

Lecture 31 - Application of rock mass classification system: TerzaghiÃ¢s rock load theory - 1

Lecture 32 - Application of rock mass classification system: TerzaghiÃ¢s rock load theory - 2

Lecture 33 - Application of rock mass classification system: rock mass rating (RMR)

Lecture 34 - Tunnel hazards

Lecture 35 - Tunnel hazards: squeezing ground conditions

Lecture 36 - Application of rock mass classification system: rock mass quality system - 1

Lecture 37 - Application of rock mass classification system: rock mass quality system - 2, NATM, NMT

Lecture 38 - Modulus of deformation of rock mass using Q-system, rock mass number, plate loading test

Lecture 39 - Modulus of deformation of rock mass: uni-axial jacking/plate jacking test

Lecture 40 - Modulus of deformation of rock mass: radial jacking test and Goodman jack test

Lecture 41 - Rock mass support interaction analysis: ground response and support reaction curves - 1

Lecture 42 - Rock mass support interaction analysis: ground response and support reaction curves - 2

Lecture 43 - Rock mass support interaction analysis: influencing factors, LadanyiÃ¢s E-P analysis

Lecture 44 - LadanyiÃ¢s elasto-plastic analysis of tunnels: analysis of stresses and deformations

Lecture 45 - Rock-support interaction analysis: required support line, analysis of available support

Lecture 46 - Rock-support interaction analysis: for shotcrete/concrete lining and blocked steel sets

Lecture 47 - Rock-support interaction analysis: for ungrouted rock bolts, grouted rock bolts/cables

Lecture 48 - Calculation sequence for rock-support interaction analysis - 1

Lecture 49 - Calculation sequence for rock-support interaction analysis - 2

Lecture 50 - Calculation sequence for rock-support interaction analysis - example

Lecture 51 - Methods of tunnel excavation, various support systems: shotcrete

Lecture 52 - Shotcrete

Lecture 53 - Various support systems: rock bolts

Lecture 54 - Permeability and groutability - 1

Lecture 55 - Permeability and groutability - 2

Lecture 56 - Rock stress determination: flat jack test

Lecture 57 - Rock stress determination: hydraulic fracturing technique

Lecture 58 - Instrumentation and monitoring of tunnels - 1

Lecture 59 - Instrumentation and monitoring of tunnels - 2

Lecture 60 - Few case studies

NPTEL : NOC:Environmental Modeling and Simulation (Civil Engineering)

Co-ordinators : Prof. Gargi Singh

Lecture 1 - Introduction - Part I

Lecture 2 - Introduction - Part II

Lecture 3 - 1D Models - Part I

Lecture 4 - 1D Models - Part II

Lecture 5 - Logistic Growth Models - Part I

Lecture 6 - Logistic Growth Models - Part II

Lecture 7 - 1D Models: Auto Catalysis

Lecture 8 - Semi Quantitative Approach to Solve 1D Models

Lecture 9 - Using MATLAB for 1D systems

Lecture 10 - Using R for 1D Systems

Lecture 11 - Bifurcations - I

Lecture 12 - Bifurcations - II

Lecture 13 - Bifurcations - III

Lecture 14 - Bifurcations - IV

Lecture 15 - Bifurcations - V

Lecture 16 - Insect Outbreak Model

Lecture 17 - 2D Systems - I

Lecture 18 - 2D Systems - II

Lecture 19 - 2D Systems - III

Lecture 20 - 2D Systems - IV

Lecture 21 - 2D Systems - V

Lecture 22 - 2D Systems - VI

Lecture 23 - 2D Systems - VII

Lecture 24 - 2D Systems - VIII

Lecture 25 - 2D Systems - IX

Lecture 26 - 2D Systems - X

Lecture 27 - 2D Systems - XI

Lecture 28 - 2D Systems - XII

Lecture 29 - Limit Cycles - I

Lecture 30 - Limit cycles - II and Bifurcations

Lecture 31 - Bifurcations

Lecture 32 - Bifurcations - I

Lecture 33 - Bifurcations - II

Lecture 34 - Bifurcations - III

Lecture 35 - Application of Empirical Approach - I

Lecture 36 - Application of Empirical Approach - II

Lecture 37 - Application of Empirical Approach - III

Lecture 38 - Gaussian Plumes - Air - I

Lecture 39 - Gaussian Plumes - Air - II

Lecture 40 - Gaussian Plumes - Air - III

Lecture 41 - Gaussian Plumes - Air - IV

Lecture 42 - Gaussian Plumes - Air - V

Lecture 43 - Gaussian Plumes - Air - VI

Lecture 44 - Ground Water - I

Lecture 45 - Ground Water - II

Lecture 46 - Environmental Transport Processes

Lecture 47 - Environmental Non-reactive and Reactive Processes - I

Lecture 48 - Environmental Non-reactive and Reactive Processes - II

Lecture 49 - Environmental Non-reactive and Reactive Processes - III

Lecture 50 - Homogeneous reactors

Lecture 51 - Heterogeneous Reactors - I

Lecture 52 - Heterogeneous Reactors - II

Lecture 53 - Ground Water Extraction

Lecture 54 - 2D Model Using MATLAB

Lecture 55 - Phase Portrait of 1D Models Using R

Lecture 56 - Phase Portrait of 2D Models Using R

Lecture 57 - Simulations - I

Lecture 58 - Simulations - II

Lecture 59 - Application: Climate change and GDP - I

Lecture 60 - Application: Climate change and GDP - II

NPTEL : NOC:Advanced Geomatics Engineering (Civil Engineering)

Co-ordinators : Prof. Pradeep Kumar Garg

Lecture 1 - Introduction to Geomatics Engineering

Lecture 2 - Various Applications of Geomatics Engineering

Lecture 3 - Photogrammetry - An Introduction

Lecture 4 - Photogrammetry - Geometry of Aerial Photographs

Lecture 5 - Photogrammetry - Scale of Aerial Photographs

Lecture 6 - Photogrammetry - Relief Displacment

Lecture 7 - Photogrammetry - Stereo Pairs and Stereovision

Lecture 8 - Photogrammetry - Stereovision with Stereoscopes

Lecture 9 - Photogrammetry - Parallax in Photographs

Lecture 10 - Height Determination from Stereo-Pairs

Lecture 11 - Photogrammetry - 3D Mapping, DEM, DTM and DSM

Lecture 12 - Digital Photogrammetry

Lecture 13 - Remote Sensing - An Introduction

Lecture 14 - Remote Sensing - Electromagnetic Spectrum

Lecture 15 - Remote Sensing - Energy Interaction with Atmosphere / Earth Surface

Lecture 16 - Remote Sensing - Blackbody and Atmospheric Window

Lecture 17 - Spectral Signature in Remote Sensing

Lecture 18 - Remote Sensing - Types of Resolutions

Lecture 19 - Multi-concepts in Remote Sensing

Lecture 20 - Remote Sensing - Satellite Orbits

Lecture 21 - Remote Sensing - Various Sensors

Lecture 22 - Remote Sensing Sensors and Platforms - I

Lecture 23 - Remote Sensing Sensors and Platforms - II

Lecture 24 - Very High Resolution Remote Sensing Data

Lecture 25 - Remote Sensing - Thermal, Microwave, and Hyperspectral Images

Lecture 26 - Remote Sensing - Visual Interpretation Method

Lecture 27 - GPS Surveying - Introduction and Components

Lecture 28 - GPS Surveying - Working Principle

Lecture 29 - GPS Surveying - Various Methods

Lecture 30 - GPS Surveying - Sources of Errors

Lecture 31 - GPS - Applications

Lecture 32 - LiDAR - An Introduction

Lecture 33 - Data Collection with Mobile Laser Scanners

Lecture 34 - Data Collection with Airborne LiDAR Systems

Lecture 35 - Unmanned Aerial Vehicles - An Introduction

Lecture 36 - Classifications of UAVs/Drones

Lecture 37 - Various Components of Drone and Their Functions

Lecture 38 - Flying Drones for Data Collection

Lecture 39 - Unmanned Aerial Vehicles - Various Applications

Lecture 40 - Digital Image Processing - An Introduction

Lecture 41 - Pre-processing - Atmospheric Corrections

Lecture 42 - Pre-processing - Geometric Corrections

Lecture 43 - Pre-processing - Resampling Methods

Lecture 44 - Digital Image Enhancement Methods

Lecture 45 - Spatial Filtering in Digital Remote Sensing

Lecture 46 - Digital Image Transformation Methods

Lecture 47 - Supervised Classification Methods

Lecture 48 - Unsupervised Classification Methods

Lecture 49 - Accuracy Assessment of Classification

Lecture 50 - Geographic Information System - An Introduction

Lecture 51 - Various Components of a GIS

Lecture 52 - GIS - Various Data Types and Their Characteristics

Lecture 53 - Geographic Information System - Data Input

Lecture 54 - GIS Databases and Their Uses

Lecture 55 - GIS - Based Extraction of Parameters from DEM

Lecture 56 - Buffering and Overlay Analysis in GIS

Lecture 57 - Spatial and Network Analysis in GIS

Lecture 58 - Geomatics Applications - Site Suitability Analysis

Lecture 59 - Geomatics Applications - Transportation Route Planning

Lecture 60 - Geomatics Applications - Smart City Planning

NPTEL : NOC:Pavement Materials (Under Pavement Engineering) (Civil Engineering)

Co-ordinators : Prof. Nikhil Saboo

Lecture 1 - Introduction to Soil as a Highway Material

Lecture 2 - Particle Size Distribution - Part 1

Lecture 3 - Particle Size Distribution - Part 2

Lecture 4 - Consistency Limits and Classification of Soils - Part 1

Lecture 5 - Consistency Limits and Classification of Soils - Part 2

Lecture 6 - Strength Properties of Soil - Part 1

Lecture 7 - Strength Properties of Soil - Part 2

Lecture 8 - Strength Properties of Soil - Part 3

Lecture 9 - Strength Properties of Soil - Part 4

Lecture 10 - Expansive Soils and Stabilization Techniques

Lecture 11 - Introduction to Mineral Aggregates: Origin and Types

Lecture 12 - Production and Storage of Aggregates

Lecture 13 - Classification and Gradation of Aggregates - Part 1

Lecture 14 - Classification and Gradation of Aggregates - Part 2

Lecture 15 - Mineralogy of Aggregates and its Importance

Lecture 16 - Aggregates Shape and Surface Texture

Lecture 17 - Aggregate Properties - Part 1

Lecture 18 - Aggregate Properties - Part 2

Lecture 19 - Aggregate Properties - Part 3

Lecture 20 - Aggregate Properties - Part 4

Lecture 21 - Bitumen Basics

Lecture 22 - Chemistry of Bitumen

Lecture 23 - Physical Properties of Bitumen - Part 1

Lecture 24 - Physical Properties of Bitumen - Part 2

Lecture 25 - Physical Properties of Bitumen - Part 3

Lecture 26 - Introduction to Viscoelasticity

Lecture 27 - Rheological Properties of Bitumen - Part 1

Lecture 28 - Rheological Properties of Bitumen - Part 2

Lecture 29 - Grading of Bitumen - Part 1

Lecture 30 - Grading of Bitumen - Part 2

Lecture 31 - Modified Bitumen

Lecture 32 - Bitumen Emulsion

Lecture 33 - Production of Bituminous Mixtures

Lecture 34 - Role and Desirable Properties: Mix Design

Lecture 35 - Volumetrics in Mix Design - Part 1

Lecture 36 - Volumetrics in Mix Design - Part 2

Lecture 37 - Volumetrics in Mix Design - Part 3

Lecture 38 - Volumetrics in Mix Design - Part 4

Lecture 39 - Volumetrics in Mix Design - Part 5

Lecture 40 - Marshall and Superpave Mix Design - Part 1

Lecture 41 - Marshall and Superpave Mix Design - Part 2

Lecture 42 - Hot Recycled Mixtures - Part 1

Lecture 43 - Hot Recycled Mixtures - Part 2

Lecture 44 - Hot Recycled Mixtures - Part 3

Lecture 45 - Cold Bituminous Mixtures

Lecture 46 - Performance Based Mix Design Concepts

Lecture 47 - Characterization of Bituminous Mixtures - Part 1

Lecture 48 - Characterization of Bituminous Mixtures - Part 2

Lecture 49 - Cementitious Materials - Part 1

Lecture 50 - Cementitious Materials - Part 2

Lecture 51 - Types of Cement, Admixtures, Geopolymers - Part 1

Lecture 52 - Types of Cement, Admixtures, Geopolymers - Part 2

Lecture 53 - Mix Design of PQC - IRC 44

Lecture 54 - Mix Design of PQC - Examples - Part 1

Lecture 55 - Mix Design of PQC - Examples - Part 2

Lecture 56 - Mix Design of DLC - IRC SP 49

Lecture 57 - Mix Design of Pervious Concrete - Part 1

Lecture 58 - Mix Design of Pervious Concrete - Part 2

Lecture 59 - Overview of Alternate Pavement Materials - Part 1

Lecture 60 - Overview of Alternate Pavement Materials - Part 2

NPTEL : NOC:Geometric Design of Highways (Civil Engineering)

Co-ordinators : Prof. Rajat Rastogi

Lecture 1 - Introduction and Design Controls - 1

Lecture 2 - Design Controls - 2

Lecture 3 - Design Controls - 3

Lecture 4 - Design Controls - 4

Lecture 5 - Design Controls and Space Requirements

Lecture 6 - Space and Sight Distance Requirements - 1

Lecture 7 - Sight Distance Requirements - 2

Lecture 8 - Sight Distance Requirements - 3

Lecture 9 - Sight Distance Requirements - 4

Lecture 10 - Sight Distance Requirements - 5

Lecture 11 - Cross-Section Elements - 1

Lecture 12 - Cross-Section Elements - 2

Lecture 13 - Cross-Section Elements - 3

Lecture 14 - Cross-Section Elements - 4

Lecture 15 - Cross-Section Elements - 5

Lecture 16 - Cross-Section Elements - 6

Lecture 17 - Cross-Section Elements - 7

Lecture 18 - Cross-Section Elements - 8

Lecture 19 - Cross-Section Elements - 9

Lecture 20 - Crossing Facility and Road Furniture - 1

Lecture 21 - Road Furniture - 2

Lecture 22 - Road Furniture - 3

Lecture 23 - Road Furniture - 4

Lecture 24 - Road Furniture - 5

Lecture 25 - Road Furniture - 6

Lecture 26 - Road Furniture - 7

Lecture 27 - Alignment Design - 1

Lecture 28 - Alignment Design - 2

Lecture 29 - Alignment Design - 3

Lecture 30 - Alignment Design - 4

Lecture 31 - Alignment Design - 5

Lecture 32 - Alignment Design - 6

Lecture 33 - Alignment Design - 7

Lecture 34 - Alignment Design - 8

Lecture 35 - Alignment Design - 9

Lecture 36 - Alignment Design - 10

Lecture 37 - Alignment Design - 11

Lecture 38 - Alignment Design - 12

Lecture 39 - Alignment Design - 13

Lecture 40 - Alignment Design - 14

Lecture 41 - Alignment Design - 15

Lecture 42 - Alignment Design - 16

Lecture 43 - Intersection Layouts - 1

Lecture 44 - Intersection Layouts - 2

Lecture 45 - Intersection Layouts - 3

Lecture 46 - Intersection Layouts - 4

Lecture 47 - Intersection Layouts - 5

Lecture 48 - Intersection Layouts - 6

Lecture 49 - Intersection Layouts - 7

Lecture 50 - Intersection Layouts - 8

Lecture 51 - Intersection Layouts - 9

Lecture 52 - Intersection Layouts - 10

Lecture 53 - Design of Facilities - 1

Lecture 54 - Design of Facilities - 2

Lecture 55 - Design of Facilities - 3

Lecture 56 - Design of Facilities - 4

Lecture 57 - Design of Facilities - 5

Lecture 58 - Design of Facilities - 6

Lecture 59 - Design of Facilities - 7

Lecture 60 - Design of Facilities - 8

Lecture 61 - Design of Facilities - 9

Lecture 62 - Design of Facilities - 10

NPTEL : NOC:Plate Tectonics (Civil Engineering)

Co-ordinators : Prof. Pitambar Pati

Lecture 1 - Interior of Earth - I

Lecture 2 - Interior of Earth - II

Lecture 3 - Interior of Earth - III

Lecture 4 - Interior of Earth - IV

Lecture 5 - Interior of Earth - V

Lecture 6 - Interior of Earth - VI

Lecture 7 - Oceanic Crust - I

Lecture 8 - Oceanic Crust - II

Lecture 9 - Continental Crust - I

Lecture 10 - Continental Crust - II

Lecture 11 - Types of Plates and Plate Margins

Lecture 12 - Basic Assumption of Plate Tectonics

Lecture 13 - Relative Motion of Lithospheric Plates

Lecture 14 - Euler's Theory on Lithospheric Plate Motion

Lecture 15 - Constructive/Creative Plate Margin

Lecture 16 - Slow and Fast Spreading Ridges

Lecture 17 - Magma Chamber Properties at Mid-Oceanic Ridge

Lecture 18 - Age-Depth Relationship Around the Mid-Oceanic Ridge

Lecture 19 - Along Axis Segmentation of the Mid Oceanic Ridge

Lecture 20 - Propagating Rifts and Microplate Development

Lecture 21 - Conservative Plate Margin - I

Lecture 22 - Conservative Plate Margin - II, Continental Transform Faults

Lecture 23 - Conservative Plate Margin - III, Transform Continental Margins

Lecture 24 - Conservative Plate Margin - IV, Continental Transform Faults

Lecture 25 - Destructive Plate Margins - I

Lecture 26 - Destructive Plate Margins - II, The Oceanic Trench

Lecture 27 - Destructive Plate Margins - III, The Island Arc System

Lecture 28 - Destructive Plate Margins - IV, The Back Arc Basin and Accretionary Prism

Lecture 29 - Destructive Plate Margins - V, Seismicity in the Subduction Zone

Lecture 30 - Destructive Plate Margins - VI, Gravity Anomaly and Thermal Structure at Subduction Zone

Lecture 31 - Magmatism and Metamorphism at Different Plate Settings - I, Magmatism at Subduction Zone

Lecture 32 - Magmatism and Metamorphism at Different Plate Settings - II, Metamorphic at Subduction Zone

Lecture 33 - Orogeny and Epiorogeny - I, Ocean-Continent Collision

Lecture 34 - Orogeny and Epiorogeny - II, Continent-Continent Collision

Lecture 35 - Orogeny and Epiorogeny - III, Arc-Continent Collision

Lecture 36 - Fault Plane Solution

Lecture 37 - Plate Tectonics and Mineralisation - I

Lecture 38 - Plate Tectonics and Mineralisation - II

Lecture 39 - Plate Tectonics and Mineralisation at Divergent Margins - III

Lecture 40 - Plate Tectonics and Mineralisation at Divergent Margins - IV

Lecture 41 - Plate Tectonics and Mineralisation at Convergent Margins - V

Lecture 42 - Plate Tectonics and Mineralisation at Convergent Margins - VI

Lecture 43 - Plate Tectonics and Mineralisation at Convergent Margins - VII

Lecture 44 - Plate Tectonics and Mineralisation at Intraplate Tectono-Metallogenic System - VIII

Lecture 45 - Plate Tectonics and Hydrocarbon Exploration - I

Lecture 46 - Plate Tectonics and Hydrocarbon Exploration - II

Lecture 47 - Plate Tectonics and Climate Change

Lecture 48 - Stability of Triple Junction

Lecture 49 - Volcano

Lecture 50 - Volcano and its Products - I

Lecture 51 - Volcano and its Products - II

Lecture 52 - Himalayan Tectonics - I

Lecture 53 - Himalayan Tectonics - II

Lecture 54 - Indian Seismicity

Lecture 55 - Neotectonics - I

Lecture 56 - Neotectonics - II

Lecture 57 - Continental Drift - I

Lecture 58 - Continental Drift - II

Lecture 59 - Seafloor Spreading

Lecture 60 - Global Positioning System (GPS) and Plate

NPTEL : NOC:Earthquake Geotechnical Engineering (Civil Engineering)

Co-ordinators : Prof. B.K. Maheshwari

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Engineering Seismology

Lecture 4 - Engineering Seismology (Continued...)

Lecture 5 - Strong Ground Motion

Lecture 6 - Strong Ground Motion (Continued...)

Lecture 7 - Seismic Hazard Analysis

Lecture 8 - Seismic Hazard Analysis (Continued...)

Lecture 9 - Wave Propagation

Lecture 10 - Wave Propagation (Continued...)

Lecture 11 - Stress Conditions

Lecture 12 - Field Tests

Lecture 13 - Field Tests (Continued...)

Lecture 14 - Field Tests (Continued...)

Lecture 15 - Laboratory Tests

Lecture 16 - Laboratory Tests (Continued...)

Lecture 17 - Laboratory Tests (Continued...)

Lecture 18 - Constitutive Relationships of Soils

Lecture 19 - Constitutive Relationships of Soils (Continued...)

Lecture 20 - Constitutive Relationships of Soils (Continued...)

Lecture 21 - One-Dimensional

Lecture 22 - One-Dimensional (Continued...)

Lecture 23 - One-Dimensional (Continued...)

Lecture 24 - Two Dimensional

Lecture 25 - Soil-Structure Interaction

Lecture 26 - Soil-Structure Interaction (Continued...)

Lecture 27 - Local Site Effects

Lecture 28 - Local Site Effects (Continued...)

Lecture 29 - Local Site Effects (Continued...)

Lecture 30 - Local Site Effects (Continued...)

Lecture 31 - Introduction

Lecture 32 - Liquefaction Susceptibility

Lecture 33 - Liquefaction Susceptibility (Continued...)

Lecture 34 - Initiation of Liquefaction

Lecture 35 - Initiation of Liquefaction (Continued...)

Lecture 36 - Initiation of Liquefaction (Continued...)

Lecture 37 - Initiation of Liquefaction (Continued...)

Lecture 38 - Initiation of Liquefaction (Continued...)

Lecture 39 - Initiation of Liquefaction (Continued...)

Lecture 40 - Effects of Liquefaction

Lecture 41 - Slope Stability Analysis

Lecture 42 - Slope Stability Analysis (Continued...)

Lecture 43 - Slope Stability Analysis (Continued...)

Lecture 44 - Slope Stability Analysis (Continued...)

Lecture 45 - Slope Stability Analysis (Continued...)

Lecture 46 - Introduction to Retaining Walls

Lecture 47 - Static Pressure on Retaining Walls

Lecture 48 - Static Pressure on Retaining Walls (Continued...)

Lecture 49 - Design of Retaining Walls

Lecture 50 - Design of Retaining Walls (Continued...)

Lecture 51 - Slope Stability and Retaining Walls: Design of Retaining Walls

Lecture 52 - Ground Improvement Techniques: Types of GIT

Lecture 53 - Ground Improvement Techniques: Types of GIT

Lecture 54 - Ground Improvement Techniques: Types of GIT

Lecture 55 - Ground Improvement Techniques: Geosynthetics

Lecture 56 - Ground Improvement Techniques: Geosynthetics

Lecture 57 - Ground Improvement Techniques: Vertical Drains

Lecture 58 - Ground Improvement Techniques: Vertical Drains

Lecture 59 - Ground Improvement Techniques: Reinforced Fibers

Lecture 60 - Ground Improvement Techniques: Verification and IS Code

NPTEL : NOC:Railway Engineering (Civil Engineering)

Co-ordinators : Prof. Rajat Rastogi

Lecture 1 - Introduction

Lecture 2 - Permanent Way

Lecture 3 - Gauges

Lecture 4 - Wheels and Axles, Locomotives, Wagons

Lecture 5 - Wagons, Coning of Wheels

Lecture 6 - Rail Sections

Lecture 7 - Rail Length, Tests and Failures

Lecture 8 - Sleepers - Density and Spacing

Lecture 9 - Sleepers - Types and Uses

Lecture 10 - Ballast Cushion

Lecture 11 - Traction and Resistances

Lecture 12 - Resistances

Lecture 13 - Hauling Capacity and Tractive Effort

Lecture 14 - Hauling Capacity Numerical

Lecture 15 - Track Modulus and Relief of Stresses

Lecture 16 - Track Stresses - Vertical Lateral Longitudinal

Lecture 17 - Track Stresses - Rails

Lecture 18 - Track Stresses - Rails and Sleepers

Lecture 19 - Track Stresses - Ballast Formation

Lecture 20 - Joints in Rails - Types and Requirements

Lecture 21 - Joints in Rails - Insulated and Welded

Lecture 22 - Joints in Rails - Flash Butt Weld

Lecture 23 - SWR Rails

Lecture 24 - Creep in Rails

Lecture 25 - Buckling, Hogging, Battering, Corrosion and Corrugation

Lecture 26 - Corrosion, Corrugation and Rail Failures - I

Lecture 27 - Rail Failures - II

Lecture 28 - Rail Failures and Wears

Lecture 29 - Rail Wears

Lecture 30 - Permissible Wear, LWR and CWR

Lecture 31 - LWR and CWR

Lecture 32 - Fastenings - Rail to Rail

Lecture 33 - Fastenings - Rail to Sleeper (Elastic)

Lecture 34 - Fastenings - Rail to Sleeper (Others)

Lecture 35 - Track Alignment

Lecture 36 - Speed on Track

Lecture 37 - Circular Curve on Track

Lecture 38 - Superelevation on Track - I

Lecture 39 - Superelevation on Track - II and Transition Curves - I

Lecture 40 - Transition Curves - II, Extra Clearances

Lecture 41 - Widening of Gauge and Vertical Curves

Lecture 42 - Realignment of Curves

Lecture 43 - Turnouts, Points and Crossings - I

Lecture 44 - Turnouts, Points and Crossings - II

Lecture 45 - Crossings and Turnout Design

Lecture 46 - Turnout Design and Maintenance

Lecture 47 - Track Junctions and Design - I

Lecture 48 - Track Junctions and Design - II

Lecture 49 - Signaling - I

Lecture 50 - Signaling - II

Lecture 51 - Signaling - III

Lecture 52 - Interlocking Systems - I

Lecture 53 - Interlocking Systems - II

Lecture 54 - Interlocking Systems - III

Lecture 55 - Interlocking Systems - IV

Lecture 56 - Train Control Systems - I

Lecture 57 - Train Control Systems - II

Lecture 58 - Stations, Yards, Level Crossings

Lecture 59 - Track Maintenance - I

Lecture 60 - Track Maintenance - II

Lecture 61 - Track Maintenance - III

Lecture 62 - Track Maintenance - IV

Lecture 63 - Track Renewals and Drainage

Lecture 64 - High Speed Tracks

NPTEL : NOC:Groundwater Engineering (Civil Engineering)

Co-ordinators : Prof. Arun K. Saraf

Lecture 1 - Introduction to Groundwater Hydrology - 1

Lecture 2 - Introduction to Groundwater Hydrology - 2

Lecture 3 - Why to study groundwater

Lecture 4 - Hydrological Cycle - 1

Lecture 5 - Hydrological Cycle - 2

Lecture 6 - Surface water vs groundwater

Lecture 7 - Water Balance and its Components

Lecture 8 - Types of aquifers - 1

Lecture 9 - Types of aquifers - 2

Lecture 10 - Infiltration and Percolation

Lecture 11 - Porosity

Lecture 12 - Permeability

Lecture 13 - Surface Runoff

Lecture 14 - Darcy's Law - 1

Lecture 15 - Darcy's Law - 2

Lecture 16 - Darcy's Law - 3

Lecture 17 - Reynolds Number

Lecture 18 - Groundwater Flow and Flow Nets

Lecture 19 - Darcy's law applied to aquifers

Lecture 20 - Flow to a well

Lecture 21 - Transmissibility

Lecture 22 - Speed of Groundwater Movement

Lecture 23 - Drawdowns in the vicinity of discharging wells

Lecture 24 - Aquifer Boundaries

Lecture 25 - Flow nets near aquifer boundaries

Lecture 26 - Nonsteady state steady shape and steady shape conditions

Lecture 27 - Jacob Method

Lecture 28 - Field determination of transmissibility and storage coefficient - 1

Lecture 29 - Field determination of transmissibility and storage coefficient - 2

Lecture 30 - Theis Equation and example of superposition for solution

Lecture 31 - Theis Equation Theis Equation Assumptions and Applications - 1

Lecture 32 - Theis Equation Theis Equation Assumptions and Applications - 2

Lecture 33 - Geologic Formations as Aquifers - 1

Lecture 34 - Geologic Formations as Aquifers - 2

Lecture 35 - Geologic Formations as Aquifers - 3

Lecture 36 - Springs

Lecture 37 - Springs in India - 1

Lecture 38 - Springs in India - 2

Lecture 39 - Groundwater Exploration - 1

Lecture 40 - Groundwater Exploration - 2

Lecture 41 - Groundwater Exploration - 3

Lecture 42 - Groundwater Exploration - 4

Lecture 43 - Groundwater Exploration - 5

Lecture 44 - Groundwater Exploration - 6

Lecture 45 - Groundwater Exploration - 7

Lecture 46 - Groundwater Exploration - 8

Lecture 47 - Groundwater Exploration - 9

Lecture 48 - Groundwater Exploration - 10

Lecture 49 - Groundwater Exploration - 11

Lecture 50 - Groundwater Exploration - 12

Lecture 51 - Groundwater Exploration - 13 : Sampling

Lecture 52 - Groundwater Exploration - 14 : Hydrogeological Well Logging

Lecture 53 - Groundwater Exploration - 15 : Spontaneous potential logging

Lecture 54 - Groundwater Exploration - 16 : Selection of types of wells and Exploration for Art-Rec sites

Lecture 55 - Groundwater Exploration - 17 : Exploration for hot springs

Lecture 56 - Groundwater Exploration - 18 : Pollution related exploration

Lecture 57 - Groundwater Quality

Lecture 58 - Conjunctive use of ground and surface water

Lecture 59 - Groundwater Modelling - 1

Lecture 60 - Groundwater Modelling - 2

Lecture 61 - Groundwater Recharge Methods in India

Lecture 62 - Artificial Recharge Techniques and Designs

NPTEL : Ground Improvement Techniques (Civil Engineering)

Co-ordinators : Dr. G.L. Sivakumar Babu

Lecture 1 - Need for Ground Improvement

Lecture 2 - Classification of ground modification techniques

Lecture 3 - Emerging trends in ground improvement

Lecture 4 - Mechanical modification

Lecture 5 - Compaction Control

Lecture 6 - Deep compaction

Lecture 7 - Dynamic compaction

Lecture 8 - Vibro-compaction methods

Lecture 9 - Case studies in stone columns

Lecture 10 - Prefabricated Vertical Drains (PVDS) - I

Lecture 11 - Prefabricated drains (PVDS) - II

Lecture 12 - Dewatering - I

Lecture 13 - Dewatering - II

Lecture 14 - Electro-kinetic stabilization

Lecture 15 - Heating and freezing methods, Blasting methods - I

Lecture 16 - Heating and freezing methods, Blasting methods - II

Lecture 17 - Ground Treatment with lime - I

Lecture 18 - Ground Treatment with lime - II

Lecture 19 - Ground treatment with cement

Lecture 20 - Grouting procedures

Lecture 21 - Grouting

Lecture 22 - Micropiles

Lecture 23 - Introduction to Geosynthetics - I

Lecture 24 - Introduction to Geosynthetics - II

Lecture 25 - Reinforced soil principles and mechanisms

Lecture 26 - Material properties

Lecture 27 - Factors affecting reinforced soil

Lecture 28 - Bearing capacity improvement - I

Lecture 29 - Bearing capacity improvement - II

Lecture 30 - Reinforced soil slopes

Lecture 31 - Reinforced Soil Walls

Lecture 32 - Reinforced Soil Walls - I

Lecture 33 - Soil Nailing

Lecture 34 - Design of embankments on soft soil using geosynthetics

Lecture 35 - Design of embankments on soft soil using geocells, Use of geosyntheticsfor filtration and drainage

Lecture 36 - Applications in filtration and drainage & erosion control

Lecture 37 - Geosynthetics in pavements

Lecture 38 - Sustainable development and energy geotechnology

Lecture 39 - Microbial geotechnology and Ground Improvement

Lecture 40 - Nano-technologies in ground improvement and site remediation

NPTEL : Stochastic Hydrology (Civil Engineering)

Co-ordinators : Prof. P.P. Mujumdar

Lecture 1 - Introduction

Lecture 2 - Bivariate Distributions

Lecture 3 - Independence ; Functions of Random Variables

Lecture 4 - Moments of a Distribution

Lecture 5 - Normal Distribution

Lecture 6 - Other Continuous Distributions

Lecture 7 - Parameter Estimation

Lecture 8 - Covariance and Correlation

Lecture 9 - Data Generation

Lecture 10 - Time Series Analysis (1)

Lecture 11 - Time Series Analysis (2)

Lecture 12 - Time Series Analysis (3)

Lecture 13 - Frequency Domain Analysis (1)

Lecture 14 - Frequency Domain Analysis (2) and ARIMA Models (1)

Lecture 15 - ARIMA Models (2)

Lecture 16 - ARIMA Models (3)

Lecture 17 - ARIMA Models (4)

Lecture 18 - Case Studies (1)

Lecture 19 - Case Studies (2)

Lecture 20 - Case Studies (3)

Lecture 21 - Case Studies (4)

Lecture 22 - Markov Chains (1)

Lecture 23 - Markov Chains (2)

Lecture 24 - Frequency Analysis (1)

Lecture 25 - Frequency Analysis (2)

Lecture 26 - Frequency Analysis (3) and Probability Plotting (1)

Lecture 27 - Probability Plotting (2)

Lecture 28 - Goodness of Fit

Lecture 29 - IDF Relationships

Lecture 30 - Multiple Linear Regression

Lecture 31 - Principal Component Analysis

Lecture 32 - Regression on Principal Components

Lecture 33 - Multivariate Stochastic Models (1)

Lecture 34 - Multivariate Stochastic Models (2)

Lecture 35 - Multivariate Stochastic Models (3)

Lecture 36 - Data Consistency Checks (1)

Lecture 37 - Data Consistency Checks (2)

Lecture 38 - Data Consistency Checks (3)

Lecture 39 - Recent Applications: Climate Change Impact Assessment

Lecture 40 - Summary of the Course

NPTEL : Stochastic Structural Dynamics (Civil Engineering)

Co-ordinators : Prof. C.S. Manohar

Lecture 1 - Definition of probability measure and conditional probability

Lecture 2 - Scalar random variables - 1

Lecture 3 - Scalar random variables - 2

Lecture 4 - Multi-dimensional random variables - 1

Lecture 5 - Multi-dimensional random variables - 2

Lecture 6 - Random processes - 1

Lecture 7 - Random processes - 2

Lecture 8 - Random processes - 3

Lecture 9 - Random processes - 4, Random vibrations of sdof systems - 1

Lecture 10 - Random processes - 4, Random vibrations of sdof systems - 1

Lecture 11 - Random vibrations of sdof systems - 2

Lecture 12 - Random vibrations of sdof systems - 3

Lecture 13 - Random vibrations of sdof systems - 4

Lecture 14 - Random vibrations of mdof systems - 1

Lecture 15 - Random vibrations of mdof systems - 2

Lecture 16 - Random vibrations of mdof systems - 3

Lecture 17 - Random vibrations of mdof systems - 4

Lecture 18 - Failure of randomly vibrating systems - 1

Lecture 19 - Failure of randomly vibrating systems - 2

Lecture 20 - Failure of randomly vibrating systems - 3

Lecture 21 - Failure of randomly vibrating systems - 4

Lecture 22 - Markov vector approach - 1

Lecture 23 - Markov vector approach - 2

Lecture 24 - Markov vector approach - 3

Lecture 25 - Markov vector approach - 4

Lecture 26 - Markov vector approach - 5, Monte Carlo simulation approach - 1

Lecture 27 - Markov vector approach - 5 & Monte Carlo simulation approach - 1

Lecture 28 - Monte Carlo simulation approach - 2

Lecture 29 - Monte Carlo simulation approach - 3

Lecture 30 - Monte Carlo simulation approach - 4

Lecture 31 - Monte Carlo simulation approach - 5

Lecture 32 - Monte Carlo simulation approach - 6

Lecture 33 - Monte Carlo simulation approach - 7

Lecture 34 - Probabilistic methods in earthquake engineering - 1

Lecture 35 - Probabilistic methods in earthquake engineering - 2

Lecture 36 - Probabilistic methods in earthquake engineering - 3

Lecture 37 - Probabilistic methods in earthquake engineering - 4

Lecture 38 - Fatigue failure & Vibration energy flow models

Lecture 39 - Problem solving session - 1

Lecture 40 - Problem solving session - 2

Lecture 41 - Problem solving session - 3

Lecture 42 - Problem solving session - 4

NPTEL : Water Resources Systems : Modeling Techniques and Analysis (Civil Engineering)

Co-ordinators : Prof. P.P. Mujumdar

Lecture 1 - Introduction

Lecture 2 - Definitions and types of systems

Lecture 3 - Optimization: Functions of a single variable

Lecture 4 - Optimization: Functions of multiple variables

Lecture 5 - Constrained optimization (1)

Lecture 6 - Constrained optimization (2)

Lecture 7 - Kuhn-Tucker conditions and Introduction to Linear Programming

Lecture 8 - Linear Programming: Graphical method

Lecture 9 - Linear Programming: Simplex method (1)

Lecture 10 - Linear Programming: Simplex method (2)

Lecture 11 - Linear Programming: Multiple solutions

Lecture 12 - Linear Programming: Unbounded and infeasible problems

Lecture 13 - Linear Programming: Dual problem

Lecture 14 - Introduction to Dynamic Programming

Lecture 15 - Dynamic Programming: Water allocation problem

Lecture 16 - Dynamic Programming: Reservoir operation problem

Lecture 17 - Dynamic Programming: Capacity expansion and shortest route problems

Lecture 18 - Simulation: Introduction to Multi-objective planning

Lecture 19 - Multi-objective planning

Lecture 20 - Reservoir sizing

Lecture 21 - Reservoir capacity using Linear Programming (1)

Lecture 22 - Reservoir capacity using Linear Programming (2)

Lecture 23 - Reservoir operation

Lecture 24 - Multi-reservoir systems

Lecture 25 - Stationary policy using Dynamic Programming

Lecture 26 - Hydropower generation

Lecture 27 - Basic probability theory (1)

Lecture 28 - Basic probability theory (2)

Lecture 29 - Chance constrained Linear Programming for reservoir operation and design (1)

Lecture 30 - Chance constrained Linear Programming for reservoir operation and design (2)

Lecture 31 - Stochastic Dynamic Programming for reservoir operation (1)

Lecture 32 - Stochastic Dynamic Programming for reservoir operation (2)

Lecture 33 - Stochastic Dynamic Programming for reservoir operation (3)

Lecture 34 - Fuzzy optimization (1)

Lecture 35 - Fuzzy optimization (2)

Lecture 36 - Fuzzy optimization for water quality control and reservoir operation

Lecture 37 - Conjunctive use of ground and surface water

Lecture 38 - Hydropower optimization

Lecture 39 - Crop yield optimization

Lecture 40 - Multi-basin and multi-reservoir systems

NPTEL : Finite Element method for vibration and Stability analyses (Civil Engineering)

Co-ordinators : Prof. C.S. Manohar

Lecture 1 - Equations of motion using HamiltonÂ's principle

Lecture 2 - Equations of motion for continuous systems and RayleighÂ's quotient

Lecture 3 - Rayleigh Ritz method and method of weighted residuals

Lecture 4 - FEM: motivations. Analysis of axially vibrating rods and Euler-Bernoulli beams

Lecture 5 - Beam elements. Reference systm. Assembly of matrices. Imposition of BCS. Final equation of motion

Lecture 6 - FE modelling of planar structures

Lecture 7 - FE modelling of planar structures (Continued...)

Lecture 8 - FRF-s and damping models-1

Lecture 9 - FRF-s and damping models-2

Lecture 10 - Material damping models. Dynamic stiffness and transfer matrices

Lecture 11 - Twisting of circular bars and rectangular bars. Analysis of grids

Lecture 12 - 3D frames

Lecture 13 - Mathematical preliminaries and terminologies; EulerÂ's forward and backward difference methods

Lecture 14 - Forward and backward Euler method. Central difference method

Lecture 15 - Second order implicit methods

Lecture 16 - Energy conservation. Nonlinear systems

Lecture 17 - Model reduction schemes

Lecture 18 - Substructuring schemes

Lecture 19 - Plane stress models

Lecture 20 - Plane stress models (Continued...)

Lecture 21 - 3d Solid element

Lecture 22 - Axisymmetric models. Plate bending elements.

Lecture 23 - Plate bending elements (Continued...)

Lecture 24 - Plate bending elements (Continued...)

Lecture 25 - Plate bending elements (Continued...)

Lecture 26 - Introduction

Lecture 27 - Introduction (Continued...)

Lecture 28 - Nonlinear dynamical systems, fixed points and bifurcations

Lecture 29 - Energy methods in stability analysis

Lecture 30 - FEM for stability analysis. Euler-Bernoulli beam and general formulations

Lecture 31 - 3D beam element; plate element; imperfection sensitive structures; beams on elastic foundations; rings and arches

Lecture 32 - Dynamic analysis of stability and analysis of time varying systems

Lecture 33 - Dynamic analysis of stability and analysis of time varying systems

Lecture 34 - FE modelling of vehicle structure interactions

Lecture 35 - Inverse response sensitivity analysis

Lecture 36 - Inverse response sensitivity analysis (Continued...)

Lecture 37 - Introduction and review of continuum mechanics

Lecture 38 - Review of measures of strain and stress; balance laws

Lecture 39 - Total and updated Lagrangian formulations

Lecture 40 - Closure

NPTEL : NOC:Introduction to Engineering Seismology (Civil Engineering)

Co-ordinators : Dr. P. Anbazhagan

Lecture 1 - Introduction

Lecture 2 - Earthquake hazard: Mitigation and preparedness

Lecture 3 - Different Earthquake Hazards

Lecture 4 - Different Earthquake Hazards (Continued...)

Lecture 5 - Earthquake Terminologies

Lecture 6 - Plate Tectonics

Lecture 7 - Faults; Seismic Sources

Lecture 8 - Types of Earthquakes; Causes of Earthquakes

Lecture 9 - Introduction to Wave Propagation

Lecture 10 - Seismic Wave propagation;

Lecture 11 - Instrumentation to record Earthquake

Lecture 12 - Seismic Sensors

Lecture 13 - Seismic Instrumentation in India

Lecture 14 - Seismic Instrumentation in India (Continued...)

Lecture 15 - Intensity scales of Earthquake

Lecture 16 - Road Damage Intensity Scale; and Seismic Vulnerability assessment

Lecture 17 - Quantification of Earthquake (magnitude)

Lecture 18 - Energy released due to earthquakes

Lecture 19 - Interpretation of Earthquake records; Baseline correction

Lecture 20 - Interpretation of Earthquake records (Continued...); Time Domain Parameters

Lecture 21 - Time Domain Parameters (Continued...)

Lecture 22 - Duration parameters; Duration Prediction Equations

Lecture 23 - Frequency Domain Characteristics; Response Spectrum

Lecture 24 - Fourier Spectrum

Lecture 25 - Seismic Source Parameters;

Lecture 26 - Time history; response Spectra (design); Stochastic models

Lecture 27 - Ground Motion Simulation models

Lecture 28 - Prediction Relationships

Lecture 29 - Recapitulation - 1

Lecture 30 - Recapitulation - 2

Lecture 31 - Recapitulation - 3

Lecture 32 - Recapitulation - 4

Lecture 33 - Recapitulation - 5

Lecture 34 - Recapitulation - 6

Lecture 35 - Recapitulation - 7

Lecture 36 - Recapitulation - 8

Lecture 37 - Earthquake Prediction

Lecture 38 - Earthquake prediction (Continued...)

Lecture 39 - Seismic Gap

Lecture 40 - Earthquake Prediction (some Precautions)

Lecture 41 - Seismic zonation and microzonation

Lecture 42 - Seismic zonation and microzonation (Continued...)

Lecture 43 - Seismic microzonation of various Indian cities

Lecture 44 - Seismic microzonation of various Indian cities (Continued...)

Lecture 45 - Global Equation model

Lecture 46 - Global Earthquake risk map

Lecture 47 - Seismic Microzonation of Bangalore

Lecture 48 - Seismic Microzonation of Bangalore

Lecture 49 - Seismic zonation of India

Lecture 50 - IS 1893 version 2002 and 2016 explained

Lecture 51 - Zonation Map of India

Lecture 52 - Seismicity of India : Some Past Earthquakes reported in India - 1

Lecture 53 - Seismicity of India : Some Past Earthquakes reported in India - 2

Lecture 54 - SeismoTectonics of India - 1

Lecture 55 - SeismoTectonics of India - 2

Lecture 56 - SeismoTectonics of India - 3

Lecture 57 - Seismic Hazard Analysis - Introduction

Lecture 58 - SHA (Continued...) - Seismic Study area and Seismotectonic Map

Lecture 59 - SHA (Continued...) - Seismic Data Collection

Lecture 60 - SHA (Continued...) - Maximum Magnitude Estimation

Lecture 61 - SHA - Source and Source-Site Distance

Lecture 62 - SHA - Prediction Equation for India

Lecture 63 - SHA - Selection of GMPE

Lecture 64 - SHA - Estimation of Hazard

NPTEL : Natural Language Processing (Computer Science and Engineering)

Co-ordinators : Prof. Pushpak Bhattacharya

Lecture 1 - Introduction

Lecture 2 - Stages of NLP

Lecture 3 - Stages of NLP Continue...

Lecture 4 - Two approaches to NLP

Lecture 5 - Sequence Labelling and Noisy Channel

Lecture 6 - Noisy Channel: Argmax Based Computation

Lecture 7 - Argmax Based Computation

Lecture 8 - Noisy Channel Application to NLP

Lecture 9 - Brief on Probabilistic Parsing & Start of Part of Speech Tagging

Lecture 10 - Part of Speech Tagging

Lecture 11 - Part of Speech Tagging counted ...

Lecture 12 - Part of Speech Tagging counted ... and Indian Language in Focus; Morphology Analysis

Lecture 13 - PoS Tagging contd... , Indian Language Consideration; Accuracy Measure

Lecture 14 - PoS Tagging; Fundamental Principle; Why Challenging; accuracy

Lecture 15 - PoS Tagging; Accuracy Measurement; Word categories

Lecture 16 - AI and Probability; HMM

Lecture 17 - HMM

Lecture 18 - HMM, Viterbi, Forward Backward Algorithm

Lecture 19 - HMM, Viterbi, Forward Backward Algorithm (Continued...)

Lecture 20 - HMM, Forward Backward Algorithms, Baum Welch Algorithm

Lecture 21 - HMM, Forward Backward Algorithms, Baum Welch Algorithm (Continued...)

Lecture 22 - Natural Language Processing and Informational Retrieval

Lecture 23 - CLIA; IR Basics

Lecture 24 - IR Models: Boolean Vector

Lecture 25 - IR Models: NLP and IR Relationship

Lecture 26 - NLP and IR: How NLP has used IR, Toward Latent Semantic

Lecture 27 - Least Square Method; Recap of PCA; Towards Latent Semantic Indexing (LSI)

Lecture 28 - PCA; SVD; Towards Latent Semantic Indexing (LSI)

Lecture 29 - Wordnet and Word Sense Disambiguation

Lecture 30 - Wordnet and Word Sense Disambiguation (Continued...)

Lecture 31 - Wordnet; Metonymy and Word Sense Disambiguation

Lecture 32 - Word Sense Disambiguation

Lecture 33 - Word Sense Disambiguation; Overlap Based Method; Supervised Method

Lecture 34 - Word Sense Disambiguation: Supervised and Unsupervised methods

Lecture 35 - Word Sense Disambiguation: Semi - Supervised and Unsupervised method; resource - constrained WSD

Lecture 36 - Resource Constrained WSD; Parsing

Lecture 37 - Parsing

Lecture 38 - Parsing Algorithm

Lecture 39 - Parsing Ambiguous Sentences; Probabilistic Parsing

Lecture 40 - Probabilistic Parsing Algorithms

NPTEL : Design and Analysis of Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Sundar Viswanathan, Prof. Ajit A Diwan, Prof. Abhiram G Ranade

Lecture 1 - Overview of the course

Lecture 2 - Framework for Algorithms Analysis

Lecture 3 - Algorithms Analysis Framework - II

Lecture 4 - Asymptotic Notations

Lecture 5 - Algorithm Design Techniques : Basics

Lecture 6 - Divide And Conquer - I

Lecture 7 - Divide And Conquer - II Median Finding

Lecture 8 - Divide And Conquer - III Surfing Lower Bounds

Lecture 9 - Divide And Conquer - IV Closest Pair

Lecture 10 - Greedy Algorithms - I

Lecture 11 - Greedy Algorithms - II

Lecture 12 - Greedy Algorithms - III

Lecture 13 - Greedy Algorithms - IV

Lecture 14 - Pattern Matching - I

Lecture 15 - Pattern Matching - II

Lecture 16 - Combinational Search and Optimization - I

Lecture 17 - Combinational Search and Optimization - II

Lecture 18 - Dynamic Programming

Lecture 19 - Longest Common Subsequences

Lecture 20 - Matrix Chain Multiplication

Lecture 21 - Scheduling with Startup and Holding Costs

Lecture 22 - Average case Analysis of Quicksort

Lecture 23 - Bipartite Maximum Matching

Lecture 24 - Lower Bounds for Sorting

Lecture 25 - Element Distinctness Lower Bounds

Lecture 26 - NP-Completeness - I - Motivation

Lecture 27 - NP-Completeness - II

Lecture 28 - NP-Completeness - III

Lecture 29 - NP-Completeness - IV

Lecture 30 - NP-Completeness - V

Lecture 31 - NP-Completeness - VI

Lecture 32 - Approximation Algorithms

Lecture 33 - Approximation Algorithms

Lecture 34 - Approximation Algorithms for NP

NPTEL : Software Engineering (Computer Science and Engineering)

Co-ordinators : Prof. N.L. Sarda, Prof. Umesh Bellur, Prof. Rushikesh K Joshi

Lecture 1 - Introduction to Software Engineering - Challenges

Lecture 2 - Introduction to Software Engineering

Lecture 3 - Overview of Phases

Lecture 4 - Overview of Phases

Lecture 5 - Requirements Engineering / Specification

Lecture 6 - Formal Specification

Lecture 7 - Algebraic Specification Methods

Lecture 8 - Systems Modeling Overview

Lecture 9 - Process Modeling - DFD , Function Decomp

Lecture 10 - Process Modeling - DFD, Function Decomp

Lecture 11 - Data Modeling - ER Diagrams, Mapping

Lecture 12 - Data Modeling - ER Diagrams, Mapping

Lecture 13 - Production Quality Software - Introduction

Lecture 14 - Software Design - Primary Consideration

Lecture 15 - Design Patterns

Lecture 16 - Class and Component Level Design

Lecture 17 - Architectural Design

Lecture 18 - Software Testing - I

Lecture 19 - Software Testing - II

Lecture 20 - Structural Programming and Some implementation

Lecture 21 - Software Metrics and Quality

Lecture 22 - Verification and Validation

Lecture 23 - Case Study

Lecture 24 - Case Study

Lecture 25 - Software Evolution

Lecture 26 - Agile Development

Lecture 27 - Software Reuse CBSE

Lecture 28 - Reuse Continued

Lecture 29 - Introduction to Project Management

Lecture 30 - Project Scope Management

Lecture 31 - Project Time Management

Lecture 32 - Estimation - I

Lecture 33 - Estimation - II

Lecture 34 - Project Quality Management

Lecture 35 - Quality Management Systems - I

Lecture 36 - Quality Management Systems

Lecture 37 - Project Configuration Management

Lecture 38 - Project Risk Management

Lecture 39 - Other PM Processes

NPTEL : NOC:Software Testing (2017) (Computer Science and Engineering)

Co-ordinators : Prof. Meenakshi D'souza

Lecture 1 - Motivation

Lecture 2 - Terminologies

Lecture 3 - Testing based on Models and Criteria

Lecture 4 - Automation - JUnit as an example

Lecture 5 - Basics of Graphs: As used in testing

Lecture 6 - Structural Graph Coverage Criteria

Lecture 7 - Elementary Graph Algorithms - Part 1

Lecture 8 - Elementary Graph Algorithms - Part 2

Lecture 9 - Algorithms: Structural Graph Coverage Criteria

Lecture 10 - Assignment 2: Structural Coverage Criteria

Lecture 11 - Data Flow Graphs

Lecture 12 - Algorithms: Data Flow Graph Coverage Criteria

Lecture 13 - Graph Coverage Criteria: Applied to Test Code

Lecture 14 - Testing Source Code: Classical Coverage Criteria

Lecture 15 - Data Flow Graph Coverage Criteria : Applied to Test Code

Lecture 16 - Software Design and Integration Testing

Lecture 17 - Design Integration Testing and Graph Coverage

Lecture 18 - Specification Testing and Graph Coverage

Lecture 19 - Graph Coverage and Finite state Machines

Lecture 20 - Assignment 4: Graph Coverage Criteria

Lecture 21 - Logic: Basics Needed for Software Testing

Lecture 22 - Logic: Coverage Criteria

Lecture 23 - Coverage Criteria, (Continued...)

Lecture 24 - Logic Coverage Criteria

Lecture 25 - Logic Coverage Criteria: Applied to Test Code_1

Lecture 26 - Logic Coverage Criteria: Applied to Test Code_2

Lecture 27 - Logic Coverage Criteria: Issues in Applying to Test Code

Lecture 28 - Logic Coverage Criteria: Applied to Test Specifications

Lecture 29 - Logic Coverage Criteria: Applied to Finite State Machines

Lecture 30 - Week 6 Assignment Solving

Lecture 31 - Functional Testing

Lecture 32 - Input Space Partitioning

Lecture 33 - Input Space Partitioning: Coverage Criteria

Lecture 34 - Input Space Partitioning Coverage Criteria: Example

Lecture 35 - Syntax-Based Testing

Lecture 36 - Mutatioon Testing

Lecture 37 - Mutation Testing for Programs

Lecture 38 - Mutation Testing: Mutation Operators for Source Code

Lecture 39 - Mutation Testing Vs. Graphs and Logic Based Testing

Lecture 40 - Assignment Solving for Week8

Lecture 41 - Mutation testing

Lecture 42 - Mutation Testing : Mutation for integration

Lecture 43 - Mutation testing : Grammars and inputs

Lecture 44 - Software Testing Course: Summary after Week 9

Lecture 45 - Testing of web Applications and Web Services

Lecture 46 - Testing of web Applications and Web Services

Lecture 47 - Testing of web Applications and Web Services

Lecture 48 - Testing of Object-Oriented Applications

Lecture 49 - Testing of Object-Oriented Applications

Lecture 50 - Symbolic Testing - 1

Lecture 51 - Symbolic Testing - 2

Lecture 52 - DART: Directed Automated Random Testing - 1

Lecture 53 - DART: Directed Automated Random Testing - 2

Lecture 54 - DART: Directed Automated Random Testing - 3

Lecture 55 - Testing of Object-Oriented Applications

Lecture 56 - Testing of Mobile Applications

Lecture 57 - Non-Functional System Testing

Lecture 58 - Regression Testing

Lecture 59 - Assignment: Week 11 Solving

Lecture 60 - Software Testing: Summary at the End of the Course

NPTEL : NOC:Design and Pedagogy of the Introductory Programming Course (Computer Science and Engineering)

Co-ordinators : Prof. Abhiram G Ranade

Lecture 1 - Course Overview

Lecture 2 - Introduction and Survey.0: The standard approach to introductory programming

Lecture 3 - Introduction and Survey.1: Experience with the standard approach

Lecture 4 - Introduction and Survey.2: Alternative approaches, Summary, and Conclusion

Lecture 5 - Basic Ideas in Our Approach.0: Introduction

Lecture 6 - Basic Ideas in Our Approach.1: Examples of translating manual algorithms to computer programs

Lecture 7 - Basic Ideas in Our Approach.2: More examples

Lecture 8 - Basic Ideas in Our Approach.3: Should we teach students (manual) problem solving strategies?

Lecture 9 - Basic Ideas in Our Approach.4: The design of the course

Lecture 10 - Basic Ideas in Our Approach.5: Remarks on individual topics - 1

Lecture 11 - Basic Ideas in Our Approach.6: Remarks on individual topics - 2, Conclusion

Lecture 12 - Pedagogy.0: Introduction and basic principles

Lecture 13 - Pedagogy.1: Scaffolding, Lesson Plan

Lecture 14 - Pedagogy.2: A quick tour of the course - 1

Lecture 15 - Pedagogy.3: Tour-2

Lecture 16 - Pedagogy.4: Tour-3, Conclusion

Lecture 17 - Advanced Programming Topics.0: Introduction, Organization of medium sized programs

Lecture 18 - Advanced Programming Topics.1: Advanced memory management, Standard Library

Lecture 19 - Advanced Programming topics.2: Object Oriented Programming, Concluding remarks

Lecture 20 - In class questions, Assignments, Examinations.0: In class questions and lab assignments

Lecture 21 - In class questions, Assignments, Examinations.1: Examinations

Lecture 22 - Summing up

NPTEL : NOC:An Introduction to Programming through C++ (Computer Science and Engineering)

Co-ordinators : Prof. Abhiram G Ranade

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Introduction - Part 3

Lecture 4 - Introduction - Part 4

Lecture 5 - Problem Solving using Computer - Part 1

Lecture 6 - Problem Solving using Computer - Part 2

Lecture 7 - Problem Solving using Computer - Part 3

Lecture 8 - Problem Solving using Computer - Part 4

Lecture 9 - Problem Solving using Computer - Part 5

Lecture 10 - Basic Elements of Program - Part 1

Lecture 11 - Basic Elements of Program - Part 2

Lecture 12 - Basic Elements of Program - Part 3

Lecture 13 - Basic Elements of Program - Part 4

Lecture 14 - Program Design - Part 1

Lecture 15 - Program Design - Part 2

Lecture 16 - Program Design - Part 3

Lecture 17 - Simple cpp Graphics

Lecture 18 - Conditional Execution - Part 1

Lecture 19 - Most general form of if - Part 2

Lecture 20 - More general form of conditions - Part 3

Lecture 21 - A somewhat large program example - Part 4

Lecture 22 - Switch statement and logical data - Part 5

Lecture 23 - Loops - Part 1

Lecture 24 - Mark averaging - Part 2

Lecture 25 - The break and continue statements - Part 3

Lecture 26 - The for statement - Part 4

Lecture 27 - Euclid's algorithm for GCD - Part 5

Lecture 28 - Correctness proof for GCD - Part 6

Lecture 29 - Computing Mathematical Functions - Part 1 : Taylor series

Lecture 30 - Computing Mathematical Functions - Part 2 : Numerical integration

Lecture 31 - Computing Mathematical Functions - Part 3 : Bisection Method

Lecture 32 - Computing Mathematical Functions - Part 4 : Newton Raphson Method

Lecture 33 - Loops in various applications - Part 1 : Loops in various applications brute force algorithms

Lecture 34 - Loops in various applications - Part 2 : Finding Pythagorean Triples

Lecture 35 - Loops in various applications - Part 3 : Modelling a system: bargaining

Lecture 36 - Loops in various applications - Part 4 : Simulating a water tank

Lecture 37 - Loops in various applications - Part 5 : Arithmetic on very large numbers

Lecture 38 - Functions - Part 1 : Basics

Lecture 39 - Functions - Part 2 : Examples

Lecture 40 - Functions - Part 3 : Reference parameters

Lecture 41 - Functions - Part 4 : Pointers

Lecture 43 - Recursion - Part 1 : Introduction

Lecture 44 - Recursion - Part 2 : Recursive objects, Tree drawing

Lecture 45 - Recursion - Part 3 : How to think about recursion

Lecture 46 - Virahanka Numbers - Part 1 : Introduction

Lecture 47 - Virahanka Numbers - Part 2 : Recursive Program

Lecture 48 - Virahanka Numbers - Part 3 : Iterative Program and Conclusion

Lecture 49 - Program Organization and Functions - Part 1 : Introduction

Lecture 50 - Program Organization and Functions - Part 2 : Splitting into files

Lecture 51 - Program Organization and Functions - Part 3 : Namespaces

Lecture 52 - Program Organization and Functions - Part 4 : How to use C++ without simplecpp

Lecture 53 - Advanced Features of Functions - Part 1 : Introduction and passing one function to another

Lecture 54 - Advanced Features of Functions - Part 2 : Lambda expressions

Lecture 55 - Advanced Features of Functions - Part 3 : Default values to parameters

Lecture 56 - Advanced Features of Functions - Part 4 : Function overloading and lecture conclusion

Lecture 57 - Array Part-1 - Part 1 : Introduction

Lecture 58 - Array Part-1 - Part 2 : Marks averaging problem

Lecture 59 - Array Part-1 - Part 3 : Histogram computation

Lecture 60 - Array Part-1 - Part 4 : Marks display variation

Lecture 61 - Array Part-1 - Part 5 : Polynomial multiplication

Lecture 62 - Array Part-1 - Part 6 : Queues in dispatching taxis

Lecture 63 - Array Part-1 - Part 7 : More efficient Queues in dispatching taxis

Lecture 64 - Array Part-1 - Part 8 : Disk intersection

Lecture 65 - Array Part-1 - Part 9 : Arrays of graphical objects and conclusion

Lecture 66 - Array Part-2 - Part 1 : Introduction

Lecture 67 - Array Part-2 - Part 2 : Interpretation of aname[index]

Lecture 68 - Array Part-2 - Part 3 : Arrays and function calls

Lecture 69 - Array Part-2 - Part 4 : A function to sort an array

Lecture 70 - More on Arrays - Part 1 : Textual data

Lecture 71 - More on Arrays - Part 2 : Functions on character strings

Lecture 72 - More on Arrays - Part 3 : Two dimensional arrays

Lecture 73 - More on Arrays - Part 4 : Command Line Arguments

Lecture 74 - Arrays and recursion - Part 1 : Binary Search Introduction

Lecture 75 - Arrays and recursion - Part 2 : Binary search analysis

Lecture 76 - Arrays and recursion - Part 3 : Mergesort overview

Lecture 77 - Arrays and recursion - Part 4 : Merge function

Lecture 78 - Arrays and recursion - Part 5 : Mergesort conclusion

Lecture 79 - Structures - Part 1 : Definition and instantiation

Lecture 80 - Structures - Part 2 : Operations on structures

Lecture 81 - Structures - Part 3 : An example program

Lecture 82 - Structures - Part 4 : Pointers and lecture conclusion

Lecture 83 - Structures Part 2 - Part 1 : Introduction to Member functions

Lecture 84 - Structures Part 2 - Part 2 : Vectors from Physics

Lecture 85 - Structures Part 2 - Part 3 : Taxi dispatch

Lecture 86 - Classes - Part 1 : Introduction

Lecture 87 - Classes - Part 2 : Constructors

Lecture 88 - Classes - Part 3 : Operator overloading

Lecture 89 - Classes - Part 4 : Access control

Lecture 90 - Classes - Part 5 : Classes for graphics and input output

Lecture 91 - Classes - Part 6 : General remarks

Lecture 92 - Representing variable length entities - Part 1 : Introduction

Lecture 93 - Representing variable length entities - Part 2 : Heap memory basics

Lecture 94 - Representing variable length entities - Part 3 : Pitfalls of using heap memory

Lecture 95 - Representing variable length entities - Part 4 : Automating memory management

Lecture 96 - Representing variable length entities - Part 5 : Implementing a class with automated memory management - 1

Lecture 97 - Representing variable length entities - Part 6 : Implementing a class with automated memory management - 2

Lecture 98 - Representing variable length entities - Part 7 : Using the implemented class and conclusion

Lecture 99 - The Standard Library - Part 1 : Class string

Lecture 100 - The Standard Library - Part 2 : Class vector

Lecture 101 - The Standard Library - Part 3 : Sorting vectors and arrays

Lecture 102 - The Standard Library - Part 4 : Classes map and unordered_map

Lecture 103 - The Standard Library - Part 5 : Iterators

Lecture 104 - Data structure based programming - Part 1 : Introduction

Lecture 105 - Data structure based programming - Part 2 : Set and pair classes

Lecture 106 - Data structure based programming - Part 3 : Implementation of standard library data structures

Lecture 107 - Data structure based programming - Part 4 : Composing data structures

Lecture 108 - Data structure based programming - Part 5 : typedef and lecture conclusion

Lecture 109 - Medium size programs - Part 1 : The new marks display program

Lecture 110 - Medium size programs - Part 2 : Manual algorithm for new marks display

Lecture 111 - Medium size programs - Part 3 : RSMTAB and rest of the program

Lecture 112 - Medium size programs - Part 4 : Sophisticated solutions to marks display

Lecture 113 - A graphical editor and solver for circuits - Part 1 : Outline

Lecture 114 - A graphical editor and solver for circuits - Part 2 : Main program and organization

Lecture 115 - A graphical editor and solver for circuits - Part 3 : Mathematical representation of the circuit

Lecture 116 - A graphical editor and solver for circuits - Part 4 : Extensions and concluding remarks

Lecture 117 - Cosmological simulation - Part 1 : Introduction and First order Euler method

Lecture 118 - Cosmological simulation - Part 2 : Second order Euler method

Lecture 119 - Cosmological simulation - Part 3 : The program

Lecture 120 - Cosmological simulation - Part 4 : Concluding remarks

NPTEL : NOC:Demystifying Networking (Computer Science and Engineering)

Co-ordinators : Prof.Sridhar Iyer

Lecture 1 - Introduction

Lecture 2 - Analogy for CEO's Problem

Lecture 3 - Discussing the CEO's Problem

Lecture 4 - From the CEO's Company to Layers in a Network

Lecture 5 - Layers in Detail

Lecture 6 - Layered Nature of a Network

Lecture 7 - Introduction to Internet Data Capturing using Wireshark

Lecture 8 - Network data captured while requesting a website

Lecture 9 - What is Cisco Packet Tracer

Lecture 10 - Modes of Cisco Packet Tracer

Lecture 11 - Getting Cisco Packet Tracer

Lecture 12 - Logical and Physical Typologies in Cisco Packet Tracer

Lecture 13 - Devices on Cisco Packet Tracer

Lecture 14 - Introduction to the Cisco Packet Tracer Activity for Week 1

Lecture 15 - Introduction to the campus network on Cisco Packet Tracer

Lecture 16 - Loading the page in Simulation Mode

Lecture 17 - Inspecting the packets in Simulation Mode

Lecture 18 - Editing the dummy website on Cisco Packet Tracer

Lecture 19 - Summary of the Cisco Packet Tracer Activity

Lecture 20 - Introduction to Anupam's Adventure

Lecture 21 - Anupam's adventure brings us to IP Addressing

Lecture 22 - Addressing at various layers

Lecture 23 - IP Addresses

Lecture 24 - Address Translation

Lecture 25 - Introduction to IP Addressing

Lecture 26 - Creating a network with Sub-net mask

Lecture 27 - Nomenclature of a sub-net mask

Lecture 28 - Network addresses and Private networks

Lecture 29 - Introduction to the Addressing Topology

Lecture 30 - Addressing a local network and DHCP

Lecture 31 - Addressing a local network manually

Lecture 32 - Addressing in Pubilc and Private Networks

Lecture 33 - Verifying Connectivity using Ping

Lecture 34 - Using network address translation to communicate on internet

Lecture 35 - Using Sub nets and Summary of addressing

Lecture 36 - Summary of the week

Lecture 37 - Analogy for the week 2

Lecture 38 - Discussion on dabbawala analogy

Lecture 39 - From dabbawalas to routers and switches

Lecture 40 - What is routing ?

Lecture 41 - Static routing in a router in CPT

Lecture 42 - How does a switch forwards packets CPT

Lecture 43 - How to add static route in a router? (CPT)

Lecture 44 - Traveler's dilemma

Lecture 45 - Duscussing the Traveler's dilemma

Lecture 46 - From Traveler's dilemma to Dynamic Routing

Lecture 47 - Dynamic Routing with Distance Vector

Lecture 48 - Distance Vector Routing in Detail

Lecture 49 - Dynamic Routing with Link State

Lecture 50 - Setting up dynamic routing in Packet Tracer

Lecture 51 - Summary of the week

Lecture 52 - Introduction to analogy for week 3

Lecture 53 - Analogy for week 3

Lecture 54 - Questions on analogy for week 3

Lecture 55 - Understanding the new order requirements

Lecture 56 - Introduction to Tranport Layer

Lecture 57 - Introduction to TCP

Lecture 58 - Introduction to UDP

Lecture 59 - Exploring UDP on Cisco Packet Tracer

Lecture 60 - TCP Connection Establishment

Lecture 61 - TCP Connection Closure

Lecture 62 - Summay of TCP and UDP on Cisco Packet Tracer

Lecture 63 - The story of the delivery fiasco

Lecture 64 - From delivery fisaco to Port Numbers

Lecture 65 - Application Layer in depth

Lecture 66 - Port number in Wireshark

Lecture 67 - Summary of port number and PAT

Lecture 68 - Summary of the entire TCP IP stack

Lecture 69 - Introducing the analogy for week 4

Lecture 70 - The secret box

Lecture 71 - Questions on analogy for week 4

Lecture 72 - Secret of the secret box

Lecture 73 - From secret box to encryption

Lecture 74 - Introduction to security and CIA

Lecture 75 - Information Security and Defence in Depth

Lecture 76 - Information Classification and Access Control

Lecture 77 - Process Management

Lecture 78 - Introduction to Network Security

Lecture 79 - Network Breach and Countermeasures

Lecture 80 - Internet Security

Lecture 81 - Securing the Internet Usage

Lecture 82 - Internet Security Products

Lecture 83 - Personal Computing Device Recommendations

Lecture 84 - Responsible Behavior on the Internet

Lecture 85 - Best practices for home Network and Media Devices

Lecture 86 - Closing thoughts on security

Lecture 87 - The story of a family trip

Lecture 88 - The troubleshooting approach

Lecture 89 - Troubleshooting Physical and Data Link Layers

Lecture 90 - Troubleshooting Network Layer

Lecture 91 - Troubleshooting Transport and Application Layers

Lecture 92 - Troubleshooting Summary

Lecture 93 - Troubleshooting Heuristics

Lecture 94 - Troubleshooting Challenge - 1

Lecture 95 - Troubleshooting challenge - 2

Lecture 96 - Troubleshooting Challenge - 3

Lecture 97 - Thats How we Troubleshoot

Lecture 98 - Week Summary

Lecture 99 - Course Closure

Lecture 100 - Course Credits

NPTEL : NOC:Learning Analytics Tools (Computer Science and Engineering)

Co-ordinators : Prof. Ramkumar Rajendran

Lecture 1 - Intro to Data Analytics. What is Learning Analytics?

Lecture 2 - Academic Analytics, and Educational Data Mining

Lecture 3 - Four Levels of Analytics

Lecture 4 - Four Levels of Learning Analytics Overview - II

Lecture 5 - Data Collection from Different learning environment

Lecture 6 - Data collection in TELE

Lecture 7 - Data Preprocessing

Lecture 8 - Ethics in Learning Analytics, Student Privacy

Lecture 9 - Demo of Weka

Lecture 10 - Introduction to Machine Learning - Part 1

Lecture 11 - Introduction to Machine Learning - Part 2

Lecture 12 - Training and testing data

Lecture 13 - Performance Metrics - I

Lecture 14 - Performance Metrics - II

Lecture 15 - Performance Metrics - III

Lecture 16 - Demo of Orange

Lecture 17 - Descriptive Analytics - I

Lecture 18 - Descriptive Analytics - II

Lecture 19 - Charts - I

Lecture 20 - Charts - II

Lecture 21 - Charts - III

Lecture 22 - Comparing Charts

Lecture 23 - Descriptive Analytics â€“ Example I

Lecture 24 - Descriptive Analytics â€“ Example II

Lecture 25 - Excel tool

Lecture 26 - Diagnostics Analytics

Lecture 27 - Correlation

Lecture 28 - Correlation Matrix

Lecture 29 - Spearmanâ€™s Rank Correlation

Lecture 30 - Data Mining

Lecture 31 - iSAT

Lecture 32 - Diagnostic Analytics - SPM

Lecture 33 - Sequential pattern mining (SPM-II)

Lecture 34 - Differential Sequence Mining (DSM)

Lecture 35 - Process Mining

Lecture 36 - Diagnostic Analytics - Clustering

Lecture 37 - K-means Clustering

Lecture 38 - Hierarchical Clustering

Lecture 39 - Clustering - Examples

Lecture 40 - Predictive Analytics

Lecture 41 - Linear Regression

Lecture 42 - Multiple Regression

Lecture 43 - Logistic Regression

Lecture 44 - Linear Regression - Example

Lecture 45 - Predictive Analytics - II

Lecture 46 - Naive Bayes Classifier

Lecture 47 - Decision Tree

Lecture 48 - Decision Tree Classifier

Lecture 49 - DT, NB - Examples

Lecture 50 - Text Analytics

Lecture 51 - Introduction to NLP

Lecture 52 - NLP-II

Lecture 53 - NLP-Tools

Lecture 54 - NLP-Examples

Lecture 55 - Intro Multimodal Learning Analytics

Lecture 56 - Affective Computing - 1

Lecture 57 - Affective Computing - 2

Lecture 58 - Eye Tracking

Lecture 59 - Revision of Learning Analytics tools course

Lecture 60 - Source of Data collection and Research Community

Lecture 61 - Machine Learning tools used in industry

NPTEL : NOC:Design and Engineering of Computer Systems (Computer Science and Engineering)

Co-ordinators : Prof. Mythili Vutukuru

Lecture 1 - Introduction to Computer Systems

Lecture 2 - Principles of Computer Systems Design

Lecture 3 - Overview of CPU hardware

Lecture 4 - Overview of memory and I/O hardware

Lecture 5 - Introduction to Operating Systems

Lecture 6 - Week 1: Tutorial 1

Lecture 7 - Week 1: Tutorial 2

Lecture 8 - Processes

Lecture 9 - Kernel mode execution

Lecture 10 - Threads

Lecture 11 - CPU scheduling policies

Lecture 12 - Virtual machines and containers

Lecture 13 - Week 2: Tutorial 1

Lecture 14 - Week 2: Tutorial 2

Lecture 15 - Week 2: Tutorial 3

Lecture 16 - Memory management in OS

Lecture 17 - Paging

Lecture 18 - Demand paging

Lecture 19 - File system and memory

Lecture 20 - Optimizing memory access

Lecture 21 - Week 3: Tutorial 1

Lecture 22 - Week 3: Tutorial 2

Lecture 23 - Week 3: Tutorial 3

Lecture 24 - Filesystem Datastructures

Lecture 25 - Filesystem Implementation

Lecture 26 - Network I/O via Sockets

Lecture 27 - Network I/O Implementation

Lecture 28 - Memory and I/O virtualization

Lecture 29 - Week 4: Tutorial 1

Lecture 30 - Week 4: Tutorial 2

Lecture 31 - Introduction to computer networking

Lecture 32 - Internet Routing and Forwarding

Lecture 33 - Transport protocols

Lecture 34 - Application layer protocols

Lecture 35 - Network Security

Lecture 36 - Week 5: Tutorial 1

Lecture 37 - Week 5: Tutorial 2

Lecture 38 - Multithreaded application design

Lecture 39 - Inter-process communication

Lecture 40 - Multi-tier application design

Lecture 41 - Examples of end-to-end systems design

Lecture 42 - Deployment of computer systems

Lecture 43 - Week 6: Tutorial 1

Lecture 44 - Week 6: Tutorial 2

Lecture 45 - Performance measurement

Lecture 46 - Performance analysis

Lecture 47 - Performance profiling and optimization

Lecture 48 - Caching

Lecture 49 - Performance scalability

Lecture 50 - Week 7: Tutorial 1

Lecture 51 - Fault tolerance and reliability

Lecture 52 - Replication and consistency

Lecture 53 - Atomicity

Lecture 54 - Distributed transactions

Lecture 55 - Case studies of distributed systems design

NPTEL : NOC:Software Conceptual Design (Computer Science and Engineering)

Co-ordinators : Prof. Sridhar Iyer, Prof. Prajish Prasad, Prof. T. G. Lakshmi

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

NPTEL : NOC:Introduction to Game Theory and Mechanism Design (Computer Science and Engineering)

Co-ordinators : Prof. Swaprava Nath

Lecture 1 - Introduction: Game Theory

Lecture 2 - Introduction: Mechanism Design

Lecture 3 - The game of chess

Lecture 4 - Proof of the chess theorem

Lecture 5 - Normal form games

Lecture 6 - Dominance

Lecture 7 - Nash equilibrium

Lecture 8 - Maxmin strategies

Lecture 9 - Elimination of dominated strategies

Lecture 10 - Preservation of PSNE

Lecture 11 - Matrix games

Lecture 12 - Relation between Maxmin and PSNE in matrix

Lecture 13 - Mixed strategies

Lecture 14 - Mixed strategy Nash equilibrium (MSNE)

Lecture 15 - Find MSNE

Lecture 16 - MSNE characterization theorem proof

Lecture 17 - Algorithm to find MSNE

Lecture 18 - Correlated equilibrium (CE)

Lecture 19 - Computing correlated equilibrium

Lecture 20 - Extensive form games

Lecture 21 - Subgame perfection

Lecture 22 - Limitations of SPNE

Lecture 23 - Imperfect Information Extensive Form Games (IIEFG)

Lecture 24 - Strategies in IIEFGs

Lecture 25 - Equivalence of Strategies in IIEFGs

Lecture 26 - Perfect Recall

Lecture 27 - Equilibrium in IIEFG

Lecture 28 - Game Theory in Practice: P2P file sharing

Lecture 29 - Bayesian Games

Lecture 30 - Strategy, Utility in Bayesian Games

Lecture 31 - Equilibrium in Bayesian Games

Lecture 32 - Examples of Bayesian Equilibrium

Lecture 33 - Introduction to Mechanism Design

Lecture 34 - Revelation Principle

Lecture 35 - Introduction to Arrow's Impossibility Result

Lecture 36 - Proof of Arrow's Result

Lecture 37 - Introduction to the Social Choice Setup

Lecture 38 - Introduction to Gibbard-Satterthwaite Theorem

Lecture 39 - Proof of Gibbard-Satterthwaite Theorem

Lecture 40 - Domain Restriction

Lecture 41 - Median Voting Rule

Lecture 42 - Median Voter Theorem - Part 1

Lecture 43 - Median Voter Theorem - Part 2

Lecture 44 - The Task Sharing Domain

Lecture 45 - The Uniform Rule

Lecture 46 - Mechanism Design with Transfers

Lecture 47 - Examples of Quasi-linear Preferences

Lecture 48 - Pareto Optimality and Groves Payments

Lecture 49 - Introduction to VCG Mechanism

Lecture 50 - VCG in Combinatorial Allocations

Lecture 51 - Applications to Internet Advertising

Lecture 52 - Slot Allocation and Payments in Position

Lecture 53 - Pros and Cons of VCG Mechanism

Lecture 54 - Affine Maximizers

Lecture 55 - Single Object Allocation

Lecture 56 - Myerson's Lemma

Lecture 57 - Illustration of Myerson's Lemma

Lecture 58 - Optimal Mechanism Design

Lecture 59 - Single Agent Optimal Mechanism Design

Lecture 60 - Multiple Agent Optimal Mechanism Design

Lecture 61 - Examples of Optimal Mechanisms

Lecture 62 - Endnotes and Summary

NPTEL : NOC:Introduction to Computer and Network Performance Analysis using Queuing Systems (Computer Science and Engineering)

Co-ordinators : Prof. Varsha Apte

Lecture 1 - Introduction, why do delays happen, contention for resources

Lecture 2 - Performance metrics and parameters

Lecture 3 - Introducing Queuing Systems

Lecture 4 - Memoryless Distributions

Lecture 5 - Operational Laws

Lecture 6 - Asymptotic Analysis of G/G/1, G/G/1/K queues

Lecture 7 - Asymptotic Analysis of G/G/c/K queues

Lecture 8 - Little's Law

Lecture 9 - Littleâ€™s Law examples and A Case Study of Open Load test on a Web server

Lecture 10 - Some results for M/G/1 queue and Memoryless Arrivals

Lecture 11 - Continuing the Case Study of Open Load test on a web server (Response Time)

Lecture 12 - Open queuing networks - tandem queuing network

Lecture 13 - Open queuing networks - general (Jackson) queuing networks

Lecture 14 - Open queuing networks - examples

Lecture 15 - Closed Queuing Systems

Lecture 16 - Closed Queuing System (Continued...)

Lecture 17 - Case study of Closed Load Test on a Web Server

Lecture 18 - General formulation of Jacksonian Closed Queuing Networks

Lecture 19 - Mean Value Analysis for Closed Queuing Networks

Lecture 20 - Mean Value Analysis examples,Case Study of a Load test on a web server,Closing Remarks

NPTEL : NOC:Games and Information (Computer Science and Engineering)

Co-ordinators : Prof. Ankur A. Kulkarni

Lecture 1 - Introduction, why do delays happen, contention for resources

Lecture 2 - Performance metrics and parameters

Lecture 3 - Introducing Queuing Systems

Lecture 4 - Memoryless Distributions

Lecture 5 - Operational Laws

Lecture 6 - Aumann model of incomplete information: Definition and Examples

Lecture 7 - Knowledge operator: Definition and Examples

Lecture 8 - Common knowledge: Definition and Examples

Lecture 9 - The structural theorem of common knowledge

Lecture 10 - Proof of the structural theorem (forward direction)

Lecture 11 - Proof of the structural theorem (backward direction)

Lecture 12 - Aumann model of incomplete information with belief: Definition and Examples

Lecture 13 - Aumann's agreement theorem

Lecture 14 - Zero-sum game definition and Security strategies

Lecture 15 - Saddle point strategies

Lecture 16 - Further properties of saddle point strategies

Lecture 17 - Mixed strategies

Lecture 18 - Weirstrass lemma and existence of a mixed saddle point strategy

Lecture 19 - Von Nuenmann minmax theorem

Lecture 20 - Computing mixed saddle point startegy: Holmes and Moriarty

Lecture 21 - Computing mixed strategy saddle point: 2X2 matrix game

Lecture 22 - Computing mixed strategy saddle point: 2X3 matrix game

Lecture 23 - Nash equilibrium of a non zero-sum game and its relation with Kakutani fixed

Lecture 24 - Proof: Existence of Nash equilibrium (Condition 1 of Kakutani fixed point)

Lecture 25 - Proof: Existence of Nash equilibrium (Condition 2 of Kakutani fixed point)

Lecture 26 - Existence of Nash equilibrium for infinite strategy space (Using Brower's)

Lecture 27 - Quantal Response: Motivation

Lecture 28 - Quantal Response: Formal model

Lecture 29 - Dynamic games definiton

Lecture 30 - Solution concept in dynamic games

Lecture 31 - Relation of the heuristic solution with the Nash equilibrium of the standard

Lecture 32 - Example of a Threat equilibrium

Lecture 33 - Interpreting the threat equilibrium in standard normal form of the dynamic game

Lecture 34 - Extensive form games - I

Lecture 35 - Extensive form games - II

Lecture 36 - Single Act Games

Lecture 37 - Informationally inferior games

Lecture 38 - Information Structure in Single Act Games

Lecture 39 - Nested and Ladder Nested Extensive form games

Lecture 40 - Equilibrium Algorithm

Lecture 41 - Stage-wise multi act games

Lecture 42 - Feedback equilibrium

Lecture 43 - Mixed and Behavioral Strategies

Lecture 44 - Conditions for equivalence for mixed and behavioral strategies

Lecture 45 - Kuhn's Theorem - I

Lecture 46 - Kuhn's Theorem - II

Lecture 47 - Kuhn's Theorem - III

Lecture 48 - Games of incomplete information

Lecture 49 - Bayesian Nash equilibrium - I

Lecture 50 - Bayesian Nash equilibrium - II

Lecture 51 - Self-enforcement of Nash equilibrium

Lecture 52 - Stackelberg game

Lecture 53 - Principal-Agent Models - I

Lecture 54 - Principal-Agent Models - II

Lecture 55 - Moral Hazard and Adverse selection

Lecture 56 - Games with contracts

Lecture 57 - Correlated Equilibrium - I

Lecture 58 - Correlated Equilibrium - II

Lecture 59 - Correlated Equilibrium - III

Lecture 60 - Bayesian Game with mediated communication

Lecture 61 - Revelation Principle

NPTEL : NOC:Distributed Optimization and Machine Learning (Computer Science and Engineering)

Co-ordinators : Prof. Mayank Baranwal

Lecture 1 - Introduction to optimization

Lecture 2 - Analyzing optimization algorithms in continuous time domain

Lecture 3 - Course Outline

Lecture 4 - Basics of optimization problems

Lecture 5 - Convex sets and Convex functions

Lecture 6 - Strictly and strongly convex functions

Lecture 7 - Implications of strong convexity

Lecture 8 - Primal and dual optimization problems

Lecture 9 - Slaters condition

Lecture 10 - Analysis of gradient descent algorithm

Lecture 11 - KKT conditions

Lecture 12 - Acceleration under strong convexity

Lecture 13 - Accelerate the convergence even further

Lecture 14 - Stability theory

Lecture 15 - Connections to optimization problems

Lecture 16 - Exponential stability

Lecture 17 - Bregman Divergance

Lecture 18 - Rescaled Gradient Flow

Lecture 19 - Advanced Results on PL inequality - Part 1

Lecture 20 - Advanced Results on PL inequality - Part 2

Lecture 21 - Constrained Optimization Problem

Lecture 22 - Augmented Lagrangian

Lecture 23 - Method of Multipliers

Lecture 24 - Dual Ascent and Dual Decomposition

Lecture 25 - ADMM Algorithm

Lecture 26 - Basics of Graph Theory - 1

Lecture 27 - Basics of Graph Theory - 2

Lecture 28 - Consensus and Average Consensus - 1

Lecture 29 - Consensus and Average Consensus - 2

Lecture 30 - Consensus Algorithms

Lecture 31 - Consensus Algorithms - Fixed time

Lecture 32 - Distributed Economic Dispatch Problem

Lecture 33 - Algorithm for Uncapacitated EDP

Lecture 34 - Capacitated EDP

Lecture 35 - Algorithms for Distributed Optimization - 1

Lecture 36 - Algorithms for Distributed Optimization - 2

Lecture 37 - Continuous-time Distributed Optimization Algorithms

Lecture 38 - Introduction to Neural Networks

Lecture 39 - Large Scale Machine Learning

Lecture 40 - Decentralized Stochastic Gradient Descent - 1

Lecture 41 - Decentralized Stochastic Gradient Descent - 2

Lecture 42 - Introduction to Federated Learning

Lecture 43 - FedAvg Algorithm

Lecture 44 - Convergence Analysis of FL

Lecture 45 - Sources of Computational Heterogenity in FL

Lecture 46 - Objective Inconsistency Problem

Lecture 47 - General Update Rule

NPTEL : Computational Geometry (Computer Science and Engineering)

Co-ordinators : Prof. Sandeep Sen

Lecture 1 - Introduction

Lecture 2 - Visibility Problems

Lecture 3 - 2D Maxima

Lecture 4 - Line Sweep Method

Lecture 5 - Segment Intersection Problem

Lecture 6 - Line Sweep: Rectangle Union

Lecture 7 - Convex Hull

Lecture 8 - Convex Hull Contd

Lecture 9 - Quick Hull

Lecture 10 - More Convex Hull Algorithms

Lecture 11 - Intersection of Half Planes and Duality

Lecture 12 - Intersection of Half Planes and Duality Contd

Lecture 13 - Lower Bounds

Lecture 14 - Planar Point Location

Lecture 15 - Point Location and Triangulation Contd...

Lecture 16 - Triangulation of Arbitrary Polygon

Lecture 17 - Voronoi Diagram : Properties

Lecture 18 - Voronoi Diagram Construction

Lecture 19 - Delaunay Triangulation

Lecture 20 - Quick sort and Backward Analysis

Lecture 21 - Generalized RIC

Lecture 22 - RIC Continued

Lecture 23 - Arrangements

Lecture 24 - Zone Theorem and Application

Lecture 25 - Levels

Lecture 26 - Range Searching : Introduction

Lecture 27 - Orthogonal Range searching

Lecture 28 - Priority Search Trees

Lecture 29 - Non - Orthogonal Range Searching

Lecture 30 - Half - Plane Range Query

Lecture 31 - Well Separated Partitioning

Lecture 32 - Quadtrees Epsilon -WSPD

Lecture 33 - Construction of Epsilon - WSPD

Lecture 34 - Epsilon - WSPD to Geometric Spanner

Lecture 35 - Epsilon-Nets & VC Dimension

Lecture 36 - Epsilon-Nets & VC Dimension contd

Lecture 37 - Geometric Set Cover

Lecture 38 - Geometric Set Cover (with Bounded VC Dimension)

Lecture 39 - Shape Representation

Lecture 40 - Shape Comparison

NPTEL : Logic for CS (Computer Science and Engineering)

Co-ordinators : Prof. S. Arun Kumar

Lecture 1 - Introduction

Lecture 2 - Propositional Logic Syntax

Lecture 3 - Semantics of Propositional Logic

Lecture 4 - Logical and Algebraic Concepts

Lecture 5 - Identities and Normal forms

Lecture 6 - Tautology Checking

Lecture 7 - Propositional Unsatisfiability

Lecture 8 - Analytic Tableaux

Lecture 9 - Consistency and Completeness

Lecture 10 - The Completeness Theorem

Lecture 11 - Maximally Consistent Sets

Lecture 12 - Formal Theories

Lecture 13 - Proof Theory : Hilbert-style

Lecture 14 - Derived Rules

Lecture 15 - The Hilbert System : Soundness

Lecture 16 - The Hilbert System : Completeness

Lecture 17 - Introduction to Predicate Logic

Lecture 18 - The Semantic of Predicate Logic

Lecture 19 - Subsitutions

Lecture 20 - Models

Lecture 21 - Structures and Substructures

Lecture 22 - First-Order Theories

Lecture 23 - Predicate Logic: Proof Theory (Continued...)

Lecture 24 - Existential Quantification

Lecture 25 - Normal Forms

Lecture 26 - Skalemization

Lecture 27 - Substitutions and Instantiations

Lecture 28 - Unification

Lecture 29 - Resolution in FOL

Lecture 30 - More on Resolution in FOL

Lecture 31 - Resolution : Soundness and Completeness

Lecture 32 - Resolution and Tableaux

Lecture 33 - Completeness of Tableaux Method

Lecture 34 - Completeness of the Hilbert System

Lecture 35 - First-Order Theories

Lecture 36 - Towards Logic Programming

Lecture 37 - Verification of Imperative Programs

Lecture 38 - Verification of WHILE Programs

Lecture 39 - References

NPTEL : Computer Architecture (Prof. Anshul Kumar) (Computer Science and Engineering)

Co-ordinators : Prof. Anshul Kumar

Lecture 1 - Introduction to Computer Architecture

Lecture 2 - History of Computers

Lecture 3 - Instruction Set Architecture - I

Lecture 4 - Instruction Set Architecture - II

Lecture 5 - Instruction Set Architecture - III

Lecture 6 - Recursive Programs

Lecture 7 - Architecture Space

Lecture 8 - Architecture Examples

Lecture 9 - Performance

Lecture 10 - Performance

Lecture 11 - Binary Arithmetic, ALU Design

Lecture 12 - ALU Design, Overflow

Lecture 13 - Multiplier Design

Lecture 14 - Divider Design

Lecture 15 - Fast Addition , Multiplication

Lecture 16 - Floating Point Arithmetic

Lecture 17 - Processor Design - Introduction

Lecture 18 - Processor Design

Lecture 19 - Processor Design - Simple Design

Lecture 20 - Processor Design - Multi Cycle Approach

Lecture 21 - Processor Design - Control for Multi Cycle

Lecture 22 - Processor Design - Micro programmed Control

Lecture 23 - Processor Design - Exception Handling

Lecture 24 - Pipelined Processor Design Basic Idea

Lecture 25 - Pipelined Processor Design: Data path

Lecture 26 - Pipelined Processor Design: Handling Data

Lecture 27 - Pipelined Processor Design

Lecture 28 - Memory Hierarchy : Basic Idea

Lecture 29 - Memory Hierarchy : Cache Organization

Lecture 30 - Memory Hierarchy : Cache Organization

Lecture 31 - Memory Hierarchy : Virtual Memory

Lecture 32 - Memory Hierarchy : Virtual Memory

Lecture 33 - Input / Output Subsystem: Introduction

Lecture 34 - Input / Output Subsystem: Interfaces and buses

Lecture 35 - Input / Output Subsystem: Interfaces and buses

Lecture 36 - Input / Output Subsystem: I/O Operations

Lecture 37 - Input / Output Subsystem: Designing I/O Systems

Lecture 38 - Concluding Remarks

NPTEL : Data Structures And Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Naveen Garg

Lecture 1 - Introduction to Data Structures and Algorithms

Lecture 2 - Stacks

Lecture 3 - Queues and Linked Lists

Lecture 4 - Dictionaries

Lecture 5 - Hashing

Lecture 6 - Trees

Lecture 7 - Tree Walks / Traversals

Lecture 8 - Ordered Dictionaries

Lecture 9 - Deletion

Lecture 10 - Quick Sort

Lecture 11 - AVL Trees

Lecture 12 - AVL Trees

Lecture 13 - Trees

Lecture 14 - Red Black Trees

Lecture 15 - Insertion in Red Black Trees

Lecture 16 - Disk Based Data Structures

Lecture 17 - Case Study: Searching for Patterns

Lecture 18 - Tries

Lecture 19 - Data Compression

Lecture 20 - Priority Queues

Lecture 21 - Binary Heaps

Lecture 22 - Why Sorting

Lecture 23 - More Sorting

Lecture 24 - Graphs

Lecture 25 - Data Structures for Graphs

Lecture 26 - Two Applications of Breadth First Search

Lecture 27 - Depth First Search

Lecture 28 - Applications of DFS

Lecture 29 - DFS in Directed Graphs

Lecture 30 - Applications of DFS in Directed Graphs

Lecture 31 - Minimum Spanning Trees

Lecture 32 - The Union

Lecture 33 - Prims Algorithm for Minimum Spanning Trees

Lecture 34 - Single Source Shortest Paths

Lecture 35 - Correctness of Dijkstras Algorithm

Lecture 36 - Single Source Shortest Paths

NPTEL : Introduction to Computer Graphics (Computer Science and Engineering)

Co-ordinators : Prof. Prem K Kalra

Lecture 1 - Introduction

Lecture 2 - Raster Graphics

Lecture 3 - Raster Graphics (Continued...)

Lecture 4 - Clipping

Lecture 5 - Polygon Clipping and Polygon Scan Conversion

Lecture 6 - Transformations

Lecture 7 - Transformations (Continued...)

Lecture 8 - 3D Viewing

Lecture 9 - 3D Viewing (Continued...)

Lecture 10 - Curves

Lecture 11 - Assignment - I

Lecture 12 - Curves (Continued...)

Lecture 13 - Curves (Continued...)

Lecture 14 - Curves (Continued...)

Lecture 15 - Curves (Continued...)

Lecture 16 - Surfaces

Lecture 17 - Surfaces (Continued...)

Lecture 18 - Surfaces (Continued...)

Lecture 19 - Surfaces (Continued...)

Lecture 20 - Hierarchical Models

Lecture 21 - Rendering

Lecture 22 - Rendering (Continued...)

Lecture 23 - Rendering (Continued...)

Lecture 24 - Ray Tracing

Lecture 25 - Ray Tracing (Continued...)

Lecture 26 - Ray Tracing (Continued...)

Lecture 27 - Assignment: Ray Tracing

Lecture 28 - Hidden Surface Elimination

Lecture 29 - Hidden Surface Elimination (Continued...)

Lecture 30 - Hidden Surface Elimination (Continued...)

Lecture 31 - Fractals

Lecture 32 - Fractals (Continued...)

Lecture 33 - Computer Animation

Lecture 34 - Animation (Continued...)

Lecture 35 - Animation (Continued...)

NPTEL : Principles of Programming Languages (Computer Science and Engineering)

Co-ordinators : Prof. S. Arun Kumar

Lecture 1 - Introduction

Lecture 2 - Syntax

Lecture 3 - Grammars

Lecture 4 - Ambiguity

Lecture 5 - PLO:Syntax

Lecture 6 - Semantics

Lecture 7 - Syntactic Classes

Lecture 8 - Transition Systems

Lecture 9 - PL0 : Expressions

Lecture 10 - Binding

Lecture 11 - Environments

Lecture 12 - Declarations

Lecture 13 - Commands

Lecture 14 - Stores

Lecture 15 - Summary

Lecture 16 - Declarations and Commands

Lecture 17 - Blocks

Lecture 18 - Qualification

Lecture 19 - Pragmatics

Lecture 20 - Data

Lecture 21 - Structured Data

Lecture 22 - Sequences

Lecture 23 - Control

Lecture 24 - Non-Determinacy

Lecture 25 - Programming Languages

Lecture 26 - Programming Languages

Lecture 27 - Programming Languages

Lecture 28 - Data as Functions

Lecture 29 - Data and Fixpoints

Lecture 30 - Normal Forms

Lecture 31 - Programming Languages

Lecture 32 - Monomorphism

Lecture 33 - Polymorphism

Lecture 34 - Type Checking

Lecture 35 - Contexts

Lecture 36 - Abstracts

Lecture 37 - Procedures

Lecture 38 - Meanings

Lecture 39 - Parameters

Lecture 40 - The Future

NPTEL : Parallel Computing (Computer Science and Engineering)

Co-ordinators : Dr. Subodh Kumar

Lecture 1 - Introduction

Lecture 2 - Parallel Programming Paradigms

Lecture 3 - Parallel Architecture

Lecture 4 - Parallel Architecture (case studies)

Lecture 5 - Open MP

Lecture 6 - Open MP (Continued.)

Lecture 7 - Open MP (Continued..)

Lecture 8 - Open MP & PRAM Model of Computation

Lecture 9 - PRAM

Lecture 10 - Models of Parallel Computation, Complexity

Lecture 11 - Memory Consistency

Lecture 12 - Memory Consistency & Performance Issues

Lecture 13 - Parallel Program Design

Lecture 14 - Shared Memory & Message Passing

Lecture 15 - MPI

Lecture 16 - MPI (Continued.)

Lecture 17 - MPI (Continued..)

Lecture 18 - Algorithmic Techniques

Lecture 19 - Algorithmic Techniques (Continued.)

Lecture 20 - Algorithmic Techniques (Continued..)

Lecture 21 - CUDA

Lecture 22 - CUDA (Continued.)

Lecture 23 - CUDA (Continued..)

Lecture 24 - CUDA (Continued...)

Lecture 25 - CUDA (Continued....)

Lecture 26 - CUDA (Continued.....)

Lecture 27 - CUDA (Continued.....)

Lecture 28 - Algorithms, Merging & Sorting

Lecture 29 - Algorithms, Merging & Sorting (Continued.)

Lecture 30 - Algorithms, Merging & Sorting (Continued..)

Lecture 31 - Algorithms, Merging & Sorting (Continued...)

Lecture 32 - Algorithms, Merging & Sorting (Continued....)

Lecture 33 - Lower Bounds Lock Free Synchronization, Load Stealing

Lecture 34 - Lock Free Synchronization, Graph Algorithms

NPTEL : Operating Systems (Computer Science and Engineering)

Co-ordinators : Prof. Sorav Bansal

Lecture 1 - Introduction to UNIX System Calls - Part 1

Lecture 2 - Introduction to UNIX System Calls - Part 2

Lecture 3 - Threads, Address Spaces, Filesystem Devices

Lecture 4 - PC Architecture

Lecture 5 - x86 Instruction Set, GCC Calling Conventions

Lecture 6 - Physical Memory Map, I/O, Segmentation

Lecture 7 - Segmentation, Trap Handling

Lecture 8 - Traps, Trap Handlers

Lecture 9 - Kernel Data Structures, Memory Management

Lecture 10 - Segmentation Review, Introduction to Paging

Lecture 11 - Paging

Lecture 12 - Process Address Spaces Using Paging

Lecture 13 - Translation Lookaside Buffer, Large Pages, Boot Sector

Lecture 14 - Loading the kernel, Initializing the Page table

Lecture 15 - Setting up page tables for user processes

Lecture 16 - Processes in action

Lecture 17 - Process structure, Context Switching

Lecture 18 - Process Kernel stack, Scheduler, Fork,Context-Switch, Process Control Block, Trap Entry and Return

Lecture 19 - Creating the first process

Lecture 20 - Handling User Pointers, Concurrency

Lecture 21 - Locking

Lecture 22 - Fine-grained Locking and its challenges

Lecture 23 - Locking variations

Lecture 24 - Condition variables

Lecture 25 - Multiple producer, multiple consumer queue; semaphores; monitors

Lecture 26 - Transcations and lock-free primitives read/write locks

Lecture 27 - Synchronization in xv6: acquire/release, sleep/wakeup, exit/wait

Lecture 28 - More synchronization in xv6: kill, IDE device driver; introducion to Demand Paging

Lecture 29 - Demand Paging; Introduction to Page Replacement

Lecture 30 - Page Replacement, Thrashing

Lecture 31 - Storage Devices, Filesystem Intrerfaces

Lecture 32 - File System Implementation

Lecture 33 - File System Operation

Lecture 34 - Cash Recovery and Logging

Lecture 35 - Logging in Linux ext3 filesystem

Lecture 36 - Protection and Security

Lecture 37 - Scheduling Policies

Lecture 38 - Lock-free multiprocessor coordination, Read-Copy-Update

Lecture 39 - Microkernel, Exokernel, Multikernel

Lecture 40 - Virtualization, Cloud Computing, Technology Trends

NPTEL : NOC:Computer Architecture (2017) (Computer Science and Engineering)

Co-ordinators : Prof. Smruti R.Sarangi

Lecture 1 - Introduction to Computer Architecture

Lecture 2 - The Language of Bits - Part-I

Lecture 3 - The Language of Bits - Part-II

Lecture 4 - The Language of Bits - Part-III

Lecture 5 - Assembly Language - Part-I

Lecture 6 - Assembly Language - Part-II

Lecture 7 - Assembly Language - Part-III

Lecture 8 - ARM Assembly Language - Part-I

Lecture 9 - ARM Assembly Language - Part-II

Lecture 10 - x86 Assembly Language - Part-I

Lecture 11 - x86 Assembly Language - Part-II

Lecture 12 - x86 Assembly Language - Part-III

Lecture 13 - x86 Assembly Language - Part-IV

Lecture 14 - A Primer on Digital Logic - Part-I

Lecture 15 - A Primer on Digital Logic - Part-II

Lecture 16 - A Primer on Digital Logic - Part-III

Lecture 17 - Computer Arithmetic - Part-I

Lecture 18 - Computer Arithmetic - Part-II

Lecture 19 - Computer Arithmetic - Part-III

Lecture 20 - Computer Arithmetic - Part-IV

Lecture 21 - Computer Arithmetic - Part-V

Lecture 22 - Computer Arithmetic - Part-VI

Lecture 23 - Processor Design - Part-I

Lecture 24 - Processor Design - Part-II

Lecture 25 - Processor Design - Part-III

Lecture 26 - Principles of Pipelining - Part-I

Lecture 27 - Principles of Pipelining - Part-II

Lecture 28 - Principles of Pipelining - Part-III

Lecture 29 - Principles of Pipelining - Part-IV

Lecture 30 - The Memory Systems - Part-I

Lecture 31 - The Memory Systems - Part-II

Lecture 32 - The Memory Systems - Part-III

Lecture 33 - The Memory Systems - Part-IV

NPTEL : NOC:Introduction to Parallel Programming in OpenMP (Computer Science and Engineering)

Co-ordinators : Dr. Yogish Sabharwal

Lecture 1 - Introduction to Parallel Programming

Lecture 2 - Parallel Architectures and Programming Models

Lecture 3 - Pipelining

Lecture 4 - Superpipelining and VLIW

Lecture 5 - Memory Latency

Lecture 6 - Cache and Temporal Locality

Lecture 7 - Cache, Memory bandwidth and Spatial Locality

Lecture 8 - Intuition for Shared and Distributed Memory architectures

Lecture 9 - Shared and Distributed Memory architectures

Lecture 10 - Interconnection networks in Distributed Memory architectures

Lecture 11 - OpenMP: A parallel Hello World Program

Lecture 12 - Program with Single thread

Lecture 13 - Program Memory with Multiple threads and Multi-tasking

Lecture 14 - Context Switching

Lecture 15 - OpenMP: Basic thread functions

Lecture 16 - OpenMP: About OpenMP

Lecture 17 - Shared Memory Consistency Models and the Sequential Consistency Model

Lecture 18 - Race Conditions

Lecture 19 - OpenMP: Scoping variables and some race conditions

Lecture 20 - OpenMP: thread private variables and more constructs

Lecture 21 - Computing sum: first attempt at parallelization

Lecture 22 - Manual distribution of work and critical sections

Lecture 23 - Distributing for loops and reduction

Lecture 24 - Vector-Vector operations (Dot product)

Lecture 25 - Matrix-Vector operations (Matrix-Vector Multiply)

Lecture 26 - Matrix-Matrix operations (Matrix-Matrix Multiply)

Lecture 27 - Introduction to tasks

Lecture 28 - Task queues and task execution

Lecture 29 - Accessing variables in tasks

Lecture 30 - Completion of tasks and scoping variables in tasks

Lecture 31 - Recursive task spawning and pitfalls

Lecture 32 - Understanding LU Factorization

Lecture 33 - Parallel LU Factorization

Lecture 34 - Locks

Lecture 35 - Advanced Task handling

Lecture 36 - Matrix Multiplication using tasks

Lecture 37 - The OpenMP Shared Memory Consistency Model

Lecture 38 - Applications finite element method

Lecture 39 - Applications deep learning

Lecture 40 - Introduction to MPI and basic calls

Lecture 41 - MPI calls to send and receive data

Lecture 42 - MPI calls for broadcasting data

Lecture 43 - MPI non blocking calls

Lecture 44 - Application distributed histogram updation

Lecture 45 - MPI collectives and MPI broadcast

Lecture 46 - MPI gathering and scattering collectives

Lecture 47 - MPI reduction and alltoall collectives

Lecture 48 - Discussion on MPI collectives design

Lecture 49 - Characteriziation of interconnects

Lecture 50 - Linear arrays 2D mesh and torus

Lecture 51 - d dimensional torus

Lecture 52 - Hypercube

Lecture 53 - Trees and cliques

Lecture 54 - Hockney model

Lecture 55 - Broadcast and Reduce with recursive doubling

Lecture 56 - Scatter and Gather with recursive doubling

Lecture 57 - Reduce scatter and All gather with recursive doubling

Lecture 58 - Discussion of message sizes in analysis

Lecture 59 - Revisiting Reduce scatter on 2D mesh

Lecture 60 - Reduce scatter and Allreduce on the Hypercube

Lecture 61 - Alltoall on the Hypercube

Lecture 62 - Lower bounds

Lecture 63 - Pipeline based algorithm for Allreduce

Lecture 64 - An improved algorithm for Alltoall on the Hypercube using E-cube routing

Lecture 65 - Pipeline based algorithm for Broadcast

Lecture 66 - Introduction to parallel graph algorithms

Lecture 67 - Breadth First Search BFS using matrix algebra

Lecture 68 - BFS Shared memory parallelization using OpenMP

Lecture 69 - Distributed memory settings and data distribution

Lecture 70 - Distributed BFS algorithm

Lecture 71 - Performance considerations

Lecture 72 - Prims Algorithm

Lecture 73 - OpenMP based shared memory parallelization for MST

Lecture 74 - MPI based distributed memory parallelization for MST

Lecture 75 - Sequential Algorithm Adaptation from Prims

Lecture 76 - Parallelization Strategy for Prims algorithm

Lecture 77 - Dry run with the parallel strategy

Lecture 78 - Johnsons algorithm with 1D data distribution

Lecture 79 - Speedup analysis on a grid graph

Lecture 80 - Floyds algorithm for all pair shortest paths

Lecture 81 - Floyds algorithm with 2D data distribution

Lecture 82 - Adaptation to transitive closures

Lecture 83 - Parallelization strategy for connected components

Lecture 84 - Analysis for parallel connected components

NPTEL : NOC:Synthesis of Digital Systems (Computer Science and Engineering)

Co-ordinators : Prof. Preeti Ranjan Panda

Lecture 1 - Outline - What is Synthesis?

Lecture 2 - Chip Design Flow and Hardware Modelling

Lecture 3 - VHDL: Introduction to Hardware Description Languages and VHDL Basics

Lecture 4 - VHDL: Modelling Timing - Events and Transactions

Lecture 5 - VHDL: Specifying Hardware Behaviour with Processes

Lecture 6 - VHDL: Specifying Structure, Test Benches, Parameterisation, and Libraries

Lecture 7 - Introduction to High-level Synthesis

Lecture 8 - Language front-end Design Representation

Lecture 9 - Compiler Transformation in High Level Synthesis: Constant Folding, Dead Code Elimination, Constant Propagation, and Strength Reduction

Lecture 10 - Memory Modelling and Compiler Transformation in High Level Synthesis: Common Sub-expression Elimination and Loop Invariant Code Motion

Lecture 11 - Compiler Transformations in High Level Synthesis: Loop Unrolling and Function Inlining

Lecture 12 - Hardware Transformations and ASAP / ALAP Scheduling

Lecture 13 - Scheduling in High Level Synthesis: List Scheduling and Time-constrained Scheduling

Lecture 14 - Force Directed Scheduling and Register Allocation

Lecture 15 - High Level Synthesis and Timing Issues

Lecture 16 - Finite State Machine Synthesis: Introduction to FSM Encoding

Lecture 17 - Finite State Machine Synthesis: Identifying Common Cubes and Graph Embeding

Lecture 18 - The Retiming Problem

Lecture 19 - Efficient Solution to Retiming and Introduction to Logic Synthesis

Lecture 20 - Binary Decision Diagrams

Lecture 21 - Introduction to Logic Synthesis

Lecture 22 - Two-level Logic Optimisation

Lecture 23 - Multi-Level Logic Optimisation

Lecture 24 - Multi-level Logic Synthesis: Technology Mapping

Lecture 25 - Introduction to Timing Analysis

Lecture 26 - Timing Analysis and Critical Paths

NPTEL : NOC:An Introduction to Artificial Intelligence (Computer Science and Engineering)

Co-ordinators : Prof. Mausam

Lecture 1 - Introduction: What to Expect from AI

Lecture 2 - Introduction: History of AI from 40s - 90s

Lecture 3 - Introduction: History of AI in the 90s

Lecture 4 - Introduction: History of AI in NASA and DARPA (2000s)

Lecture 5 - Introduction: The Present State of AI

Lecture 6 - Introduction: Definition of AI Dictionary Meaning

Lecture 7 - Introduction: Definition of AI Thinking VS Acting and Humanly VS Rationally

Lecture 8 - Introduction: Definition of AI Rational Agent View of AI

Lecture 9 - Introduction: Examples Tasks, Phases of AI and Course Plan

Lecture 10 - Uniform Search: Notion of a State

Lecture 11 - Uniformed Search: Search Problem and Examples - Part 2

Lecture 12 - Uniformed Search: Basic Search Strategies - Part 3

Lecture 13 - Uniformed Search: Iterative Deepening DFS - Part 4

Lecture 14 - Uniformed Search: Bidirectional Search - Part 5

Lecture 15 - Informed Search: Best First Search - Part 1

Lecture 16 - Informed Search: Greedy Best First Search and A* Search - Part 2

Lecture 17 - Informed Search: Analysis of A* Algorithm - Part 3

Lecture 18 - Informed Search Proof of optimality of A* - Part 4

Lecture 19 - Informed Search: Iterative Deepening A* and Depth First Branch and Bound - Part 5

Lecture 20 - Informed Search: Admissible Heuristics and Domain Relaxation - Part 6

Lecture 21 - Informed Search: Pattern Database Heuristics - Part 7

Lecture 22 - Local Search: Satisfaction Vs Optimization - Part 1

Lecture 23 - Local Search: The Example of N-Queens - Part 2

Lecture 24 - Local Search: Hill Climbing - Part 3

Lecture 25 - Local Search: Drawbacks of Hill Climbing - Part 4

Lecture 26 - Local Search: of Hill Climbing With random Walk and Random Restart - Part 5

Lecture 27 - Local Search: Hill Climbing With Simulated Anealing - Part 6

Lecture 28 - Local Search: Local Beam Search and Genetic Algorithms - Part 7

Lecture 29 - Adversarial Search: Minimax Algorithm for two player games

Lecture 30 - Adversarial Search: An Example of Minimax Search

Lecture 31 - Adversarial Search: Alpha Beta Pruning

Lecture 32 - Adversarial Search: Analysis of Alpha Beta Pruning

Lecture 33 - Adversarial Search: Analysis of Alpha Beta Pruning (Continued...)

Lecture 34 - Adversarial Search: Horizon Effect, Game Databases and Other Ideas

Lecture 35 - Adversarial Search: Summary and Other Games

Lecture 36 - Constraint Satisfaction Problems: Representation of the atomic state

Lecture 37 - Constraint Satisfaction Problems: Map coloring and other examples of CSP

Lecture 38 - Constraint Satisfaction Problems: Backtracking Search

Lecture 39 - Constraint Satisfaction Problems: Variable and Value Ordering in Backtracking Search

Lecture 40 - Constraint Satisfaction Problems: Inference for detecting failures early

Lecture 41 - Constraint Satisfaction Problems: Exploiting problem structure

Lecture 42 - Logic in AI : Different Knowledge Representation systems - Part 1

Lecture 43 - Logic in AI : Syntax - Part 2

Lecture 44 - Logic in AI : Semantics - Part 3

Lecture 45 - Logic in AI : Forward Chaining - Part 4

Lecture 46 - Logic in AI : Resolution - Part 5

Lecture 47 - Logic in AI : Reduction to Satisfiability Problems - Part 6

Lecture 48 - Logic in AI : SAT Solvers: DPLL Algorithm - Part 7

Lecture 49 - Logic in AI : Sat Solvers: WalkSAT Algorithm - Part 8

Lecture 50 - Uncertainty in AI: Motivation

Lecture 51 - Uncertainty in AI: Basics of Probability

Lecture 52 - Uncertainty in AI: Conditional Independence and Bayes Rule

Lecture 53 - Bayesian Networks: Syntax

Lecture 54 - Bayesian Networks: Factoriziation

Lecture 55 - Bayesian Networks: Conditional Independences and d-Separation

Lecture 56 - Bayesian Networks: Inference using Variable Elimination

Lecture 57 - Bayesian Networks: Reducing 3-SAT to Bayes Net

Lecture 58 - Bayesian Networks: Rejection Sampling

Lecture 59 - Bayesian Networks: Likelihood Weighting

Lecture 60 - Bayesian Networks: MCMC with Gibbs Sampling

Lecture 61 - Bayesian Networks: Maximum Likelihood Learning

Lecture 62 - Bayesian Networks: Maximum a-Posteriori LearningÂ

Lecture 63 - Bayesian Networks: Bayesian Learning

Lecture 64 - Bayesian Networks: Structure Learning and Expectation Maximization

Lecture 65 - Introduction, Part 10: Agents and Environments

Lecture 66 - Decision Theory: Steps in Decision Theory

Lecture 67 - Decision Theory: Non Deterministic Uncertainty

Lecture 68 - Probabilistic Uncertainty and Value of perfect information

Lecture 69 - Expected Utility vs Expected Value

Lecture 70 - Markov Decision Processes: Definition

Lecture 71 - Markov Decision Processes: An example of a Policy

Lecture 72 - Markov Decision Processes: Policy Evaluation using system of linear equations

Lecture 73 - Markov Decision Processes: Iterative Policy Evaluation

Lecture 74 - Markov Decision Processes: Value Iteration

Lecture 75 - Markov Decision Processes: Policy Iteration and Applications and Extensions of MDPs

Lecture 76 - Reinforcement Learning: Background

Lecture 77 - Reinforcement Learning: Model-based Learning for policy evaluation (Passive Learning)

Lecture 78 - Reinforcement Learning: Model-free Learning for policy evaluation (Passive Learning)

Lecture 79 - Reinforcement Learning: TD Learning

Lecture 80 - Reinforcement Learning: TD Learning and Computational Neuroscience

Lecture 81 - Reinforcement Learning: Q Learning

Lecture 82 - Reinforcement Learning: Exploration vs Exploitation Tradeoff

Lecture 83 - Reinforcement Learning: Generalization in RL

Lecture 84 - Deep Learning: Perceptrons and Activation functions

Lecture 85 - Deep Learning: Example of Handwritten digit recognition

Lecture 86 - Deep Learning: Neural Layer as matrix operations

Lecture 87 - Deep Learning: Differentiable loss function

Lecture 88 - Deep Learning: Backpropagation through a computational graph

Lecture 89 - Deep Learning: Thin Deep Vs Fat Shallow Networks

Lecture 90 - Deep Learning: Convolutional Neural Networks

Lecture 91 - Deep Learning: Deep Reinforcement Learning

Lecture 92 - Ethics of AI: Humans vs Robots

Lecture 93 - Ethics of AI: Robustness and Transparency of AI systems

Lecture 94 - Ethics of AI: Data Bias and Fairness of AI systems

Lecture 95 - Ethics of AI: Accountability, privacy and Human-AI interaction

Lecture 96 - Wrapup

NPTEL : NOC:Advanced Computer Architecture (2021) (Computer Science and Engineering)

Co-ordinators : Prof. Smruti R. Sarangi

Lecture 1 - Introduction

Lecture 2 - Out-of-Order Pipelines - Part I

Lecture 3 - Out-of-Order Pipelines - Part II

Lecture 4 - Out-of-Order Pipelines - Part III

Lecture 5 - The Fetch and Decode Stages - Part I

Lecture 6 - The Fetch and Decode Stages - Part II

Lecture 7 - The Fetch and Decode Stages - Part III

Lecture 8 - The Issue, Execute, and Commit Stages - Part I

Lecture 9 - The Issue, Execute, and Commit Stages - Part II

Lecture 10 - The Issue, Execute, and Commit Stages - Part III

Lecture 11 - The Issue, Execute, and Commit Stages - Part IV

Lecture 12 - Alternative Approaches to Issue and Commit - Part I

Lecture 13 - Alternative Approaches to Issue and Commit - Part II

Lecture 14 - Alternative Approaches to Issue and Commit - Part III

Lecture 15 - Alternative Approaches to Issue and Commit - Part IV

Lecture 16 - Graphics Processors - Part I

Lecture 17 - Graphics Processors - Part II

Lecture 18 - Graphics Processors - Part III

Lecture 19 - Caches - Part I

Lecture 20 - Caches - Part II

Lecture 21 - Caches - Part III

Lecture 22 - Caches - Part IV

Lecture 23 - Caches - Part V

Lecture 24 - Caches - Part VI

Lecture 25 - Multicore Systems - Part I

Lecture 26 - Multicore Systems - Part II

Lecture 27 - Multicore Systems - Part III

Lecture 28 - Multicore Systems - Part IV

Lecture 29 - Multicore Systems - Part V

Lecture 30 - Multicore Systems - Part VI

Lecture 31 - Multicore Systems - Part VII

Lecture 32 - Multicore Systems - Part VIII

Lecture 33 - Multicore Systems - Part IX

NPTEL : NOC:Advanced Distributed systems (Computer Science and Engineering)

Co-ordinators : Prof. Smruti R. Sarangi

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

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Lecture 15

Lecture 16

Lecture 17

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Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

NPTEL : Design Verification and Test of Digital VLSI Circuits (Computer Science and Engineering)

Co-ordinators : Dr. Santosh Biswas, Prof. Jatindra Kumar Deka

Lecture 1 - Introduction to Digital VLSI Design Flow

Lecture 2 - High Level Design Representation

Lecture 3 - Transformations for High Level Synthesis

Lecture 4 - Introduction to HLS: Scheduling, Allocation and Binding Problem

Lecture 5 - Scheduling Algorithms - 1

Lecture 6 - Scheduling Algorithms - 2

Lecture 7 - Binding and Allocation Algorithms

Lecture 8 - Two level Boolean Logic Synthesis - 1

Lecture 9 - Two level Boolean Logic Synthesis - 2

Lecture 10 - Two level Boolean Logic Synthesis - 3

Lecture 11 - Heuristic Minimization of Two-Level Circuits

Lecture 12 - Finite State Machine Synthesis

Lecture 13 - Multilevel Implementation

Lecture 14 - Introduction to formal methods for design verification

Lecture 15 - Temporal Logic: Introduction and Basic Operators

Lecture 16 - Syntax and Semantics of CTL

Lecture 17 - Syntax and Semantics of CTL â€“ Continued

Lecture 18 - Equivalence between CTL Formulas

Lecture 19 - Introduction to Model Checking

Lecture 20 - Model Checking Algorithms - I

Lecture 21 - Model Checking Algorithms - II

Lecture 22 - Model Checking with Fairness

Lecture 23 - Binary Decision Diagram: Introduction and construction

Lecture 24 - Ordered Binary Decision Diagram

Lecture 25 - Operation on Ordered Binary Decision Diagram

Lecture 26 - Ordered Binary Decision Diagram for State Transition Systems

Lecture 27 - Symbolic Model Checking

Lecture 28 - Introduction to Digital VLSI Testing

Lecture 29 - Functional and Structural Testing

Lecture 30 - Fault Equivalence

Lecture 31 - Fault Simulation - 1

Lecture 32 - Fault Simulation - 2

Lecture 33 - Fault Simulation - 3

Lecture 34 - Testability Measures (SCOAP)

Lecture 35 - Introduction to Automatic Test Pattern Generation (ATPG) and ATPG Algebras

Lecture 36 - D-Algorithm - 1

Lecture 37 - D-Algorithm - 2

Lecture 38 - ATPG for Synchronous Sequential Circuits

Lecture 39 - Scan Chain based Sequential Circuit Testing - 1

Lecture 40 - Scan Chain based Sequential Circuit Testing - 2

Lecture 41 - Built in Self Test - 1

Lecture 42 - Built in Self Test - 2

Lecture 43 - Memory Testing - 1

Lecture 44 - Memory Testing - 2

NPTEL : NOC:Computer Organization and Architecture - A Pedagogical Aspect (Computer Science and Engineering)

Co-ordinators : Prof.Arnab sarkar, Prof.Jatindra Kumar Deka, Dr. Santosh Biswas

Lecture 1 - Model of Computer and Working Principle

Lecture 2 - Digital Logic Building Blocks

Lecture 3 - Information Representation and Number Systems

Lecture 4 - Basic Elements of a Processor

Lecture 5 - Storage and I/O Interface

Lecture 6 - Execution of Program and Programming Languages

Lecture 7 - Components of Central Processing Unit (CPU) and External Interface

Lecture 8 - Main Memory

Lecture 9 - Instruction Execution

Lecture 10 - Instruction Format

Lecture 11 - Instruction Set

Lecture 12 - Addressing Modes

Lecture 13 - Flags and Conditional Instructions

Lecture 14 - Instruction: Procedure CALL/RETURN

Lecture 15 - Instruction Cycle and Micro-operations

Lecture 16 - Control Signals and Timing Sequence

Lecture 17 - Control Signals for Complete Instruction Execution

Lecture 18 - Handling Different Addressing Modes

Lecture 19 - Handling Control Transfer Instructions

Lecture 20 - Design of Hardwired controlled Control Unit

Lecture 21 - Microinstructions and Microprograms

Lecture 22 - Organization and Optimization of Microprogrammed controlled Control Unit

Lecture 23 - Different Internal CPU Bus Organization

Lecture 24 - Basics of Memory and Cache - Part 1

Lecture 25 - Basics of Memory and Cache - Part 2

Lecture 26 - Direct-mapped Caches: Misses, Writes and Performance

Lecture 27 - Associative and Multi-level Caches

Lecture 28 - Summary - Caches

Lecture 29 - Basics of Virtual Memory and Address Translation

Lecture 30 - Paging and Segmentation

Lecture 31 - TLBs and Page Fault Handling

Lecture 32 - Cache Indexing and Tagging Variations, Demand Paging

Lecture 33 - Page Replacement Algorithms

Lecture 34 - Page Frame Allocation and Thrashing

Lecture 35 - Summary - Virtual Memory

Lecture 36 - Input-Output Primitives

Lecture 37 - Interrupt Driven I/O

Lecture 38 - DMA Transfer

Lecture 39 - Storage Devices

NPTEL : NOC:Embedded Systems-Design Verification and Test (Computer Science and Engineering)

Co-ordinators : Prof.Jatindra Kumar Deka, Dr. Santosh Biswas, Prof.Arnab Sarkar

Lecture 1 - Introduction

Lecture 2 - Modeling Techniques - 1

Lecture 3 - Modeling Techniques - 2

Lecture 4 - Hardware/Software Partitioning - 1

Lecture 5 - Hardware/Software Partitioning - 2

Lecture 6 - Introduction to Hardware Design

Lecture 7 - Hardware Architectural Synthesis - 1

Lecture 8 - Hardware Architectural Synthesis - 2

Lecture 9 - Hardware Architectural Synthesis - 3

Lecture 10 - Hardware Architectural Synthesis - 4

Lecture 11 - Hardware Architectural Synthesis - 5

Lecture 12 - Hardware Architectural Synthesis - 6

Lecture 13 - Hardware Architectural Synthesis - 7

Lecture 14 - System Level Analysis

Lecture 15 - Uniprocessor Scheduling - 1

Lecture 16 - Uniprocessor Scheduling - 2

Lecture 17 - Multiprocessor Scheduling - 1

Lecture 18 - Multiprocessor Scheduling - 2

Lecture 19 - Introduction and Basic Operators of Temporal Logic

Lecture 20 - Syntax and Semantics of CTL

Lecture 21 - Equivalence between CTL formulas

Lecture 22 - Model Checking Algorithm

Lecture 23 - Binary Decision Diagram

Lecture 24 - Use of OBDDs for State Transition System

Lecture 25 - Symbolic Model Checking

Lecture 26 - Introduction to Digital VLSI Testing

Lecture 27 - Automatic Test Pattern Generation (ATPG)

Lecture 28 - Scan Chain based Sequential Circuit Testing

Lecture 29 - Software-Hardware Co-validation Fault Models and High Level Testing for Complex Embedded Systems""

Lecture 30 - Testing for embedded cores

Lecture 31 - Bus and Memory Testing

Lecture 32 - Testing for advanced faults in Real time Embedded Systems

Lecture 33 - BIST for Embedded Systems

Lecture 34 - Concurrent Testing for Fault tolerant Embedded Systems - 1

Lecture 35 - Concurrent Testing for Fault tolerant Embedded Systems - 2

Lecture 36 - Testing for Re-programmable hardware

Lecture 37 - Interaction Testing between Hardware and Software

NPTEL : NOC:Multi-Core Computer Architecture-Storage and Interconnects (Computer Science and Engineering)

Co-ordinators : Prof. John Jose

Lecture 1 - Introduction and Overview of the Course

Lecture 2 - Instruction Execution Principles

Lecture 3 - Introduction to Instruction Pipeline

Lecture 4 - Introduction to Superscalar Pipelines

Lecture 5 - Instruction Pipeline and Performance - I

Lecture 6 - Instruction Pipeline and Performance - II

Lecture 7 - Introduction to Cache Memory

Lecture 8 - Block Replacement Techniques and Write Strategy

Lecture 9 - gem5 Simulator - An Overview

Lecture 10 - Cache Memory

Lecture 11 - Basic Cache Optimization Techniques

Lecture 12 - gem5 Simulator - Cache Optimisation

Lecture 13 - Advanced Cache Optimization Techniques - I

Lecture 14 - Advanced Cache Optimization Techniques - II

Lecture 15 - Cache Memory Optimizations

Lecture 16 - Introduction to DRAM System

Lecture 17 - DRAM Controllers and Address Mapping

Lecture 18 - Address Translation Mechanisms

Lecture 19 - Main Memory Concepts

Lecture 20 - Introduction to Tiled Chip Multicore Processors

Lecture 21 - Routing Techniques in Network On Chip

Lecture 22 - Network On Chip Router Micro-Architecture

Lecture 23 - gem5 Simulator - NoC Optimisation

Lecture 24 - Energy Efficient Bufferless NoC Routers

Lecture 25 - Sidebuffered Deflection Routers

Lecture 26 - Concepts in Network on Chip

Lecture 27 - QoS of NoC and Caches in TCMP Systems

Lecture 28 - Emerging Trends in Network On Chips

Lecture 29 - Concepts in TCMP Systems

NPTEL : NOC:Multi-Core Computer Architecture (Computer Science and Engineering)

Co-ordinators : Prof. John Jose

Lecture 1 - Review of Basic Computer Organization

Lecture 2 - Instruction Set and Addressing Modes

Lecture 3 - Instruction Encoding

Lecture 4 - Performance Evaluation Methods

Lecture 5 - Tutorial on Performance Evaluvation

Lecture 6 - Introduction to RISC Instruction Pipeline

Lecture 7 - Instruction Pipeline Hazards

Lecture 8 - Tutorial on Instruction Pipeline and Hazards

Lecture 9 - Control Hazards and Branch Prediction

Lecture 10 - MIPS Pipeline for Multi-Cycle Operations

Lecture 11 - Tutorial on Longer Pipeline and Branch Prediction

Lecture 12 - Compiler Techniques to Explore ILP

Lecture 13 - Dynamic Scheduling to Explore ILP

Lecture 14 - Dynamic Scheduling with Tomasulo's Algorithm

Lecture 15 - Dynamic Scheduling with Speculative Execution

Lecture 16 - Tutorial on Static and Dynamic Scheduling

Lecture 17 - Advanced Pipelining and Superscalar Processors

Lecture 18 - Introduction to GPU architectures

Lecture 19 - Case study on GPU architectures

Lecture 20 - Tutorial on Superscalar processors and GPU

Lecture 21 - Introduction to Cache Memory

Lecture 22 - Block Replacement Techniques and Write Strategy

Lecture 23 - Design Concepts in Cache Memory

Lecture 24 - Optimization Techniques in Cache Memory

Lecture 25 - Advanced Cache Optimization Techniques

Lecture 26 - Tutorial on Advanced Concepts in Cache Memory - 1

Lecture 27 - Tutorial on Advanced Concepts in Cache Memory - 2

Lecture 28 - Cache coherence and memory consistency

Lecture 29 - Design Space for snooping protocols

Lecture 30 - Directory Based Cache coherehce

Lecture 31 - Cache coherence in multiprocessor design [T]

Lecture 32 - Introduction to DRAM System

Lecture 33 - DRAM Controllers and Address Mapping

Lecture 34 - Secondary Storage Systems

Lecture 35 - Design Concepts in Storage Systems

Lecture 36 - Introduction to Tiled Chip Multicore Processors

Lecture 37 - Routing Techniques in Network On Chip

Lecture 38 - Network On Chip Router Micro-Architecture

Lecture 39 - Concepts in Network on Chip

Lecture 40 - Energy Efficient Bufferless NoC Routers

Lecture 41 - Sidebuffered Deflection Routers

Lecture 42 - Concepts in Deflection Routers [T]

Lecture 43 - QoS of NoC and Caches in TCMP Systems

Lecture 44 - Emerging Trends in Network On Chips

Lecture 45 - Domain Specific Accelarators

Lecture 46 - Introduction to VEGA Microprocessors (Case Study)

Lecture 47 - Concepts in TCMP Systems

Lecture 48 - How to Explore Computer Architecture?

NPTEL : NOC:Randomized Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Benny George K

Lecture 1 - Introduction to Randomized Algorithms

Lecture 2 - Randomized Mincut Algorithm

Lecture 3 - Randomized Find

Lecture 4 - Probability Review

Lecture 5 - Expectation of Random Variables

Lecture 6 - Conditional Probability and Conditional Expectation2

Lecture 7 - Birthday Paradox

Lecture 8 - Markov and Chebychev's Inequalities

Lecture 9 - Median Algorithm

Lecture 10 - Chernoff Bound

Lecture 11 - Permutation Routing on a Hypercube

Lecture 12 - Permutation Routing on a Hypercube (Analysis)

Lecture 13 - Introduction to Probabilistic Method

Lecture 14 - More Examples on Probabilistic Method

Lecture 15 - Lovasz Local Lemma

Lecture 16 - Introduction to Markov Chains

Lecture 17 - 2-SAT and Markov Chains

Lecture 18 - 3-SAT and Markov Chains

Lecture 19 - Electrical Networks

Lecture 20 - Cover Time

Lecture 21 - Rapid Mixing

Lecture 22 - Introduction to Computational Complexity

Lecture 23 - Pratt's Certificate

Lecture 24 - Primality Testing

Lecture 25 - Miller Rabin Algorithm

Lecture 26 - All pair shortest path - I

Lecture 27 - All pair shortest path - II

Lecture 28 - Randomized MST

Lecture 29 - Introduction to approximate counting

Lecture 30 - DNF counting

Lecture 31 - Perfect Matching - I

Lecture 32 - Perfect Matching - II

Lecture 33 - Perfect Matching - III

Lecture 34 - Treaps

Lecture 35 - Hashing

Lecture 36 - Probabilistically checkable proofs - I

Lecture 37 - Probabilistically checkable proofs - II

Lecture 38 - Probabilistically checkable proofs - III

Lecture 39 - LFKN Protocol

Lecture 40 - summary

NPTEL : NOC:Parallel Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Sajith Gopalan

Lecture 1 - Shared Memory Models - 1

Lecture 2 - Shared Memory Models - 2

Lecture 3 - Interconnection Networks

Lecture 4 - Cost and Optimality

Lecture 5 - Basic Techniques - 1

Lecture 6 - Basic Techniques - 2

Lecture 7 - Basic Techniques - 3

Lecture 8 - Basic Techniques - 4

Lecture 9 - Basic Techniques - 5

Lecture 10 - Odd Even Merge Sort (OEMS)

Lecture 11 - OEMS, Bitonic-Sort-Merge Sort (BSMS)

Lecture 12 - BSMS, Optimal List Colouring

Lecture 13 - Description

Lecture 14 - Analysis

Lecture 15 - Applications

Lecture 16 - Applications

Lecture 17 - Fast optimal merge algorithm

Lecture 18 - High level Description

Lecture 19 - Cole's Merge Sort: Details

Lecture 20 - Analysis of Cole's Merge Sort; Lower bound for sorting

Lecture 21 - Sorting Lower bound; Connected Components

Lecture 22 - Connected Components (CREW)

Lecture 23 - Connected Components, Vertex Colouring

Lecture 24 - Sorting on a 2D mesh

Lecture 25 - Sorting on a 2D mesh

Lecture 26 - Sorting, Offline routing on a 2D mesh

Lecture 27 - Sorting on a 3D mesh

Lecture 28 - Mesh of Trees, Hypercube

Lecture 29 - Hypercube (Continued...)

Lecture 30 - Hypercube (Continued...), butterfly network

Lecture 31 - Butterfly, CCC and Benes Networks

Lecture 32 - Butterfly, CCC and Benes Networks

Lecture 33 - Shuffle Exchange Graphs, de Bruijn Graphs

Lecture 34 - Interconnection Networks Algorithms

Lecture 35 - Circuit Value Problem is P-complete for NC-reductions

Lecture 36 - Ordered DFS is P-complete for NC-reductions

Lecture 37 - Max Flow is P-complete for NC-reductions

NPTEL : NOC:Discrete Mathematics (Prof. Sajith Gopalan) (Computer Science and Engineering)

Co-ordinators : Prof. Benny George K

Lecture 1 - Boolean Functions

Lecture 2 - Propositional Calculus: Introduction

Lecture 3 - First Order Logic: Introduction

Lecture 4 - First Order Logic: Introduction (Continued...)

Lecture 5 - Proof System for Propcal

Lecture 6 - First Order Logic: wffs, interpretations, models

Lecture 7 - Soundness and Completeness of the First Order Proof System

Lecture 8 - Sets, Relations, Functions

Lecture 9 - Functions, Embedding of the theories of naturals numbers and integers in Set Theory

Lecture 10 - Embedding of the theories of integers and rational numbers in Set Theory; Countable Sets

Lecture 11 - Introduction to graph theory

Lecture 12 - Trees, Cycles, Graph coloring

Lecture 13 - Bipartitie Graphs

Lecture 14 - Bipartitie Graphs; Edge Coloring and Matching

Lecture 15 - Planar Graphs

Lecture 16 - Graph Searching; BFS and DFS

Lecture 17 - Network Flows

Lecture 18 - Counting Spanning Trees in Complete Graphs

Lecture 19 - Embedding of the theory of ral numbers in Set Theory; Paradoxes

Lecture 20 - ZF Axiomatization of Set Theory

Lecture 21 - Partially ordering relations

Lecture 22 - Natural numbers, divisors

Lecture 23 - Lattices

Lecture 24 - GCD, Euclid's Algorithm

Lecture 25 - Prime Numbers

Lecture 26 - Congruences

Lecture 27 - Pigeon Hole Principle

Lecture 28 - Stirling Numbers, Bell Numbers

Lecture 29 - Generating Functions

Lecture 30 - Product of Generating Functions

Lecture 31 - Composition of Generating Function

Lecture 32 - Principle of Inclusion Exclusion

Lecture 33 - Rook placement problem

Lecture 34 - Solution of Congruences

Lecture 35 - Chinese Remainder Theorem

Lecture 36 - Totient; Congruences; Floor and Ceiling Functions

Lecture 37 - Introduction to Groups

Lecture 38 - Modular Arithmetic and Groups

Lecture 39 - Dihedral Groups, Isomorhphisms

Lecture 40 - Cyclic groups, Direct Products, Subgroups

Lecture 41 - Cosets, Lagrange's theorem

Lecture 42 - Rings and Fields

Lecture 43 - Construction of Finite Fields

NPTEL : NOC:Advanced Computer Architecture (Computer Science and Engineering)

Co-ordinators : Prof. John Jose

Lecture 1 - Review of Basic Computer Organization

Lecture 2 - Perfomance Evaluation Methods

Lecture 3 - Introduction to RISC Instruction Pipeline

Lecture 4 - Instruction Pipeline and Performance

Lecture 5 - Pipeline Hazards

Lecture 6 - Control Hazards and Branch Prediction

Lecture 7 - MIPS Pipeline for Multi-Cycle Operations

Lecture 8 - Tutorial 2 : Pipeline Hazard Analysis

Lecture 9 - Compiler Techniques to Explore ILP

Lecture 10 - Dynamic Scheduling to Explore ILP

Lecture 11 - Dynamic Scheduling with Tomasuloâ€™s Algorithm

Lecture 12 - Dynamic Scheduling with Speculative Execution

Lecture 13 - Tutorial 3 : Static and Dynamic Scheduling

Lecture 14 - Advanced Pipelining and Superscalar Processors

Lecture 15 - Exploiting DLP: Vector and GPU Architectures

Lecture 16 - Tutorial 4 : Architectural Simulation using gem5

Lecture 17 - Tutorial 5 : Core Optimization in gem5

Lecture 18 - Introduction to Cache Memory

Lecture 19 - Block Replacement Techniques and Write Strategy

Lecture 20 - Tutorial 6 : Design Concepts in Cache Memory

Lecture 21 - Optimization Techniques in Cache Memory

Lecture 22 - Advanced Cache Optimization Techniques

Lecture 23 - Tutorial 7 : Optimization Techniques in Cache Memory

Lecture 24 - Tutorial 8 : Cache Optimization in gem5

Lecture 25 - Introduction to DRAM System

Lecture 26 - DRAM Controllers and Address Mapping

Lecture 27 - Secondary Storage Systems

Lecture 28 - Tutorial 9 : Design Concepts in DRAM and Harddisk

Lecture 29 - Tiled Chip Multicore Processors

Lecture 30 - Routing Techniques in Network on Chip

Lecture 31 - NoC Router Microarchitecture

Lecture 32 - How to Explore Computer Architecture?

Lecture 33 - Tutorial 10 : TCMP and NoC Design Principles

NPTEL : NOC:User-centric Computing for Human-Computer Interaction (Computer Science and Engineering)

Co-ordinators : Prof. Samit Bhattacharya

Lecture 1 - Introduction to UCC and history

Lecture 2 - Issues and challenges

Lecture 3 - Latest research trends

Lecture 4 - User-Centric Design and Software Engineering

Lecture 5 - Components of SDLC - Contextual Inquiry

Lecture 6 - Components of SDLC - Design Guidelines

Lecture 7 - Components of SDLC - Prototyping

Lecture 8 - Case study (web site design)

Lecture 9 - Introduction to User-Centric Computing

Lecture 10 - The UCC framework with illustrative case study

Lecture 11 - User-centric models - introduction and descriptive models

Lecture 12 - User-centric models - predictive models and taxonomy

Lecture 13 - Introduction to GOMS family of models

Lecture 14 - Keystroke-Level Model (KLM)

Lecture 15 - (CMN)GOMS Model

Lecture 16 - The Fitts' Law

Lecture 17 - The Hick-Hyman Law

Lecture 18 - 2D and 3D pointing models

Lecture 19 - The Steering Law for constrained navigation

Lecture 20 - Model for hierarchical menu selection

Lecture 21 - Mobile typing models (single finger and two thumb typing)

Lecture 22 - Model for touch performance (FFitts' law)

Lecture 23 - Introduction to formal models in UCD

Lecture 24 - Formal modeling of user-computer dialogue

Lecture 25 - Case studies on the use of models

Lecture 26 - Introduction and research question formulation

Lecture 27 - Variables determination and experiment design

Lecture 28 - Data analysis including model building

Lecture 29 - Introduction to user-centric design evaluation and expert evaluation technique

Lecture 30 - User evaluation, empirical and model-based evaluation

Lecture 31 - Concluding remarks

NPTEL : NOC:Computer Graphics (Computer Science and Engineering)

Co-ordinators : Prof. Samit Bhattacharya

Lecture 1 - Introduction to graphics

Lecture 2 - Historical evolution, issues and challenges

Lecture 3 - Basics of a graphics system

Lecture 4 - Introduction to 3D graphics pipeline

Lecture 5 - Introduction and overview on object representation techniques

Lecture 6 - Various Boundary Representation Techniques

Lecture 7 - Spline representation - I

Lecture 8 - Spline representation - II

Lecture 9 - Space representation methods

Lecture 10 - Introduction to modeling transformations

Lecture 11 - Matrix representation and composition of transformations

Lecture 12 - Transformations in 3D

Lecture 13 - Color computation - basic idea

Lecture 14 - Simple lighting model

Lecture 15 - Shading models

Lecture 16 - Intensity mapping

Lecture 17 - Color models and texture synthesis

Lecture 18 - View transformation

Lecture 19 - Projection transformation

Lecture 20 - Windows-to-viewport transformation

Lecture 21 - Clipping introduction and 2D point and line clipping

Lecture 22 - 2D fill-area clipping and 3D clipping

Lecture 23 - Hidden surface removal - I

Lecture 24 - Hidden surface removal - II

Lecture 25 - Scan conversion of basic shapes - I

Lecture 26 - Scan conversion of basic shapes - II

Lecture 27 - Fill area and character scan conversion

Lecture 28 - Anti-aliasing techniques

Lecture 29 - Graphics I/O Devices

Lecture 30 - Introduction to GPU and Shaders

Lecture 31 - Programming with OpenGL

Lecture 32 - Concluding remarks

NPTEL : NOC:C-Based VLSI Design (Computer Science and Engineering)

Co-ordinators : Prof. Chandan Karfa

Lecture 1 - Introduction to C-Based VLSI Design

Lecture 2 - C-based VLSI Design: An Overview

Lecture 3 - C-based VLSI Design: Problem Formulation

Lecture 4 - C-based VLSI Design: Course Plan

Lecture 5 - Introduction to Scheduling

Lecture 6 - ILP formulation of Scheduling

Lecture 7 - ILP formulation of MRLC and MLRC Scheduling

Lecture 8 - Multiprocessor Scheduling

Lecture 9 - Huâ€™s algorithm for Multiprocessor Scheduling

Lecture 10 - List based Scheduling of MLRC

Lecture 11 - List based Scheduling of MRLC

Lecture 12 - Forced Directed Scheduling

Lecture 13 - Forced Directed MLRC and MRLC Scheduling Algorithm

Lecture 14 - Path Based Scheduling

Lecture 15 - Path Based Scheduling

Lecture 16 - Allocation and Binding Problem Formulation

Lecture 17 - Left Edge Algorithm

Lecture 18 - ILP Formulation of Allocation and Binding

Lecture 19 - Allocation and Binding for Hierarchical Graph

Lecture 20 - Register Allocation and Binding

Lecture 21 - Multi-port Binding Problem

Lecture 22 - Datapath and Controller Synthesis

Lecture 23 - HLS for Arrays

Lecture 24 - HLS for Loops

Lecture 25 - HLS for Loop - pipeline

Lecture 26 - Hardware Efficient C Coding - Part I

Lecture 27 - Hardware Efficient C Coding - Part II

Lecture 28 - Dataflow Optimization in HLS

Lecture 29 - Frontend Optimizations in C

Lecture 30 - HLS Optimizations: Case Study 1

Lecture 31 - HLS Optimizations: Case Study 1

Lecture 32 - Simulation based Verification

Lecture 33 - RTL to C Reverse Engineering

Lecture 34 - Phase-wise Verification of HLS

Lecture 35 - Equivalence between C and RTL

Lecture 36 - Introduction to Hardware Security

Lecture 37 - HLS for Security

Lecture 38 - Attacks on RTL Logic locking

Lecture 39 - Introduction to Logic Synthesis

Lecture 40 - FPGA Technology Mapping

Lecture 41 - Introduction to Physical Synthesis

Lecture 42 - Introduction to Circuit optimizations

Lecture 43 - Recent Advances in C-Based VLSI Design

NPTEL : NOC:Design and Implementation of Human-Computer Interfaces (Computer Science and Engineering)

Co-ordinators : Prof. Samit Bhattacharya

Lecture 1 - Interactive Systems

Lecture 2 - Introduction to Usability

Lecture 3 - Engineering for Usability

Lecture 4 - Interactive System Life Cycle

Lecture 5 - Usability Requirements

Lecture 6 - Contexual Inquiry

Lecture 7 - Functional Requirements Specification

Lecture 8 - Case Study on SRS

Lecture 9 - Case Study (Usability Requirement Gathering)

Lecture 10 - Case Study (Other Requirement Gathering)

Lecture 11 - Case Study - Non-Functional Requirements to SRS

Lecture 12 - Introduction to Interface Design

Lecture 13 - Shneiderman's Golden Rules

Lecture 14 - Norman's Principles

Lecture 15 - Prototyping

Lecture 16 - Prototype Evaluation - I

Lecture 17 - Prototype Evaluation - II

Lecture 18 - Case Study on Prototype Evaluation - I

Lecture 19 - Case Study on Prototype Evaluation - II

Lecture 20 - Basics of System Design

Lecture 21 - Data Flow Diagram

Lecture 22 - Entity Relationship Diagram

Lecture 23 - Case Study on DFD and ER

Lecture 24 - Introduction to Object Oriented Design

Lecture 25 - UML

Lecture 26 - UML Case Study

Lecture 27 - Coding Basics

Lecture 28 - Code Testing Basics

Lecture 29 - Review-Based Code Testing

Lecture 30 - Code Review Case Study

Lecture 31 - Black-Box Testing - I

Lecture 32 - Black-Box Testing - II

Lecture 33 - Black-Box Testing Case Study

Lecture 34 - White-Box Testing

Lecture 35 - White-Box Testing Case Study

Lecture 36 - System Integration and Testing

Lecture 37 - Empirical Usability Evaluation - I

Lecture 38 - Empirical Usability Evaluation - II

Lecture 39 - Experiment Design - I

Lecture 40 - Experiment Design - II

Lecture 41 - Empirical Data Analysis

Lecture 42 - Project Management

Lecture 43 - Note on Agile Development

Lecture 44 - Concluding Remarks

NPTEL : NOC:Digital Design with Verilog (Computer Science and Engineering)

Co-ordinators : Prof. Chandan Karfa, Prof. Aryabartta Sahu

Lecture 1 - Introduction to Digital Design with Verilog

Lecture 2 - Switching Algebra

Lecture 3 - Canonical Forms of Switching Functions

Lecture 4 - Number Systems

Lecture 5 - Binary Arithmetic

Lecture 6 - Binary Codes

Lecture 7 - Error Detection and Corrections Codes

Lecture 8 - Minimization of Switching functions-Karnaugh Map

Lecture 9 - Karnaugh Map

Lecture 10 - Minimization of Switching functions-Properties

Lecture 11 - Quine-McCluskey Method

Lecture 12 - Quine-McCluskey Method-Prime Implication Chart

Lecture 13 - ESPRESSO-Heuristic Based Switching Function Minimization

Lecture 14 - Multi-level Logic Minimization

Lecture 15 - Multi-level Logic Minimization-Kernels Extraction

Lecture 16 - Digital Circuits Modelling using Verilog

Lecture 17 - Modelling Techniques in Verilog

Lecture 18 - Behavioral Modelling in Verilog

Lecture 19 - Digital System Design using Verilog

Lecture 20 - Testbench in Verilog

Lecture 21 - Code Conversion, Parity Bit Generator

Lecture 22 - Comparator, Multiplexer

Lecture 23 - Encoder, Decoder

Lecture 24 - Ripple Carry Adder, Carry Look ahead Adder

Lecture 25 - Adder/Subtractor

Lecture 26 - BCD Adder, Multiplier

Lecture 27 - Latch/Storage Design

Lecture 28 - Flipflop Design, Characteristics of Flipflop

Lecture 29 - Flipflop, Register and Memory

Lecture 30 - Digital Counter

Lecture 31 - Finite State Machine Design and Implementation with many Examples

Lecture 32 - FSM Completeness and Correctness

Lecture 33 - Sync Counter using FSM, Implementation using different FFs and Comparision of types of FSM

Lecture 34 - FSM State Optimization using Row Matching and Partitioning Methods

Lecture 35 - State Optimization using Implication chart and State Encoding

Lecture 36 - RTL Design, Introduction to ASM (Algorithmic State Machine)

Lecture 37 - RTL/ASM Design Examples and Implementation

Lecture 38 - ASM Data Path Inference and Control Path Generation

Lecture 39 - Sequential Multplier the Classic Example of RTL Design

Lecture 40 - Introduction to FPGA and Design Flow

Lecture 41 - Introduction to Electronic Design Automation

NPTEL : NOC:Parallel Computer Architecture (Computer Science and Engineering)

Co-ordinators : Prof. Hemangee K. Kapoor

Lecture 1 - Why do we need parallel architecture ?

Lecture 2 - Multicore Revolution

Lecture 3 - What is Parallel Architecture?

Lecture 4 - Performance and Benchmarking

Lecture 5 - Reporting Results

Lecture 6 - Some Laws

Lecture 7 - A shift from sequential to parallel

Lecture 8 - Programming Models

Lecture 9 - Shared Memory Paradigm

Lecture 10 - Message Passing Paradigm

Lecture 11 - Examples

Lecture 12 - Cache Basics

Lecture 13 - Memory hierarchy questions - 1

Lecture 14 - Memory hierarchy questions - 2

Lecture 15 - Six basic cache optimisations - 1

Lecture 16 - Six basic cache optimisations - 2

Lecture 17 - Virtual Memory - 1

Lecture 18 - Virtual Memory - 2

Lecture 19 - Cache Coherence Problem

Lecture 20 - Concept of Serialisation

Lecture 21 - Coherence related Conditions

Lecture 22 - Types of Coherence Protocols - 1

Lecture 23 - Types of Coherence Protocols - 2

Lecture 24 - VI Protocol

Lecture 25 - 3 State: MSI Protocol

Lecture 26 - MESI Protocol

Lecture 27 - Dragon Protocol

Lecture 28 - Coherence misses

Lecture 29 - Coherence misses example

Lecture 30 - Correctness Requirements

Lecture 31 - Single-Level caches with an Atomic Bus - 1

Lecture 32 - Single-Level caches with an Atomic Bus - 2

Lecture 33 - Multi-Level caches with an Atomic Bus - 1

Lecture 34 - Multi-Level caches with an Atomic Bus - 2

Lecture 35 - Split transaction Bus

Lecture 36 - Phases in Split Transaction Bus

Lecture 37 - Request table and Organization

Lecture 38 - Path of a Cache Miss

Lecture 39 - Multi-Level cache + Split transaction Bus

Lecture 40 - Introduction to Directory Cache Coherence

Lecture 41 - Basic Operation of a Directory

Lecture 42 - Directory Organisations

Lecture 43 - Directory Overhead Optimisations

Lecture 44 - Directory Protocol optimisations

Lecture 45 - Proving Correctness - 1

Lecture 46 - Proving Correctness - 2

Lecture 47 - SGI Origin Architecture

Lecture 48 - Working of protocol

Lecture 49 - Correctness Issues

Lecture 50 - Sequent NUMA-Q Architecture

Lecture 51 - Working of protocol - 1

Lecture 52 - Working of protocol - 2

Lecture 53 - Correctness and Protocol Interaction

Lecture 54 - Sequential Consistency

Lecture 55 - Implications of Sequential Consistency

Lecture 56 - Relaxed Consistency Models - 1

Lecture 57 - Relaxed Consistency Models - 2

Lecture 58 - Relaxing all Orders

Lecture 59 - Uninterruptible Instructions

Lecture 60 - Implementation of atomic instructions

Lecture 61 - Other synchronisation options

Lecture 62 - Interconnect Overview

Lecture 63 - Topologies

Lecture 64 - Routing

Lecture 65 - Flow Control

NPTEL : Computer Algorithms - 2 (Computer Science and Engineering)

Co-ordinators : Prof. Shashank K. Mehta

Lecture 1 - Graph_Basics

Lecture 2 - Breadth_First_Search

Lecture 3 - Dijkstra_Algo

Lecture 4 - All Pair Shortest Path

Lecture 5 - Matriods

Lecture 6 - Minimum Spanning Tree

Lecture 7 - Edmond's Matching Algo I

Lecture 8 - Edmond's Matching Algo II

Lecture 9 - Flow Networks

Lecture 10 - Ford Fulkerson Method

Lecture 11 - Edmond Karp Algo

Lecture 12 - Matrix Inversion

Lecture 13 - Matrix Decomposition

Lecture 14 - Knuth Morris Pratt Algo

Lecture 15 - Rabin Karp Algo

Lecture 16 - NFA Simulation

Lecture 17 - Integer-Polynomial Ops-I

Lecture 18 - Integer-Polynomial Ops-II

Lecture 19 - Integer-Polynomial Ops-III

Lecture 20 - Chinese Remainder-I

Lecture 21 - Chinese Remainder-II

Lecture 22 - Chinese Remainder-III

Lecture 23 - Discrete Fourier Transform-I

Lecture 24 - Discrete Fourier Transform-II

Lecture 25 - Discrete Fourier Transform-III

Lecture 26 - Schonhage Strassen Algo

Lecture 27 - Linear Programming-I

Lecture 28 - Linear Programming-II

Lecture 29 - Geometry-I

Lecture 30 - Geometry-II

Lecture 31 - Geometry-III

Lecture 32 - Approximation Algo-I

Lecture 33 - Approximation Algo-II

Lecture 34 - Approximation Algo-III

Lecture 35 - General: Dynamic Programming

NPTEL : Theory of Computation (Computer Science and Engineering)

Co-ordinators : Prof. Somenath Biswas

Lecture 1 - What is theory of computation? Set membership problem, basic notions like alphabet, strings, formal languages

Lecture 2 - Introduction to finite automaton

Lecture 3 - Finite automata continued, deterministic finite automata(DFAs), language accepted by a DFA

Lecture 4 - Regular languages, their closure properties

Lecture 5 - DFAs solve set membership problems in linear time, pumping lemma

Lecture 6 - More examples of nonregular languages, proof of pumping lemma, pumping lemma as a game, converse of pumping lemma does not hold

Lecture 7 - A generalization of pumping lemma, nondeterministic finite automata (NFAs), computation trees for NFAs

Lecture 8 - Formal description of NFA, language accepted by NFA, such languages are also regular

Lecture 9 - 'Guess and verify' paradigm for nondeterminism

Lecture 10 - NFA's with epsilon transitions

Lecture 11 - Regular expressions, they denote regular languages

Lecture 12 - Construction of a regular expression for a language given a DFA accepting it. Algebraic closure properies of regular languages

Lecture 13 - Closure properties (Continued...)

Lecture 14 - Closure under reversal, use of closure properties

Lecture 15 - Decision problems for regular languages

Lecture 16 - About minimization of states of DFAs. Myhill-Nerode theorem

Lecture 17 - Continuation of proof of Myhill-Nerode theorem

Lecture 18 - Application of Myhill-Nerode theorem. DFA minimization

Lecture 19 - DFA minimization (Continued...)

Lecture 20 - Introduction to context free languages (cfls) and context free grammars (cfgs). Derivation of strings by cfgs

Lecture 21 - Languages generated by a cfg, leftmost derivation, more examples of cfgs and cfls

Lecture 22 - Parse trees, inductive proof that L is L(G). All regular languages are context free

Lecture 23 - Towards Chomsky normal forms: elimination of useless symbols, analysis of reachable symbols, generating nonterminals, order of substeps matter

Lecture 24 - Simplification of cfgs continued, Removal of epsilon productions: algorithm and its correctness

Lecture 25 - Elimination of unit productions. Converting a cfg into Chomsky normal form. Towards pumping lemma for cfls

Lecture 26 - Pumping lemma for cfls. Adversarial paradigm

Lecture 27 - Completion of pumping lemma proof. Examples of use of pumping lemma. Converse of lemma does not hold. Closure properties of cfls

Lecture 28 - Closure properties continued. cfls not closed under complementation

Lecture 29 - Another example of a cfl whose complement is not a cfl. Decision problems for cfls

Lecture 30 - More decision problems. CYK algorithm for membership decision

Lecture 31 - Introduction to pushdown automata (pda)

Lecture 32 - pda configurations, acceptance notions for pdas. Transition diagrams for pdas

Lecture 33 - Equivalence of acceptance by empty stack and acceptance by final state

Lecture 34 - Turing machines (TM): motivation, informal definition, example, transition diagram

Lecture 35 - Execution trace, another example (unary to binary conversion)

Lecture 36 - Example continued. Finiteness of TM description, TM configuration, language acceptance, definition of recursively enumerable (r.e.) languages

Lecture 37 - Notion of non-acceptance or rejection of a string by a TM. Multitrack TM, its equivalence to standard TM. Multitape TMs

Lecture 38 - Simulation of multitape TMs by basic model. Nondeterministic TM (NDTM). Equivalence of NDTMs with deterministic TMs

Lecture 39 - Counter machines and their equivalence to basic TM model

Lecture 40 - TMs can simulate computers, diagonalization proof

Lecture 41 - Existence of non-r.e. languages, recursive languages, notion of decidability

Lecture 42 - Separation of recursive and r.e. classes, halting problem and its undecidability

NPTEL : Introduction to Problem Solving and Programming (Computer Science and Engineering)

Co-ordinators : Prof. D. Gupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

NPTEL : Riemann Hypothesis and its Applications (Computer Science and Engineering)

Co-ordinators : Prof. Manindra Agrawal

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

NPTEL : Biometrics (Computer Science and Engineering)

Co-ordinators : Prof. Phalguni Gupta

Lecture 1 - Biometrics

Lecture 2 - Biometrics

Lecture 3 - Biometrics

Lecture 4 - Biometrics

Lecture 5 - Biometrics

Lecture 6 - Biometrics

Lecture 7 - Biometrics

Lecture 8 - Biometrics

Lecture 9 - Biometrics

Lecture 10 - Biometrics

Lecture 11 - Biometrics

Lecture 12 - Biometrics

Lecture 13 - Biometrics

Lecture 14 - Biometrics

Lecture 15 - Biometrics

Lecture 16 - Biometrics

Lecture 17 - Biometrics

Lecture 18 - Biometrics

Lecture 19 - Biometrics

Lecture 20 - Biometrics

Lecture 21 - Biometrics

Lecture 22 - Biometrics

Lecture 23 - Biometrics

Lecture 24 - Biometrics

Lecture 25 - Biometrics

Lecture 26 - Biometrics

NPTEL : Parallel Algorithm (Computer Science and Engineering)

Co-ordinators : Prof. Phalguni Gupta

Lecture 1 - Parallel Algorithm

Lecture 2 - Parallel Algorithm

Lecture 3 - Parallel Algorithm

Lecture 4 - Parallel Algorithm

Lecture 5 - Parallel Algorithm

Lecture 6 - Parallel Algorithm

Lecture 7 - Parallel Algorithm

Lecture 8 - Parallel Algorithm

Lecture 9 - Parallel Algorithm

Lecture 10 - Parallel Algorithm

Lecture 11 - Parallel Algorithm

Lecture 12 - Parallel Algorithm

Lecture 13 - Parallel Algorithm

Lecture 14 - Parallel Algorithm

Lecture 15 - Parallel Algorithm

Lecture 16 - Parallel Algorithm

Lecture 17 - Parallel Algorithm

Lecture 18 - Parallel Algorithm

Lecture 19 - Parallel Algorithm

Lecture 20 - Parallel Algorithm

Lecture 21 - Parallel Algorithm

Lecture 22 - Parallel Algorithm

Lecture 23 - Parallel Algorithm

Lecture 24 - Parallel Algorithm

Lecture 25 - Parallel Algorithm

NPTEL : Computer Architecture (Dr. Mainak Chaudhuri) (Computer Science and Engineering)

Co-ordinators : Dr. Mainak Chaudhuri

Lecture 1 - Introduction, Amdahl's law, CPI equation

Lecture 2 - CPI equation, research practices, instruction set architecture

Lecture 3 - Instruction set architecture

Lecture 4 - Instruction set architecture

Lecture 5 - Instruction set architecture, case study with MIPS-I

Lecture 6 - Case study with MIPS-I

Lecture 7 - Case study with MIPS-I

Lecture 8 - Binary instrumentation for architectural studies: PIN

Lecture 9 - Binary instrumentation for architectural studies: PIN

Lecture 10 - Basic pipelining, branch prediction

Lecture 11 - Basic pipelining, branch prediction

Lecture 12 - Basic pipelining, branch prediction

Lecture 13 - Basic pipelining, branch prediction

Lecture 14 - Basic pipelining, branch prediction

Lecture 15 - Basic pipelining, branch prediction

Lecture 16 - Basic pipelining, branch prediction

Lecture 17 - Basic pipelining, branch prediction

Lecture 18 - Basic pipelining, branch prediction

Lecture 19 - Basic pipelining, branch prediction

Lecture 20 - Dynamic scheduling, speculative execution

Lecture 21 - Dynamic scheduling, speculative execution

Lecture 22 - Dynamic scheduling, speculative execution

Lecture 23 - Dynamic scheduling, speculative execution

Lecture 24 - Dynamic scheduling, speculative execution

Lecture 25 - Virtual memory and caches

Lecture 26 - Virtual memory and caches

Lecture 27 - Virtual memory and caches

Lecture 28 - Topics in memory system, DRAM and SRAM technology

Lecture 29 - Topics in memory system, DRAM and SRAM technology

Lecture 30 - Topics in memory system, DRAM and SRAM technology

Lecture 31 - Case study: MIPS R10000

Lecture 32 - Case study: MIPS R10000

Lecture 33 - Case study: Alpha 21264

Lecture 34 - Case study: Intel Pentium 4

Lecture 35 - Input/Output

Lecture 36 - Simultaneous multithreading, multi-cores

NPTEL : Compiler Design (Prof. Sanjeev K Aggarwal) (Computer Science and Engineering)

Co-ordinators : Prof. Sanjeev K Aggarwal

Lecture 1 - Compiler Design

Lecture 2 - Compiler Design

Lecture 3 - Compiler Design

Lecture 4 - Compiler Design

Lecture 5 - Compiler Design

Lecture 6 - Compiler Design

Lecture 7 - Compiler Design

Lecture 8 - Compiler Design

Lecture 9 - Compiler Design

Lecture 10 - Compiler Design

Lecture 11 - Compiler Design

Lecture 12 - Compiler Design

Lecture 13 - Compiler Design

Lecture 14 - Compiler Design

Lecture 15 - Compiler Design

Lecture 16 - Compiler Design

Lecture 17 - Compiler Design

Lecture 18 - Compiler Design

Lecture 19 - Compiler Design

Lecture 20 - Compiler Design

Lecture 21 - Compiler Design

Lecture 22 - Compiler Design

Lecture 23 - Compiler Design

Lecture 24 - Compiler Design

Lecture 25 - Compiler Design

Lecture 26 - Compiler Design

Lecture 27 - Compiler Design

Lecture 28 - Compiler Design

Lecture 29 - Compiler Design

Lecture 30 - Compiler Design

NPTEL : NOC : Introduction to programming in C (Computer Science and Engineering)

Co-ordinators : Prof. Satyadev Nandakumar

Lecture 1 - Intro - Process of programming

Lecture 2 - Intro - GCD

Lecture 3 - Intro - Programming cycle

Lecture 4 - Intro - Tracing a simple program

Lecture 5 - Intro - Variables

Lecture 6 - Intro - Operators

Lecture 7 - Loops - While

Lecture 8 - Loops - While example

Lecture 9 - Loops - While GCD example

Lecture 10 - Loops - Longest 1

Lecture 11 - Loops - Longest 2

Lecture 12 - Loops - Longest 3

Lecture 13 - Loops - Do-while

Lecture 14 - Loops - Matrix using nested loops

Lecture 15 - Loops - For

Lecture 16 - Loops - Matrix using nested for loops

Lecture 17 - Loops - Break statement

Lecture 18 - Loops - Continue statement

Lecture 19 - Loops - Continue statement example

Lecture 20 - Data types in C

Lecture 21 - ASCII code

Lecture 22 - Operators Expressions Associativity

Lecture 23 - Precedence of operators

Lecture 24 - Expression evaluation

Lecture 25 - Functions - Introduction

Lecture 26 - Functions - How functions are executed

Lecture 27 - Functions - Examples - 1

Lecture 28 - Functions - Examples - 2

Lecture 29 - Arrays in C

Lecture 30 - Initializing arrays

Lecture 31 - Initializing character arrays

Lecture 32 - Pointers in C

Lecture 33 - Pointer arithmetic

Lecture 34 - Function with pointer arguments

Lecture 35 - Example - copy a subarray

Lecture 36 - Programming using arrays and pointers

Lecture 37 - Sizeof operator

Lecture 38 - Returning pointers from functions

Lecture 39 - Example - return duplicate of a string

Lecture 40 - Recursion - Linear Recursion

Lecture 41 - Recursion - Linear Recursion - 2

Lecture 42 - Recursion - Two-way Recursion

Lecture 43 - Multidimensional Arrays

Lecture 44 - Multidimensional Arrays and Pointers

Lecture 45 - Multidimensional Arrays and Pointers - continued (2)

Lecture 46 - Multidimensional Arrays and Pointers - continued (3)

Lecture 47 - File Handling

Lecture 48 - Some other file-handling functions

Lecture 49 - Structures in C - 1

Lecture 50 - Structures in C - 2

Lecture 51 - Singly Linked Lists

Lecture 52 - Doubly Linked Lists - introduction

Lecture 53 - Organizing code into multiple files - 1

Lecture 54 - Organizing code into multiple files - 2

Lecture 55 - Pre and post increment

Lecture 56 - Doubly Linked Lists - Introduction

Lecture 57 - Organizing code into multiple files - 1

Lecture 58 - Organizing code into multiple files - 2

Lecture 59 - Pre and post increment operators

NPTEL : NOC:Fundamentals of Database Systems (Computer Science and Engineering)

Co-ordinators : Dr. Arnab Bhattacharya

Lecture 1 - Introduction to Databases

Lecture 2 - Relational Data Model

Lecture 3 - Relational Algebra Basic Operators

Lecture 4 - Relational Algebra Composition of Operators

Lecture 5 - Relational Algebra Additional Operators

Lecture 6 - Relational Algebra Extended Relational Algebra

Lecture 7 - Relational Algebra: Database Modifications

Lecture 8 - SQL: Introduction and Data Definition

Lecture 9 - SQL: Basic Queries

Lecture 10 - SQL: Advanced Queries

Lecture 11 - SQL: Updates, Joins, Views and Triggers

Lecture 12 - Normalization Theory: Motivation

Lecture 13 - Normalization Theory: 1 NF and 2NF

Lecture 14 - Normalization Theory: 3NF

Lecture 15 - Normalization Theory: BCNF

Lecture 16 - Normalization Theory: MVD

Lecture 17 - Physical Design

Lecture 18 - Database Indexing: Hashing

Lecture 19 - Database Indexing: Tree-based Indexing

Lecture 20 - Query Processing: Selection

Lecture 21 - Query Processing: Sorting

Lecture 22 - Query Processing: Nested-Loop joins and Merge join

Lecture 23 - Query Processing: Hash join and other Operations

Lecture 24 - Query Optimization: Equivalent Expressions and Simple Equivalance Rules

Lecture 25 - Query Optimization: Complex Equivalence Rules

Lecture 26 - Query Optimization: Join Order

Lecture 27 - Query Optimization: Heuristics and Sizes

Lecture 28 - Database Transactions: Properties and Failures

Lecture 29 - Database Transactions: States and Systems

Lecture 30 - Recovery Systems: Deferred Database Modification

Lecture 31 - Recovery Systems: Immediate Database Modification.

Lecture 32 - Recovery Systems: Checkpointing and Shadow Paging

Lecture 33 - Schedules: Introduction

Lecture 34 - Schedules: Conflict Serializability

Lecture 35 - Schedules: View Serializability

Lecture 36 - Schedules: Result Equivalence and Testing for Serializability

Lecture 37 - Schedules: Recoverability

Lecture 38 - Concurrency Control: Locks

Lecture 39 - Concurrency Control: Two-phase Locking Protocol

Lecture 40 - Concurrency Control: Timestamp Ordering Protocol

Lecture 41 - Concurrency Control: Validation-based Protocol

Lecture 42 - Concurrency Control: Multiple Granularity for Locks

Lecture 43 - Concurrency Control: Deadlock Prevention and Deadlock Detection

Lecture 44 - Concurrency Control: Deadlock Recovery and Update Operations

Lecture 45 - NoSQL: Introduction and Properties

Lecture 46 - NoSQL: Columnar Families

Lecture 47 - NoSQL: Different NoSQL Systems

Lecture 48 - Big Data

NPTEL : NOC:Theory of Computation (Computer Science and Engineering)

Co-ordinators : Prof. Raghunath Tewari

Lecture 1 - Introduction to Finite Automata

Lecture 2 - Basic Notation and Convention, DFA Edit Lesson

Lecture 3 - Example of DFAs

Lecture 4 - Computation by DFA and Regular operation

Lecture 5 - Introduction to Nondeterminism

Lecture 6 - NFA, definition and examples

Lecture 7 - Equivalence of NFA and DFA, Closure properties

Lecture 8 - Regular expressions

Lecture 9 - Algebraic properties, RE to NFA conversion

Lecture 10 - GNFA to RE conversion

Lecture 11 - More closure properties of regular languages

Lecture 12 - Non-regular languages and pumping lemma

Lecture 13 - Examples of non-regular languages

Lecture 14 - DFA minimization

Lecture 15 - Introduction to CFGs

Lecture 16 - Examples of CFGs, Reg subset of CFL

Lecture 17 - Parse tree, derivation, ambiguity

Lecture 18 - Normal forms, Chomsky normal form

Lecture 19 - Non-CFLs, pumping lemma

Lecture 20 - Examples of non- CFLs

Lecture 21 - Pushdown Automata

Lecture 22 - Pushdown Automata - Definition and Example

Lecture 23 - Pushdown Automata - Examples and Relation with CFGs

Lecture 24 - Closure Properties of CFLs

Lecture 25 - Deterministic Context Free Languages

Lecture 26 - Turing Machine

Lecture 27 - More on Turing Machine

Lecture 28 - Non deterministic Turing Machine Edit Lesson

Lecture 29 - Configuration Graphs

Lecture 30 - Closure Properties of Decidable and Turing recognizable languages

Lecture 31 - Decidability properties of Regular and Context Free Languages

Lecture 32 - Undecidability

Lecture 33 - More on Undecidability

Lecture 34 - Reduction

Lecture 35 - Applications of Reduction

Lecture 36 - Rice's theorem

Lecture 37 - Introduction to Computational Complexity Theory

Lecture 38 - More on the class NP

Lecture 39 - NP-Completeness

Lecture 40 - More on NP-Completeness

NPTEL : NOC:Modern Algebra (Computer Science and Engineering)

Co-ordinators : Prof. Manindra Agrawal

Lecture 1 - Groups : Introduction to abstraction

Lecture 2 - Groups : Subgroups and homomorphism

Lecture 3 - Groups : Isomorphism

Lecture 4 - Groups : Quotienting

Lecture 5 - Groups : Structure Theorem

Lecture 6 - Groups : Applications

Lecture 7 - Rings : Introduction

Lecture 8 - Rings : Failure of Unique Factorization

Lecture 9 - Rings : Birth of Ideals

Lecture 10 - Rings : Ideal Arithmetic

Lecture 11 - Rings : Special Ideals

Lecture 12 - Rings : Dedekind Domains

Lecture 13 - Rings : Quotient Rings

Lecture 14 - Fields

Lecture 15 - Cauchy sequences and real numbers

Lecture 16 - Properties of Fields

Lecture 17 - Finite Fields

Lecture 18 - Application of Fields

NPTEL : NOC:Advanced Graph Theory (Computer Science and Engineering)

Co-ordinators : Dr.Rajiv Misra

Lecture 1 - Graph Theory: Introduction

Lecture 2 - Paths, Cycles and Trails

Lecture 3 - Eulerian Circuits, Vertex Degrees and Counting

Lecture 4 - The Chinese Postman Problem and Graphic Sequences

Lecture 5 - Trees and Distance

Lecture 6 - Spanning Trees and Enumeration

Lecture 7 - Matchings and Covers

Lecture 8 - Independent Sets, Covers and Maximum Bipartite Matching

Lecture 9 - Weighted Bipartite Matching

Lecture 10 - Stable Matchings and Faster Bipartite Matching

Lecture 11 - Factors and Perfect Matching in General Graphs

Lecture 12 - Matching in General Graphs: Edmondsâ€™ Blossom Algorithm

Lecture 13 - Connectivity and Paths: Cuts and Connectivity

Lecture 14 - k-Connected Graphs

Lecture 15 - Network Flow Problems

Lecture 16 - Vertex Coloring and Upper Bounds

Lecture 17 - Brooksâ€™ Theorem and Color-Critical Graphs

Lecture 18 - Counting Proper Colorings

Lecture 19 - Planar Graphs

Lecture 20 - Characterization of Planar Graphs

Lecture 21 - Line Graphs and Edge-coloring

Lecture 22 - Hamiltonian Graph, Traveling Salesman Problem and NP-Completeness

Lecture 23 - Connected Dominating Set and Distributed Algorithm

NPTEL : NOC:Cloud Computing and Distributed Systems (Computer Science and Engineering)

Co-ordinators : Dr.Rajiv Misra

Lecture 1 - Introduction to Cloud Computing

Lecture 2 - Virtualization

Lecture 3 - Hotspot Mitigation for Virtual Machine Migration

Lecture 4 - Server Virtualization

Lecture 5 - Software Defined Network

Lecture 6 - Geo-distributed Cloud Data Centers

Lecture 7 - Leader Election in Rings (Classical Distributed Algorithms)

Lecture 8 - Leader Election (Ring LE and Bully LE Algorithm)

Lecture 9 - Design of Zookeeper

Lecture 10 - Time and Clock Synchronization in Cloud Data Centers

Lecture 11 - Global State and Snapshot Recording Algorithms

Lecture 12 - Distributed Mutual Exclusion

Lecture 13 - Consensus in Cloud Computing and Paxos

Lecture 14 - Byzantine Agreement

Lecture 15 - Failures and Recovery Approaches in Distributed Systems

Lecture 16 - Design of Key-Value Stores

Lecture 17 - Design of HBase

Lecture 18 - Peer to Peer Systems in Cloud Computing

Lecture 19 - MapReduce

Lecture 20 - Introduction to Spark

Lecture 21 - Introduction to Kafka

NPTEL : NOC:Big Data Computing (Computer Science and Engineering)

Co-ordinators : Dr. Rajiv Misra

Lecture 1 - Introduction to Big Data

Lecture 2 - Big Data Enabling Technologies

Lecture 3 - Hadoop Stack for Big Data

Lecture 4 - Hadoop Distributed File System (HDFS)

Lecture 5 - Hadoop MapReduce 1.0

Lecture 6 - Hadoop MapReduce 2.0 - Part I

Lecture 7 - Hadoop MapReduce 2.0 - Part II

Lecture 8 - MapReduce Examples

Lecture 9 - Parallel Programming with Spark

Lecture 10 - Introduction to Spark

Lecture 11 - Spark Built-in Libraries

Lecture 12 - Design of Key-Value Stores

Lecture 13 - Data Placement Strategies

Lecture 14 - CAP Theorem

Lecture 15 - Consistency Solutions

Lecture 16 - Design of Zookeeper

Lecture 17 - CQL (Cassandra Query Language)

Lecture 18 - Design of HBase

Lecture 19 - Spark Streaming and Sliding Window Analytics - Part I

Lecture 20 - Spark Streaming and Sliding Window Analytics - Part II

Lecture 21 - Sliding Window Analytics

Lecture 22 - Introduction to Kafka

Lecture 23 - Big Data Machine Learning - Part I

Lecture 24 - Big Data Machine Learning - Part II

Lecture 25 - Machine Learning Algorithm K-means using Map Reduce for Big Data Analytics

Lecture 26 - Parallel K-means using Map Reduce on Big Data Cluster Analysis

Lecture 27 - Decision Trees for Big Data Analytics

Lecture 28 - Big Data Predictive Analytics - Part I

Lecture 29 - Big Data Predictive Analytics - Part II

Lecture 30 - Parameter Servers

Lecture 31 - PageRank Algorithm in Big Data

Lecture 32 - Spark GraphX and Graph Analytics - Part I

Lecture 33 - Spark GraphX and Graph Analytics - Part II

Lecture 34 - Case Study: Flight Data Analysis using Spark GraphX

NPTEL : NOC:Introduction to Blockchain Technology and Applications (Computer Science and Engineering)

Co-ordinators : Prof. Sandeep Shukla

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

NPTEL : NOC:Arithmetic Circuit Complexity (Computer Science and Engineering)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Turing Machines and Introduction to Arithmetic Circuits

Lecture 2 - Arithmetic complexity classes

Lecture 3 - Determinant is in VP

Lecture 4 - Determinant vs Arithmetic Branching Programs (ABP)

Lecture 5 - Determinant as signed sum of clow sequence

Lecture 6 - Determinant has small ABP and Strassen's homogenization

Lecture 7 - Depth reduction for arithmetic formulas

Lecture 8 - Depth reduction for arithmetic circuits

Lecture 9 - Depth 4 reduction

Lecture 10 - Depth 3 reduction

Lecture 11 - Equivalence of Formulas and Width 3 ABP

Lecture 12 - Width-2 ABP Chasm

Lecture 13 - Grigoriev-Karpinski Measure

Lecture 14 - Lower Bound of Depth-3 circuit over finite fields

Lecture 15 - Lower Bound for depth 3 Multilinear Circuits

Lecture 16 - Lower Bound for Constant depth Multilinear Circuits

Lecture 17 - Structural lemma for constant depth multilinear circuits

Lecture 18 - Extending the proof for multilinear formulas

Lecture 19 - Shifted Partial Derivative Measure

Lecture 20 - Exponential Lower Bound for General depth-4 CIrcuits

Lecture 21 - Lower Bound on Homogeneous Depth-4 circuits

Lecture 22 - Introduction to PIT

Lecture 23 - Hitting Set and Hitting Set Generator

Lecture 24 - PIT vs Lower Bounds

NPTEL : NOC:Computational Complexity Theory (Computer Science and Engineering)

Co-ordinators : Prof. Raghunath Tewari

Lecture 1 - Introduction

Lecture 2 - NP Completeness

Lecture 3 - SAT is NP-complete

Lecture 4 - More on NP completeness

Lecture 5 - Hierarchy Theorems

Lecture 6 - Introduction to Space Complexity

Lecture 7 - Savitchâ€™s Theorem

Lecture 8 - Immerman-Szelepscenyi Theorem

Lecture 9 - Polynomial Hierarchy

Lecture 10 - A PSPACE Complete Problem

Lecture 11 - More on Polynomial Hierarchy

Lecture 12 - Alternating Turing Machines

Lecture 13 - Equivalence of Quantifier and Oracle Based Definitions of Polynomial Hierarchy

Lecture 14 - Boolean Circuits

Lecture 15 - Shannonâ€™s Theorem and Karp-Lipton-Sipser Theorem

Lecture 16 - Bounded Depth Circuit Classes

Lecture 17 - Kannanâ€™s Theorem

Lecture 18 - Probabilistic Complexity

Lecture 19 - StrongBPP and WeakBPP

Lecture 20 - One-sided and Zero-sided Error Probabilistic Complexity Classes

Lecture 21 - Error Reduction for BPP

Lecture 22 - BPP in PH and Logspace Randomized Classes

Lecture 23 - Valiant-Vazirani Theorem - I

Lecture 24 - Valiant-Vazirani Theorem - II

Lecture 25 - Amplified version of Valiant-Vazirani Theorem

Lecture 26 - Todaâ€™s Theorem - I

Lecture 27 - Todaâ€™s Theorem - II

Lecture 28 - Permanent and Determinant Functions

Lecture 29 - Permanent is hard for #P

Lecture 30 - Interactive Proofs

Lecture 31 - Graph Non-Isomorphism is in IP[2]

Lecture 32 - Set Lower Bound Protocol

Lecture 33 - MA is in AM

Lecture 34 - Sumcheck Protocol - I

Lecture 35 - Sumcheck Protocol - II

Lecture 36 - Parity not in AC0 - I

Lecture 37 - Parity not in AC0 - II

Lecture 38 - Circuits with Counters

Lecture 39 - Communication Complexity - I

Lecture 40 - PCP Theorem

Lecture 41 - Communication Complexity - II

NPTEL : NOC:Randomized Methods in Complexity (Computer Science and Engineering)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Course Outline

Lecture 2 - Circuits and Polynomial Identity Testing

Lecture 3 - Derandomization and Lower Bounds

Lecture 4 - IP=PSPACE

Lecture 5 - ACC0 Lower Bounds

Lecture 6 - ACC0 Lower Bounds (Continued...)

Lecture 7 - Monotone Circuits

Lecture 8 - Monotone Circuit Lower Bound and Sunflower Lemma

Lecture 9 - Undirected Graph Connectivity in randomized logspace

Lecture 10 - Graph Expansion Properties

Lecture 11 - Expanders

Lecture 12 - Error Reduction using Expanders

Lecture 13 - Ajtai-Komlos-Szemeredi Theorem

Lecture 14 - Explicit construction of expanders and Zig-Zag product

Lecture 15 - Spectral analysis of Zig-Zag product

Lecture 16 - Undirected Path in logspace

Lecture 17 - Explicit Prg to derandomizing classes

Lecture 18 - Hardness vs Randomness

Lecture 19 - Hardness to NW-Generator to PRG

Lecture 20 - Partial derandomization from worst-case hardness of permanent

Lecture 21 - Error-correcting codes

Lecture 22 - Introduction to various linear explicit codes

Lecture 23 - Introduction of efficient decoding

Lecture 24 - Local decoding of WH, Reed-Muller and Concatenated codes

Lecture 25 - Introduction to List Decoding

Lecture 26 - Local List decoding of WH, RM

NPTEL : NOC:Probability for Computer Science (Computer Science and Engineering)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Introductory examples

Lecture 2 - Examples and Course outline

Lecture 3 - Probability over discrete space

Lecture 4 - Inclusion-Exclusion principle

Lecture 5 - Probability over infinite space

Lecture 6 - Conditional probability, Partition formula

Lecture 7 - Independent events, Bayes theorem

Lecture 8 - Fallacies, Random variables

Lecture 9 - Expection

Lecture 10 - Conditional Expectation

Lecture 11 - Important Random Variables

Lecture 12 - Continuous Random Variables

Lecture 13 - Equality Checking, Poisson Distribution

Lecture 14 - Concentration Inequivalities, Variance

Lecture 15 - Weak Linearity of Variance, Law of Large Numbers

Lecture 16 - Chernoff's Bound. K-wise Independence

Lecture 17 - Union and Factorial Estimates

Lecture 18 - Stochastic Process: Markov Chains

Lecture 19 - Drunkard's walk, Evolution of Markov Chains

Lecture 20 - Stationary Distribution

Lecture 21 - Perron-Frobenius Theorem, Page Rank Algorithm

Lecture 22 - Page Rank Algorithm: Ergodicity

Lecture 23 - Cell Genetics

Lecture 24 - Random Sampling

Lecture 25 - Biased Coin Tosses, Hashing

Lecture 26 - Hashing, Introduction to Probabilistic Methods

Lecture 27 - Ramsey Numbers, Large Cuts in Graphcs

Lecture 28 - Sum Free Subsets, Discrepancy

Lecture 29 - Extremal Set Families

Lecture 30 - Super Concentrators

Lecture 31 - Streaming Algorithms - I

Lecture 32 - Streaming Algorithms - II

NPTEL : NOC:Circuit Complexity Theory (Computer Science and Engineering)

Co-ordinators : Prof. Raghunath Tewari

Lecture 1 - Introduction

Lecture 2 - Standard Bounds

Lecture 3 - Shannon's Theorem

Lecture 4 - Riordon-Shannon Theorem

Lecture 5 - Khrapchenko's Theorem

Lecture 6 - Proof of Khrapchenko's Theorem

Lecture 7 - Application of Khrapchenko's Theorem

Lecture 8 - Nechiporuk's Theorem

Lecture 9 - Application of Nechiporuk's Theorem

Lecture 10 - Subbotovskaya's Theorem - I

Lecture 11 - Subbotovskaya's Theorem - II

Lecture 12 - Applications of Subbotovskaya's Theorem

Lecture 13 - Upper and Lower Bounds on the Andreev Function

Lecture 14 - Upper and Lower Bounds on the Andreev Function

Lecture 15 - Polynomial Size Monotone Formula for MAJORITY (Valiant's Theorem) - II

Lecture 16 - Circuits for Addition - Ripple Adder and Carry Lookahead Adder

Lecture 17 - Circuits for Addition - Parallel Prefix Sum Method

Lecture 18 - Circuits for Iterated Addition and Multiplication

Lecture 19 - Bounded Depth Circuit Classes

Lecture 20 - Basic Circuit for Division using Newton-Raphson Method

Lecture 21 - Division in NC1 (Beame, Cook, Hoover Theorem) - I

Lecture 22 - Division in NC1 (Beame, Cook, Hoover Theorem) - II

Lecture 23 - Division in NC1 (Beame, Cook, Hoover Theorem) - III

Lecture 24 - Division in NC1 (Beame, Cook, Hoover Theorem) - IV

Lecture 25 - Division in NC1 (Beame, Cook, Hoover Theorem) - V

Lecture 26 - Division in NC1 (Beame, Cook, Hoover Theorem) - VI

Lecture 27 - Relation between Bounded Depth Circuit Classes and Uniform Complexity Classes - I

Lecture 28 - Relation between Bounded Depth Circuit Classes and Uniform Complexity Classes - II

Lecture 29 - Reducing Circuit Depth

Lecture 30 - P is in P/poly

Lecture 31 - Discussion on Lower Circuit Bounds for Bounded Depth Circuit Classes

Lecture 32 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - I

Lecture 33 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - II

Lecture 34 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - III

Lecture 35 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - IV

Lecture 36 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - V

Lecture 37 - Monotone Circuit Lower Bound for Clique (Razborov's Theorem) - VI

Lecture 38 - Circuit Lower Bound for Parity by Approximating Circuits using Polynomials (Razborov-Smolensky Theorem) - I

Lecture 39 - Circuit Lower Bound for Parity by Approximating Circuits using Polynomials (Razborov-Smolensky Theorem) - II

Lecture 40 - Circuit Lower Bound for Parity by Approximating Circuits using Polynomials (Razborov-Smolensky Theorem) - III

Lecture 41 - Circuit Lower Bound for Parity using Switching Lemma (Hastad's Theorem)

Lecture 42 - Circuit Lower Bound for Parity using Switching Lemma (Hastad's Theorem)

Lecture 43 - Circuit Lower Bound for Parity using Switching Lemma (Hastad's Theorem)

Lecture 44 - Proof of Hastad's Switching Lemma - I

Lecture 45 - Proof of Hastad's Switching Lemma - II

Lecture 46 - Communication Complexity of a Function

Lecture 47 - Relation Between Communication Complexity and Circuit Depth (Karchmer-Wigderson Theorem) - I

Lecture 48 - Relation Between Communication Complexity and Circuit Depth (Karchmer-Wigderson Theorem) - II

Lecture 49 - Bounded Width Branching Programs = NC1 (Barrington's Theorem) - I

Lecture 50 - Bounded Width Branching Programs = NC1 (Barrington's Theorem) - II

Lecture 51 - Width 3 Branching Programs = MOD3 o MOD2 Circuits (Barrington's Theorem) - I

Lecture 52 - Width 3 Branching Programs = MOD3 o MOD2 Circuits (Barrington's Theorem) - II

Lecture 53 - Uniform AC0 can be simulated by depth 3 Threshold circuits of quasipolynomial size (Allender-Hertramph Theorem) - I

Lecture 54 - Uniform AC0 can be simulated by depth 3 Threshold circuits of quasipolynomial size (Allender-Hertramph Theorem) - II

Lecture 55 - Valient-Vazirani Theorem - I

Lecture 56 - Valient-Vazirani Theorem - II

Lecture 57 - Natural Proof Barrier (Razborov-Rudich Theorem) - I

Lecture 58 - Natural Proof Barrier (Razborov-Rudich Theorem) - II

Lecture 59 - Pseudorandom Function Generator by Goldreich, Goldwasser and Micali - I

Lecture 60 - Pseudorandom Function Generator by Goldreich, Goldwasser and Micali - II

NPTEL : NOC:Foundation of Cloud IoT Edge ML (Computer Science and Engineering)

Co-ordinators : Prof. Rajiv Misra

Lecture 1 - Introduction to Edge Computing

Lecture 2 - Introduction to Cloud

Lecture 3 - Introduction to IoT Platform

Lecture 4 - Time and Clock Synchronization in IoT

Lecture 5 - Enabling Intelligence at Edge Layer for IoT

Lecture 6 - ML-based Image Classifier at IoT-Edge

Lecture 7 - Introduction to Docker Containers and Kubernetes

Lecture 8 - ML based Predictive Maintenance at IoT Edge

Lecture 9 - Deep Reinforcement Learning for Cloud Edge

Lecture 10 - Deep Reinforcement Learning for Cloud Edge Example

Lecture 11 - Public Cloud Services Case Study of AWS Services

Lecture 12 - Mathematical formulations for task offloading in Edge Cloud

Lecture 13 - Task Offloading Based on LSTM Prediction and Deep Reinforcement Learning

Lecture 14 - Vertical and Horizontal Offloading for Cloud Edge

Lecture 15 - Global State and Snapshot Recording Algorithms

Lecture 16 - Hot Data Analytics for Real Time Streaming in IoT Platform

Lecture 17 - Introduction to MQTT and Kafka in IoT Platform

Lecture 18 - Introduction to Edge Data Center for IoT Platform

Lecture 19 - Design of Key Value Stores for IoT Edge Storage

Lecture 20 - Introduction to Edge ML with AWS IoT platform

Lecture 21 - Introduction to Federated Learning at IoT Edge

Lecture 22 - ML for Autonomous Driving Car

NPTEL : NOC:Linear Programming and its Applications to Computer Science (Computer Science and Engineering)

Co-ordinators : Prof. Rajat Mittal

Lecture 1 - Linear Programming, an Example

Lecture 2 - Introduction to Linear Programming

Lecture 3 - Gaussian Elimination with Examples

Lecture 4 - Summary of Gaussian Elimination

Lecture 5 - Vector Space over real numbers

Lecture 6 - Linear Operators

Lecture 7 - Solutions of Linear Equations

Lecture 8 - Resource Allocation as LP

Lecture 9 - Approximate Degree as LP

Lecture 10 - Equivalent LP's

Lecture 11 - Introduction to Convexity

Lecture 12 - Different Kind of Convex Sets

Lecture 13 - Feasible Region of LP

Lecture 14 - Proof of Weyl's Theorem

Lecture 15 - Definition of Convex Functions

Lecture 16 - Properties of Convex Functions and Examples

Lecture 17 - Basic Feasible Solution

Lecture 18 - BFS and Vertices

Lecture 19 - Simplex Algorithm

Lecture 20 - Details of Simplex Algorithm

Lecture 21 - Starting BFS

Lecture 22 - Degeneracy

Lecture 23 - Introduction to Duality

Lecture 24 - Hyperplane Separation Theorems

Lecture 25 - Farkas Lemma

Lecture 26 - How to take dual

Lecture 27 - Examples of taking dual

Lecture 28 - Strong Duality

Lecture 29 - Proof of Strong Duality

Lecture 30 - Complementary Slackness

Lecture 31 - Introduction to Algorithmic Game Theory

Lecture 32 - Nash Equilibrium

Lecture 33 - Minimax and Nash Equilibrium

Lecture 34 - Deterministic Communication Complexity

Lecture 35 - Randomized Communication Complexity

Lecture 36 - Yao's Minimax Theorem

Lecture 37 - Lower bounds using Yao's Minimax

Lecture 38 - Set Disjointness Problem

Lecture 39 - LP for mass flow problem

Lecture 40 - LP for min cut problem

Lecture 41 - Max flow = Min cut

Lecture 42 - Primal dual approach

Lecture 43 - Primal dual for max flow

Lecture 44 - Set cover problem

Lecture 45 - Rounding for set cover

Lecture 46 - Analysis of Rounding

Lecture 47 - Algorithm for Set Cover

Lecture 48 - Linear Regression through LP

Lecture 49 - Linear Classifiers through LP

NPTEL : NOC:Basics of Computational Complexity (Computer Science and Engineering)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Introduction

Lecture 2 - Outline

Lecture 3 - Formalize Problems and Machines

Lecture 4 - Turing Machine

Lecture 5 - Asymptotics, Church-Turing Thesis and UTM

Lecture 6 - Halting Problem and Diagonalization

Lecture 7 - Classes P, NP, EXP

Lecture 8 - Comparison of Classes and Non-determination

Lecture 9 - NP Vs Ntime

Lecture 10 - SAT is NP-hard

Lecture 11 - Cook-Levin Theorem

Lecture 12 - NP-Hardness and Co-Classes

Lecture 13 - NEXP and Godel's Computation Question

Lecture 14 - Time, Space Hierarchy

Lecture 15 - NDTM Hierarchy

Lecture 16 - Ladner's Theorem and Introduction to Oracles

Lecture 17 - Oracle and Relativizing Proofs

Lecture 18 - Non Relativizing P=NP and Introduction to Space Complexity

Lecture 19 - PSpace Completeness

Lecture 20 - QBF Game and NSpace

Lecture 21 - NL Complete

Lecture 22 - NL = coNL

Lecture 23 - Polynomial Hierarchy

Lecture 24 - Polynomial Hierarchy

Lecture 25 - PH Complete and Oracle TM

Lecture 26 - NP^NP and #SAT

Lecture 27 - Counting Classes #P and PP

Lecture 28 - Permanent and its Cycle cover of a Graph

Lecture 29 - #P-Complete: Graph Gadgets

Lecture 30 - #P-Hard: Analyse XOR

Lecture 31 - Valient-Vazirani Lemma and Hashing

Lecture 32 - SAT to Parity-SAT

Lecture 33 - Parity Quantification

Lecture 34 - Randomized Reduction of PH to Parity-P

Lecture 35 - PH to #P

Lecture 36 - Probabilistic TM

Lecture 37 - Example of PTM and Introduction to RP and ZPP

Lecture 38 - ZPP = RP and coRP

Lecture 39 - Probability Amplification

Lecture 40 - BPP in PH

Lecture 41 - GNI is in BP.NP

Lecture 42 - GI is NP-hard

Lecture 43 - GI is NP-hard (Continued...) Going Beyond TMs

Lecture 44 - Circuit Complexity

Lecture 45 - TM with Advice - P/poly

Lecture 46 - Circuits for NP and EXP

Lecture 47 - Parallel Computation

Lecture 48 - P-completeness and NEXP-completeness

NPTEL : NOC:Edge Computing (Computer Science and Engineering)

Co-ordinators : Multi-Faculty

Lecture 1 - Overview of Cloud Computing

Lecture 2 - Cloud Computing and its Limitation to Support Low Latency and RTT

Lecture 3 - Introduction to Edge Computing

Lecture 4 - Edge Computing Paradigms - 004

Lecture 5 - Overview of Virtualization

Lecture 6 - Docker Containers

Lecture 7 - Kubernetes

Lecture 8 - NoSQL Databases and Key Value Stores

Lecture 9 - Edge AI Intelligence at the Edge

Lecture 10 - Edge AI Intelligence at the Edge

Lecture 11 - Mobile Edge Computing

Lecture 12 - Geo-distributed Data Centers

Lecture 13 - Time and Clock Synchronization

Lecture 14 - Edge Computing Security and Privacy

Lecture 15 - Network Virtualization

Lecture 16 - Resource Allocation in Private and Public Edge-Cloud Systems

NPTEL : NOC:Practical Cyber Security for Cyber Security Practitioners (Computer Science and Engineering)

Co-ordinators : Prof. Sandeep K. Shukla

Lecture 1 - Introduction to the Course - Practical Cyber Security for Cyber Practitioners

Lecture 2 - Introduction to Cyber Kill Chains - Lockheed Martin Kill Chain

Lecture 3 - Understanding Cyber Kill Chain - Delivery, Exploitation, and Installation

Lecture 4 - Mastering the Cyber Kill Chain: Command and Control and Actions on Objectives

Lecture 5 - Introduction to MITRE ATT&CK framework

Lecture 6 - Understanding MITRE ATT&CK: A Guide to Cyber Threat Intelligence

Lecture 7 - Mapping to ATT&CK from Finished Cyber Incident

Lecture 8 - Introduction to Mapping to ATT&CK from Raw Data

Lecture 9 - Mapping to ATT&CK from RAW Data

Lecture 10 - Storing and Analyzing ATT&CK-Mapped Data

Lecture 11 - Making Defensive Recommendations from ATT&CK-Mapped Data

Lecture 12 - TTP Mapping and Introduction to Unified Kill Chain

Lecture 13 - Deep Dive into Unified Kill Chain - Part 1

Lecture 14 - Deep Dive into Unified Kill Chain - Part 2

Lecture 15 - Introduction to MITRE DEF3ND Framework

Lecture 16 - Deep dive into MITRE DEF3ND framework - I

Lecture 17 - Deep dive into MITRE DEF3ND framework - II

Lecture 18 - MITRE DEF3ND Framework Conclusion and Introduction to Risk Identification and Assessment

Lecture 19 - Deep dive into Risk Assessment - I

Lecture 20 - Deep dive into Risk Assessment - II

Lecture 21 - Introduction to Cyber Crisis Management

Lecture 22 - Cyber Crisis Conclusion and Introduction to Cyber Resilience

Lecture 23 - Deep dive into Cyber Resilience - I

Lecture 24 - Deep dive into Cyber Resilience - II

Lecture 25 - Cyber Resilience Review (Self-Assessment)

Lecture 26 - Cyber Threat Intelligence Sharing - STIX Tutorial - Part 1

Lecture 27 - Cyber Threat Intelligence Sharing - STIX Tutorial - Part 2

Lecture 28 - Introduction to SCAP, CVE and CCE

Lecture 29 - Deep Dive into CVE, CCE, CPE, CVSS Scoring, XCCDF, OVAL Languages - Part 1

Lecture 30

Lecture 31

NPTEL : NOC:Computational Arithmetic - Geometry for Algebraic Curves (Computer Science and Engineering)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Course outline and Fundamentals

Lecture 2 - Ideals and Varieties

Lecture 3 - Dimension of Varieties

Lecture 4 - Projective varieties

Lecture 5 - Morphisms and rational functions

Lecture 6 - Local rings

Lecture 7 - Rational maps and Birationality

Lecture 8 - Tangent space and Singularities

Lecture 9 - Resolution of singularities

Lecture 10 - Discrete valuation rings

Lecture 11 - Existence of nonsingular model

Lecture 12 - Nonsingular curves

Lecture 13 - Divisor on Curves

Lecture 14 - Riemann-Roch Spaces - I

Lecture 15 - Riemann-Roch Spaces - II

Lecture 16 - Divisor Class Group

Lecture 17 - Genus of a curve

Lecture 18 - Riemann-Roch and Adeles

Lecture 19 - Differentials and Riemann-Roch

Lecture 20 - Canonical divisor and proof of Riemann-Roch

Lecture 21 - Jacobian of a curve

Lecture 22 - Zeta function of curves

Lecture 23 - Functional equation and point counting

Lecture 24 - Riemann hypothesis for curves

Lecture 25 - Proof of RH for curves: Galois covers

Lecture 26 - Proof of RH for curves II: Multilinear algebra

Lecture 27 - Cohomological interpretation of zeta function

NPTEL : Cryptography and Network Security (Computer Science and Engineering)

Co-ordinators : Dr. Debdeep Mukhopadhyay

Lecture 1 - Introduction

Lecture 2 - Overview on Modern Cryptography

Lecture 3 - Introduction to Number Theory

Lecture 4 - Probability and Information Theory

Lecture 5 - Classical Cryptosystems

Lecture 6 - Cryptanalysis of Classical Ciphers

Lecture 7 - Shannons Theory

Lecture 8 - Shannons Theory (Continued...1)

Lecture 9 - Shannons Theory (Continued...2)

Lecture 10 - Symmetric Key Ciphers

Lecture 11 - Block Cipher Standards (DES)

Lecture 12 - Block Cipher Standards (AES)

Lecture 13 - Block Cipher Standards (AES) (Continued...)

Lecture 14 - Linear Cryptanalysis

Lecture 15 - Differential Cryptanalysis

Lecture 16 - Few other Cryptanalytic Techniques

Lecture 17 - Overview on S-Box Design Principles

Lecture 18 - Modes of Operation of Block Ciphers

Lecture 19 - Stream Ciphers

Lecture 20 - Stream Ciphers (Continued...1)

Lecture 21 - Stream Ciphers (Continued...2)

Lecture 22 - Pseudorandomness

Lecture 23 - Cryptographic Hash Functions

Lecture 24 - Cryptographic Hash Functions (Continued...1)

Lecture 25 - Cryptographic Hash Functions (Continued...2)

Lecture 26 - Message Authentication Codes

Lecture 27 - More Number Theoretic Results

Lecture 28 - The RSA Cryptosystem

Lecture 29 - Primality Testing

Lecture 30 - Factoring Algorithms

Lecture 31 - Some Comments on the Security of RSA

Lecture 32 - Discrete Logarithm Problem (DLP)

Lecture 33 - The Diffie-Hellman Problem and Security of ElGamal Systems

Lecture 34 - An Introduction to Elliptic Curve Cryptography

Lecture 35 - Application of Elliptic Curves to Cryptography

Lecture 36 - Implementation of Elliptic Curve Cryptography

Lecture 37 - Secret Sharing Schemes

Lecture 38 - A Tutorial on Network Protocols

Lecture 39 - System Security

Lecture 40 - Firewalls and Intrusion Detection Systems

Lecture 41 - Side Channel Analysis of Cryptographic Implementations

NPTEL : High Performance Computer Architecture (Computer Science and Engineering)

Co-ordinators : Prof. Ajit Pal

Lecture 1 - Introduction & Course Outline

Lecture 2 - Performance

Lecture 3 - Instruction Set Architecture

Lecture 4 - MIPS ISA and Processor

Lecture 5 - MIPS ISA and Processor (Continued...)

Lecture 6 - Pipelining - Introduction

Lecture 7 - Instruction Pipelining

Lecture 8 - Pipeline Hazards

Lecture 9 - Data Hazards

Lecture 10 - Software Pipelining

Lecture 11 - In Quest of Higher ILP

Lecture 12 - In Quest of Higher ILP (Continued...)

Lecture 13 - Dynamic Instruction Scheduling

Lecture 14 - Dynamic Instruction Scheduling (Continued...)

Lecture 15 - Control Hazards

Lecture 16 - Branch Prediction

Lecture 17 - Branch Prediction (Continued...)

Lecture 18 - Dynamic Instruction Scheduling with Branch Prediction

Lecture 19 - Hardware-based Speculation

Lecture 20 - Tutorial - I

Lecture 21 - Hierarchical Memory Organization

Lecture 22 - Hierarchical Memory Organization (Continued...1)

Lecture 23 - Hierarchical Memory Organization (Continued...2)

Lecture 24 - Hierarchical Memory Organization (Continued...3)

Lecture 25 - Cache Optimization Techniques (Continued...1)

Lecture 26 - Cache Optimization Techniques (Continued...2)

Lecture 27 - Main Memory Organization

Lecture 28 - Main Memory Optimizations

Lecture 29 - Virtual Memory

Lecture 30 - Virtual Memory (Continued...)

Lecture 31 - Virtual Machines

Lecture 32 - Storage Technology

Lecture 33 - Storage Technology (Continued...)

Lecture 34 - Case Studies

Lecture 35 - Case Studies (Continued...1)

Lecture 36 - Case Studies (Continued...2)

Lecture 37 - Multithreading & Multiprocessing

Lecture 38 - Simultaneous Multithreading

Lecture 39 - Symmetric Multiprocessors

Lecture 40 - Distributed Memory Multiprocessors

Lecture 41 - Cluster, Grid and Cloud Computing

NPTEL : Low Power VLSI Circuits and Systems (Computer Science and Engineering)

Co-ordinators : Prof. Ajit Pal

Lecture 1 - Introduction & Course Outline

Lecture 2 - MOS Transistors - I

Lecture 3 - MOS Transistors - II

Lecture 4 - MOS Transistors - III

Lecture 5 - MOS Transistors - IV

Lecture 6 - MOS Inverters - I

Lecture 7 - MOS Inverters - II

Lecture 8 - MOS Inverters - III

Lecture 9 - MOS Inverters - IV

Lecture 10 - Static CMOS Circuits - I

Lecture 11 - Static CMOS Circuits - II

Lecture 12 - MOS Dynamic Circuits - I

Lecture 13 - MOS Dynamic Circuits - II

Lecture 14 - Pass Transistor Logic Circuits - I

Lecture 15 - Pass Transistor Logic Circuits - II

Lecture 16 - MOS Memories

Lecture 17 - Finite State Machines

Lecture 18 - Switching Power Dissipation

Lecture 19 - Tutorial - I

Lecture 20 - Dynamic Power Dissipation

Lecture 21 - Leakage Power Dissipation

Lecture 22 - Supply Voltage Scaling - I

Lecture 23 - Supply Voltage Scaling - II

Lecture 24 - Supply Voltage Scaling - III

Lecture 25 - Supply Voltage Scaling - IV

Lecture 26 - Tutorial - II

Lecture 27 - Minimizing Switched Capacitance - I

Lecture 28 - Minimizing Switched Capacitance - II

Lecture 29 - Minimizing Switched Capacitance - III

Lecture 30 - Minimizing Switched Capacitance - IV

Lecture 31 - Minimizing Switched Capacitance - V

Lecture 32 - Minimizing Leakage Power - I

Lecture 33 - Minimizing Leakage Power - II

Lecture 34 - Minimizing Leakage Power - III

Lecture 35 - Variation Tolerant Design

Lecture 36 - Adiabatic Logic Circuits

Lecture 37 - Battery-Driven System Design

Lecture 38 - CAD Tools for Low Power

Lecture 39 - Tutorial - III

Lecture 40 - Course Summary

NPTEL : Real Time Systems (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction

Lecture 2 - Real - Time System Characteristics

Lecture 3 - Few Basic Issues

Lecture 4 - Modelling Timing Constraints

Lecture 5 - Modelling Timing Constraints (Continued.)

Lecture 6 - Basics of Real - Time Task Scheduling

Lecture 7 - Cyclic Scheduler

Lecture 8 - Event - Driven Scheduling

Lecture 9 - Rate Monotonic Scheduler

Lecture 10 - RMA Scheduling : Further Issues

Lecture 11 - Deadline Monotonic Scheduling and Other Issues

Lecture 12 - Few Issues in Use of RMA

Lecture 13 - Resource Sharing Among Real-Time Tasks

Lecture 14 - Highest Locker and Priority Ceiling Protocols

Lecture 15 - An Analysis of Priority Ceiling Protocol

Lecture 16 - Handling Task Dependencies

Lecture 17 - Real-Time Task Scheduling on Multiprocessors and Distributed Systems

Lecture 18 - Real-Time Task Scheduling on Multiprocessors and Distributed Systems (Continued.)

Lecture 19 - Clock Synchronization in Distributed Real-Time Systems

Lecture 20 - Internal Clock Synchronization in Presence of Byzantine Clocks

Lecture 21 - A Few Basic Issues in Real-Time Operating Systems

Lecture 22 - Tutorial - I

Lecture 23 - A Few Basic Issues in Real-Time Operating Systems (Continued.)

Lecture 24 - Unix and Windows as RTOS

Lecture 25 - Real - Time POSIX

Lecture 26 - Real - Time POSIX (Continued.)

Lecture 27 - Open Source and Commercial RTOS

Lecture 28 - Open Source and Commercial RTOS (Continued.)

Lecture 29 - Benchmarking Real - Time Computer & Operating Systems

Lecture 30 - Benchmarking Real - Time Computer & Operating Systems (Continued.)

Lecture 31 - Real - Time Communications

Lecture 32 - Few Basic Issues in Real - Time Communications

Lecture 33 - Review of Computer Networking

Lecture 34 - Real - Time Communication in a LAN

Lecture 35 - Real - Time Communication in a LAN (Continued.)

Lecture 36 - Performance of Two Real -Time Communication Protocols

Lecture 37 - Real - Time Communication over Packet Switched Networks

Lecture 38 - Real - Time Communication over Packet Switched Networks (Continued.)

Lecture 39 - Real - Time Communication over Packet Switched Networks (Continued.)

Lecture 40 - Real - Time Databases

NPTEL : Artificial Intelligence (Prof. Anupam Basu) (Computer Science and Engineering)

Co-ordinators : Prof. Sudeshna Sarkar, Prof. Anupam Basu

Lecture 1 - Introduction to Artificial Intelligence

Lecture 2 - Intelligent Agents

Lecture 3 - State Space Search

Lecture 4 - Uninformed Search

Lecture 5 - Informed Search

Lecture 6 - Informed Search - 2

Lecture 7 - Two Players Games - I

Lecture 8 - Two Players Games - II

Lecture 9 - Constraint Satisfaction Problems - 1

Lecture 10 - Constraint Satisfaction Problems - 2

Lecture 11 - Knowledge Representation and Logic

Lecture 12 - Interface in Propositional Logic

Lecture 13 - First Order Logic

Lecture 14 - Reasoning Using First Order Logic

Lecture 15 - Resolution in FOPL

Lecture 16 - Rule Based System

Lecture 17 - Rule Based Systems II

Lecture 18 - Semantic Net

Lecture 19 - Reasoning in Semantic Net

Lecture 20 - Frames

Lecture 21 - Planning - 1

Lecture 22 - Planning - 2

Lecture 23 - Planning - 3

Lecture 24 - Planning - 4

Lecture 25 - Rule Based Expert System

Lecture 26 - Reasoning with Uncertainty - I

Lecture 27 - Reasoning with Uncertainty - II

Lecture 28 - Reasoning with Uncertainty - III

Lecture 29 - Reasoning with Uncertainty - IV

Lecture 30 - Fuzzy Reasoning - I

Lecture 31 - Fuzzy Reasoning - II

Lecture 32 - Introduction to Learning - I

Lecture 33 - Introduction to Learning - II

Lecture 34 - Rule Induction and Decision Trees - I

Lecture 35 - Rule Induction and Decision Trees - II

Lecture 36 - Learning Using neural Networks - I

Lecture 37 - Learning Using Neural Networks - II

Lecture 38 - Probabilistic Learning

Lecture 39 - Natural Language Processing - I

Lecture 40 - Natural Language Processing - II

NPTEL : Artificial Intelligence (Prof. P. Dasgupta) (Computer Science and Engineering)

Co-ordinators : Prof. P. Dasgupta

Lecture 1 - Introduction to Artificial Intelligence

Lecture 2 - Problem Solving by Search

Lecture 3 - Searching with Costs

Lecture 4 - Informed State Space Search

Lecture 5 - Heuristic Search: A* and Beyond

Lecture 6 - Problem Reduction Search: AND/OR Graphs

Lecture 7 - Searching Game Trees

Lecture 8 - Knowledge Based Systems: Logic and Deduction

Lecture 9 - First Order Logic

Lecture 10 - Inference in First Order Logic

Lecture 11 - Resolution - Refutation Proofs

Lecture 12 - Resolution Refutation Proofs

Lecture 13 - Logic Programming : Prolog

Lecture 14 - Prolog Programming

Lecture 15 - Prolog: Exercising Control

Lecture 16 - Additional Topics

Lecture 17 - Introduction to Planning

Lecture 18 - Partial Order Planning

Lecture 19 - GraphPLAN and SATPlan

Lecture 20 - SATPlan

Lecture 21 - Reasoning under uncertainty

Lecture 22 - Bayesian Networks

Lecture 23 - Reasoning with Bayes Networks

Lecture 24 - Reasoning with Bayes networks (Contd.)

Lecture 25 - Reasoning under uncertainty: Issues

Lecture 26 - Learning : Decision Trees

Lecture 27 - Learning : Neural Networks

Lecture 28 - Back Propagation Learning

NPTEL : Computer Networks (Computer Science and Engineering)

Co-ordinators : Prof. Sujoy Ghosh

Lecture 1 - Emergence of Networks & Reference Models

Lecture 2 - Network Topology

Lecture 3 - Physical Medium - I

Lecture 4 - Physical Medium - II

Lecture 5 - Multiplexing (Sharing a Medium)

Lecture 6 - Telecom Networks

Lecture 7 - Switches - I

Lecture 8 - Pocket Switches

Lecture 9 - SONET/SDH

Lecture 10 - Fiber Optic Components

Lecture 11 - Routing and Wavelength Assignment

Lecture 12 - Protection and Restoration

Lecture 13 - Multiple Access

Lecture 14 - Token Based Mac

Lecture 15 - Data Link Protocols

Lecture 16 - Error Control

Lecture 17 - Stop & Wait Protocol

Lecture 18 - Satellite Communication

Lecture 19 - Ethernet - CSMA/CD

Lecture 20 - Modern Ethernet

Lecture 21 - Local Internetworking

Lecture 22 - Cellular Networks

Lecture 23 - Wireless Network

Lecture 24 - ATM : Asynchronous Transfer Mode

Lecture 25 - ATM Signaling, Routing and LAN Emulation

Lecture 26 - Introduction to Routing

Lecture 27 - RIP - Distance Vector Routing

Lecture 28 - IP version 4

Lecture 29 - IP Version 6 & Mobile IP

Lecture 30 - UDP & Client Server

Lecture 31 - TCP

Lecture 32 - IP Multicasting

Lecture 33 - DHCP and ICMP

Lecture 34 - DNS & Directory

Lecture 35 - Congestion Control

Lecture 36 - QOS & Multimedia

Lecture 37 - Network Management

Lecture 38 - Security

Lecture 39 - FTP - SMTP

Lecture 40 - HTTP

NPTEL : Data Communication (Computer Science and Engineering)

Co-ordinators : Prof. Ajit Pal

Lecture 1 - Introduction and Course Outline - Data Communication

Lecture 2 - Layered Architecture

Lecture 3 - Data and Signal

Lecture 4 - Transmission Impairments and Channel Capacity

Lecture 5 - Guided Transmission Media

Lecture 6 - Unguided Media

Lecture 7 - Transmission of Digital Signal - I

Lecture 8 - Transmission of Digital Signal - II

Lecture 9 - Transmission of Analog Signal - I

Lecture 10 - Transmission of Analog Signal - II

Lecture 11 - Multiplexing

Lecture 12 - Multiplexing

Lecture 13 - Multiplexing Applications - I

Lecture 14 - Multiplexing Applications - II

Lecture 15 - Interfacing to the Media

Lecture 16 - Error Detection and Correction

Lecture 17 - Flow and Error Control

Lecture 18 - Data Link Control

Lecture 19 - Switching Techniques Circuit Switching

Lecture 20 - Switching Techniques Packet Switching

Lecture 21 - Routing - I

Lecture 22 - Routing - II

Lecture 23 - Congestion Control

Lecture 24 - X.25 and Frame Relay

Lecture 25 - ATM

Lecture 26 - Medium Access Control - I

Lecture 27 - Medium Access Control - II

Lecture 28 - Medium Access Control - III

Lecture 29 - IEEE 802 LANs

Lecture 30 - High Speed LANs

Lecture 31 - Wireless LANs

Lecture 32 - Cellular Telephone Systems

Lecture 33 - Satellite Communications

Lecture 34 - Internet and Internetworking

Lecture 35 - TCP/IP - I

Lecture 36 - TCP/IP - II

Lecture 37 - Multimedia Networks

Lecture 38 - Audio and Video Compression

Lecture 39 - Multimedia Services

Lecture 40 - Secured Communication - I

Lecture 41 - Secured Communication - II

NPTEL : Electronic Design Automation (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1 - Introduction

Lecture 2 - Verilog : Part - I

Lecture 3 - Verilog : Part - II

Lecture 4 - Verilog : Part - III

Lecture 5 - Verilog : Part - IV

Lecture 6 - Verilog : Part - V

Lecture 7 - Verilog : Part - VI

Lecture 8 - Synthesis : Part - I

Lecture 9 - Synthesis : Part - II

Lecture 10 - Synthesis : Part - III

Lecture 11 - Synthesis : Part - IV

Lecture 12 - Synthesis : Part - V

Lecture 13 - Synthesis : Part - VI

Lecture 14 - Synthesis : Part - VII

Lecture 15 - Backend Design : Part - I

Lecture 16 - Backend Design : Part - II

Lecture 17 - Backend Design : Part - III

Lecture 18 - Backend Design : Part - IV

Lecture 19 - Backend Design : Part - V

Lecture 20 - Backend Design : Part - VI

Lecture 21 - Backend Design : Part - VII

Lecture 22 - Backend Design : Part - VIII

Lecture 23 - Backend Design : Part - IX

Lecture 24 - Backend Design : Part - X

Lecture 25 - Backend Design : Part - XI

Lecture 26 - Backend Design : Part - XII

Lecture 27 - Backend Design : Part - XIII

Lecture 28 - Backend Design : Part - XIV

Lecture 29 - Backend Design : Part - XV

Lecture 30 - Testing Part - I

Lecture 31 - Testing Part - II

Lecture 32 - Testing Part - III

Lecture 33 - Testing Part - IV

Lecture 34 - Testing Part - V

Lecture 35 - Testing Part - VI

NPTEL : Internet Technology (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1 - Introduction To Internet

Lecture 2 - Review Of Network Technologies

Lecture 3 - TCP/IP - Part-I

Lecture 4 - TCP/IP - Part-II

Lecture 5 - TCP/IP - Part-III

Lecture 6 - IP Subnetting and Addressing

Lecture 7 - Internet Routing Protocol - Part-I

Lecture 8 - Internet Routing Protocol - Part-II

Lecture 9 - Client Server Concepts DNS, Telnet, FTP

Lecture 10 - Electronic Mail

Lecture 11 - World Wide Web - Part-I

Lecture 12 - World Wide Web - Part-II

Lecture 13 - HTML : Part-I

Lecture 14 - HTML : Part-II

Lecture 15 - HTML : Part-III

Lecture 16 - Extensible Markup Language (XML)

Lecture 17 - HTML Forms

Lecture 18 - Image Maps

Lecture 19 - CGI Scripts

Lecture 20 - Other Technologies

Lecture 21 - PERL - Part-I

Lecture 22 - PERL - Part II

Lecture 23 - PERL - Part III

Lecture 24 - PERL - Part IV

Lecture 25 - Javascript : Part-I

Lecture 26 - Javascript Examples (Continued)

Lecture 27 - Using Cookies

Lecture 28 - Java Applets : Part-I

Lecture 29 - Java Applets : Part-II

Lecture 30 - Client-Server Programming In Java

Lecture 31 - Intranet, Extranet, Firewall

Lecture 32 - Basic Cryptographic Concepts Part - I

Lecture 33 - Basic Cryptographic Concepts Part - II

Lecture 34 - Basic Cryptographic Concepts Part - III

Lecture 35 - Electronic Commerce

Lecture 36 - Streaming Multimedia Applications

Lecture 37 - Internet Telephony

Lecture 38 - Search Engine And Web Crawlers : Part-I

Lecture 39 - Search Engine And Web Crawlers : Part-II

Lecture 40 - Course Summary And Conclusion

NPTEL : Programming and Data Structure (Computer Science and Engineering)

Co-ordinators : Dr. P.P. Chakraborty

Lecture 1 - Introduction

Lecture 2 - C Programming - I

Lecture 3 - C Programming - II

Lecture 4 - C Programming - III

Lecture 5 - Data Structuring : Case Study - I

Lecture 6 - Data Structuring : Case Study - II

Lecture 7 - Data Structuring : Case Study - III

Lecture 8 - Problem Decomposition By Recursion - I

Lecture 9 - Problem Decomposition By Recursion - II

Lecture 10 - Problem Decomposition By Recursion - III

Lecture 11 - Merge sort And Quick sort

Lecture 12 - Characters And Strings

Lecture 13 - Arrays: Addresses And Contents

Lecture 14 - Structures - I

Lecture 15 - Structures - II

Lecture 16 - Dynamic Allocation Part - I

Lecture 17 - Linked Lists - I

Lecture 18 - Complexity (Efficiency) of Algorithms

Lecture 19 - Asymptotic Growth Functions

Lecture 20 - Asymptotic Analysis of Algorithms

Lecture 21 - Data Structuring

Lecture 22 - Search Trees

Lecture 23 - Search Trees - II

Lecture 24 - Search Trees - III

Lecture 25 - 2-3 Trees

Lecture 26 - Algorithm Design - I

Lecture 27 - Algorithm Design - II

Lecture 28 - Algorithm Design - III

Lecture 29 - Graphs - I

Lecture 30 - Graphs - II

Lecture 31 - Graphs - III

Lecture 32 - Conclusions

NPTEL : NOC:Software Testing (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction

Lecture 2 - Levels of Testing

Lecture 3 - Basic Concepts in Testing

Lecture 4 - Basic Concepts in Testing (Continued...)

Lecture 5 - Unit Testing

Lecture 6 - Equivalence and BV Testing

Lecture 7 - Special Value Testing

Lecture 8 - Combinatorial Testing

Lecture 9 - Pairwise Testing

Lecture 10 - White Box Testing

Lecture 11 - MC/DC Testing

Lecture 12 - MC/DC Testing (Continued...)

Lecture 13 - Path Testing

Lecture 14 - Dataflow and Mutation Testing

Lecture 15 - Mutation Testing

Lecture 16 - Integration Testing

Lecture 17 - System Testing

Lecture 18 - Regression Testing

Lecture 19 - Testing Object-Oriented Program - Part 1

Lecture 20 - Testing Object-Oriented Program - Part 2

NPTEL : NOC:Programming in C++ (Computer Science and Engineering)

Co-ordinators : Prof. Partha Pratim Das

Lecture 1 - Module 1 : Recap of C

Lecture 2 - Module 1 : Recap of C

Lecture 3 - Module 1 : Recap of C

Lecture 4 - Module 2 : Programs with IO and Loop

Lecture 5 - Module 3 : Arrays and Strings

Lecture 6 - Module 4 : Sorting and Searching

Lecture 7 - Module 5 : Stack and its Applications

Lecture 8 - Module 6 : Constants and Inline Functions

Lecture 9 - Module 6 : Constants and Inline Functions (Continued...)

Lecture 10 - Module 7 : Reference and Pointer

Lecture 11 - Module 7 : Reference and Pointer (Continued...)

Lecture 12 - Module 8 : Default Parameters and Function Overloading

Lecture 13 - Module 8 : Default Parameters and Function Overloading (Continued...)

Lecture 14 - Module 8 : Default Parameters and Function Overloading (Continued...)

Lecture 15 - Module 9 : Operator Overloading

Lecture 16 - Module 9 : Operator Overloading (Continued...)

Lecture 17 - Module 10 : Dynamic Memory Management

Lecture 18 - Module 10 : Dynamic Memory Management (Continued...)

Lecture 19 - Module 11 : Classes and Objects

Lecture 20 - Module 11 : Classes and Objects (Continued...)

Lecture 21 - Module 12 : Access Specifiers

Lecture 22 - Module 12 : Access Specifiers (Continued...)

Lecture 23 - Module 13 : Constructors, Destructors and Object Lifetime

Lecture 24 - Module 13 : Constructors, Destructors and Object Lifetime (Continued...)

Lecture 25 - Module 13 : Constructors, Destructors and Object Lifetime (Continued...)

Lecture 26 - Module 14 : Copy Constructor and Copy Assignment Operator

Lecture 27 - Module 14 : Copy Constructor and Copy Assignment Operator (Continued...)

Lecture 28 - Module 14 : Copy Constructor and Copy Assignment Operator (Continued...)

Lecture 29 - Module 15 : Const-ness

Lecture 30 - Module 15 : Const-ness (Continued...)

Lecture 31 - Module 16 : Static Members

Lecture 32 - Module 17 : friend Function and friend Class

Lecture 33 - Module 18 : Overloading Operator for User Defined Types - Part I

Lecture 34 - Module 19 : Overloading Operator for User Defined Types - Part II

Lecture 35 - Module 20 : Namespace

Lecture 36 - Module 21 : Inheirtnace - Part I

Lecture 37 - Module 22 : Inheritance - Part II

Lecture 38 - Module 23 : Inheritance - Part III

Lecture 39 - Module 24 : Inheritance - Part IV

Lecture 40 - Module 25 : Inheritance - Part V

Lecture 41 - Module 26 : Dynamic Binding - Part I

Lecture 42 - Module 27 : Dynamic Binding (Polymorphism) - Part II

Lecture 43 - Module 28 : Dynamic Binding (Polymorphism) - Part III

Lecture 44 - Module 29 : Dynamic Binding (Polymorphism) - Part IV

Lecture 45 - Module 30 : Dynamic Binding (Polymorphism) - Part V

Lecture 46 - Module 31 : Virtual Function Table

Lecture 47 - Module 32 : Type casting and cast operators - Part I

Lecture 48 - Module 33 : Type casting and cast operators - Part II

Lecture 49 - Module 34 : Type casting and cast operators - Part III

Lecture 50 - Module 35 : Multiple Inheritance

Lecture 51 - Module 35 : Multiple Inheritance (Continued...)

Lecture 52 - Module 36 : Exceptions (Error Handling in C) - Part I

Lecture 53 - Module 37 : Exceptions (Error Handling in C) - Part II

Lecture 54 - Module 38 : Template (Function Template) - Part I

Lecture 55 - Module 39 : Template (Function Template) - Part II

Lecture 56 - Module 40 : Closing Comments

NPTEL : NOC:Introduction to Machine Learning (Computer Science and Engineering)

Co-ordinators : Prof. S. Sarkar

Lecture 1 - Introduction

Lecture 2 - Different Types of Learning

Lecture 3 - Hypothesis Space and Inductive Bias

Lecture 4 - Evaluation and Cross-Validation

Lecture 5 - Tutorial - I

Lecture 6 - Linear Regression

Lecture 7 - Introduction to Decision Trees

Lecture 8 - Learning Decision Tree

Lecture 9 - Overfitting

Lecture 10 - Python Exercise on Decision Tree and Linear Regression

Lecture 11 - Tutorial - II

Lecture 12 - k-Nearest Neighbour

Lecture 13 - Feature Selection

Lecture 14 - Feature Extraction

Lecture 15 - Collaborative Filtering

Lecture 16 - Python Exercise on kNN and PCA

Lecture 17 - Tutorial - III

Lecture 18 - Bayesian Learning

Lecture 19 - Naive Bayes

Lecture 20 - Bayesian Network

Lecture 21 - Python Exercise on Naive Bayes

Lecture 22 - Tutorial - IV

Lecture 23 - Logistic Regression

Lecture 24 - Introduction Support Vector Machine

Lecture 25 - SVM : The Dual Formulation

Lecture 26 - SVM : Maximum Margin with Noise

Lecture 27 - Nonlinear SVM and Kennel Function

Lecture 28 - SVM : Solution to the Dual Problem

Lecture 29 - Python Exercise on SVM

Lecture 30 - Introduction

Lecture 31 - Multilayer Neural Network

Lecture 32 - Neural Network and Backpropagation Algorithm

Lecture 33 - Deep Neural Network

Lecture 34 - Python Exercise on Neural Network

Lecture 35 - Tutorial - VI

Lecture 36 - Introduction to Computational Learning Theory

Lecture 37 - Sample Complexity : Finite Hypothesis Space

Lecture 38 - VC Dimension

Lecture 39 - Introduction to Ensembles

Lecture 40 - Bagging and Boosting

Lecture 41 - Introduction to Clustering

Lecture 42 - Kmeans Clustering

Lecture 43 - Agglomerative Hierarchical Clustering

Lecture 44 - Python Exercise on kmeans clustering

NPTEL : NOC:Object-Oriented Analysis and Design (Computer Science and Engineering)

Co-ordinators : Prof. Partha Pratim Das

Lecture 1 - Challanges in Software Engineering

Lecture 2 - Complexity of Software

Lecture 3 - Complexity of Software (Continued...)

Lecture 4 - Structure and Attributes of a Complex System

Lecture 5 - Structure and Attributes of a Complex System (Continued...)

Lecture 6 - Object-Oriented Analysis and Design

Lecture 7 - Bringing Order to Chaos

Lecture 8 - Bringing Order to Chaos (Continued...)

Lecture 9 - Evolution of Object Models - Programming Languages and Paradigms

Lecture 10 - Foundations of the Object Model - OOA, OOD and OOP

Lecture 11 - Foundations of the Object Model - OOA, OOD and OOP (Continued...)

Lecture 12 - Elements of Object Model (Major) : Abstraction and Encapsulation

Lecture 13 - Elements of Object Model (Major) : Abstraction and Encapsulation (Continued...)

Lecture 14 - Elements of the Object Model (Major) : Modularity and Hierarchy

Lecture 15 - Elements of the Object Model (Major) : Modularity and Hierarchy (Continued...)

Lecture 16 - Elements of the Object Model (Minor) : Typing, Concurrency and Persistence

Lecture 17 - Elements of the Object Model (Minor) : Typing, Concurrency and Persistence (Continued...)

Lecture 18 - Nature of an object : State, Behavior and Identity

Lecture 19 - Nature of an object : State, Behavior and Identity (Continued...)

Lecture 20 - Relationships among objects

Lecture 21 - Relationships among objects (Continued...)

Lecture 22 - Nature of a class : Interface and Implementation

Lecture 23 - Nature of a class : Interface and Implementation (Continued...)

Lecture 24 - Relationships among classes

Lecture 25 - Relationships among classes (Continued...)

Lecture 26 - How to Build Quality Classes and Objects

Lecture 27 - Tutorial : LMS

Lecture 28 - How to Identify Classes and Objects ?

Lecture 29 - Identification of Classes, Objects and Relationship in LMS

Lecture 30 - Identification of Classes, Objects and Relationship in LMS (Continued...)

Lecture 31 - Identification of Classes, Objects and Relationship in LMS (Continued...)

Lecture 32 - Identification of Classes, Objects and Relationship in LMS (Continued...)

Lecture 33 - Overview of UML

Lecture 34 - SDLC Phases and UML Diagrams

Lecture 35 - Use-Case Diagrams - Part I

Lecture 36 - Use-Case Diagrams - Part II

Lecture 37 - Use-Case Diagrams - Part III

Lecture 38 - Class Diagrams - Part 1 (Class, Property and Operation)

Lecture 39 - Class Diagrams - Part 2 (Association, Weak and Strong Aggregation)

Lecture 40 - Class Diagrams - Part 3 (Generalization, Dependency and Constraints)

Lecture 41 - Sequence Diagrams - Part 1

Lecture 42 - Sequence Diagrams - Part 2

Lecture 43 - Communication Diagram

Lecture 44 - Activity Diagrams - Part II

Lecture 45 - Activity Diagrams - Part II

Lecture 46 - Activity Diagrams - Part III

Lecture 47 - Interaction Overview Diagram

Lecture 48 - State Machine Diagrams - Part I

Lecture 49 - State Machine Diagrams - Part II

Lecture 50 - State Machine Diagrams - Part III

Lecture 51 - Various UML Diagrams

Lecture 52 - Closing Comments

NPTEL : NOC:Complex Network : Theory and Application (Computer Science and Engineering)

Co-ordinators : Prof. Animesh Mukherjee

Lecture 1 - Introduction

Lecture 2 - Network Analysis - I

Lecture 3 - Network Analysis - II

Lecture 4 - Network Analysis - III

Lecture 5 - Network Analysis - IV

Lecture 6 - Network Analysis - V

Lecture 7 - Network Analysis - VI

Lecture 8 - Social Network Principles - I

Lecture 9 - Social Network Principles - II

Lecture 10 - Social Network Principles - III

Lecture 11 - Social Network Principles - IV

Lecture 12 - Community Analysis - I

Lecture 13 - Community Analysis - II

Lecture 14 - Community Analysis - III

Lecture 15 - Community Analysis - IV

Lecture 16 - Community Analysis - V

Lecture 17 - Community Analysis - VI

Lecture 18 - Citation Analysis - I

Lecture 19 - Citation Analysis - II

Lecture 20 - Citation Analysis - III

Lecture 21 - Citation Analysis - IV

NPTEL : Fundamental Algorithms:Design and Analysis (Computer Science and Engineering)

Co-ordinators : Prof.Sourav Mukhopadhyay

Lecture 1 - Insertion Sort and Asymptotic Analysis

Lecture 2 - Solving Recurrences

Lecture 3 - Divide and Conquer Paradigm

Lecture 4 - Quick Sort

Lecture 5 - Heap Sort

Lecture 6 - Decision Tree

Lecture 7 - Linear Time Sorting

Lecture 8 - Order Statistics

Lecture 9 - Hashing

Lecture 10 - Universal Hashing, BST Sort

Lecture 11 - Red-Black Tree

Lecture 12 - Augmenting Data Structure

Lecture 13 - Computational Geometry

Lecture 14 - Van Emde Boas Data Structure

Lecture 15 - Dynamic Programming

Lecture 16 - Graph Algorithm

Lecture 17 - BFS and DFS

Lecture 18 - Dijkstra

Lecture 19 - Bellman Ford

Lecture 20 - Floyd Marshall

NPTEL : NOC:Natural Language Processing (Computer Science and Engineering)

Co-ordinators : Prof. Pawan Goyal

Lecture 1 - Introduction to the Course

Lecture 2 - What Do We Do in NLP

Lecture 3 - Why is NLP hard

Lecture 4 - Empirical Laws

Lecture 5 - Text Processing: Basics

Lecture 6 - Spelling Correction: Edit Distance

Lecture 7 - Weighted Edit Distance, Other Variations

Lecture 8 - Noisy Channel Model for Spelling Correction

Lecture 9 - N-Gram Language Models

Lecture 10 - Evaluation of Language Models, Basic Smoothing

Lecture 11 - Tutorial I

Lecture 12 - Language Modeling: Advanced Smoothing Models

Lecture 13 - Computational Morphology

Lecture 14 - Finite - State Methods for Morphology

Lecture 15 - Introduction to POS Tagging

Lecture 16 - Hidden Markov Models for POS Tagging

Lecture 17 - Viterbi Decoding for HMM, Parameter Learning

Lecture 18 - Baum Welch Algorithm

Lecture 19 - Maximum Entropy Models - I

Lecture 20 - Maximum Entropy Models - II

Lecture 21 - Conditional Random Fields

Lecture 22 - Syntax - Introduction

Lecture 23 - Syntax - Parsing I

Lecture 24 - Syntax - CKY, PCFGs

Lecture 25 - PCFGs - Inside-Outside Probabilities

Lecture 26 - Inside-Outside Probabilities

Lecture 27 - Dependency Grammars and Parsing - Introduction

Lecture 28 - Transition Based Parsing : Formulation

Lecture 29 - Transition Based Parsing : Learning

Lecture 30 - MST-Based Dependency Parsing

Lecture 31 - MST-Based Dependency Parsing : Learning

Lecture 32 - Distributional Semantics - Introduction

Lecture 33 - Distributional Models of Semantics

Lecture 34 - Distributional Semantics : Applications, Structured Models

Lecture 35 - Word Embeddings - Part I

Lecture 36 - Word Embeddings - Part II

Lecture 37 - Lexical Semantics

Lecture 38 - Lexical Semantics - Wordnet

Lecture 39 - Word Sense Disambiguation - I

Lecture 40 - Word Sense Disambiguation - II

Lecture 41 - Novel Word Sense detection

Lecture 42 - Topic Models : Introduction

Lecture 43 - Latent Dirichlet Allocation : Formulation

Lecture 44 - Gibbs Sampling for LDA, Applications

Lecture 45 - LDA Variants and Applications - I

Lecture 46 - LDA Variants and Applications - II

Lecture 47 - Entity Linking - I

Lecture 48 - Entity Linking - II

Lecture 49 - Information Extraction - Introduction

Lecture 50 - Relation Extraction

Lecture 51 - Distant Supervision

Lecture 52 - Text Summarization - LEXRANK

Lecture 53 - Optimization based Approaches for Summarization

Lecture 54 - Summarization Evaluation

Lecture 55 - Text Classification - I

Lecture 56 - Text Classification - II

Lecture 57 - Tutorial II

Lecture 58 - Tutorial III

Lecture 59 - Tutorial IV

Lecture 60 - Tutorial V

Lecture 61 - Sentiment Analysis - Introduction

Lecture 62 - Sentiment Analysis - Affective Lexicons

Lecture 63 - Learning Affective Lexicons

Lecture 64 - Computing with Affective Lexicons

Lecture 65 - Aspect - Based Sentiment Analysis

NPTEL : NOC:Embedded Systems Design (Computer Science and Engineering)

Co-ordinators : Prof. Anupam Basu

Lecture 1 - Introduction

Lecture 2 - Processors

Lecture 3 - General Purpose and ASIPs Processor

Lecture 4 - Designing a Single Purpose Processor

Lecture 5 - Optimization Issues

Lecture 6 - Introduction to FPFA

Lecture 7 - FPGA (Continued...)

Lecture 8 - Behaviour Synthesis on FPGA using VHDL

Lecture 9 - Tutorial - I

Lecture 10 - Tutorial - II

Lecture 11 - Tutorial - III

Lecture 12 - Tutorial - IV

Lecture 13 - Sensors and Signals

Lecture 14 - Discretization of Signals and A/D Converter

Lecture 15 - Quantization Noise, SNR and D/A Converter

Lecture 16 - Arduino Uno

Lecture 17 - Arduino Uno (Continued...), Serial Communication and Timer

Lecture 18 - Controller Design using Arduino

Lecture 19 - Tutorial - V

Lecture 20 - Power Aware Embedded System - I

Lecture 21 - Power Aware Embedded System - II

Lecture 22 - SD and DD Algorithm

Lecture 23 - Parallel Operations and VLIW

Lecture 24 - Code Efficiency

Lecture 25 - DSP Application and Address Generation Unit

Lecture 26 - Real Time O.S - I

Lecture 27 - Real Time O.S - II

Lecture 28 - RMS Algorithm

Lecture 29 - EDF Algorithm and Resource Constraint Issue

Lecture 30 - Priority Inversion and Priority Inheritance Protocol

Lecture 31 - Modeling and Specification - I

Lecture 32 - Modeling and Specification - II

Lecture 33 - FSM and Statechart

Lecture 34 - Statechart and Statemate Semantics

Lecture 35 - Statecharts (Continued...)

Lecture 36 - Program State Machines

Lecture 37 - SDL

Lecture 38 - Data Flow Model - I

Lecture 39 - Data Flow Model - II

Lecture 40 - Hardware Synthesis - I

Lecture 41 - Hardware Synthesis - II

Lecture 42 - Scheduling

Lecture 43 - Digital Camera Design

Lecture 44 - Digital Camera - Iterative Design

Lecture 45 - HW-SW Partitioning

Lecture 46 - Optimization - I

Lecture 47 - Optimization - II

Lecture 48 - Simulation

Lecture 49 - Formal Verification

NPTEL : NOC:Wireless Ad Hoc and Sensor Networks (Computer Science and Engineering)

Co-ordinators : Prof. Sudip Misra

Lecture 1 - Introduction: Wireless Ad Hoc Networks - Part-I

Lecture 2 - Introduction: Wireless Ad Hoc Networks - Part-II

Lecture 3 - Self-organizing Behaviour of Wireless Ad Hoc Networks

Lecture 4 - Cooperation in Mobile Ad Hoc Networks - Part-I

Lecture 5 - Cooperation in Mobile Ad Hoc Networks - Part-II

Lecture 6 - MAC Protocols in MANETs - Part-I

Lecture 7 - MAC Protocols in MANETs - Part-II

Lecture 8 - Routing in MANETs - Part-I

Lecture 9 - Routing in MANETs - Part-II

Lecture 10 - Routing in MANETs - Part-III

Lecture 11 - Multicasting in MANETs

Lecture 12 - Mobility Models for MANETs

Lecture 13 - Transport Protocols for MANETs - Part-I

Lecture 14 - Transport Protocols for MANETs - Part-II

Lecture 15 - Opportunistic Mobile Networks - Part-I

Lecture 16 - Opportunistic Mobile Networks - Part-II

Lecture 17 - Opportunistic Mobile Networks - Part-III

Lecture 18 - UAV Networks - Part-I

Lecture 19 - UAV Networks - Part-II

Lecture 20 - UAV Networks - Part-III

Lecture 21 - Introduction: Wireless Sensor Networks - Part-I

Lecture 22 - Introduction: Wireless Sensor Networks - Part-II

Lecture 23 - WSN Coverage and Placement - Part-I

Lecture 24 - Topology Mangement in Wireless Sensor Network

Lecture 25 - Mobile Wireless Sensor Networks

Lecture 26 - Mobile Wireless Sensor Networks

Lecture 27 - Medium Access Control in Wireless Networks - Part-I

Lecture 28 - Medium Access Control in Wireless Networks - Part-II

Lecture 29 - Routing in Wireless Sensor Networks - Part-I

Lecture 30 - Routing in Wireless Sensor Networks - Part-II

Lecture 31 - Congestion and Flow Control - Part-I

Lecture 32 - Congestion and Flow Control - Part-II

Lecture 33 - Underwater Sensor Networks - Part-I

Lecture 34 - Underwater Sensor Networks - Part-II

Lecture 35 - Underwater Sensor Networks - Part-III

Lecture 36 - Underwater Sensor Networks - Part-IV

Lecture 37 - Security of Wireless Sensor Networks - Part-I

Lecture 38 - Security of Wireless Sensor Networks - Part-II

Lecture 39 - Hardware Design of Sensor Node

Lecture 40 - Real Life Deployment of WSN

NPTEL : NOC:VLSI Physical Design (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1 - Introduction

Lecture 2 - Design Representation

Lecture 3 - VLSI Design Styles - Part 1

Lecture 4 - VLSI Design Styles - Part 2

Lecture 5 - VLSI Physical Design Automation - Part 1

Lecture 6 - VLSI Physical Design Automation - Part 2

Lecture 7 - Partitioning

Lecture 8 - Floor planning

Lecture 9 - Floor planning Algorithms

Lecture 10 - Pin Assignment

Lecture 11 - Placement - Part 1

Lecture 12 - Placement - Part 2

Lecture 13 - Placement - Part 3

Lecture 14 - Placement - Part 4

Lecture 15 - Grid Routing - Part 1

Lecture 16 - Grid Routing - Part 2

Lecture 17 - Grid Routing - Part 3

Lecture 18 - Global Routing - Part 1

Lecture 19 - Global Routing - Part 2

Lecture 20 - Detailed Routing - Part 1

Lecture 21 - Detailed Routing - Part 2

Lecture 22 - Detailed Routing - Part 3

Lecture 23 - Detailed Routing - Part 4

Lecture 24 - Clock Design - Part 1

Lecture 25 - Clock Design - Part 2

Lecture 26 - Clock Design - Part 3

Lecture 27 - Clock Network Synthesis - Part 1

Lecture 28 - Clock Network Synthesis - Part 2

Lecture 29 - Clock Network Synthesis - Part 3

Lecture 30 - Clock Network Synthesis - Part 4

Lecture 31 - Power and Ground Routing

Lecture 32 - Time Closure - Part 1

Lecture 33 - Time Closure - Part 2

Lecture 34 - Time Closure - Part 3

Lecture 35 - Time Closure - Part 4

Lecture 36 - Time Closure - Part 5

Lecture 37 - Timing Driven Placement

Lecture 38 - Timing Driven Routing

Lecture 39 - Physical Synthesis - Part 1

Lecture 40 - Physical Synthesis - Part 2

Lecture 41 - Performance-Driven Design Flow

Lecture 42 - Miscellaneous Approaches to Timing Optimization

Lecture 43 - Interconnect Modeling - Part 1

Lecture 44 - Interconnect Modeling - Part 2

Lecture 45 - Design Rule Check

Lecture 46 - Layout Compaction - Part 1

Lecture 47 - Layout Compaction - Part 2

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53 - Test Pattern Generation

Lecture 54 - Design for Testability

Lecture 55 - Boundary Scan Standard

Lecture 56 - Built-in Self-Test - Part 1

Lecture 57 - Built-in Self-Test - Part 2

Lecture 58 - Low Power VLSI Design

Lecture 59 - Techniques to Reduce Power

Lecture 60 - Gate Level Design for Low Power - Part 1

Lecture 61 - Gate Level Design for Low Power - Part 2

Lecture 62 - Other Low Power Design Techniques

Lecture 63 - Algorithmic Level Techniques for Low Power Design

Lecture 64 - Summarization of the Course

NPTEL : NOC:Cryptography And Network Security (Computer Science and Engineering)

Co-ordinators : Prof. Sourav Mukhopadhyay

Lecture 1 - Introduction to Cryptography

Lecture 2 - Classical Cryptosystem

Lecture 3 - Cryptanalysis on Substitution Cipher (Frequency Analysis)

Lecture 4 - Play Fair Cipher

Lecture 5 - Block Cipher

Lecture 6 - Data Encryption Standard (DES)

Lecture 7 - DES (Continued...)

Lecture 8 - Triple DES and Modes of Operation

Lecture 9 - Stream Cipher

Lecture 10 - Pseudorandom Sequence

Lecture 11 - LFSR Based StreamCipher

Lecture 12 - Mathematical Background

Lecture 13 - Abstract Algebra (Continued...)

Lecture 14 - Number Theory

Lecture 15 - Number Theory (Continued...)

Lecture 16 - Modular Inverse

Lecture 17 - Extended Euclidean Algorithm

Lecture 18 - Fermat's Little Theorem, Euler Phi-Function

Lecture 19 - Euler's theorem, Quadratic Residue

Lecture 20 - Polynomial Arithmetic

Lecture 21 - Advanced Encryption Standard (AES)

Lecture 22 - Advanced Encryption Standard (AES) (Continued...)

Lecture 23 - Introduction to Public Key Cryptosystem, Diffie-Hellman Key Exchange

Lecture 24 - Knapsack Cryptosystem

Lecture 25 - RSA Cryptosystem

Lecture 26 - More on RSA

Lecture 27 - Primarily Testing

Lecture 28 - ElGamal Cryptosystem

Lecture 29 - Elliptic Curve over the Reals

Lecture 30 - Elliptic curve Modulo a Prime

Lecture 31 - Generalised ElGamal Public Key Cryptosystem

Lecture 32 - Chinese Remainder Theorem

Lecture 33 - Rabin Cryptosystem

Lecture 34 - Legendre and Jacobi Symbol

Lecture 35 - Jacobi Symbol (Continued...)

Lecture 36 - Message Authentication

Lecture 37 - Digital Signature

Lecture 38 - Key Management

Lecture 39 - Key Exchange

Lecture 40 - Hash Function

Lecture 41 - Universal Hashing

Lecture 42 - Cryptographic Hash Function

Lecture 43 - Secure Hash Algorithm (SHA)

Lecture 44 - Digital Signature Standard (DSS)

Lecture 45 - More on Key Exchange Protocol

Lecture 46 - Cryptoanalisis

Lecture 47 - Memory Trade off Attack

Lecture 48 - Differential Cryptoanalysis

Lecture 49 - More on Differential Cryptoanalysis

Lecture 50 - Linear Cryptoanalysis

Lecture 51 - Cryptoanalysis and Stream Cipher

Lecture 52 - Modern Stream Cipher

Lecture 53 - Shamir Secret Sharing

Lecture 54 - Identity Based Eneryption (IBE)

Lecture 55 - Attribute Based Encryption

Lecture 56 - Functional Encryption (Introduction)

Lecture 57 - Discrete Logarithm Problem (DLP)

Lecture 58 - Implementation Attacks

Lecture 59 - The Secure Sockets layer (SSL)

Lecture 60 - Pretty Good Privacy (PGP)

NPTEL : NOC:Computer Architecture and Organization (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta, Prof. Kamalika Datta

Lecture 1 - Evolution of Computer Systems

Lecture 2 - Basic Operation of a Computer

Lecture 3 - Memory Addressing and Languages

Lecture 4 - Software and Architecture Types

Lecture 5 - Instruction Set Architecture

Lecture 6 - Number Representation

Lecture 7 - Instruction Format and Addressing Modes

Lecture 8 - CISC and RISC Architecture

Lecture 9 - MIPS32 Instruction Set

Lecture 10 - MIPS Programming Examples

Lecture 11 - Spim â€“ A Mips32 Simulator

Lecture 12 - Measuring Cpu Performance

Lecture 13 - Choice Of Benchmarks

Lecture 14 - Summarizing Performance Results

Lecture 15 - Amadahlâ€™s Law - Part 1

Lecture 16 - Amadahlâ€™s Law - Part 2

Lecture 17 - Design Of Control Unit - Part 1

Lecture 18 - Design Of Control Unit - Part 2

Lecture 19 - Design Of Control Unit - Part 3

Lecture 20 - Design Of Control Unit - Part 4

Lecture 21 - Mips Implementation - Part 1

Lecture 22 - Mips Implementation - Part 2

Lecture 23 - Processor Memory Interaction

Lecture 24 - Static And Dynamic Ram

Lecture 25 - Asynchronous Dram

Lecture 26 - Synchronous Dram

Lecture 27 - Memory Interfacing And Addressing

Lecture 28 - Memory Hierarchy Design - Part 1

Lecture 29 - Memory Hierarchy Design - Part 2

Lecture 30 - Cache Memory - Part 1

Lecture 31 - Cache Memory - Part 2

Lecture 32 - Improving Cache Performance

Lecture 33 - Design Of Adders - Part 1

Lecture 34 - Design Of Adders - Part 2

Lecture 35 - Design Of Multipliers - Part 1

Lecture 36 - Design Of Multipliers - Part 2

Lecture 37 - Design Of Dividers

Lecture 38 - Floating-Point Numbers

Lecture 39 - Floating-Point Arithmetic

Lecture 40 - Basic Pipelining Concepts

Lecture 41 - Pipeline Scheduling

Lecture 42 - Arithmetic Pipeline

Lecture 43 - Secondary Storage Devices

Lecture 44 - Input-Output Organization

Lecture 45 - Data Transfer Techniques

Lecture 46 - Interrupt Handling - Part 1

Lecture 47 - Interrupt Handling - Part 2

Lecture 48 - Direct Memory Access

Lecture 49 - Some Example Device Interfacing

Lecture 50 - Exercises On I/O Transfer

Lecture 51 - Bus Standards

Lecture 52 - Bus Standards

Lecture 53 - Pipelining The Mips32 Data Path

Lecture 54 - Mips Pipeline (Continued...

Lecture 55 - Pipeline Hazards - Part 1

Lecture 56 - Pipeline Hazards - Part 2

Lecture 57 - Pipeline Hazards - Part 3

Lecture 58 - Pipeline Hazards - Part 4

Lecture 59 - Multicycle Operations In Mips32

Lecture 60 - Exploiting Instruction Level Parallelism

Lecture 61 - Vector Processors

Lecture 62 - Multi-Core Processors

Lecture 63 - Some Case Studies

Lecture 64 - Summarization Of The Course

NPTEL : NOC:Introduction to Algorithms and Analysis (Computer Science and Engineering)

Co-ordinators : Prof. Sourav Mukhopadhyay

Lecture 1 - Insertion sort

Lecture 2 - Analysis of Insertion Sort

Lecture 3 - Asymptotic Analysis

Lecture 4 - Recurrence of Merge Sort

Lecture 5 - Substitution Method

Lecture 6 - The Master Method

Lecture 7 - Divide-and-Conquer

Lecture 8 - Divide-and-Conquer (Continued...)

Lecture 9 - Straseen's Algorithms

Lecture 10 - QuickSort

Lecture 11 - Analysis of Quicksort

Lecture 12 - Randomized Quicksort

Lecture 13 - Heap

Lecture 14 - Heap Sort

Lecture 15 - Decision Tree

Lecture 16 - Linear time Sorting

Lecture 17 - Radix Sort and Bucket Sort

Lecture 18 - Order Statistics

Lecture 19 - Randomised Order Statistics

Lecture 20 - Worst case linear time order statistics

Lecture 21 - Hash Function

Lecture 22 - Open Addressing

Lecture 23 - Universal Hashing

Lecture 24 - Perfect Hashing

Lecture 25 - Binary Search Tree (BST) Sort

Lecture 26 - Randomly build BST

Lecture 27 - Red Black Tree

Lecture 28 - Red Black Tree (Continued...)

Lecture 29 - Augmentation of data structure

Lecture 30 - Interval trees

Lecture 31 - Fixed universe successor

Lecture 32 - Van Emde Boas data structure

Lecture 33 - Amortized analysis

Lecture 34 - Computational Geometry

Lecture 35 - Computational Geometry (Continued...)

Lecture 36 - Dynamic Programming

Lecture 37 - Longest common subsequence

Lecture 38 - Graphs

Lecture 39 - Prim's Algorithms

Lecture 40 - Graph Search

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52 - Union-Find

Lecture 53 - Augmented disjoint set data structure

Lecture 54 - Network flow

Lecture 55 - Network Flow (Continued...)

Lecture 56 - Network Flow (Continued...)

Lecture 57 - More on Dynamic Programming

Lecture 58 - More on Dynamic Programming (Continued...)

Lecture 59 - Computational Complexity

Lecture 60 - Computational Complexity (Continued...)

NPTEL : NOC:Hardware Modeling using Verilog (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6 - Verilog Language Features - Part 1

Lecture 7 - Verilog Language Features - Part 2

Lecture 8 - Verilog Language Features - Part 3

Lecture 9 - Verilog Operators

Lecture 10 - Verilog Modeling Examples

Lecture 11 - Verilog Modeling Examples (Continued...)

Lecture 12 - Verilog Description Styles

Lecture 13 - Procedural Assignment

Lecture 14 - Procedural Assignment (Continued...)

Lecture 15 - Procedural Assignment (Examples)

Lecture 16 - Blocking / Non-Blocking Assignments - Part 1

Lecture 17 - Blocking / Non-Blocking Assignments - Part 2

Lecture 18 - Blocking / Non-Blocking Assignments - Part 3

Lecture 19 - Blocking / Non-Blocking Assignments - Part 4

Lecture 20 - User Defined Primitives

Lecture 21 - Verilog Test Bench

Lecture 22 - Writing Verilog Test Benches

Lecture 23 - Modeling Finite State Machines

Lecture 24 - Modeling Finite State Machines (Continued...)

Lecture 25 - Datapath And Controller Design - Part 1

Lecture 26 - Datapath And Controller Design - Part 2

Lecture 27 - Datapath And Controller Design - Part 3

Lecture 28 - Synthesizable Verilog

Lecture 29 - Some Recommended Practices

Lecture 30 - Modeling Memory

Lecture 31 - Modeling Register Banks

Lecture 32 - Basic Pipelining Concepts

Lecture 33 - Pipeline Modeling - Part 1

Lecture 34 - Pipeline Modeling - Part 2

Lecture 35 - Switch Level Modeling - Part 1

Lecture 36 - Switch Level Modeling - Part 2

Lecture 37 - Pipeline Implementation Of A Processor - Part 1

Lecture 38 - Pipeline Implementation Of A Processor - Part 2

Lecture 39 - Pipeline Implementation Of A Processor - Part 3

Lecture 40 - Verilog Modeling Of The Processor - Part 1

Lecture 41 - Verilog Modeling Of The Processor - Part 2

NPTEL : NOC:Introduction to Internet of Things (Computer Science and Engineering)

Co-ordinators : Prof. Sudip Misra

Lecture 1 - Introduction to IoT- Part I

Lecture 2 - Introduction to IoT- Part II

Lecture 3 - Sensing

Lecture 4 - Actuation

Lecture 5 - Basics of IoT Networking - Part I

Lecture 6 - Basics of IoT Networking - Part II

Lecture 7 - Basics of IoT Networking - Part III

Lecture 8 - Basics of IoT Networking - Part IV

Lecture 9 - Connectivity Technologies - Part I

Lecture 10 - Connectivity Technologies - Part II

Lecture 11 - Connectivity Technologies - Part III

Lecture 12 - Connectivity Technologies - Part IV

Lecture 13 - Connectivity Technologies - Part V

Lecture 14 - Sensor Networks - I

Lecture 15 - Sensor Networks - II

Lecture 16 - Sensor Networks - III

Lecture 17 - Sensor Networks - IV

Lecture 18 - Sensor Networks - V

Lecture 19 - UAV Networks

Lecture 20 - Machine to Machine Communication

Lecture 21 - Interoperability in Internet of Things

Lecture 22 - Introduction to Arduino - I

Lecture 23 - Introduction to Arduino - II

Lecture 24 - Integration of Sensor and Actuators with Arduino - I

Lecture 25 - Integration of Sensor and Actuators with Arduino - II

Lecture 26 - Introduction to Python Programming - I

Lecture 27 - Introduction to Python Programming - II

Lecture 28 - Introduction to Raspberry Pi - I

Lecture 29 - Introduction to Raspberry Pi - II

Lecture 30 - Implementation of IoT with Raspberry Pi - I

Lecture 31 - Implementation of IoT with Raspberry Pi - II

Lecture 32 - Implementation of IoT with Raspberry Pi - III

Lecture 33 - Software Defined Networking - Part I

Lecture 34 - Software Defined Networking - Part II

Lecture 35 - Software Defined IoT Networking - I

Lecture 36 - Software Defined IoT Networking - II

Lecture 37 - Cloud Computing-Fundamental

Lecture 38 - Cloud Computing-Service Model

Lecture 39 - Cloud Computing-Service Management and Security

Lecture 40 - Cloud Computing - Case Studies

Lecture 41 - Cloud Computing - Practical

Lecture 42 - Sensor-Cloud - I

Lecture 43 - Sensor-Cloud - II

Lecture 44 - Fog Computing - I

Lecture 45 - Fog Computing - II

Lecture 46 - Smart Cities and Smart Homes - I

Lecture 47 - Smart Cities and Smart Homes - II

Lecture 48 - Smart Cities and Smart Homes - III

Lecture 49 - Connected Vehicles - I

Lecture 50 - Connected Vehicles - II

Lecture 51 - Smart Grid - I

Lecture 52 - Smart Grid - II

Lecture 53 - Industrial Internet of Things - I

Lecture 54 - Industrial Internet of Things - II

Lecture 55 - Data Handling and Analytics - I

Lecture 56 - Data Handling and Analytics - II

Lecture 57 - Case Study: Agriculture

Lecture 58 - Case Study: Healthcare

Lecture 59 - Case Study: Activity Monitoring - I

Lecture 60 - Case Study: Activity Monitoring - II

NPTEL : NOC:Cloud Computing (Computer Science and Engineering)

Co-ordinators : Prof. Soumya Kanti Ghosh

Lecture 1 - Cloud Computing Overview

Lecture 2 - Cloud Computing Overview (Continued...)

Lecture 3 - Cloud Computing - Introduction

Lecture 4 - Cloud Computing Architecture

Lecture 5 - Cloud Computing Architecture (Continued...)

Lecture 6 - Cloud Computing Architecture - Deployment Models

Lecture 7 - Cloud Computing Virtualization

Lecture 8 - Cloud Computing XML Basics

Lecture 9 - Cloud Computing XML Basics - II

Lecture 10 - Cloud Computing Web Services, Service Oriented Architecture

Lecture 11 - Service Level Agreement

Lecture 12 - Cloud Economics

Lecture 13 - Managing Data

Lecture 14 - Introduction to MapReduce

Lecture 15 - Open Stack

Lecture 16 - Cloud Computing - Opensource Cloud - Openstack Demo

Lecture 17 - Cloud Computing Case Study with a commercial Cloud - Microsoft Azure

Lecture 18 - Cloud Computing Demo - Microsoft Azure

Lecture 19 - Cloud Computing Case Study - Google Cloud Platform (GCP)

Lecture 20 - Cloud Computing Demo - Google Cloud Platform (GCP)

Lecture 21 - SLA-Tutorial

Lecture 22 - Cloudonomics-Tutorial

Lecture 23 - MapReduce-Tutorial

Lecture 24 - Resource Management - I

Lecture 25 - Resource Management - II

Lecture 26 - Cloud Computing: Security - I

Lecture 27 - Cloud Computing: Security - II

Lecture 28 - Cloud Computing: Security - III

Lecture 29 - Cloud Computing: Security Issues in Collaborative SaaS Cloud

Lecture 30 - Cloud Computing: Broker for Cloud Marketplace

Lecture 31 - Mobile Cloud Computing - I

Lecture 32 - Mobile Cloud Computing - II

Lecture 33 - Fog Computing - I

Lecture 34 - Fog Computing - II

Lecture 35 - Use Case-Geo-spatial Cloud

Lecture 36 - Introduction to DOCKER Container

Lecture 37 - Green Cloud

Lecture 38 - Sensor Cloud Computing

Lecture 39 - IoT Cloud

Lecture 40 - Course Summary and Research Areas

Lecture 41 - Cloud-Fog Computing - Overview

Lecture 42 - Resource Management - I

Lecture 43 - Resource Management - II

Lecture 44 - Cloud Federation

Lecture 45 - VM Migration - Basics Migration strategies

Lecture 46 - VM Migration - Basics Migration strategies

Lecture 47 - Containers Container based Virtualization Kubernetes Docker Container

Lecture 48 - Docker Container - Overview Docker - Components Docker - Architecture

Lecture 49 - Docker Container - Demo

Lecture 50 - Docker Container - Demo

Lecture 51 - Dew Computing

Lecture 52 - Serverless Computing - I

Lecture 53 - Serverless Computing - II

Lecture 54 - Sustainable Cloud Computing - I

Lecture 55 - Sustainable Cloud Computing - II

Lecture 56 - Cloud Computing in 5G Era

Lecture 57 - CPS and Cloud Computing

Lecture 58 - Case Study I (Spatial Cloud Computing)

Lecture 59 - Case Study II (Internet of Health Things) - Part A

Lecture 60 - Case Study II (Internet of Health Things) - Part B

NPTEL : NOC:Problem Solving through Programming in C (Computer Science and Engineering)

Co-ordinators : Prof.Arnab sarkar, Prof.Jatindra Kumar Deka, Dr. Santosh Biswas

Lecture 1 - Introduction

Lecture 2 - Idea of Algorithms

Lecture 3 - Flow Chart and Pseudocode

Lecture 4 - Introduction to Programming Language Concepts

Lecture 5 - Variables and Memory

Lecture 6 - Types of Software and Compilers

Lecture 7 - Introduction to C Programming Language

Lecture 8 - Variables and Variable Types in C

Lecture 9 - Introducing Functions

Lecture 10 - Address and Content of Variables and Types

Lecture 11 - Assignment Statement and Operators in C

Lecture 12 - Arithmetic Expressions and Relational Expressions

Lecture 13 - Logical Operators and Change in Control Flow

Lecture 14 - Use of Logical Operaotrs in Branching

Lecture 15 - Branching : IF-ELSE Statement

Lecture 16 - IF-ELSE Statement (Continued...)

Lecture 17 - Switch statement

Lecture 18 - Switch Statement (Continued...) and Introduction to Loops

Lecture 19 - Implementing Repetitions (Loops)

Lecture 20 - Implementation of Loops with for Statement (Continued...)

Lecture 21 - For Statement (Continued...)

Lecture 22 - Example of If-Else

Lecture 23 - Example of Loops

Lecture 24 - Example of Loops (Continued...)

Lecture 25 - Example of Loops (Continued...), Use of FOR Loops

Lecture 26 - Introduction to Arrays

Lecture 27 - Arrays (Continued...)

Lecture 28 - Arrays (Continued...)

Lecture 29 - Program using Arrays

Lecture 30 - Array Problem

Lecture 31 - Linear Search

Lecture 32 - Character Array and Strings

Lecture 33 - String Operations

Lecture 34 - 2-D Array Operation

Lecture 35 - Introducing Functions

Lecture 36 - More on Functions

Lecture 37 - Function (Continued...)

Lecture 38 - Scanf and Printf Functions; Function Prototype

Lecture 39 - Parameter Passing in Function Revision

Lecture 40 - Parameter Passing in Function Revision (Continued...)

Lecture 41 - Substitution of # include and Macro

Lecture 42 - search as a function

Lecture 43 - Binary Search

Lecture 44 - Binary Search (Continued...)

Lecture 45 - Sorting Methods

Lecture 46 - Bubble Sort (Continued...)

Lecture 47 - Use of Pointer in Function : Context Bubble Sort

Lecture 48 - Arrays at Strings

Lecture 49 - Data Representation

Lecture 50 - Bisection Method

Lecture 51 - Interpolation

Lecture 52 - Trapezoidal Rule and Runge-Kutta Method

Lecture 53 - Recursion

Lecture 54 - Recursion (Continued...)

Lecture 55 - Structure

Lecture 56 - Structure (Continued...)

Lecture 57 - Structure with typedef

Lecture 58 - Pointer

Lecture 59 - Pointer (Continued...)

Lecture 60 - Pointer in Structures

Lecture 61 - Dynamic Allocation and File

NPTEL : NOC:Real Time Operating System (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction

Lecture 2 - Basics of Tast scheduling

Lecture 3 - Cyclic executives

Lecture 4 - Cyclic Scheduler

Lecture 5 - Cyclic Scheduler

Lecture 6 - Exercises on Frame size Selectoin

Lecture 7 - Event-driven schedulers

Lecture 8 - Rate Monotonic Algorithm

Lecture 9 - RMA Task Schedulability

Lecture 10 - Rate Monotonic Analysis

Lecture 11 - RMA Generalizations

Lecture 12 - Further RMA Generalizations

Lecture 13 - Resource Sharing among Real-Time Tasks

Lecture 14 - Solution to Priority Inversion Problem

Lecture 15 - Highest Locker Protocol

Lecture 16 - Priority Ceiling Protocol

Lecture 17 - PCP Priority Inversions

Lecture 18 - Analysis of PCP priority inversions

Lecture 19 - Some basic issues in Real-Time Operating Systems

Lecture 20 - Unix as a Real-Time operating System

NPTEL : NOC:Introduction to Soft Computing (Computer Science and Engineering)

Co-ordinators : Prof. Debasis Samanta

Lecture 1 - Introduction to soft computing

Lecture 2 - Introduction to Fuzzy Logic

Lecture 3 - Fuzzy membership functions (Continued...) and Defining Membership functions

Lecture 4 - Fuzzy operations

Lecture 5 - Fuzzy relations

Lecture 6 - Fuzzy Relations (Continued...) and Fuzzy propositions

Lecture 7 - Fuzzy implications

Lecture 8 - Fuzzy Inferences

Lecture 9 - Defuzzification techniques (Part-I)

Lecture 10 - Defuzzification Techniques (Part-I) (Continued...)

Lecture 11 - Fuzzy logic controller

Lecture 12 - Fuzzy Logic Controller (Continued...)

Lecture 13 - Fuzzy logic controller (Continued...)

Lecture 14 - Concept of Genetic Algorithm

Lecture 15 - Concept of Genetic Algorithm (Continued...) and GA Strategies

Lecture 16 - GA Operator : Encoding schemes

Lecture 17 - GA operator : encoding scheme (Continued...)

Lecture 18 - GA Operator : Selection

Lecture 19 - GA Operator : Selection (Continued...)

Lecture 20 - GA Operator : Crossover techniques

Lecture 21 - GA Operator : Crossover (Continued...)

Lecture 22 - GA Operator : Crossover (Continued...)

Lecture 23 - GA Operator : Mutation and others

Lecture 24 - Multi-objective optimization problem solving

Lecture 25 - Multi-objective optimization problem solving (Continued...)

Lecture 26 - Concept of domination

Lecture 27 - Non-Pareto based approaches to solve MOOPs

Lecture 28 - Non-Pareto based approaches to solve MOOPs (Continued...)

Lecture 29 - Pareto-Based approaches to solve MOOPs

Lecture 30 - Pareto-based approaches to solve MOOPs (Continued....)

Lecture 31 - Pareto-based approach to solve MOOPs

Lecture 32 - Pareto-based approach to solve MOOPs (Continued...)

Lecture 33 - Pareto-based approach to solve MOOPs (Continued...)

Lecture 34 - Introduction to Artificial Neural Network

Lecture 35 - ANN Architectures

Lecture 36 - Training ANNs

Lecture 37 - Training ANNs (Continued....)

Lecture 38 - Training ANNs (Continued....)

Lecture 39 - Training ANNs (Continued....)

Lecture 40 - Soft computing tools

NPTEL : NOC:Data Mining (Computer Science and Engineering)

Co-ordinators : Prof. Pabitra Mitra

Lecture 1 - Introduction, Knowledge Discovery Process

Lecture 2 - Data Preprocessing - I

Lecture 3 - Data Preprocessing - II

Lecture 4 - Association Rules

Lecture 5 - Apriori algorithm

Lecture 6 - Rule generation

Lecture 7 - Classification

Lecture 8 - Decision Tree - I

Lecture 9 - Decision Tree - II

Lecture 10 - Decision Tree - III

Lecture 11 - Decision Tree - IV

Lecture 12 - Bayes Classifier - I

Lecture 13 - Bayes Classifier - II

Lecture 14 - Bayes Classifier - III

Lecture 15 - Bayes Classifier - IV

Lecture 16 - Bayes Classifier - V

Lecture 17 - K Nearest Neighbor - I

Lecture 18 - K Nearest Neighbor - II

Lecture 19

Lecture 20

Lecture 21

Lecture 22 - Support Vector Machine - I

Lecture 23 - Support Vector Machine - II

Lecture 24 - Support Vector Machine - III

Lecture 25 - Support Vector Machine - IV

Lecture 26 - Support Vector Machine - V

Lecture 27 - Kernel Machines

Lecture 28 - Artificial Neural Networks - I

Lecture 29 - Artificial Neural Networks - II

Lecture 30 - Artificial Neural Networks - III

Lecture 31 - Artificial Neural Networks - IV

Lecture 32 - Clustering - I

Lecture 33 - Clustering - II

Lecture 34 - Clustering - III

Lecture 35 - Clustering - IV

Lecture 36 - Clustering - V

Lecture 37 - Regression - I

Lecture 38 - Regression - II

Lecture 39 - Regression - III

Lecture 40 - Regression - IV

Lecture 41 - Dimensionality Reduction - I

Lecture 42 - Dimensionality Reduction - II

Lecture 43 - Tutorial

Lecture 44 - Live Session

NPTEL : NOC:Data Base Management System (Computer Science and Engineering)

Co-ordinators : Prof. Partha Pratim Das

Lecture 1 - Course Overview

Lecture 2 - Introduction to DBMS/1

Lecture 3 - Introduction to DBMS/2

Lecture 4 - Introduction to Relational Model/1

Lecture 5 - Introduction to Relational Model/2

Lecture 6 - Introduction to SQL/1

Lecture 7 - Introduction to SQL/2

Lecture 8 - Introduction to SQL/3

Lecture 9 - Intermediate SQL/1

Lecture 10 - Intermediate SQL/2

Lecture 11 - Advanced SQL

Lecture 12 - Formal Relational Query Languages

Lecture 13 - Entity-Relationship Model/1

Lecture 14 - Entity-Relationship Model/2

Lecture 15 - Entity-Relationship Model/3

Lecture 16 - Relational Database Design

Lecture 17 - Relational Database Design (Continued...)

Lecture 18 - Relational Database Design/3

Lecture 19 - Relational Database Design (Continued...)

Lecture 20 - Relational Database Design/5

Lecture 21 - Application Design and Development/1

Lecture 22 - Application Design and Development/2

Lecture 23 - Application Design and Development/3

Lecture 24 - Storage and File Structure/1: Storage

Lecture 25 - Storage and File Structure/2: File Structure

Lecture 26 - Indexing and Hashing/1 : Indexing/1

Lecture 27 - Indexing and Hashing/2 : Indexing/2

Lecture 28 - Indexing and Hashing/3 : Indexing/3

Lecture 29 - Indexing and Hashing/4 : Hashing

Lecture 30 - Indexing and Hashing/5 : Index Design

Lecture 31 - Transactions/1

Lecture 32 - Transactions/2 : Serializability

Lecture 33 - Transactions/3 : Recoverability

Lecture 34 - Concurrency Control/1

Lecture 35 - Concurrency Control/2

Lecture 36 - Recovery/1

Lecture 37 - Recovery/2

Lecture 38 - Query Processing and Optimization/1 : Processing

Lecture 39 - Query Processing and Optimization/2 : Optimization

Lecture 40 - Course Summarization

Lecture 41 - Live Session

Lecture 42 - Live Session - 2

NPTEL : NOC:Software Engineering (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Introduction - III

Lecture 4 - Introduction - IV

Lecture 5 - Introduction - V

Lecture 6 - Life Cycle Model

Lecture 7 - Life Cycle Model

Lecture 8 - Waterfall Model

Lecture 9 - Waterfall Derivatives

Lecture 10 - Incremental Model

Lecture 11 - Evolutionary Model

Lecture 12 - Agile Model

Lecture 13 - Extreme Programming and Scrum

Lecture 14 - Scrum

Lecture 15 - Introduction to requirement specification

Lecture 16 - Requirement gathering and analysis

Lecture 17 - Functional requirements

Lecture 18 - Representation of complex programming logic

Lecture 19 - Design Fundamentals

Lecture 20 - Modular Design

Lecture 21 - Classification of Cohesion

Lecture 22 - Classification of Coupling

Lecture 23 - Introduction to structured analysis and structured design

Lecture 24 - Basics of Data Flow Diagrams (DFD)

Lecture 25 - Developing DFD Model

Lecture 26 - Examples of DFD Model development

Lecture 27 - DFD Model - More Examples

Lecture 28 - Essentials of Structure Chart

Lecture 29 - Transform Analysis, Transaction Analysis

Lecture 30 - Structured Design Examples

Lecture 31 - Use Case Modelling

Lecture 32 - Factoring Use Cases

Lecture 33 - Overview of Class diagram

Lecture 34 - Inheritance relationship

Lecture 35 - Association relationship

Lecture 36 - Aggregation/ Composition and dependency relations

Lecture 37 - Interation Modelling

Lecture 38 - Development of Sequence diagrams

Lecture 39 - State-Machine diagram

Lecture 40 - An Object-Oriented design process

Lecture 41 - Domain Analysis

Lecture 42 - Examples of object-oriented design

Lecture 43 - Basic concepts in Testing - I

Lecture 44 - Basic concepts in Testing - II

Lecture 45 - Basic concepts in Testing - III

Lecture 46 - Unit testing strategies - I

Lecture 47 - Unit testing strategies - II

Lecture 48 - Equivalance Class Testing - I

Lecture 49 - Equivalance Class Testing - II

Lecture 50 - Special Value Testing

Lecture 51 - Combinatorial Testing

Lecture 52 - Decision Table Testing

Lecture 53 - Cause effect graphing

Lecture 54 - Pairwise Testing

Lecture 55 - White box Testing

Lecture 56 - Condition Testing

Lecture 57 - MC/DC Coverage

Lecture 58 - MC/DC Testing

Lecture 59 - Path Testing

Lecture 60 - Dataflow and Mutation Testing

NPTEL : NOC:Computer Networks and Internet Protocol (Computer Science and Engineering)

Co-ordinators : Prof. Sandip Chakraborty, Prof. Soumya Kanti Ghosh

Lecture 1 - Introduction to Computer Networks - A brief history

Lecture 2 - Data Networks - from Circuit Switching Network to Packet Switching Network

Lecture 3 - Network Protocol Stack

Lecture 4 - Services at the Different Layers of the Protocol Stack

Lecture 5 - Application Layer I - Different Protocols at the Application Layer

Lecture 6 - Application Layer II - Domain Name Systems

Lecture 7 - Application Layer III - The Web

Lecture 8 - Application Layer III - Hypertext Transfer Protocol

Lecture 9 - Application Layer III - Internet Mail Transfer

Lecture 10 - Application Layer IV - File Transfer (FTP)

Lecture 11 - Transport Layer I - Services

Lecture 12 - Transport Layer II - Connection

Lecture 13 - Transport Layer II - Connection (Continued...)

Lecture 14 - Transport Layer IV - Reliability

Lecture 15 - Transport Layer V - Sliding Window Protocols

Lecture 16 - Transport Layer Performance

Lecture 17 - Buffer Management and Congestion Control

Lecture 18 - Transport Layer Primitives

Lecture 19 - Transmission Control Protocol I - Basics

Lecture 20 - Transmission Control Protocol II - Connections

Lecture 21 - Transmission Control Protocol III - Flow Control

Lecture 22 - Transmission Control Protocol IV - Congestion Control

Lecture 23 - User Datagram Protocol

Lecture 24 - Socket Programming - I

Lecture 25 - Socket Programming - II

Lecture 26 - Network Layer I - Introduction

Lecture 27 - IP Addressing (IPv4) I - Classful addressing

Lecture 28 - IP Addressing (IPv4) II - CIDR

Lecture 29 - IP Addressing (IPv4) III - Network Address Translation (NAT)

Lecture 30 - IPv6 Addressing

Lecture 31 - Internet QoS - I (What is QoS)

Lecture 32 - Internet QoS - II (Basic QoS Architecture)

Lecture 33 - Internet QoS - III (Traffic Policing and Traffic Shaping)

Lecture 34 - Internet QoS - IV (Traffic Scheduling)

Lecture 35 - Internet QoS - V (Integrated and Differentiated Service Architecture)

Lecture 36 - IP Routing Table

Lecture 37 - Routing in the Internet I - Intra-domain routing

Lecture 38 - Routing in the Internet II - Routing protocols

Lecture 39 - Routing in the Internet III - Inter-domain Routing

Lecture 40 - Routing in the Internet IV - Border Gateway Protocol

Lecture 41 - IP Routers

Lecture 42 - IP Routers Demo

Lecture 43 - Software Defined Networking - I (Basics)

Lecture 44 - Software Defined Networking - II (Open Flow)

Lecture 45 - Software Defined Networking - III (Demo)

Lecture 46 - Data Link Layer - Overview

Lecture 47 - Data Link Layer - Basic Concepts

Lecture 48 - Data Link Layer - Ethernet

Lecture 49 - Data Link Layer - Ethernet (Continued...)

Lecture 50 - Data Link Layer - Flow and Error Control

Lecture 51 - ARP-RAPP-BOOTP-DHCP

Lecture 52 - ARP-RAPP-BOOTP-DHCP (Continued...)

Lecture 53

Lecture 54 - Wireless LANs

Lecture 55 - Layer 1: Physical Layer

Lecture 56 - Layer 1: Physical Layer - II

Lecture 57 - Layer 1: Physical Layer - III

Lecture 58 - Network Security - Overview

Lecture 59 - Network Security - II

Lecture 60 - Network Security - III [TCP/IP Security]

NPTEL : NOC:Blockchain Architecture Design and Use Cases (Computer Science and Engineering)

Co-ordinators : Praveen Jayachandran, Prof. Sandip Chakraborty

Lecture 1 - Introduction to Blockchain - I (Basics)

Lecture 2 - Introduction to Blockchain - II (History)

Lecture 3 - Introduction to Blockchain - III (Architecture)

Lecture 4 - Introduction to Blockchain - IV (Conceptualization)

Lecture 5 - Basic Crypto Primitives - I

Lecture 6 - Basic Crypto Primitives - II

Lecture 7 - Bitcoin Basics - I

Lecture 8 - Bitcoin Basics - II

Lecture 9 - Bitcoin Basics - III

Lecture 10 - Distributed Consensus

Lecture 11 - Consensus in Bitcoin - I (The Basics)

Lecture 12 - Consensus in Bitcoin - II (PoW and Beyond)

Lecture 13 - Consensus in Bitcoin - III (The Miners)

Lecture 14 - Permissioned Blockchain - I (Basics)

Lecture 15 - Permissioned Blockchain - II (Consensus)

Lecture 16 - Permissioned Blockchain - III (RAFT Consensus)

Lecture 17 - Permissioned Blockchain - IV (Byzantine General Problem)

Lecture 18 - Permissioned Blockchain - V (Practical Byzantine Fault Tolerance)

Lecture 19 - Blockchain for Enterprise - Overview

Lecture 20 - Blockchain Components and Concepts

Lecture 21 - Hyperledger Fabric - Transaction Flow

Lecture 22 - Hyperledger Fabric Details

Lecture 23 - Fabric - Membership and Identity Management

Lecture 24 - Hyperledger Fabric Network Setup

Lecture 25 - Fabric Demo on IBM Blockchain Cloud - I

Lecture 26 - Fabric Demo on IBM Blockchain Cloud - II

Lecture 27 - Fabric Demo, deploy from scratch - III

Lecture 28 - Hyperledger Composer - Application Development

Lecture 29 - Hyperledger Composer - Network Administration

Lecture 30 - Blockchain Use Cases

Lecture 31 - Blockchain in Financial Service - I (Payments and Secure Trading)

Lecture 32 - Blockchain in Financial Service - II (Compliance and Mortgage)

Lecture 33 - Blockchain in Financial Service - III (Financial Trade)

Lecture 34 - Revolutionizing Global Trade

Lecture 35 - Blockchain in Supply Chain - I

Lecture 36 - Blockchain in Supply Chain - II

Lecture 37 - Blockchain in Other Industries

Lecture 38 - Blockchain in Government - I (Advantages)

Lecture 39 - Blockchain in Government - II (Use Cases)

Lecture 40 - Blockchain in Government - III (Digital Identity)

Lecture 41 - Blockchain in Government - IV (Hyperledger Indy)

Lecture 42 - Blockchain in Government - V (Tax Payments and Land Registry Records)

Lecture 43 - Blockchain Security - I (Overview)

Lecture 44 - Blockchain Security - II (Membership and Access control in Fabric)

Lecture 45 - Blockchain Security - III (Privacy in Fabric)

Lecture 46 - Blockchain Security - III (Fabric SideDB)

Lecture 47 - Research Aspects - I (Consensus Scalability)

Lecture 48 - Research Aspects - II (Bitcoin-NG)

Lecture 49 - Research Aspects - III (Collective Signing)

Lecture 50 - Research Aspects - IV (Byzcoin)

Lecture 51 - Research Aspects - V (Algorand)

Lecture 52 - Research Aspects - VI (Cross Fault Tolerance)

Lecture 53 - Research Aspects - VII (Secured Multi-Party Computation)

Lecture 54 - Blockchain for Science - I (Blockchain for Big Data)

Lecture 55 - Blockchain for Science - II (Blockchain and AI)

Lecture 56 - Comparing Ecosystems - Ethereum

Lecture 57 - Comparing Ecosystems - Ethereum development tools and Quorum

Lecture 58 - Comparing Ecosystems - Corda Part 1

Lecture 59 - Comparing Ecosystems - Corda Part 2

Lecture 60 - Concluding the course

NPTEL : NOC:Switching Circuits and Logic Design (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1 - Introduction

Lecture 2 - Octal and Hexadecimal Number Systems

Lecture 3 - Signed and Unsigned Binary Number Representation

Lecture 4 - Binary Addition and Subtraction

Lecture 5 - BCD and Gray Code Representations

Lecture 6 - Error Detection and Correction

Lecture 7 - Logic Gates

Lecture 8 - Logic Families to Implement Gates

Lecture 9 - Emerging Technologies - Part I

Lecture 10 - Emerging Technologies - Part II

Lecture 11 - Switching Algebra

Lecture 12 - Algebraic Manipulation

Lecture 13 - Properties of Switching Functions

Lecture 14 - Obtaining Canonical Representations of Functions

Lecture 15 - Functional Completeness

Lecture 16 - Minimization Using Karnaugh Maps - Part I

Lecture 17 - Minimization Using Karnaugh Maps - Part II

Lecture 18 - Minimization Using Karnaugh Maps - Part III

Lecture 19 - Minimization using Tabular Method - Part I

Lecture 20 - Minimization using Tabular Method - Part II

Lecture 21 - Design of Adders - Part I

Lecture 22 - Design of Adders - Part II

Lecture 23 - Design of Adders - Part III

Lecture 24 - Logic Design - Part I

Lecture 25 - Logic Design - Part II

Lecture 26 - Logic Design - Part III

Lecture 27 - Binary Decision Diagrams - Part I

Lecture 28 - Binary Decision Diagrams - Part II

Lecture 29 - Logic Design using AND-EXOR Network

Lecture 30 - Threshold Logic and Threshold Gates

Lecture 31 - Latches and Flip-Flops - Part I

Lecture 32 - Latches and Flip-Flops - Part II

Lecture 33 - Latches and Flip-Flops - Part III

Lecture 34 - Clocking and Timing - Part I

Lecture 35 - Clocking and Timing - Part II

Lecture 36 - Synthesis of Synchronous Sequential Circuits - Part I

Lecture 37 - Synthesis of Synchronous Sequential Circuits - Part II

Lecture 38 - Synthesis of Synchronous Sequential Circuits - Part III

Lecture 39 - Synthesis of Synchronous Sequential Circuits - Part IV

Lecture 40 - Minimization of Finite State Machines - Part I

Lecture 41 - Minimization of Finite State Machines - Part II

Lecture 42 - Design of Registers - Part I

Lecture 43 - Design of Registers - Part II

Lecture 44 - Design of Registers - Part III

Lecture 45 - Design of Counters - Part I

Lecture 46 - Design of Counters - Part II

Lecture 47 - Digital-to-Analog Converter - Part I

Lecture 48 - Digital-to-Analog Converter - Part II

Lecture 49 - Analog-to-Digital Converter - Part I

Lecture 50 - Analog-to-Digital Converter - Part II

Lecture 51 - Analog-to-Digital Converter - Part III

Lecture 52 - Asynchronous Sequential Circuits - Part I

Lecture 53 - Asynchronous Sequential Circuits - Part II

Lecture 54 - Algorithmic State Machine (ASM Chart

Lecture 55 - Testing of Digital Circuits

Lecture 56 - Fault Modeling

Lecture 57 - Test Pattern Generation

Lecture 58 - Design for Testability

Lecture 59 - Built-in Self-Test - Part I

Lecture 60 - Built-in Self-Test - Part II

NPTEL : NOC:Scalable Data Science (Computer Science and Engineering)

Co-ordinators : Prof. Sourangshu Bhattacharya, Prof. Anirban Dasgupta

Lecture 1 - Background: Introduction

Lecture 2 - Probability: Concentration inequalities

Lecture 3 - Linear algebra: PCA, SVD

Lecture 4 - Optimization: Basics, Convex, GD

Lecture 5 - Machine Learning: Supervised, generalization, feature learning, clustering.

Lecture 6 - Memory-efficient data structures: Hash functions, universal / perfect hash families

Lecture 7 - Bloom filters

Lecture 8 - Sketches for distinct count

Lecture 9 - Sketches for distinct count (Continued...)

Lecture 10 - Misra-Gries sketch

Lecture 11 - Frequent Element: Space Saving and Count Min

Lecture 12 - Frequent Element: Count Sketch

Lecture 13 - Near Neighbors

Lecture 14 - Locality Sensitive Hashing

Lecture 15 - Building LSH Tables

Lecture 16 - Approximate near neighbors search: Extensions e.g. multi-probe, b-bit hashing, Data dependent variants

Lecture 17 - Approximate near neighbors search: Extensions e.g. multi-probe, b-bit hashing, Data dependent variants (Continued...)

Lecture 18 - Approximate near neighbors search: Extensions e.g. multi-probe, b-bit hashing, Data dependent variants (Continued...)

Lecture 19 - Randomized Numerical Linear Algebra: Random projection

Lecture 20 - Randomized Numerical Linear Algebra: Random projection (Continued...)

Lecture 21 - Randomized Numerical Linear Algebra: a) Matrix multiplication + QB decomposition

Lecture 22 - Randomized Numerical Linear Algebra: b) CUR+CX

Lecture 23 - Randomized Numerical Linear Algebra: a) L2 regression using RP

Lecture 24 - Randomized Numerical Linear Algebra: b) Leverage scores

Lecture 25 - Randomized Numerical Linear Algebra: c) Hash Kernels + Kitchen Sink

Lecture 26 - Map-reduce and Hadoop

Lecture 27 - Hadoop System

Lecture 28 - Hadoop System (Continued...)

Lecture 29 - Hadoop System (Continued...)

Lecture 30 - Spark

Lecture 31 - Spark (Continued...)

Lecture 32 - Spark (Continued...)

Lecture 33 - Distributed Machine Learning and Optimization: Introduction

Lecture 34 - SGD+Proof

Lecture 35 - SGD+Proof (Continued...)

Lecture 36 - Distributed Machine Learning and Optimization:ADMM + applications

Lecture 37 - Distributed Machine Learning and Optimization:ADMM + applications (Continued...)

Lecture 38 - Clustering

Lecture 39 - Clustering (Continued...)

Lecture 40 - Conclusion

NPTEL : NOC:Compiler Design (Computer Science and Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Lexical Analysis

Lecture 8 - Lexical Analysis (Continued...)

Lecture 9 - Lexical Analysis (Continued...)

Lecture 10 - Lexical Analysis (Continued...)

Lecture 11 - Lexical Analysis (Continued...)

Lecture 12 - Lexical Analysis (Continued...)

Lecture 13 - Lexical Analysis (Continued...)

Lecture 14 - Lexical Analysis (Continued...)

Lecture 15 - Lexical Analysis (Continued...)

Lecture 16 - Parser

Lecture 17 - Parser (Continued...)

Lecture 18 - Parser (Continued...)

Lecture 19 - Parser (Continued...)

Lecture 20 - Parser (Continued...)

Lecture 21 - Parser (Continued...)

Lecture 22 - Parser (Continued...)

Lecture 23 - Parser (Continued...)

Lecture 24 - Parser (Continued...)

Lecture 25 - Parser (Continued...)

Lecture 26 - Parser (Continued...)

Lecture 27 - Parser (Continued...)

Lecture 28 - Parser (Continued...)

Lecture 29 - Parser (Continued...)

Lecture 30 - Parser (Continued...)

Lecture 31 - Parser (Continued...)

Lecture 32 - SR Latch and Introduction to Clocked Flip-Flop

Lecture 33 - Edge-Triggered Flip-Flop

Lecture 34 - Representations of Flip-Flops

Lecture 35 - Analysis of Sequential Logic Circuit

Lecture 36 - Conversion of Flip-Flops and Flip-Flop Timing Parameters

Lecture 37 - Register and Shift Register: PIPO and SISO

Lecture 38 - Shift Register: SIPO, PISO and Universal Shift Register

Lecture 39 - Application of Shift Register

Lecture 40 - Linear Feedback Shift Register

Lecture 41 - Serial Addition, Multiplication and Division

Lecture 42 - Type Checking (Continued...)

Lecture 43 - Symbol Table

Lecture 44 - Symbol Table (Continued...)

Lecture 45 - Symbol Table (Continued...)

Lecture 46 - Symbol Table (Continued...) and Runtime Environment

Lecture 47 - Runtime Environment

Lecture 48 - Runtime Environment (Continued...)

Lecture 49 - Runtime Environment (Continued...)

Lecture 50 - Intermediate Code Generation

Lecture 51 - Intermediate Code Generation (Continued...)

Lecture 52 - Intermediate Code Generation (Continued...)

Lecture 53 - Intermediate Code Generation (Continued...)

Lecture 54 - Intermediate Code Generation (Continued...)

Lecture 55 - Intermediate Code Generation (Continued...)

Lecture 56 - Intermediate Code Generation (Continued...)

Lecture 57 - Intermediate Code Generation (Continued...)

Lecture 58 - Intermediate Code Generation (Continued...)

Lecture 59 - Intermediate Code Generation (Continued...)

Lecture 60 - Intermediate Code Generation (Continued...)

Lecture 61 - Intermediate Code Generation (Continued...)

NPTEL : NOC:Programming in Java (Computer Science and Engineering)

Co-ordinators : Prof. Debasis Samanta

Lecture 1 - Introduction

Lecture 2 - Java Programming Steps

Lecture 3 - Java Tools and Resources

Lecture 4 - Demonstration - I

Lecture 5 - Java Applet Programming

Lecture 6 - Demonstration - II

Lecture 7 - Encapsulation

Lecture 8 - Demonstration - III

Lecture 9 - Java Programming Insights

Lecture 10 - Demonstration - IV

Lecture 11 - Java Static Scope Rule

Lecture 12 - Demonstration - V

Lecture 13 - Inheritance

Lecture 14 - Demonstration - VI

Lecture 15 - Information Hiding

Lecture 16 - Demonstration - VII

Lecture 17 - Packages - I

Lecture 18 - Packages - II

Lecture 19 - Demonstration - VIII

Lecture 20 - Interface - I

Lecture 21 - Interface - II

Lecture 22 - Demonstration - IX

Lecture 23 - Exception Handling - I

Lecture 24 - Exception Handling - II

Lecture 25 - Exception Handling - III

Lecture 26 - Demonstration - X

Lecture 27 - Multithreading - I

Lecture 28 - Multithreading - II

Lecture 29 - Demonstration - XI

Lecture 30 - I-O Stream - I

Lecture 31 - I-O Stream - II

Lecture 32 - I-O Stream - III

Lecture 33 - Demonstration - XII

Lecture 34 - Applet Programming - I

Lecture 35 - Applet Programming - II

Lecture 36 - Applet Programming - III

Lecture 37 - Demonstration - XIII

Lecture 38 - Demonstration - XIV

Lecture 39 - AWT Programming - I

Lecture 40 - AWT Programming - II

Lecture 41 - Demonstration - XV

Lecture 42 - AWT Programming - III

Lecture 43 - Swing - I

Lecture 44 - Swing - II

Lecture 45 - Demonstration - XVI

Lecture 46 - Demonstration - XVII

Lecture 47 - Demonstration - XVIII

Lecture 48 - Networking with Java

Lecture 49 - Demonstration - XIX

Lecture 50 - JDBC - I

Lecture 51 - JDBC - II

Lecture 52 - JDBC - III

Lecture 53 - Demonstration - XX

Lecture 54 - Demonstration - XXI

Lecture 55 - Demonstration - XXII

Lecture 56 - Case Studies - I

Lecture 57 - Case Studies - II

Lecture 58 - Case Studies - III

Lecture 59 - Case Studies - IV

Lecture 60 - Case Studies - V

NPTEL : NOC:Discrete Structures (Computer Science and Engineering)

Co-ordinators : Prof. Dipanwita Roychowdhury

Lecture 1 - Introduction to Propositional Logic

Lecture 2 - Introduction to Propositional Logic (Continued...)

Lecture 3 - Introduction to Propositional Logic (Continued...)

Lecture 4 - Introduction to Propositional Logic (Continued...)

Lecture 5 - Introduction to Propositional Logic (Continued...)

Lecture 6 - Introduction to Propositional Logic (Continued...)

Lecture 7 - Predicate Logic

Lecture 8 - Predicate Logic (Continued...)

Lecture 9 - Predicate Logic (Continued...)

Lecture 10 - Predicate Logic (Continued...)

Lecture 11 - Proof Techniques

Lecture 12 - Proof Techniques (Continued...)

Lecture 13 - Proof Techniques (Continued...)

Lecture 14 - Proof Techniques (Continued...)

Lecture 15 - Proof Techniques (Continued...)

Lecture 16 - Sets and Functions

Lecture 17 - Sets and Functions (Continued...)

Lecture 18 - Sets and Functions (Continued...)

Lecture 19 - Sets and Functions (Continued...)

Lecture 20 - Sets and Functions (Continued...)

Lecture 21 - Relations and their Properties

Lecture 22 - Relations and their Properties (Continued...)

Lecture 23 - Relations and their Properties (Continued...)

Lecture 24 - Relations and their Properties (Continued...)

Lecture 25 - Relations and their Properties (Continued...)

Lecture 26 - Recursion

Lecture 27 - Recursion (Continued...)

Lecture 28 - Recursion (Continued...)

Lecture 29 - Recursion (Continued...)

Lecture 30 - Recursion (Continued...)

Lecture 31 - Recurrence relations

Lecture 32 - Recurrence relations (Continued...)

Lecture 33 - Recurrence relations (Continued...)

Lecture 34 - Recurrence relations (Continued...)

Lecture 35 - Recurrence relations (Continued...)

Lecture 36 - Counting Techniques and Pigeonhole Principle

Lecture 37 - Counting Techniques and Pigeonhole Principle (Continued...)

Lecture 38 - Counting Techniques and Pigeonhole Principle (Continued...)

Lecture 39 - Counting Techniques and Pigeonhole Principle (Continued...)

Lecture 40 - Counting Techniques and Pigeonhole Principle (Continued...)

Lecture 41 - Combinatorics

Lecture 42 - Combinatorics (Continued...)

Lecture 43 - Combinatorics (Continued...)

Lecture 44 - Combinatorics (Continued...)

Lecture 45 - Combinatorics (Continued...)

Lecture 46 - Algebraic Structures

Lecture 47 - Algebraic Structures (Continued...)

Lecture 48 - Algebraic Structures (Continued...)

Lecture 49 - Algebraic Structures (Continued...)

Lecture 50 - Algebraic Structures (Continued...)

Lecture 51 - Ring and Modular Arithmetic

Lecture 52 - Ring and Modular Arithmetic (Continued...)

Lecture 53 - Ring and Modular Arithmetic (Continued...)

Lecture 54 - Ring and Modular Arithmetic (Continued...)

Lecture 55 - Ring and Modular Arithmetic (Continued...)

Lecture 56 - Finite Field and Applications

Lecture 57 - Finite Field and Applications (Continued...)

Lecture 58 - Finite Field and Applications (Continued...)

Lecture 59 - Finite Field and Applications (Continued...)

Lecture 60 - Finite Field and Applications (Continued...)

NPTEL : NOC:Embedded System Design with ARM (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta, Prof. Kamalika Datta

Lecture 1 - Introduction To Embedded Systems

Lecture 2 - Design Considerations of Embedded Systems

Lecture 3 - Microprocessors and Microcontrollers

Lecture 4 - Architecture of ARM Microcontroller - Part 1

Lecture 5 - Architecture of ARM Microcontroller - Part 2

Lecture 6 - Architecture of ARM Microcontroller - Part 3

Lecture 7 - ARM Instruction Set - Part 1

Lecture 8 - ARM Instruction Set - Part 2

Lecture 9 - ARM Instruction Set - Part 3

Lecture 10 - About the STM32F401 Nucleo Board

Lecture 11 - PWM and Interrupt on STM32F401

Lecture 12 - Digital to Analog Conversion

Lecture 13 - Analog to Digital Conversion - Part 1

Lecture 14 - Analog to Digital Conversion - Part 2

Lecture 15 - Output Devices, Sensors and Actuators - Part 1

Lecture 16 - Output Devices, Sensors and Actuators - Part 2

Lecture 17 - Output Devices, Sensors and Actuators - Part 3

Lecture 18 - Microcontroller Development Boards

Lecture 19 - Mbed C Programming Environment

Lecture 20 - Interfacing With STM32F401 Board

Lecture 21 - Interfacing With Arduino Uno

Lecture 22 - Interfacing 7-Segment Led And LCD Displays - Part 1

Lecture 23 - Interfacing 7-segment LED and LCD Displays - Part 2

Lecture 24 - Serial Port Terminal Application (Coolterm)

Lecture 25 - Experiment With Temperature Sensor

Lecture 26 - Experiment With Ldr Light Sensor - Part 1

Lecture 27 - Experiment With Ldr Light Sensor - Part 2

Lecture 28 - Experiment With Speaker

Lecture 29 - Experiment With Microphone

Lecture 30 - Design Of Control System

Lecture 31 - Experiments With Relay

Lecture 32 - Experiments On Speed Control Of Dc Motor

Lecture 33 - Experiment With Multiple Sensors And Relay

Lecture 34 - Introduction To Internet Of Things

Lecture 35 - Gsm And Bluetooth

Lecture 36 - Design Of A Home Automation System

Lecture 37 - Design Of A Simple Alarm System Using Touch Sensor

Lecture 38 - Accelerometer

Lecture 39 - Experiment Using Accelerometer

Lecture 40 - Experiment Using Bluetooth

Lecture 41 - Experiment With Gas Sensor

Lecture 42 - Summarization Of The Course

NPTEL : NOC:Hardware Security (Computer Science and Engineering)

Co-ordinators : Dr. Debdeep Mukhopadhyay

Lecture 1 - Introduction to Hardware Security - Part 1

Lecture 2 - Introduction to Hardware Security - Part 2

Lecture 3 - Algorithm to Hardware

Lecture 4 - Finite Field Architectures - 1

Lecture 5 - Finite Field Architectures - 1 (Continued...)

Lecture 6 - Hardware Design for Finite Field Inverse

Lecture 7 - Hardware Architecture for Finite Field Inverse

Lecture 8 - Background on Cryptography, Cryptanalysis and Advanced Encryption Standard (AES)

Lecture 9 - Advanced Encryption Standard (AES) andSide Channel Analysis

Lecture 10 - Field Isomorphisms

Lecture 11 - Field Isomorphisms (Continued...)

Lecture 12 - Hardware Implementation of Advanced Encryption

Lecture 13 - Hardware Implementation of Advanced Encryption

Lecture 14 - Hardware Implementation of Advanced Encryption (Continued...)

Lecture 15 - Compact AES-Box

Lecture 16 - Compact AES S-Box - Part II

Lecture 17 - Compact AES S-Box in Normal Basis - Part I

Lecture 18 - Compact AES S-Box in Normal Basis - Part II

Lecture 19 - Hardware for Elliptic Curve Cryptography - Part I

Lecture 20 - Hardware for Elliptic Curve Cryptography - Part II

Lecture 21 - Hardware for Elliptic Curve Cryptography - Part III

Lecture 22 - Hardware for Elliptic Curve Cryptography - Part IV

Lecture 23 - Hardware for Elliptic Curve Cryptography - Part V

Lecture 24 - Introduction to Side Channel Analysis

Lecture 25 - Power Analysis - Part I

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31 - Power Analysis - Part VII

Lecture 32 - Power Analysis - Part VIII

Lecture 33 - Power Analysis - Part IX

Lecture 34 - Power Analysis - Part X

Lecture 35 - Power Analysis - Part XI

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41 - Power Analysis - Part XVII

Lecture 42 - Power Analysis - Part XVIII

Lecture 43 - Power Analysis Countermeasures

Lecture 44 - Power Analysis Countermeasures (Continued...)

Lecture 45 - Power Analysis Countermeasures (Continued...)

Lecture 46 - Fault Analysis of Cryptosystems

Lecture 47 - Improved DFA of AES

Lecture 48 - Multi-Byte and key Scheduling Based Fault Analysis of AES

Lecture 49 - Multi-Byte and key Scheduling Based Fault Analysis of AES (Continued...)

Lecture 50 - Redundaney Based Fault Intensity

Lecture 51 - Reundancy Base Fault Countermeasures and Differential Faut Intensity Attacks (Continued...)

Lecture 52 - Infective Countermeasures for DFA

Lecture 53 - Infective Countermeasures for DFA (Continued...)

Lecture 54 - Infective Countermeasures for DFA (Continued...)

Lecture 55 - Microarchitectural attacks: Part I cache Timing attacks on Block ciphers

Lecture 56 - Microarchitectural attacks: Part I cache Timing attacks on Block ciphers (Continued...)

Lecture 57 - Microarchitectural attacks: Part II Branch Prediction Attacks

Lecture 58 - Microarchitectural attacks: Part II Branch Prediction Attacks (Continued...)

Lecture 59 - Microarchitectural attacks: Part III Row Hammer Attacks

Lecture 60 - Microarchitectural attacks: Part III Row Hammer Attacks (Continued...)

NPTEL : NOC:Introduction to Industry 4.0 and Industrial Internet of Things (Computer Science and Engineering)

Co-ordinators : Prof. Sudip Misra

Lecture 1 - Introduction: Sensing and Actuation

Lecture 2 - Introduction: IoT Connectivity - Part 1

Lecture 3 - Introduction: IoT Connectivity - Part 2

Lecture 4 - Introduction: IoT Networking - Part 1

Lecture 5 - Introduction: IoT Networking - Part 2

Lecture 6 - Industry 4.0: The Fourth Revolution

Lecture 7 - Industry 4.0: Sustainability Assessment of Manufacturing Industry

Lecture 8 - Industry 4.0: Lean Production System

Lecture 9 - Industry 4.0: Smart and Connected Business Perspective

Lecture 10 - Industry 4.0: Smart Factories

Lecture 11 - Industry 4.0: Cyber-Physical Systems and Next-Generation Sensors

Lecture 12 - Industry 4.0: Collaboration Platform and Product Lifecycle Management

Lecture 13 - Industry 4.0: Augmented Reality and Virtual Reality

Lecture 14 - Industry 4.0: Artificial Intelligence

Lecture 15 - Industry 4.0: Big Data and Advanced Analysis

Lecture 16 - Industry 4.0: Cybersecurity

Lecture 17 - Basics of Industrial IoT: Introduction

Lecture 18 - Basics of Industrial IoT: Industrial Internet Systems

Lecture 19 - Basics of IIoT: Industrial Sensing and Actuation

Lecture 20 - Basics of Industrial IoT: Industrial Processes - Part 1

Lecture 21 - Basics of Industrial IoT: Industrial Processes - Part 2

Lecture 22 - Business Models and Reference Architecture for IIoT: Business Models - Part 1

Lecture 23 - Business Models and Reference Architecture for IIoT: Business Models - Part 2

Lecture 24 - Business Models and Reference Architecture for IIoT: Reference Architecture - Part 1

Lecture 25 - Business Models and Reference Architecture for IIoT: Reference Architecture - Part 2

Lecture 26 - Key Enablers of Industrial IoT: Sensing - Part 1

Lecture 27 - Key Enablers of Industrial IoT: Sensing - Part 2

Lecture 28 - Key Enablers of Industrial IoT: Connectivity - Part 1

Lecture 29 - Key Enablers of Industrial IoT: Connectivity - Part 2

Lecture 30 - Key Enablers of Industrial IoT: Connectivity - Part 3

Lecture 31 - Key Enablers of Industrial IoT: Connectivity - Part 4

Lecture 32 - Key Enablers of Industrial IoT: Connectivity - Part 5

Lecture 33 - Key Enablers of Industrial IoT: Processing - Part 1

Lecture 34 - Key Enablers of Industrial IoT: Processing - Part 2

Lecture 35 - Key Enablers of Industrial IoT: Process Control

Lecture 36 - IIoT Analytics and Data Management: Introduction

Lecture 37 - IIoT Analytics and Data Management: Machine Learning and Data Science - Part 1

Lecture 38 - IIoT Analytics and Data Management: Machine Learning and Data Science - Part 2

Lecture 39 - IIoT Analytics and Data Management: Cloud Computing in IIoT - Part 1

Lecture 40 - IIoT Analytics and Data Management: Cloud Computing in IIoT - Part 2

Lecture 41 - Analytics and Data Management: Fog Computing in IIoT

Lecture 42 - IIoT Analytics and Data Management: Tutorial for R and Julia Programming

Lecture 43 - IIoT Analytics and Data Management: Data Management with Hadoop

Lecture 44 - IIoT Analytics and Data Management: Data Center Networks

Lecture 45 - Advanced Technologies: Software-Defined Networking (SDN) in IIoT - Part 1

Lecture 46 - Advanced Technologies: Software-Defined Networking (SDN) in IIoT - Part 2

Lecture 47 - Advanced Technologies: Security in IIoT - Part 1

Lecture 48 - Advanced Technologies: Security in IIoT - Part 2

Lecture 49 - IIoT Applications: Factories and Assembly Line

Lecture 50 - IIoT Applications: Food Industry

Lecture 51 - IIoT Applications: Inventory Management and Quality Control

Lecture 52 - IIoT Applications: Plant Security and Safety

Lecture 53 - IIoT Applications: Facility Management

Lecture 54 - IIoT Applications: Oil, Chemical and Pharmaceutical Industry

Lecture 55 - IIoT Applications: UAVs in Industries

Lecture 56 - IIoT Applications: Oil, Chemical and Pharmaceutical Industry

Lecture 57 - IIoT Applications: UAVs in Industries

Lecture 58 - Case Studies for Industry 4.0 and IIoT

Lecture 59 - Milk Processing and Packaging Industries

Lecture 60 - Manufacturing Industries - Part I

Lecture 61 - Manufacturing Industries - Part II

Lecture 62 - Student Projects - Part I

Lecture 63 - Student Projects - Part II

Lecture 64 - Virtual Reality Lab

Lecture 65 - Steel Technology Lab

NPTEL : NOC:Introduction to Automata, Languages and Computation (Computer Science and Engineering)

Co-ordinators : Prof. Sourav Mukhopadhyay

Lecture 1 - Deterministic Finite Automata (DFA)

Lecture 2 - Input alphabet

Lecture 3 - Extended transition function

Lecture 4 - Language of DFA

Lecture 5 - Building DFA

Lecture 6 - Building DFA (Continued...)

Lecture 7 - NFA (Nondeterministic Finite Automata)

Lecture 8 - Language of a NFA

Lecture 9 - Equivalence of DFAs and NFAs

Lecture 10 - Subset Construction

Lecture 11 - ÃÂµ-NFA

Lecture 12 - Extended transition function of NFA

Lecture 13 - Language of NFA

Lecture 14 - NFA to NFA

Lecture 15 - NFA to DFA

Lecture 16 - Regular expression

Lecture 17 - Regular expression (Continued...)

Lecture 18 - More on regular expression

Lecture 19 - Equivalence of NFA and regular expression

Lecture 20 - Equivalence of NFA and regular expression (Continued...)

Lecture 21 - DFA to Regular expression

Lecture 22 - DFA to Regular expression (Continued...)

Lecture 23 - Construction of regular expression from a DFA (example)

Lecture 24 - Closure properties of Regular Set

Lecture 25 - Closure properties of Regular Set (Continued...)

Lecture 26 - Substitution

Lecture 27 - Pumping Lemma

Lecture 28 - Application of the pumping lemma

Lecture 29 - More on Pumping lemma

Lecture 30 - Ardens Theorem

Lecture 31 - Minimization of FA

Lecture 32 - Minimization of FA (Continued...)

Lecture 33 - Two way FA

Lecture 34 - Finite automata with output

Lecture 35 - Equivalence of Moore and Mealy machine

Lecture 36 - Context free grammars (CFG)

Lecture 37 - Context free language (CFL)

Lecture 38 - More example on CFL

Lecture 39 - More on CFG

Lecture 40 - Derivation Tree/Parse Tree

Lecture 41 - Leftmost and Rightmost derivations

Lecture 42 - Ambiguity in CFG

Lecture 43 - Simplification of CFG

Lecture 44 - Algorithms to construct reduced grammar

Lecture 45 - Elimination of Null and Unit productions

Lecture 46 - Chomsky Normal Form (CNF)

Lecture 47 - Greibach Normal Form (GNF)

Lecture 48 - Pushdown Automata (PDA)

Lecture 49 - Language accepted by PDA

Lecture 50 - Example of a language accepted by PDA

Lecture 51 - Deterministic PDA

Lecture 52 - Equivalence of language accepted

Lecture 53 - Equivalence PDA

Lecture 54 - Equivalence PDA and CFL

Lecture 55 - Equivalence PDA and CFL (Continued...)

Lecture 56 - Relationship between regular language and CFL

Lecture 57 - Pumping lemma for CFLs

Lecture 58 - Closer properties of CFLs

Lecture 59 - Turning Machine

Lecture 60 - Language accepted by a Turning machine

NPTEL : NOC:Operating System Fundamentals (Computer Science and Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Operating System Structures

Lecture 8 - Operating System Structures (Continued...)

Lecture 9 - Operating System Structures (Continued...)

Lecture 10 - Operating System Structures (Continued...)

Lecture 11 - Operating System Structures (Continued...)

Lecture 12 - Processes

Lecture 13 - Processes (Continued...)

Lecture 14 - Processes (Continued...)

Lecture 15 - Processes (Continued...)

Lecture 16 - Processes (Continued...)

Lecture 17 - Processes (Continued...)

Lecture 18 - Processes (Continued...)

Lecture 19 - Threads

Lecture 20 - Threads (Continued...)

Lecture 21 - Threads (Continued...)

Lecture 22 - Threads (Continued...)

Lecture 23 - Threads, Scheduling

Lecture 24 - Scheduling

Lecture 25 - Scheduling (Continued...)

Lecture 26 - Scheduling (Continued...)

Lecture 27 - Scheduling (Continued...)

Lecture 28 - Scheduling (Continued...)

Lecture 29 - Process Synchronization

Lecture 30 - Process Synchronization (Continued...)

Lecture 31 - Process Synchronization (Continued...)

Lecture 32 - Process Synchronization (Continued...)

Lecture 33 - Process Synchronization (Continued...)

Lecture 34 - Process Synchronization (Continued...)

Lecture 35 - Synchronization Examples

Lecture 36 - Synchronization Examples, Deadlock

Lecture 37 - Deadlock

Lecture 38 - Deadlock (Continued...)

Lecture 39 - Deadlock (Continued...)

Lecture 40 - Deadlock (Continued...)

Lecture 41 - Memory Management

Lecture 42 - Memory Management (Continued...)

Lecture 43 - Memory Management (Continued...)

Lecture 44 - Memory Management (Continued...)

Lecture 45 - Memory Management (Continued...)

Lecture 46 - Memory Management (Continued...)

Lecture 47 - Memory Management (Continued...)

Lecture 48 - Memory Management (Continued...)

Lecture 49 - Virtual Memory

Lecture 50 - Virtual Memory (Continued...)

Lecture 51 - Virtual Memory (Continued...)

Lecture 52 - Virtual Memory (Continued...)

Lecture 53 - Virtual Memory (Continued...)

Lecture 54 - Virtual Memory (Continued...)

Lecture 55 - Virtual Memory (Continued...)

Lecture 56 - Virtual Memory (Continued...)

Lecture 57 - File System and Secondary Storage

Lecture 58 - File System and Secondary Storage (Continued...)

Lecture 59 - File System and Secondary Storage (Continued...)

Lecture 60 - File System and Secondary Storage (Continued...)

NPTEL : NOC:Deep Learning (Prof. P.K. Biswas) (Computer Science and Engineering)

Co-ordinators : Prof. P.K. Biswas

Lecture 1 - Introduction

Lecture 2 - Feature Descriptor - I

Lecture 3 - Feature Descriptor - II

Lecture 4 - Bayesian Learning - I

Lecture 5 - Bayesian Learning - II

Lecture 6 - Discriminant Function - I

Lecture 7 - Discriminant Function - II

Lecture 8 - Discriminant Function - III

Lecture 9 - Linear Classifier - I

Lecture 10 - Linear Classifier - II

Lecture 11 - Support Vector Machine - I

Lecture 12 - Support Vector Machine - II

Lecture 13 - Linear Machine

Lecture 14 - Multiclass Support Vector Machine - I

Lecture 15 - Multiclass Support Vector Machine - II

Lecture 16 - Optimization

Lecture 17 - Optimization Techniques in Machine Learning

Lecture 18 - Nonlinear Functions

Lecture 19 - Introduction to Neural Network

Lecture 20 - Neural Network - II

Lecture 21 - Multilayer Perceptron - I

Lecture 22 - Multilayer Perceptron - II

Lecture 23 - Backpropagation Learning

Lecture 24 - Loss Function

Lecture 25 - Backpropagation Learning- Example - I

Lecture 26 - Backpropagation Learning- Example - II

Lecture 27 - Backpropagation Learning- Example - III

Lecture 28 - Autoencoder

Lecture 29 - Autoencoder Vs PCA - I

Lecture 30 - Autoencoder Vs PCA - II

Lecture 31 - Autoencoder Training

Lecture 32 - Autoencoder Variants - I

Lecture 33 - Autoencoder Variants - II

Lecture 34 - Convolution

Lecture 35 - Cross Correlation

Lecture 36 - CNN Architecture

Lecture 37 - MLP versus CNN, Popular CNN Architecture: LeNet

Lecture 38 - Popular CNN Architecture: AlexNet

Lecture 39 - Popular CNN Architecture: VGG16, Transfer Learning

Lecture 40 - Vanishing and Exploding Gradient

Lecture 41 - GoogleNet

Lecture 42 - ResNet, Optimisers: Momentum Optimiser

Lecture 43 - Optimisers: Momentum and Nesterov Accelerated Gradient (NAG) Optimiser

Lecture 44 - Optimisers: Adagrad Optimiser

Lecture 45 - Optimisers: RMSProp, AdaDelta and Adam Optimiser

Lecture 46 - Normalization

Lecture 47 - Batch Normalization - I

Lecture 48 - Batch Normalization - II

Lecture 49 - Layer, Instance, Group Normalization

Lecture 50 - Training Trick, Regularization,Early Stopping

Lecture 51 - Face Recognition

Lecture 52 - Deconvolution Layer

Lecture 53 - Semantic Segmentation - I

Lecture 54 - Semantic Segmentation - II

Lecture 55 - Semantic Segmentation - III

Lecture 56 - Image Denoising

Lecture 57 - Variational Autoencoder - I

Lecture 58 - Variational Autoencoder - II

Lecture 59 - Variational Autoencoder - III

Lecture 60 - Generative Adversarial Network

NPTEL : NOC:Computer Vision (Computer Science and Engineering)

Co-ordinators : Prof. Jayanta Mukhopadhyay

Lecture 1 - Fundamentals of Image Processing - Part I

Lecture 2 - Fundamentals of Imagr Processing - Part II

Lecture 3 - Image Transform - Part I

Lecture 4 - Image Transform - Part II

Lecture 5 - Projective Geometry - Part I

Lecture 6 - Projective Geometry - Part II

Lecture 7 - Projective Transformation

Lecture 8 - Homography: Properties - Part I

Lecture 9 - Homography: Properties - Part II

Lecture 10 - Homography: Properties - Part III

Lecture 11 - Camera Geometry - Part I

Lecture 12 - Camera Geometry - Part II

Lecture 13 - Camera Geometry - Part III

Lecture 14 - Camera Geometry - Part IV

Lecture 15 - Camera Geometry - Part V

Lecture 16 - Stereo Geometry - Part I

Lecture 17 - Stereo Geometry - Part II

Lecture 18 - Stereo Geometry - Part III

Lecture 19 - Stereo Geometry - Part IV

Lecture 20 - Stereo Geometry - Part V

Lecture 21 - Stereo Geometry - Part VI

Lecture 22 - Stereo Geometry - Part VII

Lecture 23 - Stereo Geometry - Part VIII

Lecture 24 - Feature Detection And Description - Part I

Lecture 25 - Feature Detection And Description - Part II

Lecture 26 - Feature Detection And Description - Part III

Lecture 27 - Feature Detection And Description - Part IV

Lecture 28 - Feature Detection And Description - Part V

Lecture 29 - Feature Matching And Model Fitting- Part I

Lecture 30 - Feature Matching And Model Fitting- Part II

Lecture 31 - Feature Matching And Model Fitting- Part III

Lecture 32 - Feature Matching And Model Fitting- Part IV

Lecture 33 - Feature Matching And Model Fitting- Part V

Lecture 34 - Color Fundamentals And Processing-Part I

Lecture 35 - Color Fundamentals And Processing-Part II

Lecture 36 - Color Fundamentals And Processing-Part III

Lecture 37 - Color Fundamentals And Processing-Part IV

Lecture 38 - Color Fundamentals And Processing-Part V

Lecture 39 - Color Fundamentals And Processing-Part VI

Lecture 40 - Color Fundamentals And Processing-Part VII

Lecture 41 - Range Image Processing - Part I

Lecture 42 - Range Image Processing - Part II

Lecture 43 - Range Image Processing - Part III

Lecture 44 - Range Image Processing - Part IV

Lecture 45 - Range Image Processing - Part V

Lecture 46 - Clustering and Classification - Part I

Lecture 47 - Clustering and Classification - Part II

Lecture 48 - Clustering and Classification - Part III

Lecture 49 - Clustering and Classification - Part IV

Lecture 50 - Clustering and Classification - Part V

Lecture 51 - Dimensional Reduction And Sparse Representation - Part I

Lecture 52 - Dimensional Reduction And Sparse Representation - Part II

Lecture 53 - Dimensional Reduction And Sparse Representation - Part III

Lecture 54 - Dimensional Reduction And Sparse Representation - Part IV

Lecture 55 - Deep Neural Architecture And Applications - Part I

Lecture 56 - Deep Neural Architecture And Applications - Part II

Lecture 57 - Deep Neural Architecture And Applications - Part III

Lecture 58 - Deep Neural Architecture And Applications - Part IV

Lecture 59 - Deep Neural Architecture And Applications - Part V

Lecture 60 - Deep Neural Architecture And Applications - Part VI

NPTEL : NOC:Ethical Hacking (Computer Science and Engineering)

Co-ordinators : Prof. Indranil Sengupta

Lecture 1 - Introduction to Ethical Hacking

Lecture 2 - Basic Concepts of Networking - Part I

Lecture 3 - Basic Concepts of Networking - Part II

Lecture 4 - TCP/IP Protocol Stack - Part I

Lecture 5 - TCP/IP Protocol Stack - Part II

Lecture 6 - IP addressing and routing - Part I

Lecture 7 - IP addressing and routing - Part II

Lecture 8 - TCP and UDP - Part I

Lecture 9 - TCP and UDP - Part II

Lecture 10 - IP subnetting

Lecture 11 - Routing protocols - Part I

Lecture 12 - Routing protocols - Part II

Lecture 13 - Routing protocols - Part III

Lecture 14 - IP version 6

Lecture 15 - Routing examples

Lecture 16 - Demonstration - Part I

Lecture 17 - Demonstration - Part II

Lecture 18 - Demonstration - Part III

Lecture 19 - Nessus Installation

Lecture 20 - How to use nessus

Lecture 21 - Metasploit Exploiting System Software - I

Lecture 22 - Metasploit Exploiting System Software - II

Lecture 23 - Metasploit Exploiting System Software and Privilege

Lecture 24 - Metasploit Social Eng Attack

Lecture 25 - MITM (Man in The middle) Attack

Lecture 26 - Basic concepts of cryptography

Lecture 27 - Private-key cryptography - Part I

Lecture 28 - Private-key cryptography - Part II

Lecture 29 - Public-key cryptography - Part I

Lecture 30 - Public-key cryptography - Part II

Lecture 31 - Cryptographic hash functions - Part I

Lecture 32 - Cryptographic hash functions - Part II

Lecture 33 - Digital signature and certificate

Lecture 34 - Applications - Part I

Lecture 35 - Applications - Part II

Lecture 36 - Steganography

Lecture 37 - Biometrics

Lecture 38 - Network Based Attacks - Part I

Lecture 39 - Network Based Attacks - Part II

Lecture 40 - DNS and Email Security

Lecture 41 - Password cracking

Lecture 42 - Phishing attack

Lecture 43 - Maloeware

Lecture 44 - Wifi hacking

Lecture 45 - Dos and DDos attack

Lecture 46 - Elements of Hardware Security

Lecture 47 - Side Channel Attacks - Part I

Lecture 48 - Side Channel Attacks - Part II

Lecture 49 - Physical Unclonable Function

Lecture 50 - Hardware Trojan

Lecture 51 - Web Application Vulnerability Scanning

Lecture 52 - SQL Injection Authentication Bypass - Part 1

Lecture 53 - SQL Injection Error Based - Part 2

Lecture 54 - SQL Injection Error Based from Web Application - Part 3

Lecture 55 - SQLMAP

Lecture 56 - Cross Site Scripting

Lecture 57 - File Upload Vulnerability

Lecture 58 - The NMAP Tool: A Relook - Part I

Lecture 59 - The NMAP Tool: A Relook - Part II

Lecture 60 - The NMAP Tool: A Relook - Part III

Lecture 61 - Network Analysis using Wireshark

Lecture 62 - Summarization of the Course

NPTEL : NOC:Software Project Management (Computer Science and Engineering)

Co-ordinators : Prof. Durga Prasad Mohapatra

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Introduction - III

Lecture 4 - Project Management Standards

Lecture 5 - Life Cycle Models - I

Lecture 6 - Life Cycle Models - II

Lecture 7 - Life Cycle Models - III

Lecture 8 - Life Cycle Models - IV

Lecture 9 - Life Cycle Models - V

Lecture 10 - Life Cycle Models - VI

Lecture 11 - Project Evaluation and Programme Management

Lecture 12 - Project Evaluation and Programme Management (Continued...)

Lecture 13 - Project Evaluation and Programme Management (Continued...)

Lecture 14 - Project Evaluation and Programme Management (Continued...)

Lecture 15 - Project Evaluation and Programme Management (Continued...)

Lecture 16 - Project Estimation Techniques

Lecture 17 - Project Estimation Techniques (Continued...)

Lecture 18 - Project Estimation Techniques (Continued...)

Lecture 19 - Project Estimation Techniques (Continued...)

Lecture 20 - Project Estimation Techniques (Continued...)

Lecture 21 - Project Estimation Techniques (Continued...)

Lecture 22 - Project Estimation Techniques (Continued...)

Lecture 23 - Project Estimation Techniques (Continued...)

Lecture 24 - Project Estimation Techniques (Continued...)

Lecture 25 - Project Estimation Techniques (Continued...)

Lecture 26 - Project Scheduling

Lecture 27 - Project Scheduling Using PERT/CPM

Lecture 28 - Project Scheduling Using PERT/CPM (Continued...)

Lecture 29 - Computation of Project Characteristics Using PERT/CPM

Lecture 30 - Computation of Project Characteristics Using PERT/CPM: Illustration

Lecture 31 - PERT, Project Crashing

Lecture 32 - Team Management

Lecture 33 - Organization and Team Structure

Lecture 34 - Team Structure (Continued...) and Risk Management

Lecture 35 - Risk Management (Continued...) and Introduction to Software Quality

Lecture 36 - Resource Allocation

Lecture 37 - Resource Allocation (Continued...)

Lecture 38 - Resource Allocation (Continued...)

Lecture 39 - Project Monitoring and Control

Lecture 40 - Project Monitoring and Control (Continued...)

Lecture 41 - Project Monitoring and Control (Continued...)

Lecture 42 - Project Monitoring and Control (Continued...)

Lecture 43 - Project Monitoring and Control (Continued...)

Lecture 44 - Project Monitoring and Control (Continued...)

Lecture 45 - Project Monitoring and Control (Continued...)

Lecture 46 - Project Monitoring and Control (Continued...)

Lecture 47 - Project Monitoring and Control (Continued...)

Lecture 48 - Contract Management

Lecture 49 - Contract Management (Continued...)

Lecture 50 - Project Close Out

Lecture 51 - Software Quality Management

Lecture 52 - ISO 9000

Lecture 53 - ISO 9001, SEI CMM

Lecture 54 - SEI CMM (Continued...)

Lecture 55 - SEI CMM (Continued...)

Lecture 56 - Personal Software Process (PSP)

Lecture 57 - Software Reliability - I

Lecture 58 - Software Reliability - II

Lecture 59 - Software Reliability - III

Lecture 60 - Software Testing

NPTEL : NOC:Spatial Informatics (Computer Science and Engineering)

Co-ordinators : Prof. Soumya Kanti Ghosh

Lecture 1 - Introduction

Lecture 2 - Spatial Data Models - 1

Lecture 3 - Spatial Data Models - 2

Lecture 4 - Spatial Data Models - 3

Lecture 5 - Spatial Data Models - 4

Lecture 6 - Spatial Web Services - 1

Lecture 7 - Spatial Web Services - 2

Lecture 8 - Spatial Web Services - 3

Lecture 9 - Spatial Web Services - 4

Lecture 10 - Spatial Web Services - Demo

Lecture 11 - Spatial Database: An Overview

Lecture 12 - Spatial Query Processing / SQL - 1

Lecture 13 - Spatial Query Processing / SQL - 2

Lecture 14 - Spatial Query Processing / SQL - 3

Lecture 15 - Spatial Query Processing / SQL - 4

Lecture 16 - Spatial Query Demo Tutorial

Lecture 17 - Spatial Indexing - I

Lecture 18 - Spatial Indexing - II

Lecture 19 - Spatial Indexing - III

Lecture 20 - Spatial Indexing - IV

Lecture 21 - Spatial Networks - I

Lecture 22 - Spatial Networks - II

Lecture 23 - Spatial Networks - III

Lecture 24 - Spatial Networks - IV

Lecture 25 - Spatial Networks - V

Lecture 26 - Spatial Analysis - I

Lecture 27 - Spatial Analysis - II

Lecture 28 - Spatial Analysis - III

Lecture 29 - Spatial Analysis - IV

Lecture 30 - Spatial Analysis - V

Lecture 31 - Remote Sensing and GIS - I

Lecture 32 - Remote Sensing and GIS - II

Lecture 33 - Remote Sensing and GIS - III

Lecture 34 - Remote Sensing and GIS - IIV

Lecture 35 - Remote Sensing and GIS - V

Lecture 36 - SDS / Spatial Cloud / GeoViz - I

Lecture 37 - SDS / Spatial Cloud / GeoViz - II

Lecture 38 - SDS / Spatial Cloud / GeoViz - III

Lecture 39 - SDS / Spatial Cloud / GeoViz - IV

Lecture 40 - SDS / Spatial Cloud / GeoViz - V

NPTEL : NOC:GPU Architectures and Programming (Computer Science and Engineering)

Co-ordinators : Prof. Soumyajit Dey

Lecture 1 - Review of basic COA w.r.t. performance

Lecture 2 - Review of basic COA w.r.t. performance

Lecture 3 - Review of basic COA w.r.t. performance

Lecture 4 - Review of basic COA w.r.t. performance

Lecture 5 - Intro to GPU architectures

Lecture 6 - Intro to GPU architectures

Lecture 7 - Intro to GPU architectures

Lecture 8 - Intro to GPU architectures

Lecture 9 - Intro to CUDA programming

Lecture 10 - Intro to CUDA programming (Continued...)

Lecture 11 - Intro to CUDA programming (Continued...)

Lecture 12 - Intro to CUDA programming (Continued...)

Lecture 13 - Multi-dimensional mapping of dataspace; Synchronization

Lecture 14 - Multi-dimensional mapping of dataspace; Synchronization (Continued...)

Lecture 15 - Multi-dimensional mapping of dataspace; Synchronization (Continued...)

Lecture 16 - Warp Scheduling and Divergence

Lecture 17 - Warp Scheduling and Divergence (Continued...)

Lecture 18 - Warp Scheduling and Divergence (Continued...)

Lecture 19 - Memory Access Coalescing

Lecture 20 - Memory Access Coalescing (Continued...)

Lecture 21 - Memory Access Coalescing (Continued...)

Lecture 22 - Memory Access Coalescing (Continued...)

Lecture 23 - Memory Access Coalescing (Continued...)

Lecture 24 - Memory Access Coalescing (Continued...)

Lecture 25 - Memory Access Coalescing (Continued...)

Lecture 26 - Memory Access Coalescing (Continued...)

Lecture 27 - Memory Access Coalescing (Continued...)

Lecture 28 - Optimizing Reduction Kernels

Lecture 29 - Optimizing Reduction Kernels (Continued...)

Lecture 30 - Optimizing Reduction Kernels (Continued...)

Lecture 31 - Optimizing Reduction Kernels (Continued...)

Lecture 32 - Optimizing Reduction Kernels (Continued...)

Lecture 33 - Optimizing Reduction Kernels (Continued...)

Lecture 34 - Optimizing Reduction Kernels (Continued...)

Lecture 35 - Kernel Fusion, Thread and Block Coarsening

Lecture 36 - Kernel Fusion, Thread and Block Coarsening (Continued...)

Lecture 37 - Kernel Fusion, Thread and Block Coarsening (Continued...)

Lecture 38 - Kernel Fusion, Thread and Block Coarsening (Continued...)

Lecture 39 - Kernel Fusion, Thread and Block Coarsening (Continued...)

Lecture 40 - Kernel Fusion, Thread and Block Coarsening (Continued...)

Lecture 41 - OpenCL - Runtime System

Lecture 42 - OpenCL - Runtime System (Continued...)

Lecture 43 - OpenCL - Runtime System (Continued...)

Lecture 44 - OpenCL - Runtime System (Continued...)

Lecture 45 - OpenCL - Runtime System (Continued...)

Lecture 46 - OpenCL - Runtime System (Continued...)

Lecture 47 - OpenCL - Runtime System (Continued...)

Lecture 48 - OpenCL - Heterogeneous Computing

Lecture 49 - OpenCL - Heterogeneous Computing (Continued...)

Lecture 50 - OpenCL - Heterogeneous Computing (Continued...)

Lecture 51 - OpenCL - Heterogeneous Computing (Continued...)

Lecture 52 - OpenCL - Heterogeneous Computing (Continued...)

Lecture 53 - OpenCL - Heterogeneous Computing (Continued...)

Lecture 54 - Efficient Neural Network Training/Inferencing

Lecture 55 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 56 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 57 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 58 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 59 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 60 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 61 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 62 - Efficient Neural Network Training/Inferencing (Continued...)

Lecture 63 - Efficient Neural Network Training/Inferencing (Continued...)

NPTEL : NOC:Google Cloud Computing Foundation Course (Computer Science and Engineering)

Co-ordinators : Prof. Soumya Kanti Ghosh

Lecture 1 - Introduction to Cloud

Lecture 2 - Cloud Computing

Lecture 3 - Cloud vs Traditional Architecture

Lecture 4 - Iaas, PaaS and SaaS

Lecture 5 - Google Cloud Architecture

Lecture 6 - Cloud Computing Recap Quiz

Lecture 7 - Summary - Cloud Computing

Lecture 8 - Introduction - Start with a Solid Platform

Lecture 9 - The GCP Console

Lecture 10 - Understanding Projects

Lecture 11 - Billing in GCP

Lecture 12 - Install and Configure Cloud SDK

Lecture 13 - Use Cloud Shell

Lecture 14 - GCP APIs

Lecture 15 - Cloud Console Mobile App

Lecture 16 - Recap Quiz - Start with a Solid Foundation

Lecture 17 - Introduction

Lecture 18 - Compute Options in the Cloud

Lecture 19 - Exploring IaaS with Compute Engine

Lecture 20 - Configuring Elastic Apps with Autoscaling

Lecture 21 - Exploring PaaS with App Engine

Lecture 22 - Event Driven Programs with Cloud Functions

Lecture 23 - Containerizing and Orchestrating Apps with GKE

Lecture 24 - Summary

Lecture 25 - Introduction

Lecture 26 - Storage Options in the Cloud

Lecture 27 - Structured and Unstructured Storage in the Cloud

Lecture 28 - Unstructured Storage using Cloud Storage

Lecture 29 - SQL Managed Services

Lecture 30 - Exploring Cloud SQL

Lecture 31 - Cloud Spanner as a Managed Service

Lecture 32 - NoSQL Managed Services Options

Lecture 33 - Cloud Datastore a NoSQL Document Store

Lecture 34 - Cloud Bigtable as a NoSQL Option

Lecture 35 - Summary

Lecture 36 - Introduction to API

Lecture 37 - The Purpose of APIs

Lecture 38 - Cloud Endpoints

Lecture 39 - Using Apigee

Lecture 40 - Managed Message Services

Lecture 41 - Cloud Pub/Sub

Lecture 42 - Recap Quiz - There's an API for that!

Lecture 43 - Introduction - Cloud Security

Lecture 44 - Introduction to security in the cloud

Lecture 45 - Understanding the shared security model

Lecture 46 - Explore encryption options

Lecture 47 - Understand authentication and authorization

Lecture 48 - Identify best practices for authorization

Lecture 49 - Recap Quiz - Security

Lecture 50 - Summary - Security

Lecture 51 - Introduction

Lecture 52 - Intro to Networking in the Cloud

Lecture 53 - Defining a Virtual Private Cloud

Lecture 54 - Public and Private IP Address Basics

Lecture 55 - Googles Network Architecture

Lecture 56 - Routes and Firewall Rules in the Cloud

Lecture 57 - Multiple VPC Networks

Lecture 58 - Building Hybrid Clouds

Lecture 59 - Different Options for Load Balancing

Lecture 60 - Recap Quiz

Lecture 61 - Summary

Lecture 62 - Introduction - Let Google keep an eye on things

Lecture 63 - Introduction to IaC

Lecture 64 - Cloud Deployment Manager

Lecture 65 - Monitoring and Managing Your Services, Apps, and Infra

Lecture 66 - Stackdriver

Lecture 67 - Recap Quiz - Let Google keep an eye on things

Lecture 68 - Summary - Let Google keep an eye on things

Lecture 69 - Introduction - You have the data, but what are you doing with it?

Lecture 70 - Intro to Big Data Managed Services in the Cloud

Lecture 71 - Leverage Big Data Operations with Cloud Dataproc

Lecture 72 - Build ETL Pipelines using Cloud Dataflow

Lecture 73 - BigQuery Googles Enterprise Data Warehouse

Lecture 74 - Recap Quiz - You have the data, but what are you doing with it?

Lecture 75 - Summary - You have the data, but what are you doing with it?

Lecture 76 - Introduction

Lecture 77 - Introduction to ML

Lecture 78 - ML and GCP

Lecture 79 - Building Bespoke ML models

Lecture 80 - Cloud AutoML

Lecture 81 - Googles Pre-trained ML APIs

Lecture 82 - Recap Quiz

Lecture 83 - Summary

NPTEL : NOC:Object Oriented System Development using UML, Java and Patterns (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction

Lecture 2 - Basic Concepts in UML

Lecture 3 - Introduction to Use case Modelling

Lecture 4 - Factoring Use Cases

Lecture 5 - Use Case Examples

Lecture 6 - Use Case Guidelines

Lecture 7 - Class Diagram

Lecture 8 - Class Relations

Lecture 9 - Binary and Unary Associations

Lecture 10 - Implementation of Association Relation in Java

Lecture 11 - Implementation of Association in General Case

Lecture 12 - Association Class and Ternary Association

Lecture 13 - Qualified Association

Lecture 14 - Aggregation and Composition

Lecture 15 - Dependency Relation

Lecture 16 - Class Diagram Exercises

Lecture 17 - Interfaces, Packages and Abstract Classes

Lecture 18 - Polymorphism

Lecture 19 - State Machine Diagrams

Lecture 20 - State Charts Overview

Lecture 21 - Features of State Machine Model

Lecture 22 - Example of State Machine Modelling

Lecture 23 - Encoding a State Machine - I

Lecture 24 - Encoding a State Machine - II

Lecture 25 - Interaction Diagrams

Lecture 26 - Sequence Diagram - I

Lecture 27 - Sequence Diagram - II

Lecture 28 - Activity Diagram

Lecture 29 - Introduction to OOAD

Lecture 30 - OOAD - I

Lecture 31 - OOAD - II

Lecture 32 - Example Application of OOAD

Lecture 33 - CRD Cards

Lecture 34 - Open/Closed Principle

Lecture 35 - LSP, ISP Principles

Lecture 36 - DIP Principle

Lecture 37 - Introduction to Design Pattern

Lecture 38 - GRASP Pattern: Introduction

Lecture 39 - Expert and Creator Pattern

Lecture 40 - Pure Fabrication, Law of Demeter

Lecture 41 - Introduction to GOF Patterns

Lecture 42 - Facade Pattern

Lecture 43 - Observer Pattern - I

Lecture 44 - Observer Pattern - II

Lecture 45 - Singleton Pattern - I

Lecture 46 - Singleton Pattern - II

Lecture 47 - State Pattern - I

Lecture 48 - State Pattern - II

Lecture 49 - Composite Pattern - I

Lecture 50 - Composite Pattern - II

Lecture 51 - Adapter Pattern - I

Lecture 52 - Adapter Pattern - II

Lecture 53 - Bridge Pattern - I

Lecture 54 - Bridge Pattern - II

Lecture 55 - Proxy Pattern - I

Lecture 56 - Proxy Pattern - II

Lecture 57 - Decorator Pattern - I

Lecture 58 - Decorator Pattern - II

Lecture 59 - Decorator Pattern - III

Lecture 60 - Iterator Pattern

NPTEL : NOC:Data Structure and Algorithms using Java (Computer Science and Engineering)

Co-ordinators : Prof. Debasis Samanta

Lecture 1 - Introduction and Course Plan

Lecture 2 - Generic Methods

Lecture 3 - Basics of Generic Class

Lecture 4 - Parameterized Generic Class

Lecture 5 - Bounded Argument Generic Class

Lecture 6 - Basics of the Framework

Lecture 7 - Collection in JCF

Lecture 8 - Set of JCF

Lecture 9 - Map Framework

Lecture 10 - Java Legacy Classes

Lecture 11 - Array Data Structures

Lecture 12 - Programming for Arrays

Lecture 13 - Class ArrayList for Arrays

Lecture 14 - Arrays for Arrays

Lecture 15 - Vector Class for Arrays

Lecture 16 - Linked List Data Structure - Part I

Lecture 17 - Linked List Data Structure - Part II

Lecture 18 - Programming for Linked Lists - Part I

Lecture 19 - Programming for Linked Lists - Part II

Lecture 20 - Linked Lists Using JCF

Lecture 21 - Stack Data Structures

Lecture 22 - Programming for Stack

Lecture 23 - Stack Using JCF

Lecture 24 - Queue Data Structure

Lecture 25 - Programming for Queue

Lecture 26 - Queue Using JCF

Lecture 27 - Understanding Tree Data Structures

Lecture 28 - Operations on Binary Tree Data Structures

Lecture 29 - Binary Search Tree

Lecture 30 - Programming for Binary Search Tree

Lecture 31 - Height Balanced Binary Search Tree

Lecture 32 - Heap Tree

Lecture 33 - Programming for Heap Tree

Lecture 34 - Huffman Tree

Lecture 35 - Graph Structures

Lecture 36 - Graph Algorithms

Lecture 37 - Map Framework in Java

Lecture 38 - Applications of Map - Part I

Lecture 39 - Applications of Map - Part II

Lecture 40 - Collection Set

Lecture 41 - Operations on Set Collection

Lecture 42 - Introduction to java.io

Lecture 43 - IO with Byte Streams

Lecture 44 - IO with Character Streams

Lecture 45 - File Input-Output

Lecture 46 - Random Access File

Lecture 47 - Linear Searching Algorithms

Lecture 48 - Non-linear Searching Algorithms

Lecture 49 - Programs for Searching

Lecture 50 - Sorting Algorithms - Part I

Lecture 51 - Improved Sorting Algorithms

Lecture 52 - Advanced Sorting Algorithms

Lecture 53 - Programs for Sorting - Part I

Lecture 54 - Programs for Sorting - Part II

Lecture 55 - Sorting Using JCF

Lecture 56 - String Class

Lecture 57 - Applications of String

Lecture 58 - StringBuffer Class

Lecture 59 - Miscellaneous Utilities

Lecture 60 - Java Cursors

NPTEL : NOC:Real-Time Systems (Computer Science and Engineering)

Co-ordinators : Prof. Rajib Mall

Lecture 1 - Introduction

Lecture 2 - Introduction

Lecture 3 - Characteristics of a real-time embedded system

Lecture 4 - Characteristics of a real-time embedded system

Lecture 5 - Types of real-time tasks

Lecture 6 - Events in a Real-Time System

Lecture 7 - Types of time constraints

Lecture 8 - Basics of Real-Time Task scheduling

Lecture 9 - Clock-driven schedulers

Lecture 10 - Basics of Cyclic schedulers

Lecture 11 - Cyclic Scheduler

Lecture 12 - Frame size constraints

Lecture 13 - Frame size selection: Examples

Lecture 14 - Event-driven scheduling

Lecture 15 - EDF scheduler

Lecture 16 - Variants of EDF and Rate Monotonic Scheduling

Lecture 17 - Rate Monotonic Schedulability Analysis

Lecture 18 - Rate Monotonic Schedulability Analysis

Lecture 19 - Rate Monotonic Scheduling: Miscellaneous issues

Lecture 20 - RMS Generalizations

Lecture 21 - RMS Generalizations

Lecture 22 - Handling aperiodic and sporadic tasks in rate monotonic scheduling

Lecture 23 - Handling aperiodic and sporadic tasks in rate monotonic scheduling

Lecture 24 - Coping up with Insufficient number of priorities

Lecture 25 - Handling task jitter and precedence ordering

Lecture 26 - Resource Sharing Among Real-Time Tasks

Lecture 27 - Basic priority inheritance protocol (PIP)

Lecture 28 - Highest Locker Protocol (HLP)

Lecture 29 - Priority Ceiling Protocol (PCP)

Lecture 30 - Working of Priority Ceiling Protocol

Lecture 31 - Analysis of Priority Ceiling Protocol

Lecture 32 - Introduction to Multiprocessor and Distributed Systems

Lecture 33 - Static Allocation of Tasks

Lecture 34 - Dynamic Allocation of Tasks

Lecture 35 - Centralized Clock Synchronization in Distributed RT Systems

Lecture 36 - Distributed Clock Synchronization in R-T Systems

Lecture 37 - A Few Basics in Real-Time Operating Systems

Lecture 38 - Time Services

Lecture 39 - Unix as a Real-Time Operating System

Lecture 40 - Unix as a Real-Time Operating System (Continued...)

Lecture 41 - Windows as RTOS

Lecture 42 - POSIX

Lecture 43 - Unix-Based Real-Time Operating Systems

Lecture 44 - A survey of some contemporary Real-Time Operating Systems

Lecture 45 - A survey of some contemporary Real-Time Operating Systems (Continued...)

Lecture 46 - Benchmarking Real-Time Systems

Lecture 47 - Introduction to Real-Time Communication

Lecture 48 - Basics of Real-Time Communication

Lecture 49 - Basics of Networking

Lecture 50 - Basics of Internet

Lecture 51 - Real-Time Communication in a LAN

Lecture 52 - Bounded Access Protocols for LANs

Lecture 53 - Performance Comparison and QoS Framework

Lecture 54 - Routing and Resource Reservation

Lecture 55 - Rate Control

Lecture 56 - QoS Models and Soft Real-Time Communication in a LAN

Lecture 57 - Review of Basic Database Concepts

Lecture 58 - Applications and Issues of Real-Time Database

Lecture 59 - Characteristics of Temporal Data

Lecture 60 - Locking-Based Concurrency Control In Real-Time Databases

Lecture 61 - Concurrency Control In Real-Time Databases and Commercial RT Databases

NPTEL : NOC:Algorithms for Protein Modelling and Engineering (Computer Science and Engineering)

Co-ordinators : Prof. Pralay Mitra

Lecture 1 - Introduction on Proteins

Lecture 2 - Introduction on Proteins (Continued...) and Sequence Database

Lecture 3 - Protein Data Bank

Lecture 4 - PDB Parsing

Lecture 5 - Molecular Visualization Tools

Lecture 6 - Representation and Data Structure

Lecture 7 - Digitization of a Molecule

Lecture 8 - Application to Protein Docking, FFT

Lecture 9 - Implementation Details

Lecture 10 - Hashing

Lecture 11 - Geometric Hashing

Lecture 12 - Geometric Hashing (Continued...)

Lecture 13 - Geometric Hashing (Continued...)

Lecture 14 - Molecular Surface

Lecture 15 - Genetic Algorithm (GA) for Surface Comparison

Lecture 16 - Monte Carlo (MC) Method

Lecture 17 - Monte Carlo Method (Continued...) and Random Number

Lecture 18 - Monte Carlo (MC) Method (Continued...)

Lecture 19 - Protein Folding

Lecture 20 - Protein Folding (Continued...) and Protein Design

Lecture 21 - Protein Energy Landscape

Lecture 22 - Protein Energy Landscape (Continued...), Limitation of MC

Lecture 23 - Replica Exchange Monte Carlo (REMC)

Lecture 24 - Ab Initio Protein Folding

Lecture 25 - Structure Alignment Measures

Lecture 26 - Dynamic Programming

Lecture 27 - Dynamic Programming (Continued...), Sequence Alignment

Lecture 28 - Dynamic Programming (Continued...), Position Specific Scoring Matrix (PSSM)

Lecture 29 - Structure Alignment

Lecture 30 - Structure Alignment (Continued...)

Lecture 31 - Structural Classification of Proteins (SCOP)

Lecture 32 - SCOP (Continued...), Symmetry in Proteins

Lecture 33 - Symmetry in Proteins

Lecture 34 - Discriminating Biological Protein Interfaces from Crystal Artifacts

Lecture 35 - Discriminating Biological Protein Interfaces from Crystal Artifacts (Continued...)

Lecture 36 - Discriminating Biological Protein Interfaces from Crystal Artifacts (Continued...)

Lecture 37 - Discriminating Biological Protein Interfaces from Crystal Artifacts (Continued...)

Lecture 38 - Symmetry-Based Protein Complex Modeling

Lecture 39 - Some Protein Docking Methods

Lecture 40 - Some Protein Docking Methods (Continued...)

Lecture 41 - Computational Protein Design (CPD)

Lecture 42 - Computational Protein Design (CPD) (Continued...)

Lecture 43 - Protein Design Energy Function

Lecture 44 - Protein Design Analysis

Lecture 45 - Application of Protein Design on Drug Design

Lecture 46 - RECM in Protein Design

Lecture 47 - Application of Protein Design on Drug Design

Lecture 48 - Application of Protein Design on Drug Design (Continued...), Protein Modification

Lecture 49 - Protein Modification (Continued...)

Lecture 50 - Protein Modification (Continued...)

Lecture 51 - Assigning Secondary Structure to Protein Sequence

Lecture 52 - Assigning Secondary Structure to Protein Sequence (Continued...)

Lecture 53 - Machine Learning to Predict the Secondary Structure from Amino Acid Sequences

Lecture 54 - Machine Learning to Predict the Secondary Structure from Amino Acid Sequences (Continued...)

Lecture 55 - Post Translational Modification

Lecture 56 - Predicting Protein Phosphorylation Sites

Lecture 57 - Predicting Protein Phosphorylation Sites (Continued...)

Lecture 58 - Summarizing Protein Folding and Protein Docking

Lecture 59 - Summarizing Protein Folding and Protein Docking (Continued...)

Lecture 60 - Summarizing Potein Engineering

NPTEL : NOC:Programming in Modern C++ (Computer Science and Engineering)

Co-ordinators : Prof. Partha Pratim Das

Lecture 1 - Course Outline

Lecture 2 - Quick Recap 01: Recap of C/1

Lecture 3 - Quick Recap 02: Recap of C/2

Lecture 4 - Course Overview

Lecture 5 - IO and Loop

Lecture 6 - Arrays and Strings

Lecture 7 - Sorting and Searching

Lecture 8 - Stack and Common Data Structures/Containers

Lecture 9 - Tutorial 1: How to build a C/C++ program?: Part 1: C Preprocessor (CPP)

Lecture 10 - Constants and Inline Functions

Lecture 11 - Reference and Pointer

Lecture 12 - Default Parameters and Function Overloading

Lecture 13 - Operator Overloading

Lecture 14 - Dynamic Memory Management

Lecture 15 - Tutorial 2: How to build a C/C++ program?: Part 2: Build Pipeline

Lecture 16 - Static Members

Lecture 17 - Classes and Objects

Lecture 18 - Access Specifiers

Lecture 19 - Constructors, Destructors and Object Lifetime

Lecture 20 - Copy Constructor and Copy Assignment Operator

Lecture 21 - Const-ness

Lecture 22 - Tutorial 3: How to build a C/C++ program?: Part 3: make Utility

Lecture 23 - Inheritance: Part 3 (Constructor and Destructor - Object Lifetime)

Lecture 24 - Friend Function and Friend Class

Lecture 25 - Overloading Operator for User-Defined Types: Part 1

Lecture 26 - Overloading Operator for User-Defined Types: Part 2

Lecture 27 - Namespace

Lecture 28 - Tutorial 4: How to build a C/C++ program?: Part 4: Static and Dynamic Library

Lecture 29 - Inheritance: Part 2 (Data Member and Member Function - Override and Overload)

Lecture 30 - Inheritance: Part 3 (Constructor and Destructor - Object Lifetime)

Lecture 31 - Inheritance: Part 4: Phone Hierarchy

Lecture 32 - Inheritance: Part 5: private and protected Inheritance

Lecture 33 - Tutorial 5: Mixing C and C++ Code: Part 1: Issues and Resolutions

Lecture 34 - Polymorphism: Part 1: Type Casting

Lecture 35 - Polymorphism: Part 2: Static and Dynamic Binding

Lecture 36 - Polymorphism: Part 3: Abstract Base Class

Lecture 37 - Polymorphism: Part 4: Staff Salary Processing using C

Lecture 38 - Polymorphism: Part 5: Staff Salary Processing using C++

Lecture 39 - Tutorial 6: Mixing C and C++ Code: Part 2: Project Example

Lecture 40 - Virtual Function Table

Lecture 41 - Type Casting and Cast Operators: Part 1

Lecture 42 - Type Casting and Cast Operators: Part 2

Lecture 43 - Type Casting and Cast Operators: Part 3

Lecture 44 - Multiple Inheritance

Lecture 45 - Tutorial 7: How to design a UDT like built-in types?: Part 1: Fraction UDT

Lecture 46 - Exceptions (Error handling in C): Part 1

Lecture 47 - Exceptions (Error handling in C++): Part 2

Lecture 48 - Template (Function Template): Part 1

Lecture 49 - Template (Class Template): Part 2

Lecture 50 - Functors: Function Objects

Lecture 51 - Tutorial 8: How to design a UDT like built-in types?: Part 2: Int and Poly UDT

Lecture 52 - Input-Output: File Handling in C

Lecture 53 - Input-Output: Streams in C++

Lecture 54 - C++ Standard Library: Part 1 (Generic Programming)

Lecture 55 - C++ Standard Library: Part 2 (STL)

Lecture 56 - C++ Standard Library: Part 3 (STL)

Lecture 57 - Tutorial 9: How to design a UDT like built-in types?: Part 3: Updates and Mixes of UDTs

Lecture 58 - C++11 and beyond: General Features: Part 1

Lecture 59 - C++11 and beyond: General Features: Part 2

Lecture 60 - C++11 and beyond: General Features: Part 3

Lecture 61 - C++11 and beyond: General Features: Part 4: Rvalue and Move/1

Lecture 62 - C++11 and beyond: General Features: Part 5: Rvalue and Move/2

Lecture 63 - Tutorial 10: How to optimize C++11 programs using Rvalue and Move Semantics?

Lecture 64 - C++11 and beyond: General Features: Part 6: Rvalue and Perfect Forwarding

Lecture 65 - C++11 and beyond: General Features: Part 7: Lambda in C++/1

Lecture 66 - C++11 and beyond: General Features: Part 8: Lambda in C++/2

Lecture 67 - C++11 and beyond: Class Features

Lecture 68 - C++11 and beyond: Non-class Types and Template Features

Lecture 69 - Tutorial 11: Compatibility of C and C++: Part 1: Significant Features

Lecture 70 - C++11 and beyond: Resource Management by Smart Pointers: Part 1

Lecture 71 - C++11 and beyond: Resource Management by Smart Pointers: Part 2

Lecture 72 - C++11 and beyond: Concurrency: Part 1

Lecture 73 - C++11 and beyond: Concurrency: Part 2

Lecture 74 - Closing Comments

Lecture 75 - Tutorial 12: Compatibility of C and C++: Part 2: Summary

NPTEL : NOC:Blockchain and its Applications (Computer Science and Engineering)

Co-ordinators : Prof. Sandip Chakraborty, Prof. Shamik Sural

Lecture 1 - The Model of Decentralization

Lecture 2 - What is Blockchain

Lecture 3 - Basic Cryptographic Primitives - I

Lecture 4 - Basic Cryptographic Primitives - II

Lecture 5 - Basic Cryptographic Primitives - III

Lecture 6 - Basic Cryptographic Primitives - IV

Lecture 7 - Basic Cryptographic Primitives - V

Lecture 8 - Distributed Systems for Decentralization - The Beginningâ€‹

Lecture 9 - The Evolution of Cryptocurrencies

Lecture 10 - Open Consensus and Bitcoin

Lecture 11 - Bitcoin Mining and Beyond

Lecture 12 - Smart Contracts and the Permissioned Models of Blockchainâ€‹

Lecture 13 - Blockchain Elements - I

Lecture 14 - Blockchain Elements - II

Lecture 15 - Blockchain Elements - III

Lecture 16 - Blockchain Elements - IV

Lecture 17 - Blockchain Elements - V

Lecture 18 - Permissionless Model and Open Consensus

Lecture 19 - Nakamoto Consensus (Proof of Work)

Lecture 20 - Limitations of PoW: Forking and Security

Lecture 21 - Beyond PoW

Lecture 22 - Ethereum 1

Lecture 23 - Ethereum 2

Lecture 24 - Ethereum 3

Lecture 25 - Ethereum 4

Lecture 26 - Consensus for Permissioned Models

Lecture 27 - State Machine Replication as Distributed Consensus

Lecture 28 - Paxos

Lecture 29 - Paxos - Safety and Liveness

Lecture 30 - Byzantine Faults

Lecture 31 - Byzantine Agreement Protocols

Lecture 32 - Safety and Liveness of PBFT

Lecture 33 - Enterprise Blockchains

Lecture 34 - Hyperledger Fabric 1

Lecture 35 - Hyperledger Fabric 2

Lecture 36 - Hyperledger Fabric 3

Lecture 37 - Hyperledger Fabric 4

Lecture 38 - Consensus Scalability

Lecture 39 - Bitcoin-NG

Lecture 40 - Collective Signing (CoSi)

Lecture 41 - ByzCoin

Lecture 42 - Algorand

Lecture 43 - Identity Management - I

Lecture 44 - Identity Management - II

Lecture 45 - Identity Management - III

Lecture 46 - Blockchain Interoperability - I

Lecture 47 - Blockchain Interoperability - II

Lecture 48 - Blockchain Interoperability - III

Lecture 49 - Hyperledger Indy - I

Lecture 50 - Hyperledger Indy - II

Lecture 51 - Hyperledger Aries

Lecture 52 - Blockchain Security - I

Lecture 53 - Blockchain Security - II

Lecture 54 - Blockchain Security - III

Lecture 55 - Use Cases

Lecture 56 - A Potential Use Case From a Critics Perspective

Lecture 57 - Blockchain in Financial Services

Lecture 58 - Public Sector Use Cases

Lecture 59 - Blockchain for Decentralized Marketplace - Part 1

Lecture 60 - Blockchain for Decentralized Marketplace - Part 2

NPTEL : NOC:Algorithmic Game Theory (Computer Science and Engineering)

Co-ordinators : Prof. Palash Dey

Lecture 1 - Introduction

Lecture 2 - Assumptions of Game Theory

Lecture 3 - Examples of Games

Lecture 4 - Equilibrium Concepts

Lecture 5 - Nash Equilibrium

Lecture 6 - Indifference Principle

Lecture 7 - Security of Players

Lecture 8 - Minmax Theorem

Lecture 9 - Implications of Minmax Theorem

Lecture 10 - MSNEs of Matrix Games

Lecture 11 - Iterative Eliminations of Dominated Strategies

Lecture 12 - Iterative Eliminations of Dominated Strategies (Continued...)

Lecture 13 - Braess's paradox

Lecture 14 - Yao's Lemma and its applications

Lecture 15 - Support Enumeration Algorithm

Lecture 16 - Succinct game

Lecture 17 - Potential Games

Lecture 18 - Best Response Dynamics

Lecture 19 - Fast Convergence of Best Response Dynamics

Lecture 20 - Computing ÃŽÂµ-PSNE for Network Congestion Games

Lecture 21 - PSNE for Congestion Games

Lecture 22 - PSNE for Symmetric Congestion Games

Lecture 23 - Functional NP

Lecture 24 - PPAD Class

Lecture 25 - Sperner's Lemma

Lecture 26 - Approximate MSNE Computation

Lecture 27 - Correlated Equilibrium

Lecture 28 - Coarse Correlated Equilibrium

Lecture 29 - External Regret Framework

Lecture 30 - Multiplicative Weight Algorithm

Lecture 31 - Multiplicative Weight Algorithm (Continued....)

Lecture 32 - Swap Regret and Correlated Equilibrium

Lecture 33 - Swap Regret to External Regret Reduction

Lecture 34 - Braess's paradox and Pigou's Network

Lecture 35 - PoA of Selfish Routing Game

Lecture 36 - PoA of Selfish Load Balancing Game

Lecture 37 - Bayesian Game

Lecture 38 - BNE of First Price Auction

Lecture 39 - Extensive Form Game

Lecture 40 - Mechanism Design Introduction

Lecture 41 - Implementation of Social Choice Functions

Lecture 42 - Revelation Principle

Lecture 43 - Properties of Social Choice Function

Lecture 44 - Gibbard-Satterthwaite Theorem

Lecture 45 - Quasilinear Environment

Lecture 46 - Ex-Post Efficiency

Lecture 47 - VCG Mechanism

Lecture 48 - Example of VCG Mechanism

Lecture 49 - Weighted VCG

Lecture 50 - Affine Maximizer

Lecture 51 - Recap of Topics Discussed so Far

Lecture 52 - Single Parameter Domain

Lecture 53 - DSIC in Single Parameter Domain

Lecture 54 - Mayerson's Lemma

Lecture 55 - Sponsored Search Auction

Lecture 56 - Intermediate Domain

Lecture 57 - Algorithmic Mechanism Design

Lecture 58 - Stable Matching

Lecture 59 - Gale-Shapley Algorithm

Lecture 60 - Properties of Stable Matching

NPTEL : NOC:Machine Learning for Earth System Sciences (Computer Science and Engineering)

Co-ordinators : Prof. Adway Mitra

Lecture 1 - Introduction

Lecture 2 - Basics of Spatio-Temporal Modeling

Lecture 3 - Geostatistical Equation for Spatio-Temporal Process

Lecture 4 - Gaussian Process Regression and Inverse Problems

Lecture 5 - Anomaly Event Detection

Lecture 6 - Extreme Events

Lecture 7 - Extreme Value Theory

Lecture 8 - Causality

Lecture 9 - Networks

Lecture 10 - Data Assimilation

Lecture 11 - Challenges and Opportunities for ML in ESS

Lecture 12 - Types of Machine Learning Problems in ESS

Lecture 13 - Convolutional Networks for Spatial Problems

Lecture 14 - Sequential Models for Temporal Problems

Lecture 15 - Probabilistic Models for Earth System Science

Lecture 16 - Identification of Indian Monsoon Predictors

Lecture 17 - Statistical Downscaling of Rainfall with Machine Learning

Lecture 18 - Detection of Anomaly and Extreme Events

Lecture 19 - Identifying Causal Relations from Time-Series - 1

Lecture 20 - Identifying Causal Relations from Time-Series - 2

Lecture 21 - Spatio-Temporal Modelling of Extremes

Lecture 22 - Hierarchical Bayesian Models for Spatio-Temporal Processes

Lecture 23 - Geostatistical modelling for mapping based on in-situ measurements

Lecture 24 - Nowcasting of Extreme Weather Events

Lecture 25 - Discovering Clustered Weather Patterns

Lecture 26 - Interpretable Machine Learning for Earth System Science

Lecture 27 - Object Detection in Satellite Imagery - 1

Lecture 28 - Object Detection in Satellite Imagery - 2

Lecture 29 - Image Fusion from Multiple Sources for Remote Sensing

Lecture 30 - Image Segmentation for Remote Sensing

Lecture 31 - Satellite Imagery as a Proxy for Geophysical Measurements

Lecture 32 - Precipitation Nowcasting from Remote Sensing

Lecture 33 - Deep Domain Adaptation for Remote Sensing

Lecture 34 - Introduction to Earth System Modelling

Lecture 35 - Stochastic Weather Generator

Lecture 36 - Physics-Inspired Machine Learning for Process Models - 1

Lecture 37 - Physics-Inspired Machine Learning for Process Models - 2

Lecture 38 - Parameterizations for Sub-Grid Processes Using ML

Lecture 39 - Data Assimilation for Earth System Model Correction

Lecture 40 - ML for Climate Change Projection and Course Conclusion

NPTEL : NOC:Statistical Learning for Reliability Analysis (Computer Science and Engineering)

Co-ordinators : Prof. Monalisa Sarma

Lecture 1 - Introduction to Reliability Engineering

Lecture 2 - Introduction to Statistical Methods in Reliability

Lecture 3 - Concept of Probability and Probability Theory

Lecture 4 - Tutorial on Introduction to RE, SL and Probability Theory - Part I

Lecture 5 - Conditional, Total and Reverse Probability

Lecture 6 - Tutorial on Conditional Probability and Total Probability

Lecture 7 - Introduction to Probability Distributions

Lecture 8 - Introduction to Probability Distributions (Continued...)

Lecture 9 - Discrete Probability Distribution - Part 1

Lecture 10 - Discrete Probability Distribution - Part 2

Lecture 11 - Tutorial on Discrete Probability Distributions

Lecture 12 - Continuous Probability Distributions - Part 1

Lecture 13 - Continuous Probability Distributions - Part 2

Lecture 14 - Tutorial on Continuous Probability Distribution Functions - Part 1

Lecture 15 - Tutorial on Continuous Probability Distribution Functions - Part 2

Lecture 16 - Sampling Distributions - Part 1

Lecture 17 - Sampling Distributions - Part 2

Lecture 18 - Sampling Distributions - Part 3

Lecture 19 - Sampling Distributions - Part 4

Lecture 20 - Sampling Distributions - Part 5

Lecture 21 - Tutorial on Sampling Distributions

Lecture 22 - Statistical Inference - Part 1

Lecture 23 - Statistical Inference - Part 2

Lecture 24 - Statistical Inference - Part 3

Lecture 25 - Tutorial on Statistical Inference

Lecture 26 - Statistical Inference - Part 4

Lecture 27 - Statistical Inference - Part 5

Lecture 28 - Tutorial on Confidence Interval

Lecture 29 - Statistical Inference - Part 6

Lecture 30 - Statistical Inference - Part 7

Lecture 31 - Statistical Inference - Part 8

Lecture 32 - ANOVA - I

Lecture 33 - ANOVA - II

Lecture 34 - ANOVA - III

Lecture 35 - ANOVA - IV

Lecture 36 - ANOVA - V

Lecture 37 - ANOVA - VI

Lecture 38 - Correlation Analysis - Part I

Lecture 39 - Correlation Analysis - Part II

Lecture 40 - Regression Analysis - Part I

Lecture 41 - Regression Analysis - Part II

Lecture 42 - Regression Analysis - Part III

Lecture 43 - Tutorial on Relation Analysis

Lecture 44 - Auto-Regression Analysis

Lecture 45 - Logistic Regression - Part I

Lecture 46 - Logistic Regression - Part II

Lecture 47 - Logistic Regression - Part III

Lecture 48 - Tutorial on Logistic Regression

Lecture 49 - Introduction

Lecture 50 - Bayesian Classification - Part I

Lecture 51 - Bayesian Classification - Part II

Lecture 52 - k-Nearest Neighbor Classification

Lecture 53 - Tutorial on Classification Techniques

Lecture 54 - Support Vector Machine - Part I

Lecture 55 - Support Vector Machine - Part II

Lecture 56 - Support Vector Machine - Part III

Lecture 57 - Support Vector Machine - Part IV

Lecture 58 - Support Vector Machine - Part V

Lecture 59 - Support Vector Machine - Part VI

Lecture 60 - Tutorial on SVM

NPTEL : NOC:Foundations of Cyber Physical Systems (Computer Science and Engineering)

Co-ordinators : Prof. Soumyajit Dey

Lecture 1 - CPS: Motivational examples and compute platforms

Lecture 2 - CPS: Motivational examples and compute platforms (Continued...)

Lecture 3 - CPS: Motivational examples and compute platforms (Continued...)

Lecture 4 - CPS: Motivational examples and compute platforms (Continued...)

Lecture 5 - CPS: Motivational examples and compute platforms (Continued...)

Lecture 6 - Real time sensing and communication for CPS

Lecture 7 - Real time sensing and communication for CPS (Continued...)

Lecture 8 - Real time sensing and communication for CPS (Continued...)

Lecture 9 - Real time sensing and communication for CPS (Continued...)

Lecture 10 - Real time task scheduling for CPS

Lecture 11 - Real time task scheduling for CPS (Continued...)

Lecture 12 - Real time task scheduling for CPS (Continued...)

Lecture 13 - Real time task scheduling for CPS (Continued...)

Lecture 14 - Real time task scheduling for CPS (Continued...)

Lecture 15 - Real time task scheduling for CPS (Continued...)

Lecture 16 - Real time task scheduling for CPS (Continued...)

Lecture 17 - Real time task scheduling for CPS (Continued...)

Lecture 18 - Dynamical system modeling, stability, controller design

Lecture 19 - Dynamical system modeling, stability, controller design (Continued...)

Lecture 20 - Dynamical system modeling, stability, controller design (Continued...)

Lecture 21 - Dynamical system modeling, stability, controller design (Continued...)

Lecture 22 - Dynamical system modeling, stability, controller design (Continued...)

Lecture 23 - Dynamical system modeling, stability, controller design (Continued...)

Lecture 24 - Delay-aware Design; Platform effect on Stability/Performance

Lecture 25 - Delay-aware Design; Platform effect on Stability/Performance (Continued...)

Lecture 26 - Delay-aware Design; Platform effect on Stability/Performance (Continued...)

Lecture 27 - Delay-aware Design; Platform effect on Stability/Performance (Continued...) Corrigendum

Lecture 28 - Hybrid Automata based modelling of CPS

Lecture 29 - Hybrid Automata based modelling of CPS (Continued...)

Lecture 30 - Hybrid Automata based modelling of CPS (Continued...)

Lecture 31 - Hybrid Automata based modelling of CPS (Continued...)

Lecture 32 - Hybrid Automata based modelling of CPS (Continued...)

Lecture 33 - Reachability analysis

Lecture 34 - Reachability analysis (Continued...)

Lecture 35 - Reachability analysis (Continued...)

Lecture 36 - Reachability analysis (Continued...)

Lecture 37 - Lyapunov Stability, Barrier Functions

Lecture 38 - Lyapunov Stability, Barrier Functions (Continued...)

Lecture 39 - Lyapunov Stability, Barrier Functions (Continued...)

Lecture 40 - Lyapunov Stability, Barrier Functions (Continued...)

Lecture 41 - Lyapunov Stability, Barrier Functions (Continued...)

Lecture 42 - Lyapunov Stability, Barrier Functions (Continued...)

Lecture 43 - Quadratic Program based safe Controller Design

Lecture 44 - Quadratic Program based safe Controller Design (Continued...)

Lecture 45 - Quadratic Program based safe Controller Design (Continued...)

Lecture 46 - Quadratic Program based safe Controller Design (Continued...)

Lecture 47 - Neural Network (NN) Based controllers in CPS

Lecture 48 - Neural Network (NN) Based controllers in CPS (Continued...)

Lecture 49 - Neural Network (NN) Based controllers in CPS (Continued...)

Lecture 50 - State Estimation using Kalman Filters (KF)

Lecture 51 - State Estimation using Kalman Filters (KF) (Continued...)

Lecture 52 - Attack Detection and Mitigation in CPS

Lecture 53 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 54 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 55 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 56 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 57 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 58 - Attack Detection and Mitigation in CPS (Continued...)

Lecture 59 - Attack Detection and Mitigation in CPS (Continued...)

NPTEL : NOC:Selected Topics in Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Palash Dey

Lecture 1 - Introduction to Maximum Flow

Lecture 2 - Ford - Fulkerson Method

Lecture 3 - Edmond - Karp Algorithm

Lecture 4 - Edmond - Karp Algorithm (Continued...)

Lecture 5 - Flow Decomposition

Lecture 6 - Maximum Bipartite Matching, Fattest Augmenting Path

Lecture 7 - Karger's Algorithm

Lecture 8 - Augmenting Path

Lecture 9 - Edmonds Blossom Algorithm

Lecture 10 - Edmond - Karp Algorithm (Continued...)

Lecture 11 - Introduction to Randomized Algorithm

Lecture 12 - Polynomial Identity Testing

Lecture 13 - Perfect Bipartite Matching, Randomized Quicksort

Lecture 14 - Concentration Inequalities: Markov, Chebyshev, Chernoff

Lecture 15 - Proof of Chernoff Bound

Lecture 16 - Coupon Collector Problem

Lecture 17 - Balls and Bins

Lecture 18 - Balls and Bins (Continued...)

Lecture 19 - Two Point Sampling

Lecture 20 - Randomized Algorithm for 2 SAT

Lecture 21 - Markov Chain, Periodicity, Stationary Distribution

Lecture 22 - Mixing Time, Reversible Markov Chain

Lecture 23 - Metropolis Algorithm, Markov Chain on Independent Sets

Lecture 24 - Random Walk on Cycles

Lecture 25 - Shuffling Cards

Lecture 26 - Monte Carlo Method, Hitting Time, Cover Time

Lecture 27 - DNF Counting

Lecture 28 - DNF Counting (Continued...)

Lecture 29 - Counting Independent Sets of a Graph

Lecture 30 - Counting Independent Sets of a Graph (Continued...)

Lecture 31 - Introduction of NP, co-NP, and P

Lecture 32 - Turing Reduction, Karp Reduction

Lecture 33 - NP - Completeness of 3SAT

Lecture 34 - NP - Completeness of Independent Set

Lecture 35 - NP - Completeness of vertex cover and clique

Lecture 36 - NP - Completeness of 3-coloring

Lecture 37 - NP - Completeness of Subset sum and Knapsack

Lecture 38 - NP - Completeness of set cover, Weak and Strong NP - completeness

Lecture 39 - Self Reduction

Lecture 40 - Randomized Approximation Algorithm

Lecture 41 - Derandomization

Lecture 42 - Travelling Salesman Problem

Lecture 43 - 2-Factor Approximation Algorithm for Metric TSP

Lecture 44 - 1.5-Factor Approximation Algorithm for Metric TSP

Lecture 45 - Approximation Algorithm for Set Cover

Lecture 46 - FPTAS for Knapsack

Lecture 47 - Introduction to Linear Program

Lecture 48 - Introduction to Linear Program (Continued...,)

Lecture 49 - Dual Fitting

Lecture 50 - Dual Fitting (Continued...)

Lecture 51 - Dual Fitting

Lecture 52 - Set Cover using LP rounding

Lecture 53 - Vertex Cover using reduction to set cover

Lecture 54 - Vertex Cover LP

Lecture 55 - Randomized Rounding

Lecture 56 - Primal Dual Scheme

Lecture 57 - Introduction to Parameterized Algorithm

Lecture 58 - Faster FPT Algorithm for Vertex Cover

Lecture 59 - Introduction to Kernelization

Lecture 60 - Linear Programming Based Kernels

NPTEL : NOC:Foundations and Applications of Machine Learning (Bengali) (Computer Science and Engineering)

Co-ordinators : Prof. Adway Mitra

Lecture 1 - AI/ML à¦šà¦¾à¦°à¦ªà¦¾à¦¶à§‡à¦° à¦¨à¦¾à¦¨à¦¾ à¦‰à¦¦à¦¾à¦¹à¦°à¦£

Lecture 2 - AI/ML à¦à¦° à¦‰à¦ªà¦•à¦°à¦£

Lecture 3 - Supervised and Unsupervised Learning (à¦¤à¦¤à§à§à¦¬à¦¾à¦¬à¦§à¦¾à¦¨à§‡ à¦“ à¦¤à¦¤à§à§à¦¬à¦¾à¦¬à¦§à¦¾à¦¨à¦¹à¦¨à§€à¦¨ à¦¶à¦¿à¦•à§à¦·à¦¾)

Lecture 4 - ML Model à¦“ Algorithm/à¦²à§‡à¦•à¦šà¦¾à¦° 04 : à¦à¦®à¦à¦² à¦®à¦¡à§‡à¦² à¦“ à¦…à§à¦¯à¦¾à¦²à¦—à¦°à¦¿à¦®

Lecture 5 - AI/ML problem -à¦à¦° à¦—à¦ à¦¨ /à¦à¦†à¦‡/à¦à¦®à¦à¦² à¦,à¦®à¦,à§à¦¯à¦¾ - à¦à¦° à¦—à¦ à¦¨

Lecture 6 - K-nearest-neighbor classification/regression/K-à¦¨à¦¿à¦•à¦Ÿà¦¬à¦°à§à¦¤à§€-à¦ªà§à¦°à¦¤à¦¿à¦¬à§‡à¦¶à¦¿à¦¤à¦¾ à¦¶à§à¦°à§‡à¦£à§€à¦¬à¦¿à¦à¦¾à¦—/à¦°à¦¿à¦—à§à¦°à§‡à¦¶à¦¨

Lecture 7 - à¦¨à§ˆà¦ªà§à¦£à§à¦¯à§‡à¦° à¦ªà¦°à¦¿à¦®à¦¾à¦ª : Accuracy, Precision, Recall, Confusion

Lecture 8 - Discriminative Feature Selection

Lecture 9 - Decision Tree Algorithm/à¦,à¦¿à¦¦à§à¦§à¦¾à¦¨à§à¦¤à¦²à¦¤à¦¿à¦•à¦¾

Lecture 10 - Classifier -à¦à¦° à¦,à¦®à¦·à§à¦Ÿà¦¿ à¦“ Random Forests

Lecture 11 - Probability Theory à¦¿à¦«à§‡à¦° Îà¦¦à¦–

Lecture 12 - Bayesian à¦à¦¬à¦, NaÃ¯ve Bayes Classifier

Lecture 13 - Linear Algebra à¦¿à¦«à§‡à¦° Îà¦¦à¦–à¦¾

Lecture 14 - Linear Classifiers à¦à¦¬à¦, Perceptron Algorithm

Lecture 15 - Multi-class Linear Classifier à¦à¦¬à¦, Logistic Regression

Lecture 16 - Optimization à¦¿à¦«à§‡à¦° Îà¦¦à¦–à¦¾

Lecture 17 - Linear (à¦,à¦°à¦²) à¦“ Regularized (à¦ªà¦¿à¦°à§‡à¦¶à¦¾à¦¿à¦§à¦¤) Regression

Lecture 18 - Max-margin Linear Classification/à¦,à§‡à¦¬à¦¾Ð—Îº à¦¬Òà¦¬à¦§à¦¾à§‡à¦¨à¦° ÎÏœà¦£à§€à¦¿à¦¬à¦¾à¦œà¦¨

Lecture 19 - à¦•à§ƒÎÏà¦® Ñ¹à¦¾à§Ÿà§à¦¤Ï´/Basic Neural Networks

Lecture 20 - Neural Network à¦—à¦ à¦¨ à¦“ Backpropagation

Lecture 21 - Overfitting and Underfitting

Lecture 22 - Boosting-à¦à¦° à¦®à¦¾à¦§Òà§‡à¦® à¦,à¦®ÎœÑà¦¬Ð´ à¦…à¦¨à§à¦®à¦¾à¦¨

Lecture 23 - Data à¦° à¦®à¦¾Ïà¦¾ (dimensionality) à¦¿à¦¨à§ŸÏ´à¦£

Lecture 24 - à¦²à§‡à¦•à¦šà¦¾à¦° à§¨à§ªà¦ƒ à¦¶à§à¦°à§‡à¦£à§€ à¦“ à¦¬à§ˆà¦¶à¦¿à¦·à§à¦Ÿà§‡à¦° à¦®à¦¾à¦¨à§‡à¦° à¦…à¦,à¦¾à¦®à§à¦¯

Lecture 25 - Supervised Learning à¦…à¦¿à¦¯à¦¾à¦¨

Lecture 26 - Hierarchical Clustering/à¦,à§à¦¤à¦°à¦à¦¿à¦¤à¦¤à¦¿à¦• à¦—à§‹à¦·à§à¦ à §€à¦•à¦°à¦£

Lecture 27 - K-means Clustering/ K-à¦—à§œ à¦—à§‹à¦·à§à¦ à §€à¦•à¦°à¦£

Lecture 28 - Evaluation of Clustering/à¦—à§‹à¦·à§à¦ à §€à¦•à¦°à¦£à§‡à¦° à¦®à§,à¦²à§à¦¯à¦¾à¦¾à§Ÿà¦¨

Lecture 29 - Mean-shift à¦à¦¬à¦, DB-Scan à¦—à§‹à¦·à§à¦ à §€à¦•à¦°à¦£

Lecture 30 - Graph-based Clustering/à¦—à§‹à¦·à§à¦ à §€à¦•à¦°à¦£

Lecture 31 - Time-series/à¦à¦®à§Ÿà¦•à§à¦°à¦®à§‡à¦° à¦¬à¦¿à¦¶à§à¦²à§‡à¦·à¦£

Lecture 32 - à¦¬à§à¦¯à¦¤à¦¿à¦•à§à¦°à¦®à§€ à¦‰à¦¦à¦¾à¦¹à¦°à¦£ à¦šà¦¿à¦¤à¦¨à¦¨à¦¿à¦¤à¦•à¦°à¦£

Lecture 33 - Image/à¦šà¦¿à¦¤à§à¦° à¦¬à¦¿à¦¶à§à¦²à§‡à¦·à¦£

Lecture 34 - Neural Features for Images

Lecture 35 - à¦²à¦¿à¦–à¦¿à¦¤ Data à¦“ à¦à¦¾à¦·à¦¾ à¦¬à¦¿à¦¶à§à¦²à§‡à¦·à¦£

Lecture 36 - Sequential Neural Models and Natural Language Processing

Lecture 37 - à¦,à§ƒà¦·à§à¦Ÿà¦¿à¦®à§,à¦²à¦•/Generative Models, Reinforcement Learning

Lecture 38 - Transfer Learning and Domain Adaptation

Lecture 39 - à¦¨à§€à¦¤à¦¿, à¦¨à¦¿à¦°à¦ªà§‡à¦•à§à¦·à¦¤à¦¾ à¦“ à¦¬à§‹à§à¦—à¦®à§à¦¯à¦¤à¦¾

Lecture 40 - Machine Learning for Climate Sciences

NPTEL : NOC:Artificial Intelligence for Economics (Computer Science and Engineering)

Co-ordinators : Prof. Dripto Bakshi, Prof. Adway Mitra, Prof. Palash Dey

Lecture 1 - Network Data - Some Stories !!

Lecture 2 - The Stable Matching Algorithm

Lecture 3 - Uncertainty in Financial Markets : Idea of Hedging

Lecture 4 - Uncertainty in Financial Markets : Idea of Hedging (Continued...)

Lecture 5 - Uncertainty in Financial Markets : Idea of Hedging (Continued...)

Lecture 6 - Unconstrained Optimization

Lecture 7 - Constrained Optimization

Lecture 8 - Heuristic Search Techniques

Lecture 9 - Multi-objective Heuristic Search and Game Trees

Lecture 10 - Clustering and Segmentation

Lecture 11 - Decision Tree and Random Forest

Lecture 12 - Linear Regression and Classifiers

Lecture 13 - Uncertainty Modeling

Lecture 14 - Neural Networks

Lecture 15 - Deep Learning for Time Series Forecasting

Lecture 16 - Causality in Time-Series

Lecture 17 - Interventional Causality and Attribution

Lecture 18 - Game Theory

Lecture 19 - Game Theory (Continued...)

Lecture 20 - Game Theory (Continued...) Games with Incomplete Information

Lecture 21 - Game Theory (Continued...) Games with Incomplete Information (Continued...)

Lecture 22 - Game Theory - Sequential Games

Lecture 23 - Game Theory - Rubenstein Bargaining

Lecture 24 - Network Economics

Lecture 25 - Network Economics (Continued...)

Lecture 26 - Introduction to Auction Theory

Lecture 27 - Second Price Auction

Lecture 28 - First Price Auction

Lecture 29 - Overview of Mechanism Design

Lecture 30 - Groves Mechanism

Lecture 31 - VCG Mechanism

Lecture 32 - Single Parameter Domain and Myerson Lemma

Lecture 33 - Sponsored Search Auction

Lecture 34 - Single Peaked Domain and Median Voting

Lecture 35 - Dimensionality Reduction (Principal Component Analysis) â€“ The Math Prerequisites

Lecture 36 - Dimensionality Reduction (Principal Component Analysis) â€“ The Technique

Lecture 37 - Agent-based Modeling for Economics

Lecture 38 - Computer Vision for Economics

Lecture 39 - Text Mining and NLP for Economics

Lecture 40 - Bias, Fairness, Ethics and Interpretability in AI

NPTEL : NOC:Approximation Algorithm (Computer Science and Engineering)

Co-ordinators : Prof. Palash Dey

Lecture 1 - Overview of NP-completeness and How to Tackle It

Lecture 2 - Deterministic Rounding of Linear Program: An Approximation Algorithm for Weighted

Lecture 3 - Overview of LP Duality and Complementary Slackness

Lecture 4 - Dual Rounding: An Approximation Algorithm for Weighted Set Cover

Lecture 5 - Primal dual method for Weighted Set Cover

Lecture 6 - Greedy algorithm for Weighted Set Cover

Lecture 7 - Dual Fitting Analysis of Greedy Set Cover

Lecture 8 - Randomized Rounding Algorithm for Weighted Set Cover

Lecture 9 - Scheduling Jobs with Deadlines and Release Dates on a Single Machine

Lecture 10 - The k-Center Problem

Lecture 11 - Local Search Algorithm for Scheduling Jobs on Multiple Identical Machines

Lecture 12 - Greedy Algorithm for Scheduling Jobs on Multiple Identical Machines

Lecture 13 - Inapproximability of the Traveling Salesman problem

Lecture 14 - 2-Approximation Algorithm for Metric TSP

Lecture 15 - 1.5-Approximation Algorithm for Metric TSP

Lecture 16 - Edge Coloring

Lecture 17 - Pseudo Polynomial Time Algorithm for Knapsack

Lecture 18 - FPTAS for Knapsack

Lecture 19 - PTAS for Minimizing Makespan for Scheduling Jobs on Constant Number of Machines

Lecture 20 - PTAS for Minimizing Makespan for Scheduling Jobs on Parallel Identical Machines

Lecture 21 - PTAS for Minimizing Makespan for Scheduling Jobs on Parallel Identical Machines (Continued...)

Lecture 22 - An APTAS for Bin Packing

Lecture 23 - An APTAS for Bin Packing (Continued...)

Lecture 24 - 2 Factor Approximation Algorithm for Scheduling Unweighted Jobs on a Single Machine

Lecture 25 - 3 Factor Approximation Algorithm for Scheduling Weighted Jobs on a Single Machine

Lecture 26 - A Polynomial Time Separation Oracle for Scheduling Weighted Jobs on a Single Machine

Lecture 27 - 3 Factor Approximation Algorithm for Prize Collecting Steiner Tree

Lecture 28 - 3 Factor Approximation Algorithm for Prize Collecting Steiner Tree (Continued...)

Lecture 29 - A 4 Factor Approximation Algorithm for Uncapacitated Facility Location Problem

Lecture 30 - A 4 Factor Approximation Algorithm for Uncapacitated Facility Location Problem (Continued...)

Lecture 31 - A 4 Factor Approximation Algorithm for Uncapacitated Facility Location Problem (Continued...)

Lecture 32 - Randomized 1/2 Factor Approximation Algorithm for MAX-SAT and MAX-CUT

Lecture 33 - Derandomization using Method of Conditional Expectation

Lecture 34 - Flipping Biased Coin for Better Than .5 Approximation Algorithm for Max-SAT

Lecture 35 - Randomized Rounding Based (1-1/e) Factor Approximation Algorithm for Max-SAT

Lecture 36 - Best of Two Solutions for Max-SAT

Lecture 37 - Nonlinear Rounding for Max-SAT

Lecture 38 - Randomized Rounding for Prize Collecting Steiner Tree

Lecture 39 - Randomized Rounding for Prize Collecting Steiner Tree (Continued...)

Lecture 40 - Randomized Rounding for Uncapacitated Facility Location

Lecture 41 - Chernoff Bound

Lecture 42 - Chernoff Bound (Continued...)

Lecture 43 - Integer Multicommodity Flow

Lecture 44 - Primal-dual Algorithm for Minimum Weighted Feedback Vertex Set

Lecture 45 - Primal-dual Algorithm for Minimum Weighted Feedback Vertex Set (Continued...)

Lecture 46 - Primal-dual Algorithm for Minimum Weighted Feedback Vertex Set (Continued...)

Lecture 47 - Primal-dual Algorithm for Steiner Forest

Lecture 48 - Primal-dual Algorithm for Steiner Forest (Continued...)

Lecture 49 - Primal-dual Algorithm for Steiner Forest (Continued...)

Lecture 50 - 2-Approximation Algorithm for Multiway Cut

Lecture 51 - 3/2-Approximation Algorithm for Multiway Cut

Lecture 52 - 3/2-Approximation Algorithm for Multiway Cut (Continued...)

Lecture 53 - Approximation Algorithm for Multicut

Lecture 54 - Approximation Algorithm for Multicut (Continued...)

Lecture 55 - Approximation Algorithm for Multicut (Continued...)

Lecture 56 - Introduction to Semidefinite Program

Lecture 57 - SDP Based Approximation Algorithm for Max Cut

Lecture 58 - SDP Based Approximation Algorithm for Max Cut (Continued...)

Lecture 59 - Inapproximability of Scheduling Jobs on Multiple Non-identical Machines

Lecture 60 - Inapproximability of Edge Disjoint Path

NPTEL : Pattern Recognition (Computer Science and Engineering)

Co-ordinators : Prof. Sukhendu Das, Prof. C.A. Murthy

Lecture 1 - Principles of Pattern Recognition I (Introduction and Uses)

Lecture 2 - Principles of Pattern Recognition II (Mathematics)

Lecture 3 - Principles of Pattern Recognition III (Classification and Bayes Decision Rule)

Lecture 4 - Clustering vs. Classification

Lecture 5 - Relevant Basics of Linear Algebra, Vector Spaces

Lecture 6 - Eigen Value and Eigen Vectors

Lecture 7 - Vector Spaces

Lecture 8 - Rank of Matrix and SVD

Lecture 9 - Types of Errors

Lecture 10 - Examples of Bayes Decision Rule

Lecture 11 - Normal Distribution and Parameter Estimation

Lecture 12 - Training Set, Test Set

Lecture 13 - Standardization, Normalization, Clustering and Metric Space

Lecture 14 - Normal Distribution and Decision Boundaries I

Lecture 15 - Normal Distribution and Decision Boundaries II

Lecture 16 - Bayes Theorem

Lecture 17 - Linear Discriminant Function and Perceptron

Lecture 18 - Perceptron Learning and Decision Boundaries

Lecture 19 - Linear and Non-Linear Decision Boundaries

Lecture 20 - K-NN Classifier

Lecture 21 - Principal Component Analysis (PCA)

Lecture 22 - Fisherâ€™s LDA

Lecture 23 - Gaussian Mixture Model (GMM)

Lecture 24 - Assignments

Lecture 25 - Basics of Clustering, Similarity/Dissimilarity Measures, Clustering Criteria.

Lecture 26 - K-Means Algorithm and Hierarchical Clustering

Lecture 27 - K-Medoids and DBSCAN

Lecture 28 - Feature Selection : Problem statement and Uses

Lecture 29 - Feature Selection : Branch and Bound Algorithm

Lecture 30 - Feature Selection : Sequential Forward and Backward Selection

Lecture 31 - Cauchy Schwartz Inequality

Lecture 32 - Feature Selection Criteria Function: Probabilistic Separability Based

Lecture 33 - Feature Selection Criteria Function: Interclass Distance Based

Lecture 34 - Principal Components

Lecture 35 - Comparison Between Performance of Classifiers

Lecture 36 - Basics of Statistics, Covariance, and their Properties

Lecture 37 - Data Condensation, Feature Clustering, Data Visualization

Lecture 38 - Probability Density Estimation

Lecture 39 - Visualization and Aggregation

Lecture 40 - Support Vector Machine (SVM)

Lecture 41 - FCM and Soft-Computing Techniques

Lecture 42 - Examples of Uses or Application of Pattern Recognition; And When to do clustering

Lecture 43 - Examples of Real-Life Dataset

NPTEL : Performance Evaluation of Computer Systems (Computer Science and Engineering)

Co-ordinators : Prof. Krishna Moorthy Sivalingam

Lecture 1 - Introduction to performance evaluation of computer systems

Lecture 2 - How to avoid common mistakes

Lecture 3 - Selection of techniques and metrics

Lecture 4 - Case study: Selection of techniques and metrics

Lecture 5 - Random Variables and probability distributions

Lecture 6 - Probability distributions - I

Lecture 7 - Probability distributions - II

Lecture 8 - Probability distributions - III

Lecture 9 - Stochastic process

Lecture 10 - Markov Chain

Lecture 11 - Slotted Aloha protocol model and discrete-time birth death process

Lecture 12 - Continuous time Markov chain and queuing theory - I

Lecture 13 - Queuing theory - I (Continued)

Lecture 14 - Queuing theory - II

Lecture 15 - Queuing theory - III

Lecture 16 - Queuing theory - IV

Lecture 17 - Queuing theory - V

Lecture 18 - Queuing theory - VI

Lecture 19 - Queuing networks - I

Lecture 20 - Queuing networks - II

Lecture 21 - Slotted Aloha Markov model

Lecture 22 - Simulations - I

Lecture 23 - Simulations - II

Lecture 24 - Simulations - III

Lecture 25 - Operational laws - I

Lecture 26 - Operational laws - II

Lecture 27 - Open and closed queuing networks

Lecture 28 - Approximate MVA

Lecture 29 - Convolution algorithm - I

Lecture 30 - Convolution algorithm - II

Lecture 31 - Load-dependent service centers

Lecture 32 - Hierarchical decomposition

Lecture 33 - Balanced Job Bounds

Lecture 34 - Confidence interval for propotions and introduction to experimental design

Lecture 35 - 2k factorial design

Lecture 36 - 2k r factorial design and 2k-p fractional factorial design

Lecture 37 - Programming aspects of discrete-event simulations - I

Lecture 38 - Programming aspects of discrete-event simulations - II

Lecture 39 - Discrete-event simulations - III

Lecture 40 - PetriNets - I

Lecture 41 - PetriNets - II

Lecture 42 - PetriNets - III

NPTEL : Theory of Automata, Formal Languages and Computation (Computer Science and Engineering)

Co-ordinators : Prof. Kamala Krithivasan

Lecture 1 - Grammars and Natural Language Processing

Lecture 2 - Grammars and Languages Generated

Lecture 3 - Grammars and Languages Generated (Continued.)

Lecture 4 - Ambiguity in CFG

Lecture 5 - Simplication of CFG

Lecture 6 - Removal of Unit Productions, Chomsky Normal Form for CFG

Lecture 7 - Greibach Normal Form for CFG

Lecture 8 - Final State Automata

Lecture 9 - Non Deterministic FSA

Lecture 10 - Non Deterministic FSA (Continued.)

Lecture 11 - Non Deterministic FSA with E(Epsilon)- Moves

Lecture 12 - Equivalence Between FSA and Type 3 Grammars

Lecture 13 - Regular Expressions, Regular Expressions to NFSA

Lecture 14 - DFSA to Regular Expressions

Lecture 15 - Problems and Solutions - I

Lecture 16 - Pumping Lemmas for Regular Sets and CFL

Lecture 17 - MYHILL - Nerode Theorem

Lecture 18 - Minimization of DFSA

Lecture 19 - FSA with output Moore and Mealy Machines

Lecture 20 - Pushdown Automata

Lecture 21 - Pushdown Automata, Equivalence Between Acceptance by Empty Store and Acceptance by Final State

Lecture 22 - Pushdown Automata CFG to PDA

Lecture 23 - Pushdown Automata PDA to CFG

Lecture 24 - Problems and Solutions - II

Lecture 25 - Problems and Solutions - III

Lecture 26 - Turing Machines

Lecture 27 - Turing Machines (Continued.)

Lecture 28 - Turing Machine as Acceptor, Techniques for TM Construction

Lecture 29 - Generalized Versions of Turing Machines

Lecture 30 - Turing Machine as a Generating Device

Lecture 31 - Recursive Sets, Recursively Innumerable Sets, Encoding of TM, Halting Problem

Lecture 32 - Problems and Instances, Universal TM, Decidability

Lecture 33 - RICE'S Theorem, Linear Bounded Automata, Properties of TM

Lecture 34 - POST'S Correspondence Problems

Lecture 35 - POST'S Correspondence Problems (Continued.), Time and Tape Complexity of TM

Lecture 36 - NP - Complete Problems, Cook's Theorem

Lecture 37 - NP - Complete Problems (Continued.)

Lecture 38 - Regulated Rewriting

Lecture 39 - L-Systems

Lecture 40 - Grammar Systems

Lecture 41 - DNA Computing

Lecture 42 - Membrane Computing

NPTEL : Computer Graphics (Computer Science and Engineering)

Co-ordinators : Prof. Sukhendu Das

Lecture 1 - Introduction

Lecture 2 - CRT Display Devices

Lecture 3 - CRT Display Devices (Continued...)

Lecture 4 - CRT Display Devices (Continued...)

Lecture 5 - CRT Display Devices (Continued...)

Lecture 6 - Transformations in 2D

Lecture 7 - Transformations in 2D (Continued...)

Lecture 8 - Three Dimensional Graphics

Lecture 9 - Three Dimensional Graphics (Continued...)

Lecture 10 - Three Dimensional Graphics (Continued...)

Lecture 11 - Projection Transformations And Viewing Pipeline

Lecture 12 - 3D Viewing - Projection Transformations And Viewing Pipeline

Lecture 13 - Scan Converting Lines, Circles And Ellipses

Lecture 14 - Scan Converting Lines, Circles And Ellipses (Continued...)

Lecture 15 - Scan Converting Lines, Circles And Ellipses (Continued...)

Lecture 16 - Scan Converting Lines, Circles And Ellipses (Continued...)

Lecture 17 - Scan Converting Lines, Circles And Ellipses (Continued...)

Lecture 18 - Polyfill- Scan Conversion Of A Polygon

Lecture 19 - Scan Conversion Of A Polygon (Continued...)

Lecture 20 - Clipping - Lines And Polygons

Lecture 21 - Clipping Lines And Polygons

Lecture 22 - Clipping Lines

Lecture 23 - Solid Modelling

Lecture 24 - Solid Modelling

Lecture 25 - Solid Modelling (Continued...)

Lecture 26 - Visible Surface Detection

Lecture 27 - Visible Surface Detection (Continued...)

Lecture 28 - Visible Surface Detection (Continued...)

Lecture 29 - Visible Surface Detection (Continued...)

Lecture 30 - Visible Surface Detection (Continued...)

Lecture 31 - Visible Surface Detection (Continued...)

Lecture 32 - Visible Surface Detection (Continued...)

Lecture 33 - Illumination And Shading

Lecture 34 - Illumination And Shading (Continued...)

Lecture 35 - Illumination And Shading (Continued...)

Lecture 36 - Curve Representation

Lecture 37 - Curve Representation (Continued...)

Lecture 38 - Curves And Surface Representation

Lecture 39 - Graphics Programming Using Open GL

Lecture 40 - Graphics Programming Using Open GL (Continued...)

Lecture 41 - Advanced Topics: Anti Aliasing,Color,Soft Objects,Animation,Visual Effects,System Architectures

Lecture 42 - Digital Image Processing Image Compression-Jpeg-Enhancements

Lecture 43 - Digital Image Processing (Continued...)

NPTEL : Computer Organization (Computer Science and Engineering)

Co-ordinators : Prof. S. Raman

Lecture 1 - Introduction To Computing

Lecture 2 - Introduction To System : Software

Lecture 3 - Introduction To System : Hardware

Lecture 4 - Processor Activities

Lecture 5 - Processor As a State Machine

Lecture 6 - Data Path Architecture

Lecture 7 - Data Path Controller : Micro Programmed

Lecture 8 - State Machine Design

Lecture 9 - Controller Design: Microprogrammed and Hardwired

Lecture 10 - Controller Design (Contd)

Lecture 11 - Typical Micro Instructions

Lecture 12 - Addressing Modes

Lecture 13 - Problem Exercise

Lecture 14 - Problem Exercise

Lecture 15 - Introduction to memory system

Lecture 16 - CPU - Memory Interaction

Lecture 17 - Cache Organization

Lecture 18 - Cache Organization

Lecture 19 - Virtual Memory

Lecture 20 - Virtual Memory

Lecture 21 - Performance Calculation

Lecture 22 - Segmentation

Lecture 23 - Address Translation and Protection

Lecture 24 - Programmed I/O

Lecture 25 - Interrupt Driven I/O

Lecture 26 - DMA : Direct Memory Access

Lecture 27 - Device Service Routines

Lecture 28 - Evolution Of I/O

Lecture 29 - I/O Devices

Lecture 30 - I/O Devices - Contd

Lecture 31 - Buses

Lecture 32 - Buses Contd

Lecture 33 - Conclusion

NPTEL : Database Design (Computer Science and Engineering)

Co-ordinators : Dr. S. Srikanth, Prof. D. Janaki Ram

Lecture 1 - Introduction to Database Management System

Lecture 2 - Conceptual Designs

Lecture 3 - Conceptual Designs

Lecture 4 - Relational Model

Lecture 5 - Relational Model

Lecture 6 - Structured Query Language - I

Lecture 7 - Structured Query Language - II

Lecture 8 - ER Model to Relational Mapping

Lecture 9 - Functional Dependencies and Normal Form

Lecture 10 - ER Model to Relational Model Mapping

Lecture 11 - Storage Structures

Lecture 12 - Indexing Techniques Single Level

Lecture 13 - Indexing Techniques Multi Level

Lecture 14 - Constraints and Triggers

Lecture 15 - Query Processing and Optimization

Lecture 16 - Query Processing and Optimization - II

Lecture 17 - Query Processing and Optimization - III

Lecture 18 - Transaction Processing Concepts

Lecture 19 - Transaction Processing and Database Manager

Lecture 20 - Foundation for Concurrency Control

Lecture 21 - Concurrency Control Part - 1

Lecture 22 - Concurrency Control Part - 2

Lecture 23 - Concurrency Control Part - 3

Lecture 24 - Concurrency Control Part - 4

Lecture 25 - Distributed Transaction Models

Lecture 26 - Basic 2-Phase and 3-phase commit protocol

Lecture 27 - Concurrency Control for Distributed Transaction

Lecture 28 - Introduction to Transaction Recovery

Lecture 29 - Recovery Mechanisms - II

Lecture 30 - Recovery Mechanisms - III

Lecture 31 - Introduction to Data Warehousing and OLAP

Lecture 32 - Introduction to Data Warehousing and OLAP

Lecture 33 - Case Study : MySQL

Lecture 34 - Case Study ORACLE and Microsoft Access

Lecture 35 - Data Mining and Knowledge Discovery

Lecture 36 - Data Mining and Knowledge Discovery Part - II

Lecture 37 - Object Oriented Databases

Lecture 38 - Object Oriented Databases - II

Lecture 39 - XML - Introductory Concepts

Lecture 40 - XML - Advanced Concepts

Lecture 41 - XML - Databases

Lecture 42 - Case Study - Part One - Database Design

Lecture 43 - Case Study - Part Two - Database Design

NPTEL : Discrete Mathematical Structures (Computer Science and Engineering)

Co-ordinators : Prof. Kamala Krithivasan

Lecture 1 - Propositional Logic

Lecture 2 - Propositional Logic (Continued)

Lecture 3 - Predicates & Quantifiers

Lecture 4 - Predicates & Quantifiers (Continued)

Lecture 5 - Logical Inference

Lecture 6 - Resolution Principles & Application to PROLOG

Lecture 7 - Methods of Proof

Lecture 8 - Normal Forms

Lecture 9 - Proving Programs Correct (Continued)

Lecture 10 - Sets

Lecture 11 - Induction

Lecture 12 - Set Operations On Strings

Lecture 13 - Relations

Lecture 14 - Graphs

Lecture 15 - Graphs (Continued)

Lecture 16 - Trees

Lecture 17 - Trees And Graphs

Lecture 18 - Special Properties Of Relations

Lecture 19 - Closure Of Relations

Lecture 20 - Closure Properties Of Relations

Lecture 21 - Order Relations

Lecture 22 - Order Relations And Equivalence Relations

Lecture 23 - Equivalence Relations And Partitions

Lecture 24 - Functions

Lecture 25 - Functions (Continued)

Lecture 26 - Functions (Continued)

Lecture 27 - Pigeonhole Principle

Lecture 28 - Permutations And Combinations

Lecture 29 - Permutations And Combinations (Continued)

Lecture 30 - Generating Functions

Lecture 31 - Generating Functions (Continued)

Lecture 32 - Recurrence Relations

Lecture 33 - Recurrence Relations (Continued)

Lecture 34 - Recurrence Relations (Continued)

Lecture 35 - Algebras

Lecture 36 - Algebras (Continued)

Lecture 37 - Algebras (Continued)

Lecture 38 - Finite State Automaton

Lecture 39 - Finite State Automaton (Continued)

Lecture 40 - Lattices

NPTEL : Artificial Intelligence (Prof. Deepak Khemani) (Computer Science and Engineering)

Co-ordinators : Prof. Deepak Khemani

Lecture 1 - Artificial Intelligence: Introduction

Lecture 2 - Introduction to AI

Lecture 3 - AI Introduction: Philosophy

Lecture 4 - AI Introduction

Lecture 5 - Introduction: Philosophy

Lecture 6 - State Space Search - Introduction

Lecture 7 - Search - DFS and BFS

Lecture 8 - Search DFID

Lecture 9 - Heuristic Search

Lecture 10 - Hill Climbing

Lecture 11 - Solution Space Search, Beam Search

Lecture 12 - TSP Greedy Methods

Lecture 13 - Tabu Search

Lecture 14 - Optimization - I (Simulated Annealing)

Lecture 15 - Optimization - II (Genetic Algorithms)

Lecture 16 - Population based methods for Optimization

Lecture 17 - Population Based Methods II

Lecture 18 - Branch and Bound, Dijkstra's Algorithm

Lecture 19 - A* Algorithm

Lecture 20 - Admissibility of A*

Lecture 21 - A* Monotone Property, Iterative Deeping A*

Lecture 22 - Recursive Best First Search, Sequence Allignment

Lecture 23 - Pruning the Open and Closed lists

Lecture 24 - Problem Decomposition with Goal Trees

Lecture 25 - AO* Algorithm

Lecture 26 - Game Playing

Lecture 27 - Game Playing - Minimax Search

Lecture 28 - Game Playing - AlphaBeta

Lecture 29 - Game Playing - SSS *

Lecture 30 - Rule Based Systems

Lecture 31 - Inference Engines

Lecture 32 - Rete Algorithm

Lecture 33 - Planning

Lecture 34 - Planning FSSP, BSSP

Lecture 35 - Goal Stack Planning. Sussman's Anomaly

Lecture 36 - Non-linear planning

Lecture 37 - Plan Space Planning

Lecture 38 - GraphPlan

Lecture 39 - Constraint Satisfaction Problems

Lecture 40 - CSP continued

Lecture 41 - Knowledge-based systems

Lecture 42 - Knowledge-based Systems, PL

Lecture 43 - Propositional Logic

Lecture 44 - Resolution Refutation for PL

Lecture 45 - First-order Logic (FOL)

Lecture 46 - Reasoning in FOL

Lecture 47 - Backward chaining

Lecture 48 - Resolution for FOL

NPTEL : NOC:Programming, Data Structures and Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Hema A Murthy, Prof. Shankar Balachandran, Dr. N.S. Narayanaswamy

Lecture 1 - Introduction to Computers and Programming

Lecture 2 - Writing your first program

Lecture 3 - Variables, Operators and Expressions

Lecture 4 - Variable declarations, more operators and precedence

Lecture 5 - Input and Output Statements

Lecture 6 - Conditionals

Lecture 7 - Loops

Lecture 8 - Video Solution to Digital Root Programming Assignment

Lecture 9 - Introduction to arrays

Lecture 10 - Working with 1D arrays

Lecture 11 - Find prime numbers

Lecture 12 - Debugging demo

Lecture 13 - Multi-dimensional arrays

Lecture 14 - Pointers

Lecture 15 - More on pointers

Lecture 16 - Arrays and pointer arithmetic

Lecture 17 - Introduction to Strings

Lecture 18 - More on Strings

Lecture 19 - Video Solution to Print Elements of a Matrix in Spiral Order Programming Assignment

Lecture 20 - Introduction to functions

Lecture 21 - More details on functions

Lecture 22 - Arguments, variables and parameters

Lecture 23 - Pass parameters by reference

Lecture 24 - Recursive functions

Lecture 25 - Running time of a program

Lecture 26 - Computing time complexity

Lecture 27 - Video Solution to Palindrome Checker Programming Assignment

Lecture 28 - Algorithms and Powering

Lecture 29 - Polynomial evaluation and multiplication

Lecture 30 - Linear and Binary Search Analysis

Lecture 31 - Analysis of minimum and maximum in an array

Lecture 32 - Sorting I: Insertion, Merge

Lecture 33 - Sorting II: Counting, Radix

Lecture 34 - Finding i-th smallest number

Lecture 35 - Video Solution to Sorting words Programming Assignment

Lecture 36 - Structures

Lecture 37 - More on structures

Lecture 38 - Using structures and pointers to structures

Lecture 39 - Dynamic memory allocation

Lecture 40 - Linked Lists

Lecture 41 - Brief introduction to C++: Classes and objects

Lecture 42 - Data Structures: Abstract Data Type

Lecture 43 - Lists

Lecture 44 - Supplementary Lesson

Lecture 45 - Video Solution to Implementing a Hash Table ADT Programming Assignment

Lecture 46 - Stacks: Last In First Out

Lecture 47 - Queues: First In First Out

Lecture 48 - Trees

Lecture 49 - Tree traversal

Lecture 50 - Binary Search Trees

Lecture 51 - Heaps

Lecture 52 - Graphs and Representation

Lecture 53 - Supplementary Lesson

Lecture 54 - Video Solution to the Queue in a Hospital Programming Assignment

Lecture 55 - Greedy Algorithms

Lecture 56 - Dynamic Programming

Lecture 57 - Matrix Chain Multiplication

Lecture 58 - Dijkstra's Algorithm

Lecture 59 - Boyer-Moore String Matching Algorithm

Lecture 60 - File I/O

Lecture 61 - Modular Programming

NPTEL : NOC:Introduction to Information Security I (Computer Science and Engineering)

Co-ordinators : Prof. V. Kamakoti

Lecture 1 - Module 1 - Part 0 - Introduction to the Course

Lecture 2 - Module 1 - Part 1 - Definition of Information Security

Lecture 3 - Module 1 - Part 2 - Information Security Terminologies

Lecture 4 - Module 1 - Part 3 - Goals of Information Security

Lecture 5 - Module 1 - Part 4 - Implementation Issues of the Goals of Information Security - I

Lecture 6 - Module 1 - Part 5 - Implementation Issues of the Goals of Information Security - II

Lecture 7 - Module 1 - Part 6 - Control Mechanisms for Information Security - I

Lecture 8 - Module 1 - Part 7 - Access Control - Administrative and Technical

Lecture 9 - Module 1 - Part 8 - Passwords - Are they secure? - I

Lecture 10 - Module 1 - Part 9 - Access Control - Administrative and Technical

Lecture 11 - Module 1 - Part 10 - Passwords - Are they secure? - III

Lecture 12 - Module 1 - Part 11 - Multifactor Authentication - Challenges

Lecture 13 - Module 1 - Part 12 - Application Level Control and Information Security Planning

Lecture 14 - Module 1 - Part 13 - Information Security - Policy, Standard and Practice

Lecture 15 - Module 1 - Part 14 - Policies governing Issues, Roles and Responsibilities

Lecture 16 - Module 1 - Part 15 - Managing changes in Information Security Policies

Lecture 17 - Module 1 - Part 16 - Spheres of Information Security

Lecture 18 - Module 2 - Part 1 - Protecting your Personal Computer - I

Lecture 19 - Module 2 - part 2 - Protecting your Personal Computer - II

Lecture 20 - Module 2 - Part 3 - Protecting your Personal Computer - III

Lecture 21 - Module 2 - Part 4 - Cloud Computing (Basic Definitions) - I

Lecture 22 - Module 2 - Part 5 - Cloud Computing (Deployment) - II

Lecture 23 - Module 2 - Part 6 - Cloud Computing (Security Issues) - III

Lecture 24 - Module 2 - Part 7 - Cloud Computing (Trust and Risk) - IV

Lecture 25 - Module 2 - Part 8 - Cloud Computing (Security and Privacy Issues) - V

Lecture 26 - Module 2 - Part 9 - Cloud Computing (Security and Privacy Issues) - VI

Lecture 27 - Module 2 - Part 10 - Cloud Computing (Application and Data level security) - VII

Lecture 28 - Module 2 - Part 11 - Cloud Computing (Summary) - VIII

Lecture 29 - Module 2 - Part 12 - Standard I

Lecture 30 - Module 2 - Part 13 - Standard II

Lecture 31 - Module 2 - Part 14 - Standard III

Lecture 32 - Module 3 - Part 1

Lecture 33 - Module 3 - Part 2

Lecture 34 - Module 3 - Part 3

Lecture 35 - Module 3 - Part 4

Lecture 36 - Module 3 - Part 5

Lecture 37 - Module 3 - Part 6

Lecture 38 - Module 3 - Part 7

Lecture 39 - Module 3 - Part 8

Lecture 40 - Module 3 - Part 9

Lecture 41 - Module 4 - Part 1

Lecture 42 - module 4 - Part 2

Lecture 43 - Module 4 - Part 3

Lecture 44 - Module 4 - Part 4

Lecture 45 - Module 4 - Part 5

Lecture 46 - Module 4 - Part 6

Lecture 47 - Module 4 - Part 7

Lecture 48 - Module 4 - Part 8

Lecture 49 - Module 4 - Part 9

Lecture 50 - Module 4 - Part 10

Lecture 51 - Module 5 - Part 1

Lecture 52 - Module 5 - Part 2

Lecture 53 - Module 5 - Part 3

Lecture 54 - Module 5 - Part 4

Lecture 55 - Module 5 - Part 5

Lecture 56 - Module 5 - Part 6

Lecture 57 - Module 5 - Part 7

Lecture 58 - Module 6 - Part 1

Lecture 59 - Module 6 - Part 2

Lecture 60 - Module 6 - Part 3

Lecture 61 - Module 6 - Part 4

Lecture 62 - Module 6 - Part 5

Lecture 63 - Module 6 - Part 6

Lecture 64 - Module 6 - Part 7

Lecture 65 - Module 6 - Part 8

NPTEL : NOC:Programming and Data structures (PDS) (Computer Science and Engineering)

Co-ordinators : Dr. N S. Narayanaswamy

Lecture 1 - A Simple C Program for Sorting

Lecture 2 - Review of Structures, Pointers and Functions

Lecture 3 - Recursion

Lecture 4 - Abstract Data Types-Data + Methods

Lecture 5 - List Data Type

Lecture 6 - Access and update methods

Lecture 7 - Doubly Linked List Data Type

Lecture 8 - Doubly Linked Lists and Arrays

Lecture 9 - ADT Stacks

Lecture 10 - Checking of Balanced Parenthesis

Lecture 11 - Infix and Postfix expressions and Expression evaluation

Lecture 12 - Queue ADT Definition and Implementation

Lecture 13 - Merging using Queue ADT and Queue types

Lecture 14 - Tree ADT and Traversals

Lecture 15 - Binary Tree ADT and traversals

Lecture 16 - Tree Applications

Lecture 17 - Binary Search Trees

Lecture 18 - Heaps

NPTEL : NOC:Design and Analysis of Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Madhavan Mukund

Lecture 1 - Course Outline

Lecture 2 - Example: Air Travel

Lecture 3 - Example: Xerox shop

Lecture 4 - Example: Document similarity

Lecture 5 - Introduction and motivation

Lecture 6 - Input size, worst case, average case

Lecture 7 - Quantifying efficiency: O( ), Omega( ), Theta( )

Lecture 8 - Examples: Analysis of iterative and recursive algorithms

Lecture 9 - Arrays and lists

Lecture 10 - Searching in an array

Lecture 11 - Selection Sort

Lecture 12 - Insertion sort

Lecture 13 - Merge sort

Lecture 14 - Merge sort - analysis

Lecture 15 - Quicksort

Lecture 16 - Quicksort - analysis

Lecture 17 - Sorting - Concluding remarks

Lecture 18 - Introduction to graphs

Lecture 19 - Representing graphs

Lecture 20 - Breadth first search (BFS)

Lecture 21 - Depth first search (DFS)

Lecture 22 - Applications of BFS and DFS

Lecture 23 - Directed acylic graphs: topological sort

Lecture 24 - Directed acylic graphs: longest paths

Lecture 25 - Single source shortest paths: Dijkstras algorithm

Lecture 26 - Dijkstras algorithm: analysis

Lecture 27 - Negative edge weights: Bellman-Ford algorithm

Lecture 28 - All pairs shortest paths

Lecture 29 - Minimum Cost Spanning Trees

Lecture 30 - Prims Algorithm

Lecture 31 - Kruskals algorithm

Lecture 32 - Union-Find using arrays

Lecture 33 - Union-Find using pointers

Lecture 34 - Priority queues

Lecture 35 - Heaps

Lecture 36 - Heaps: Updating values, sorting

Lecture 37 - Counting inversions

Lecture 38 - Closest pair of points

Lecture 39 - Binary Search Trees

Lecture 40 - Balanced search trees

Lecture 41 - Interval scheduling

Lecture 42 - Scheduling with deadlines: minimizing lateness

Lecture 43 - Huffman codes

Lecture 44 - Introduction to dynamic programming

Lecture 45 - Memoization

Lecture 46 - Grid Paths

Lecture 47 - Common subwords and subsequences

Lecture 48 - Edit distance

Lecture 49 - Matrix multiplication

Lecture 50 - Linear Programming

Lecture 51 - LP modelling: Production Planning

Lecture 52 - LP modelling: Bandwidth allocation

Lecture 53 - Network Flows

Lecture 54 - Reductions

Lecture 55 - Checking Algorithms

Lecture 56 - P and NP

NPTEL : NOC:Programming, Data Structures and Algorithms (Aricent) (Computer Science and Engineering)

Co-ordinators : Dr. N S. Narayanaswamy, Prof. Shankar Balachandran, Prof. Hema A Murthy

Lecture 1 - Introduction to Computers and Programming

Lecture 2 - Writing your first program

Lecture 3 - Variables, Operators and Expressions

Lecture 4 - Variable declarations, more operators and precedence

Lecture 5 - Input and Output Statements

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Lecture 8 - Introduction to arrays

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Lecture 10 - Find prime numbers

Lecture 11 - Debugging demo

Lecture 12 - Multi-dimensional arrays

Lecture 13 - Pointers

Lecture 14 - More on pointers

Lecture 15 - Arrays and pointer arithmetic

Lecture 16 - Introduction to Strings

Lecture 17 - More on Strings

Lecture 18 - Introduction to functions

Lecture 19 - More details on functions

Lecture 20 - Arguments, variables and parameters

Lecture 21 - Pass parameters by reference

Lecture 22 - Recursive Functions

Lecture 23 - C control structures, functional specification of programs

Lecture 24 - Complexity Analysis using Sum and Product Rule

Lecture 25 - Complexity Analysis of Recursive Functions

Lecture 26 - Algorithms and Powering

Lecture 27 - Polynomial evaluation and multiplication

Lecture 28 - Linear and Binary Search Analysis

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Lecture 34 - More on Structures

Lecture 35 - Using structures and pointers to structures

Lecture 36 - Dynamic memory allocation

Lecture 37 - Linked List

Lecture 38 - Brief introduction to C++: Classes and objects

Lecture 39 - Abstract Data Types

Lecture 40 - More on ADT

Lecture 41 - Stacks: Last In First Out

Lecture 42 - Queues: First In First

Lecture 43 - Trees

Lecture 44 - Tree Traversal

Lecture 45 - Binary Search

Lecture 46 - Heaps

Lecture 47 - Graphs and Representations

Lecture 48 - Greedy Algorithms

Lecture 49 - Dynamic Programming

Lecture 50 - Matrix Chain Multiplication

Lecture 51 - Hash Tables

Lecture 52 - Graph Algorithms: Dijkstras Algorithm and Prims Algorithm

Lecture 53 - Graph Traversals: BFS,DFS and Articulation Points

Lecture 54 - File I/O

Lecture 55 - Modular Programming

NPTEL : NOC:Computer Architecture (Computer Science and Engineering)

Co-ordinators : Prof.Madhu Mutyam

Lecture 1 - Introduction to Computer Architecture

Lecture 2 - Quantitative Principles of Computer Design

Lecture 3 - Instruction Set Principles-Part 1

Lecture 4 - Instruction Set Principles-Part 2

Lecture 5 - Instruction Set Principles-Part 3

Lecture 6 - Cache Memory Hierarchy - Part 1

Lecture 7 - Cache Memory Hierarchy - Part 2

Lecture 8 - Cache Memory Hierarchy - Part 3

Lecture 9 - Cache Memory Hierarchy - Part 4

Lecture 10 - Main Memory Design - Part 1

Lecture 11 - Main Memory Design - Part 2

Lecture 12 - Main Memory Design - Part 3

Lecture 13 - Fundamentals of Pipelining - Part 1

Lecture 14 - Fundamentals of Pipelining - Part 2

Lecture 15 - Fundamentals of Pipelining - Part 3

Lecture 16 - Fundamentals of Pipelining - Part 4

Lecture 17 - Fundamentals of Pipelining - Part 5

Lecture 18 - Scalar to Superscalar pipeline

Lecture 19 - Instruction Dependencies

Lecture 20 - Compiler optimizations for Exposing ILP

Lecture 21 - Advanced Branch Prediction Techniques - Part 1

Lecture 22 - Advanced Branch Prediction Techniques - Part 2

Lecture 23 - Superscalar Organization

Lecture 24 - Register Renaming

Lecture 25 - Tomasulo Algorithm

Lecture 26 - Dynamic Execution Core

Lecture 27 - Multi threading

Lecture 28 - Multicore Processor Architecture

Lecture 29 - Cache Coherence

Lecture 30 - Cache Coherence Protocol Design

Lecture 31 - Synchronization

Lecture 32 - Memory Consistency - Part 1

Lecture 33 - Memory Consistency - Part 2

NPTEL : NOC:Model Checking (Computer Science and Engineering)

Co-ordinators : Prof. B. Srivathsan

Lecture 1 - Course Overview

Lecture 2 - Module 1 - Modeling code behaviour

Lecture 3 - Module 2 - Modeling hardware circuits

Lecture 4 - Module 3 - Modeling data-dependent programs

Lecture 5 - Module 4 - Modeling concurrent systems

Lecture 6 - Summary

Lecture 7 - Module 1 - Model checking tools

Lecture 8 - Module 2 - Simple models in NuSMV

Lecture 9 - Module 3 - Hardware verification using NuSMV

Lecture 10 - Module 4 - Modeling concurrent systems in NuSMV

Lecture 11 - Summary.

Lecture 12 - Module 1 - A problem in concurrency

Lecture 13 - Module 2 - What is a property?

Lecture 14 - Module 3 - Invariants

Lecture 15 - Module 4 - Safety properties

Lecture 16 - Module 5 - Liveness properties

Lecture 17 - Summary..

Lecture 18 - Module 1 - Road map

Lecture 19 - Module 2 - A gentle introduction to automata

Lecture 20 - Module 3 - Simple properties of finite automata

Lecture 21 - Module 4 - Safety properties described by automata

Lecture 22 - Summary...

Lecture 23 - Module 1 - Specifying properties

Lecture 24 - Module 2 - Omega-regular expressions

Lecture 25 - Module 3 - Bchi automata

Lecture 26 - Module 4 - Simple properties of Bchi automata

Lecture 27 - Summary....

Lecture 28 - Module 1 - Overview

Lecture 29 - Module 2 - Omega-regular expressions to NBA

Lecture 30 - Module 3 - Checking emptiness of NBA

Lecture 31 - Module 4 - Generalized NBA

Lecture 32 - Summary.....

Lecture 33 - Module 1 - Introduction to LTL

Lecture 34 - Module 2 - Semantics of LTL

Lecture 35 - Module 3 - A puzzle

Lecture 36 - Summary.

Lecture 37 - Module 1 - Automata based LTL model-checking

Lecture 38 - Module 2 - LTL to NBA

Lecture 39 - Module 3 - Automaton construction

Lecture 40 - Summary..

Lecture 41 - Module 1 - Tree view of a transition system

Lecture 42 - Module 2 - CTL*

Lecture 43 - Module 3 - CTL

Lecture 44 - summary...

Lecture 45 - Module 1 - Adequate CTL formulae

Lecture 46 - Module 2 - EX, EU, EG

Lecture 47 - Module 3 - Final algorithm

Lecture 48 - Module 4 - State-space explosion

Lecture 49 - Summary....

Lecture 50 - Module 1 - Introduction to BDDs

Lecture 51 - Module 2 - Ordered BDDs

Lecture 52 - Module 3 - Representing transition systems as OBDDs

Lecture 53 - Summary.....

Lecture 54 - Timed transition systems

Lecture 55 - Concluding remarks

NPTEL : NOC:Functional Programming in Haskell (Computer Science and Engineering)

Co-ordinators : Prof. Madhavan Mukund, Prof. S P Suresh

Lecture 1 - Functions

Lecture 2 - Types

Lecture 3 - Haskell

Lecture 4 - Running Haskell programs

Lecture 5 - Currying

Lecture 6 - Examples

Lecture 7 - Lists

Lecture 8 - Functions on lists

Lecture 9 - Characters and strings

Lecture 10 - Tuples

Lecture 11 - Computation as rewriting

Lecture 12 - Polymorphism and higher-order functions

Lecture 13 - Map and filter

Lecture 14 - List comprehension

Lecture 15 - Folding through a list

Lecture 16 - Measuring efficiency

Lecture 17 - Sorting

Lecture 18 - Using infinite lists

Lecture 19 - Conditional polymorphism

Lecture 20 - Defining functions in ghci

Lecture 21 - User-defined datatypes

Lecture 22 - Abstract datatypes

Lecture 23 - Modules

Lecture 24 - Recursive data types

Lecture 25 - Binary search trees

Lecture 26 - Balanced search trees

Lecture 27 - Arrays

Lecture 28 - Input/Output

NPTEL : Virtual Reality ()

Lecture 1 - Course mechanics

Lecture 2 - Goals and VR definitions

Lecture 3 - Historical perspective

Lecture 4 - Birds-eye view (general)

Lecture 5 - Birds-eye view (general) (Continued...)

Lecture 6 - Birds-eye view (hardware)

Lecture 7 - Birds-eye view (software)

Lecture 8 - Birds-eye view (sensation and perception)

Lecture 9 - Geometric modeling

Lecture 10 - Transforming models

Lecture 11 - Matrix algebra and 2D rotations

Lecture 12 - 3D rotations and yaw, pitch, and roll

Lecture 13 - 3D rotations and yaw, pitch, and roll (Continued...)

Lecture 14 - Axis-angle representations

Lecture 15 - Quaternions

Lecture 16 - Converting and multiplying rotations

Lecture 17 - Converting and multiplying rotations (Continued...)

Lecture 18 - Homogeneous transforms

Lecture 19 - The chain of viewing transforms

Lecture 20 - Eye transforms

Lecture 21 - Eye transforms (Continued...)

Lecture 22 - Canonical view transform

Lecture 23 - Viewport transform

Lecture 24 - Viewport transform (Continued...)

Lecture 25 - Three interpretations of light

Lecture 26 - Refraction

Lecture 27 - Simple lenses

Lecture 28 - Diopters

Lecture 29 - Imaging properties of lenses

Lecture 30 - Lens aberrations

Lecture 31 - Optical system of eyes

Lecture 32 - Photoreceptors

Lecture 33 - Sufficient resolution for VR

Lecture 34 - Light intensity

Lecture 35 - Eye movements

Lecture 36 - Eye movements (Continued...)

Lecture 37 - Eye movement issues for VR

Lecture 38 - Neuroscience of vision

Lecture 39 - Depth perception

Lecture 40 - Depth perception (Continued...)

Lecture 41 - Motion perception

Lecture 42 - Frame rates and displays

Lecture 43 - Frame rates and displays (Continued...)

Lecture 44 - Overview

Lecture 45 - Orientation tracking

Lecture 46 - Tilt drift correction

Lecture 47 - Yaw drift correction

Lecture 48 - Tracking with a camera

Lecture 49 - Perspective n-point problem

Lecture 50 - Filtering

Lecture 51 - Lighthouse approach

Lecture 52 - Visual Rendering-Overview

Lecture 53 - Visual Rendering-overview (Continued...)

Lecture 54 - Shading models

Lecture 55 - Rasterization

Lecture 56 - Pixel shading

Lecture 57 - VR-specific problems

Lecture 58 - Distortion shading

Lecture 59 - Post-rendering image warp

Lecture 60 - Physics and physiology

Lecture 61 - Auditory perception

Lecture 62 - Auditory localization

Lecture 63 - Rendering

Lecture 64 - Spatialization and display

Lecture 65 - Combining other senses

Lecture 66 - Interfaces -overview

Lecture 67 - Locomotion

Lecture 68 - Manipulation

Lecture 69 - System control

Lecture 70 - Social interaction

Lecture 71 - Evaluation of VR Systems

NPTEL : NOC:Introduction to Machine Learning (Sponsored by Arihant) (Computer Science and Engineering)

Co-ordinators : Dr. Balaraman Ravindran

Lecture 1 - A brief introduction to machine learning

Lecture 2 - Supervised Learning

Lecture 3 - Unsupervised Learning

Lecture 4 - Reinforcement Learning

Lecture 5 - Probability Basics - 1

Lecture 6 - Probability Basics - 2

Lecture 7 - Linear Algebra - 1

Lecture 8 - Linear Algebra - 2

Lecture 9 - Statistical Decision Theory - Regression

Lecture 10 - Statistical Decision Theory - Classification

Lecture 11 - Bias-Variance

Lecture 12 - Linear Regression

Lecture 13 - Multivariate Regression

Lecture 14 - Subset Selection 1

Lecture 15 - Subset Selection 2

Lecture 16 - Shrinkage Methods

Lecture 17 - Principal Components Regression

Lecture 18 - Partial Least Squares

Lecture 19 - Linear Classification

Lecture 20 - Logistic Regression

Lecture 21 - Linear Discriminant Analysis 1

Lecture 22 - Linear Discriminant Analysis 2

Lecture 23 - Linear Discriminant Analysis 3

Lecture 24 - Optimization

Lecture 25 - Perceptron Learning

Lecture 26 - SVM - Formulation

Lecture 27 - SVM - Interpretation & Analysis

Lecture 28 - SVMs for Linearly Non Separable Data

Lecture 29 - SVM Kernels

Lecture 30 - SVM - Hinge Loss Formulation

Lecture 31 - Weka Tutorial

Lecture 32 - Early Models

Lecture 33 - Backpropogation - I

Lecture 34 - Backpropogation - II

Lecture 35 - Initialization, Training and Validation

Lecture 36 - Maximum Likelihood Estimate

Lecture 37 - Priors and MAP Estimate

Lecture 38 - Bayesian Parameter Estimation

Lecture 39 - Introduction

Lecture 40 - Regression Trees

Lecture 41 - Stopping Criteria and Pruning

Lecture 42 - Loss Functions for Classification

Lecture 43 - Categorical Attributes

Lecture 44 - Multiway Splits

Lecture 45 - Missing Values, Imputation and Surrogate Splits

Lecture 46 - Instability, Smoothness and Repeated Subtrees

Lecture 47 - Tutorial

Lecture 48 - Evaluation Measures I

Lecture 49 - Bootstrapping and Cross Validation

Lecture 50 - 2 Class Evaluation Measures

Lecture 51 - The ROC Curve

Lecture 52 - Minimum Description Length and Exploratory Analysis

Lecture 53 - Introduction to Hypothesis Testing

Lecture 54 - Basic Concepts

Lecture 55 - Sampling Distributions and the Z Test

Lecture 56 - Student's t-test

Lecture 57 - The Two Sample and Paired Sample t-tests

Lecture 58 - Confidence Intervals

Lecture 59 - Bagging, Committee Machines and Stacking

Lecture 60 - Boosting

Lecture 61 - Gradient Boosting

Lecture 62 - Random Forest

Lecture 63 - Naive Bayes

Lecture 64 - Bayesian Networks

Lecture 65 - Undirected Graphical Models - Introduction

Lecture 66 - Undirected Graphical Models - Potential Functions

Lecture 67 - Hidden Markov Models

Lecture 68 - Variable Elimination

Lecture 69 - Belief Propagation

Lecture 70 - Partitional Clustering

Lecture 71 - Hierarchical Clustering

Lecture 72 - Threshold Graphs

Lecture 73 - The BIRCH Algorithm

Lecture 74 - The CURE Algorithm

Lecture 75 - Density Based Clustering

Lecture 76 - Gaussian Mixture Models

Lecture 77 - Expectation Maximization

Lecture 78 - Expectation Maximization (Continued...)

Lecture 79 - Spectral Clustering

Lecture 80 - Learning Theory

Lecture 81 - Frequent Itemset Mining

Lecture 82 - The Apriori Property

Lecture 83 - Introduction to Reinforcement Learning

Lecture 84 - RL Framework and TD Learning

Lecture 85 - Solution Methods and Applications

Lecture 86 - Multi-class Classification

NPTEL : NOC:Artificial Intelligence: Knowledge Representation and Reasoning (Computer Science and Engineering)

Co-ordinators : Prof. Deepak Khemani

Lecture 1 - Introduction

Lecture 2 - Abductive Inferences and Expectations

Lecture 3 - On Machine Learning

Lecture 4 - A New Test of Intelligence?

Lecture 5 - The World According to Us

Lecture 6 - From Particles to Concepts

Lecture 7 - The Domains for Reasoning

Lecture 8 - Hierarchies in Representation

Lecture 9 - Logic and Representation: A Quick Tour

Lecture 10 - Symbols and Thought

Lecture 11 - From Gears to Symbols

Lecture 12 - Truth, Logic, and Provability

Lecture 13 - A Syntactic Machine

Lecture 14 - Entailment and Proof

Lecture 15 - The Languages of Logic

Lecture 16 - Patterns in Arguments

Lecture 17 - Rules of Inference

Lecture 18 - Propositional Logic

Lecture 19 - Propositional Logic: Syntax

Lecture 20 - Propositional Logic: Semantics

Lecture 21 - Proofs: Natural Deduction

Lecture 22 - The Deduction Theorem

Lecture 23 - Models

Lecture 24 - The Tableau Method

Lecture 25 - First Order Logic

Lecture 26 - First Order Logic: Syntax

Lecture 27 - FOL: Universal Instantiation

Lecture 28 - First Order Logic: Semantics

Lecture 29 - FOL: Truth Assignments

Lecture 30 - Modified Modus Ponens

Lecture 31 - The Unification Algorithm

Lecture 32 - Skolemization

Lecture 33 - Expert Systems

Lecture 34 - Backward Chaining Systems

Lecture 35 - Deductive Retrieval

Lecture 36 - The Resolution Refutation Method

Lecture 37 - Clause Form in FOL

Lecture 38 - Resolution Refutation in FOL

Lecture 39 - First Order Logic with Equality

Lecture 40 - Who was the surgeon?

Lecture 41 - Consistency vs. Completeness

Lecture 42 - Logic Programming

Lecture 43 - Arithmetic

Lecture 44 - Horn Clauses and Prolog

Lecture 45 - SLD Derivation = Backward Chaining

Lecture 46 - Programming in Logic

Lecture 47 - Prolog: Programming in Logic

Lecture 48 - Prolog: Procedural Interpretation

Lecture 49 - Prolog: Query Evaluation

Lecture 50 - Prolog: Unifying Terms

Lecture 51 - Prolog: Goal Order

Lecture 52 - Prolog: Tabling

Lecture 53 - Prolog: Negation by Failure

Lecture 54 - Prolog: The Cut Operator

Lecture 55 - Rule Based Expert Systems

Lecture 56 - The OPS5 Language

Lecture 57 - Match, Resolve, Execute

Lecture 58 - Conflict Resolution Strategies

Lecture 59 - The Rete Algorithm

Lecture 60 - The Rete Net

Lecture 61 - The Rete Net : Examples

Lecture 62 - Knowledge Representation

Lecture 63 - Synonyms, Antonyms, Hyponyms, Meronyms

Lecture 64 - Binary Relations

Lecture 65 - Describing Family Relations

Lecture 66 - Recursive Descriptions

Lecture 67 - Abstract Entities

Lecture 68 - Reification: Units of Measurement

Lecture 69 - Semantic Nets and Knowledge Graphs

Lecture 70 - DL: Description Logics

Lecture 71 - Defining New Concepts and Roles

Lecture 72 - The Sentences in DL

Lecture 73 - A Family of Logics

Lecture 74 - DL: Some Examples

Lecture 75 - ALC Tableau

Lecture 76 - Model Checking in ALC

Lecture 77 - ALC Tableau: Examples

Lecture 78 - Language Independent Represntation

Lecture 79 - Conceptual Dependency Theory

Lecture 80 - CD States

Lecture 81 - Inferences in MARGIE

Lecture 82 - CD: Actions

Lecture 83 - English to CD

Lecture 84 - Representing Complex Verbs

Lecture 85 - Semantic Parsing of Language

Lecture 86 - Knowledge Structures

Lecture 87 - Scripts

Lecture 88 - SAM: Script Apploer Mechanism

Lecture 89 - A VIP Visit

Lecture 90 - Invoking Scripts

Lecture 91 - Goals, Plans, and Actions

Lecture 92 - Goal Interactions

Lecture 93 - Explanation Driven Understanding

Lecture 94 - Tussle Over a Bicycle

Lecture 95 - Plan Applier Mechanism (PAM)

Lecture 96 - Requests and Rule Instances

Lecture 97 - Managing Rule Instances

Lecture 98 - Knowledge Structures: Frames

Lecture 99 - Inheritance

Lecture 100 - A Frame System for Travel Planning

Lecture 101 - Inheritance in Taxonomies

Lecture 102 - Default Reasoning

Lecture 103 - Closed World Assumption

Lecture 104 - Circumscription

Lecture 105 - Default Logic

Lecture 106 - Autoepistemic Reasoning

Lecture 107 - The Event Calculus

Lecture 108 - The Effects of Events

Lecture 109 - Epistemic Logic

Lecture 110 - Kripke Structures: Possible Worlds Semantics

Lecture 111 - The Muddy Children Puzzle

Lecture 112 - The Effects of Epistemic Actions

Lecture 113 - Reasoning with Beliefs

NPTEL : NOC:Information Security - II (Computer Science and Engineering)

Co-ordinators : Prof. V. Kamakoti

Lecture 1 - Experimental Setup: Video Tutorial

Lecture 2 - Need for Secure Systems

Lecture 3 - Ignorance of A is Sin of B

Lecture 4 - Function calls and Stacks

Lecture 5 - Stack Smashing

Lecture 6 - Virtual Machine Based Rootkits

Lecture 7 - Security and Architecture: Introduction

Lecture 8 - Structured Computer Organization Completed

Lecture 9 - X86 ISA - Part1

Lecture 10 - X86 ISA - Part 2

Lecture 11 - X86 Protected Mode

Lecture 12 - X86 Memory Segmentation

Lecture 13 - Process Isolation using Segmentation

Lecture 14 - Paging and Virtual Memory

Lecture 15 - Task Switching and Interrupt Service

Lecture 16 - Memory Segmentation Deep dive - Part 1

Lecture 17 - Memory Segmentation Deep dive - Part 2

Lecture 18 - Memory Segmentation Deep dive - Part 3

Lecture 19 - Memory Segmentation Deep dive - Part 4

Lecture 20 - Segmentation Recap

Lecture 21 - Lab 1 - Part 1

Lecture 22 - Lab 1 - Part 2

Lecture 23 - Lab 1 - Part 3

Lecture 24 - ISR Recap

Lecture 25 - Lab 2 - Part 1

Lecture 26 - Lab 2 - Part 2

Lecture 27 - Memory Management Recap

Lecture 28 - Lab 3 - Part 1

Lecture 29 - Lab 3 - Part 2

Lecture 30 - Task Switch recap

Lecture 31 - Lab 4 - Part 1

Lecture 32 - Lab 4 - Part 2

Lecture 33 - Lab 4 - Part 3

Lecture 34 - Lab 4 - Part 4

Lecture 35 - Introduction to Basic Cryptography

Lecture 36 - Public Key Cryptography

Lecture 37 - Freescale ARM iMX6 Processor

Lecture 38 - High Assurance Boot in iMX6

Lecture 39 - Case Study

Lecture 40 - Basics of Networking

Lecture 41 - Network Processor Vs General Purpose Processor

Lecture 42 - Network Processor Architecture

NPTEL : NOC:Algorithms for Big Data (Computer Science and Engineering)

Co-ordinators : Prof. John Augustine

Lecture 1 - Basic definitions

Lecture 2 - Conditional probability

Lecture 3 - Example problems

Lecture 4 - Karger's mincut algorithm

Lecture 5 - Analysis of Karger's mincut algorithm

Lecture 6 - Random variables

Lecture 7 - Randomized quicksort

Lecture 8 - Problem solving video - The rich get richer

Lecture 9 - Problem solving video - Monty Hall problem

Lecture 10 - Bernoulli, Binomial and Geometric distributions

Lecture 11 - Tail Bounds

Lecture 12 - Application of Chernoff bound

Lecture 13 - Application of Chebyshev's inequality

Lecture 14 - Intro to Big Data Algorithms

Lecture 15 - SAT Problem

Lecture 16 - Classification of States

Lecture 17 - Stationary Distribution of a Markov Chain

Lecture 18 - Celebrities Case Study

Lecture 19 - Random Walks on Undirected Graphs

Lecture 20 - Intro to Streaming, Morris Algorithm

Lecture 21 - Reservoir Sampling

Lecture 22 - Approximate Median

Lecture 23 - Overview

Lecture 24 - Balls, bins, hashing

Lecture 25 - Chain hashing, SUHA, Power of Two choices

Lecture 26 - Bloom filter

Lecture 27 - Pairwise independence

Lecture 28 - Estimating expectation of continuous function

Lecture 29 - Universal hash functions

Lecture 30 - Perfect hashing

Lecture 31 - Count-min filter for heavy hitters in data streams

Lecture 32 - Problem solving video - Doubly Stochastic Transition Matrix

Lecture 33 - Problem solving video - Random Walks on Linear Structures

Lecture 34 - Problem solving video - Lollipop Graph

Lecture 35 - Problem solving video - Cat And Mouse

Lecture 36 - Estimating frequency moments

Lecture 37 - Property testing framework

Lecture 38 - Testing Connectivity

Lecture 39 - Enforce and Test Introduction

Lecture 40 - Testing if a graph is a biclique

Lecture 41 - Testing bipartiteness

Lecture 42 - Property testing and random walk algorithms

Lecture 43 - Testing if a graph is bipartite (using random walks)

Lecture 44 - Graph streaming algorithms: Introduction

Lecture 45 - Graph streaming algorithms: Matching

Lecture 46 - Graph streaming algorithms: Graph sparsification

Lecture 47 - MapReduce

Lecture 48 - K-Machine Model (aka Pregel Model)

NPTEL : NOC:Reinforcement Learning (Computer Science and Engineering)

Co-ordinators : Dr. B. Ravindran

Lecture 1 - Tutorial 1 - Probability Basics 1

Lecture 2 - Tutorial 1 - Probability Basics 2

Lecture 3 - Tutorial 2 - Linear algebra - 1

Lecture 4 - Tutorial 2 - Linear algebra - 2

Lecture 5 - Introduction to RL

Lecture 6 - RL Framework and applications

Lecture 7 - Introduction to Immediate RL

Lecture 8 - Bandit Optimalities

Lecture 9 - Value function based methods

Lecture 10 - UCB 1

Lecture 11 - Concentration Bounds

Lecture 12 - UCB 1 Theorem

Lecture 13 - PAC Bounds

Lecture 14 - Median Elimination

Lecture 15 - Thompson Sampling

Lecture 16 - Policy Search

Lecture 17 - REINFORCE

Lecture 18 - Contextual Bandits

Lecture 19 - Full RL Introduction

Lecture 20 - Returns, Value Functions and MDPs

Lecture 21 - MDP Modelling

Lecture 22 - Bellman Equation

Lecture 23 - Bellman Optimality Equation

Lecture 24 - Cauchy Sequence and Green's Equation

Lecture 25 - Banach Fixed Point Theorem

Lecture 26 - Convergence Proof

Lecture 27 - Lpi Convergence

Lecture 28 - Value Iteration

Lecture 29 - Policy Iteration

Lecture 30 - Dynamic Programming

Lecture 31 - Monte Carlo

Lecture 32 - Control in Monte Carlo

Lecture 33 - Off Policy MC

Lecture 34 - UCT

Lecture 35 - TD(0)

Lecture 36 - TD(0) Control

Lecture 37 - Q-Learning

Lecture 38 - Afterstate

Lecture 39 - Eligibility Traces

Lecture 40 - Backward View of Eligibility Traces

Lecture 41 - Eligibility Trace Control

Lecture 42 - Thompson Sampling Recap

Lecture 43 - Function Approximation

Lecture 44 - Linear Parameterization

Lecture 45 - State Aggregation Methods

Lecture 46 - Function Approximation and Eligibility Traces

Lecture 47 - LSTD and LSTDQ

Lecture 48 - LSPI and Fitted Q

Lecture 49 - DQN and Fitted Q-Iteration

Lecture 50 - Policy Gradient Approach

Lecture 51 - Actor Critic and REINFORCE

Lecture 52 - REINFORCE (cont'd)

Lecture 53 - Policy Gradient with Function Approximation

Lecture 54 - Hierarchical Reinforcement Learning

Lecture 55 - Types of Optimality

Lecture 56 - Semi Markov Decision Processes

Lecture 57 - Options

Lecture 58 - Learning with Options

Lecture 59 - Hierarchical Abstract Machines

Lecture 60 - MAXQ

Lecture 61 - MAXQ Value Function Decomposition

Lecture 62 - Option Discovery

Lecture 63 - POMDP Introduction

Lecture 64 - Solving POMDP

NPTEL : NOC:Introduction to Operating Systems (Computer Science and Engineering)

Co-ordinators : Prof. Chester Rebeiro

Lecture 1 - Intro to the Course

Lecture 2 - Introduction to OS

Lecture 3 - PC Hardware

Lecture 4 - From Programs to Processes

Lecture 5 - Sharing the CPU

Lecture 6 - Introduction

Lecture 7 - Virtual Memory

Lecture 8 - MMU Mapping

Lecture 9 - Segmentation

Lecture 10 - Memory Management in xv6

Lecture 11 - PC Booting

Lecture 12 - Week 3 Introduction

Lecture 13 - Create Execute and Exit from Processes

Lecture 14 - System Calls for Process Management

Lecture 15 - Interrupts

Lecture 16 - Interrupt Handling

Lecture 17 - Software Interrupts and System calls

Lecture 18 - CPU Context switching

Lecture 19 - CPU Scheduling

Lecture 20 - Priority Based Scheduling Algorithms

Lecture 21 - Multi-Processor Scheduling

Lecture 22 - Scheduling in Linux

Lecture 23 - Completely Fair Scheduling

Lecture 24 - Inter Process Communication

Lecture 25 - Synchronization

Lecture 26 - Software solutions for critical sections

Lecture 27 - Bakery Algorithm

Lecture 28 - Hardware Locks

Lecture 29 - Mutexes

Lecture 30 - Semaphores

Lecture 31 - Dining Philosophers Problem

Lecture 32 - Deadlocks

Lecture 33 - Dealing with Deadlocks

Lecture 34 - Threads - Part 1

Lecture 35 - Threads - Part 2

Lecture 36 - Operating system security

Lecture 37 - Information Flow policies

Lecture 38 - Buffer Overflows

Lecture 39 - Preventing Buffer Overflow Attacks

NPTEL : NOC:Programming, Data Structures and Algorithms in Python (Computer Science and Engineering)

Co-ordinators : Prof. Madhavan Mukund

Lecture 1 - Lecture 1 - Algorithms and programming: simple gcd

Lecture 2 - Lecture 2 - Improving naive gcd

Lecture 3 - Lecture 3 - Euclid's algorithm for gcd

Lecture 4 - Lecture 4 - Downloading and installing Python

Lecture 5 - Lecture 1 - Assignment statement, basic types - int, float, bool

Lecture 6 - Lecture 2 - Strings

Lecture 7 - Lecture 3 - Lists

Lecture 8 - Lecture 4 - Control Flow

Lecture 9 - Lecture 5 - Functions

Lecture 10 - Lecture 6 - Examples

Lecture 11 - Lecture 1 - More about range()

Lecture 12 - Lecture 2 - Manipulating lists

Lecture 13 - Lecture 3 - Breaking out of a loop

Lecture 14 - Lecture 4 - Arrays vs lists, binary search

Lecture 15 - Lecture 5 - Efficiency

Lecture 16 - Lecture 6 - Selection Sort

Lecture 17 - Lecture 7 - Insertion Sort

Lecture 18 - Lecture 8 - Recursion

Lecture 19 - Lecture 1 - Mergesort

Lecture 20 - Lecture 2 - Mergesort, analysis

Lecture 21 - Lecture 3 - Quicksort

Lecture 22 - Lecture 4 - Quicksort analysis

Lecture 23 - Lecture 5 - Tuples and dictionaries

Lecture 24 - Lecture 6 - Function definitions

Lecture 25 - Lecture 7 - List Comprehension

Lecture 26 - Lecture 1 - Exception Handling

Lecture 27 - Lecture 2 - Standard input and output

Lecture 28 - Lecture 3 - Handling files

Lecture 29 - Lecture 4 - String functions

Lecture 30 - Lecture 5 - Formatting printed output

Lecture 31 - Lecture 6 - pass, del() and None

Lecture 32 - Lecture 1 - Backtracking, N queens

Lecture 33 - Lecture 2 - Global scope, nested functions

Lecture 34 - Lecture 3 - Generating permutations

Lecture 35 - Lecture 4 - Sets, stacks, queues

Lecture 36 - Lecture 5 - Priority queues and heaps

Lecture 37 - Lecture 1 - Abstract datatypes, classes and objects

Lecture 38 - Lecture 2 - Classes and objects in Python

Lecture 39 - Lecture 3 - User defined lists

Lecture 40 - Lecture 4 - Search trees

Lecture 41 - Lecture 1 - Memoization and dynamic programming

Lecture 42 - Lecture 2 - Grid paths

Lecture 43 - Lecture 3 - Longest common subsequence

Lecture 44 - Lecture 4 - Matrix multiplication

Lecture 45 - Lecture 5 - Wrap-up, Python vs other languages

NPTEL : NOC:Privacy and Security in Online Social Networks (Computer Science and Engineering)

Co-ordinators : Prof. Ponnurangam Kumaraguru

Lecture 1 - Intro to Course

Lecture 2 - Intro to Course

Lecture 3 - Incidents

Lecture 4 - Tutorial 1 - Part 1 Ubuntu

Lecture 5 - Tutorial 1 - Part 2 Python

Lecture 6 - OSM APIs and tools for data collection

Lecture 7 - Tutorial 2 - Part 1 Facebook API

Lecture 8 - Tutorial 2 - Part 2 Facebook API

Lecture 9 - Trust and Credibility on OSM

Lecture 10 - Misinformation on Social Media

Lecture 11 - Privacy and Social Media

Lecture 12 - Tutorial 3 - Part 1 Twitter API

Lecture 13 - Tutorial 3 - Part 2 MySQL

Lecture 14 - Tutorial 3 - Part 3 MongoDB

Lecture 15 - Privacy and Pictures on Online Social Media

Lecture 16 - Policing and Online Social Media

Lecture 17 - Policing and Online Social Media

Lecture 18 - Policing and Online Social Media

Lecture 19 - eCrime on Online Social Media

Lecture 20 - eCrime on Online Social Media

Lecture 21 - Tutorial 4 - Social Network Analysis

Lecture 22 - Link Farming in Online Social Media

Lecture 23 - Nudges

Lecture 24 - Semantic attacks: Spear phishing

Lecture 25 - Tutorial 5 - Analyzing text using Python NLTK

Lecture 26 - Profile Linking on Online Social Media

Lecture 27 - Anonymous Networks

Lecture 28 - Tutorial 6 - Gephi Network Visualization

Lecture 29 - Privacy in Location Based Social Networks - Part 1

Lecture 30 - Privacy in Location Based Social Networks - Part 2

Lecture 31 - Tutorial 7 - Visualization - Highcharts

Lecture 32 - Beware of What You Share Inferring Home Location in Social Networks

Lecture 33 - On the dynamics of username change behavior on Twitter

Lecture 34 - Boston Marathon Analyzing Fake Content on Twitter

NPTEL : NOC:Mobile Computing (Computer Science and Engineering)

Co-ordinators : Prof. Pushpendra Singh

Lecture 1 - Java Basics

Lecture 2 - Java : Primitive Data Types, Strings, Loops, Conditional Statements

Lecture 3 - Java : Strings, OOP principles

Lecture 4 - Java : Interfaces

Lecture 5 - Java : Classes, Exceptions, Threads

Lecture 6 - Introduction to Android Studio

Lecture 7 - Your First App

Lecture 8 - Deploying your App to a Phone

Lecture 9 - Extending app - Buttons, Toast

Lecture 10 - Android Development Environment

Lecture 11 - User Interface

Lecture 12 - Application Fundamentals

Lecture 13 - Extending the application

Lecture 14 - Activity Lifecycle - I

Lecture 15 - Activity Lifecycle - II

Lecture 16 - Activity LifeCycle - III

Lecture 17 - Adding Icon, Layouts, Handling Rotation - I

Lecture 18 - Adding Icon, Layouts, Handling Rotation - II

Lecture 19 - Debugging

Lecture 20 - Intents - I

Lecture 21 - Intents - II

Lecture 22 - Observer Pattern

Lecture 23 - Fragments - I

Lecture 24 - Fragments - II

Lecture 25 - Fragment Basic Programming Example

Lecture 26 - Fragments - Advanced Example

Lecture 27 - Implicit Intents

Lecture 28 - Saving Data - I

Lecture 29 - Saving Data - II

Lecture 30 - Security and System Permissions

Lecture 31 - Services

Lecture 32 - Processes and threads

Lecture 33 - Working with Fragments - I

Lecture 34 - Working with Fragments - II

Lecture 35 - Working with Fragments - III

Lecture 36 - RecyclerView, Adapter

Lecture 37 - RecyclerView, Adapter, ViewHolder

Lecture 38 - ViewPager

Lecture 39 - Dialogues

NPTEL : NOC:Introduction to Modern Application Development (Computer Science and Engineering)

Co-ordinators : Tanmai Gopal, Prof. Gaurav Raina

Lecture 1 - Introduction to the course

Lecture 2 - Introduction to a web-app

Lecture 3 - Building a web-app

Lecture 4 - Networks

Lecture 5 - Practical - Running your own web-server

Lecture 6 - Protocols

Lecture 7 - Practical - SSH + Network experiments

Lecture 8 - Practical - Building a webapp with nodejs and using git. Introduction to reverse proxies.

Lecture 9 - Practical - Introduciton to server-side javascript and HTML/CSS

Lecture 10 - Introduction to client-side Javascript

Lecture 11 - Practical - APIs and mobile apps use web-servers

Lecture 12 - Introduction to databases

Lecture 13 - Data modelling and constraints

Lecture 14 - Interacting with a DBMS

Lecture 15 - Practical - Deeper exploration of a DBMS (column types and more)

Lecture 16 - Introduction to SQL

Lecture 17 - Understanding database performance

Lecture 18 - Transactions and ACID properties

Lecture 19 - Database security, backup and recovery

Lecture 20 - Analytics and Views

Lecture 21 - Scaling a database

Lecture 22 - Connecting your webapp to your database and SQL Injection

Lecture 23 - SQL and NoSQL systems

Lecture 24 - Authentication with HTTP

Lecture 25 - Understanding security, and some best practices for webapps

Lecture 26 - Introduction to authentication, hashing, curl and sessions

Lecture 27 - Introduction to mobile apps

Lecture 28 - Introduction to Mobile Application Development Part 2

Lecture 29 - Introduction to Android

Lecture 30 - Getting started with Android Application Development

Lecture 31 - Building Custom UI using XML and Logs

Lecture 32 - Building a Blog App

Lecture 33 - Deploying an app to the Google Play Store

Lecture 34 - Introduction to iOS

Lecture 35 - The API Economy

Lecture 36 - Version Control using Git

Lecture 37 - Backend Architectures

NPTEL : NOC:Information Security-3 (Computer Science and Engineering)

Co-ordinators : Prof. V. Kamakoti

Lecture 1 - Operating System Introduction

Lecture 2 - Storage Hierarchy, Exceptions, Interrupts and traps

Lecture 3 - OS Management Services

Lecture 4 - OS Security Issues

Lecture 5 - Process and Threads

Lecture 6 - Process Scheduling

Lecture 7 - Scheduling Algorithm

Lecture 8 - Process Synchronization

Lecture 9 - Memory Management - 1

Lecture 10 - Memory Management - 2

Lecture 11 - File Systems - 1

Lecture 12 - File Systems - 2

Lecture 13 - Unix Filesystem

Lecture 14 - Unix Filesystem (Continued...)

Lecture 15 - Linux: Basic Commands

Lecture 16 - Linux: Basic Commands (Continued...)

Lecture 17 - Linux: Users and Permissions

Lecture 18 - Linux: I/O Redirection and Pipes

Lecture 19 - Linux: Task Control

Lecture 20 - Linux: Shell Environment

Lecture 21 - Linux: Text Editors

Lecture 22 - Linux: Compression / Archiving

Lecture 23 - Linux: Print and Sync Commands

Lecture 24 - Linux: File Comparison

Lecture 25 - Basic Networking Administration

Lecture 26 - Filesystems and Devices

Lecture 27 - Shell Introduction

Lecture 28 - Shell Comments and Variables

Lecture 29 - Shell Variables

Lecture 30 - Shell Arrays and Arithmetic

Lecture 31 - Shell Condition and Relation

Lecture 32 - Shell Examples

Lecture 33 - Shell Functions

Lecture 34 - Shell File Test

Lecture 35 - Shell Loop Control

Lecture 36 - Shell Script Variations

Lecture 37 - Shell Pattern Matching

Lecture 38 - Shell Case Statements

Lecture 39 - Shell Co-routines

Lecture 40 - Shell Signals and Traps

Lecture 41 - Shell Subshell

Lecture 42 - Shell Declarations

Lecture 43 - Shell Examples 2

Lecture 44 - Shell Review

Lecture 45 - An Introduction

Lecture 46 - Structure of a Network

Lecture 47 - Network Core - Definition

Lecture 48 - Network Access and Physical Media

Lecture 49 - Structure of ISP and Packet Delays

Lecture 50 - Network Protocol Layers

Lecture 51 - Network Devices

Lecture 52 - Network Security - An Introduction

Lecture 53 - Public Key Cryptography

Lecture 54 - Digital Signatures

Lecture 55 - Security in Practise

Lecture 56 - Security in Practise (Continued...)

Lecture 57 - Wireshark

Lecture 58 - Snort

Lecture 59 - Review I

Lecture 60 - Review II

NPTEL : NOC:AI:Constraint Satisfaction (Computer Science and Engineering)

Co-ordinators : Prof. Deepak Khemani

Lecture 1 - Constraint Satisfaction Problems

Lecture 2 - CSP Examples: Map colouring, N-Queens, Classroom scheduling

Lecture 3 - CSP Examples: Huffman-Clowes Labelling, Waltz Algorithm, Crosswords

Lecture 4 - Model Based Diagnosis - An application of CSP

Lecture 5 - Constraint Networks - An Introduction

Lecture 6 - Binary Constraint Networks (BCN), Equivalent Networks

Lecture 7 - Projection Networks

Lecture 8 - Constraint Propagation

Lecture 9 - Algorithms AC1 and AC3

Lecture 10 - Can we do better than AC3?

Lecture 11 - Algorithm AC4

Lecture 12 - Generalized AC, Path-Consistency

Lecture 13 - i-Consistency, Algorithm PC1

Lecture 14 - Algorithm PC2, Strong i-Consistency

Lecture 15 - Directional Consistency and Graph Ordering

Lecture 16 - Min-Width and Min-Induced-Width Ordering

Lecture 17 - Directional Arc-Consistency and Tree CSPs

Lecture 18 - Directional Path-Consistency and Directional i-Consistency

Lecture 19 - Backtrack-Free search and Adaptive Consistency

Lecture 20 - Adaptive Consistency: Bucket Elimination

Lecture 21 - Search Methods for Solving CSPs

Lecture 22 - Algorithm Backtracking

Lecture 23 - Look-Ahead Methods in Search

Lecture 24 - Look-Ahead Search: Examples

Lecture 25 - Combining Search with Reasoning: Algorithm DPLL

Lecture 26 - Algorithm Backmarking

Lecture 27 - Dynamic Value Ordering, Dynamic Variable Ordering

Lecture 28 - Look-Back Methods - Definitions

Lecture 29 - GaschnigÂ’s Backjumping: The Culprit Variable

Lecture 30 - GaschnigÂ’s Backjumping, Graph-Based Backjumping

Lecture 31 - Graph-Based Backjumping: Internal and Relevant Dead-Ends

Lecture 32 - Conflict-Directed Backjumping: Definitions

Lecture 33 - Algorithm Conflict-Directed Backjumping

Lecture 34 - Combining Look-Ahead and Look-Back: FC-CBJ

Lecture 35 - Learning During Search

Lecture 36 - Model Based Systems

Lecture 37 - Model Based Diagnosis

Lecture 38 - Truth Maintenance Systems

Lecture 39 - Planning as Constraint Satisfaction

Lecture 40 - Planning as Constraint Satisfaction (Continued...)

Lecture 41 - Planning as Satisfiability

Lecture 42 - Wrapping Up and Further Study

NPTEL : NOC:Computer Organization (Computer Science and Engineering)

Co-ordinators : Prof. V. Kamakoti

Lecture 1 - Introduction High Speed Circuit - Design Recursive Doubling

Lecture 2 - High Speed Circuit Design - Fast Adder Circuits

Lecture 3 - Lab 1 : Introduction

Lecture 4 - Fast Adder Circuits (Continued...)

Lecture 5 - Fast Multiplier Circuit

Lecture 6 - Fast Multiplier Circuit (Continued...)

Lecture 7 - Programming using X86 ISA - Addressing Modes

Lecture 8 - Programming using X86 ISA - Addressing Modes

Lecture 9 - Floating point - Precision and Accuracy

Lecture 10 - Floating Point - Addition, Subtraction and Multiplication

Lecture 11 - Instruction Set Architecture

Lecture 12 - Instruction Set Architecture (Continued...)

Lecture 13 - Lab 2 : Segmentation - Part I

Lecture 14 - Lab 2 : Segmentation - Part II

Lecture 15 - Lab 2 : Segmentation - Part III

Lecture 16 - Orthogonal ISA, C Constructs Mapping, Addressing Modes

Lecture 17 - Atomic and Predicated Instructions

Lecture 18 - Atomic and Predicated Instructions (Continued...)

Lecture 19 - General Purpose Registers

Lecture 20 - Expanding opcodes

Lecture 21 - Introduction to Pipelining

Lecture 22 - Pipelining

Lecture 23 - Data Hazards

Lecture 24 - Lab 2 : Instruction Scheduling - Static and Dynamic

Lecture 25 - Dynamic Instruction Scheduling

Lecture 26 - Dynamic Instruction Scheduling (Continued...)

Lecture 27 - Control Hazard, Branch Prediction

Lecture 28 - Process Management

Lecture 29 - Branch prediction

Lecture 30 - Global Branch Prediction

Lecture 31 - Structural Hazard, Architectural Enhancements

Lecture 32 - Lab 3 : Virtual Memory

Lecture 33 - Locality of Reference, Demand paging

Lecture 34 - Page Replacement Algorithm

Lecture 35 - Multilevel Paging, Translational Lookaside Buffer

Lecture 36 - Multilevel Paging

Lecture 37 - Multilevel Paging - Part 1

Lecture 38 - Page Frame Allocation, Beledy's Anomaly

Lecture 39 - Paging, Cache

Lecture 40 - Cache

Lecture 41 - Cache Organisation

Lecture 42 - Cache - Cache Coherency, Dual Ported Cache

Lecture 43 - Multilevel Caching, Multitasking

Lecture 44 - Cache, Degree of Multiprogramming

Lecture 45 - Shared Memory Architecture

Lecture 46 - Shared Memory Architecture - Part I

Lecture 47 - Virtually Indexed - Virtually Tagged and Physically Tagged Caches

Lecture 48 - Lab 4 : Task Switching (Continued...)

Lecture 49 - Shared Memory Architecture, Cache Coherence

Lecture 50 - Concurrent Programming in Hardware - Part I

Lecture 51 - Concurrent Programming in Hardware - Part II

Lecture 52 - Conclusion : Recent Trends in Computer Organization and Architecture

NPTEL : NOC:Introduction to Wireless and Cellular Communications (Computer Science and Engineering)

Co-ordinators : Prof. David Kovil Pillai

Lecture 1 - Overview of Cellular Systems - Part 1

Lecture 2 - Overview of Cellular Systems - Part 2

Lecture 3 - Overview of Cellular Systems - Part 3

Lecture 4 - 5G and other Wireless Technologies

Lecture 5 - Basic Cellular Terminology

Lecture 6 - Introduction to Antennas and Propagation Models

Lecture 7 - Link budget, Fading margin, Outage

Lecture 8 - Cellular Concept

Lecture 9 - Cellular system design and analysis

Lecture 10 - Cellular Geometry and System Design

Lecture 11 - Cellular System Capacity, Trunking

Lecture 12 - Handoff and Mobility

Lecture 13 - Handoff Part 2, Classification of Signal Variation

Lecture 14 - Shadowing, Outage, Multipath

Lecture 15 - Rayleigh Fading and Statistical Characterization

Lecture 16 - Properties of Rayleigh Distribution

Lecture 17 - BER in Fading, Narrowband vs Wideband Channels

Lecture 18 - Characterization of Multipath Fading Channels

Lecture 19 - Choice of Modulation

Lecture 20 - Coherent versus Differential Detection

Lecture 21 - Review of Lecture 1-19

Lecture 22 - Coherent vs Differential Detection - Part II and BER in Fading

Lecture 23 - BER in Fading - Part II, Ricean Fading

Lecture 24 - Ricean and Nakagami Fading, Moment Generating Function (MGF)

Lecture 25 - MGF Part II, WSSUS Model

Lecture 26 - WSSUS Part II, Coherence Time, Doppler Spectrum

Lecture 27 - Doppler, Temporal Characteristics of Fading Channels

Lecture 28 - WSSUS-Characterization of Time Dispersive Fading Channels

Lecture 29 - WSSUS-Classification of Fading Channels

Lecture 30 - Practical Channel Models (ITU, COST), Computer generation of Rayleigh fading

Lecture 31 - Rayleigh Fading simulation - Clark and Gans Method, Jakesâ€™ Method

Lecture 32 - Jakesâ€™ Method properties

Lecture 33 - Introduction to Diversity, Antenna selection diversity

Lecture 34 - Statistical Characterization of Antenna Diversity, Optimal Diversity Combining

Lecture 35 - BER in fading, Equal Gain Combining

Lecture 36 - Array Gain, Diversity Gain, Alamouti Scheme

Lecture 37 - Alamouti Scheme - Part II, Channel Capacity

Lecture 38 - Capacity of fading Channels, Capacity with Outage

Lecture 39 - Channel State Information, Optimum Power Allocation

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48 - Rake Receiver for multipath channels

Lecture 49 - Multiuser environment

Lecture 50 - CDMA system Capacity

Lecture 51 - CDMA Multiuser Detectors - Part 1

Lecture 52 - CDMA Multiuser Detectors - Part 2

Lecture 53

Lecture 54

Lecture 55

Lecture 56

NPTEL : NOC:Distributed Systems (Computer Science and Engineering)

Co-ordinators : Dr. Rajiv Misra

Lecture 1 - Introduction to Distributed Systems

Lecture 2 - Basic Algorithms in Message Passing System

Lecture 3 - Leader Election in Rings

Lecture 4 - Distributed Models of Computation, Causality and Logical Time

Lecture 5 - Size of Vector Clock, Matrix Clocks, Virtual Time and Physical Clock Synchronization

Lecture 6 - Global State and Snapshot Recording Algorithms

Lecture 7 - Distributed Mutual Exclusion and Non-Token based Approaches

Lecture 8 - Quorum Based Distributed Mutual Exclusion Approaches

Lecture 9 - Token Based Distributed Mutual Exclusion Approaches

Lecture 10 - Consensus and Agreement Algorithms

Lecture 11 - Checkpointing and Rollback Recovery

Lecture 12 - Deadlock Detection in Distributed Systems

Lecture 13 - Distributed Shared Memory

Lecture 14 - Distributed Minimum Spanning Tree

Lecture 15 - Termination Detection in Distributed System

Lecture 16 - Message Ordering and Group Communication

Lecture 17 - Self-Stabilization

Lecture 18 - Case Study 1 - Distributed Randomized Algorithms

Lecture 19 - Case Study 2 - Peer-to-Peer Computing and Structured Overlay Network

Lecture 20 - Case Study 3 - The Google File System (GFS)

Lecture 21 - Case Study 4 - MapReduce

Lecture 22 - Case Study 5 - HDFS

Lecture 23 - Case Study 6 - Spark

Lecture 24 - Case Study 7 - Distributed Algorithms for Sensor Networks

Lecture 25 - Case Study 8 - Authentication in Distributed Systems

Lecture 26 - Case Study 9 - Bitcoin: A Peer-to-Peer Electronic Cash System

Lecture 27 - Case Study 10 - BlockChain Technology

NPTEL : NOC:Social Networks (Computer Science and Engineering)

Co-ordinators : Prof. Sudarshan Iyengar

Lecture 1 - Introduction

Lecture 2 - Answer to the puzzle

Lecture 3 - Introduction to Python - 1

Lecture 4 - Introduction to Python - 2

Lecture 5 - Introduction to Networkx - 1

Lecture 6 - Introduction to Networkx - 2

Lecture 7 - Social Networks: The Challenge

Lecture 8 - Google Page Rank

Lecture 9 - Searching in a Network

Lecture 10 - Link Prediction

Lecture 11 - The Contagions

Lecture 12 - Importance of Acquaintances

Lecture 13 - Marketing on Social Networks

Lecture 14 - Introduction to Datasets

Lecture 15 - Ingredients Network

Lecture 16 - Synonymy Network

Lecture 17 - Web Graph

Lecture 18 - Social Network Datasets

Lecture 19 - Datasets : Different Formats

Lecture 20 - Datasets : How to Download?

Lecture 21 - Datasets : Analysing Using Networkx

Lecture 22 - Datasets : Analysing Using Gephi

Lecture 23 - Introduction : Emergence of Connectedness

Lecture 24 - Advanced Material : Emergence of Connectedness

Lecture 25 - Programming Illustration : Emergence of Connectedness

Lecture 26 - Summary to Datasets

Lecture 27 - Introduction

Lecture 28 - Granovetter's Strength of weak ties

Lecture 29 - Triads, clustering coefficient and neighborhood overlap

Lecture 30 - Structure of weak ties, bridges, and local bridges

Lecture 31 - Validation of Granovetter's experiment using cell phone data

Lecture 32 - Embededness

Lecture 33 - Structural Holes

Lecture 34 - Social Capital

Lecture 35 - Finding Communities in a graph (Brute Force Method)

Lecture 36 - Community Detection Using Girvan Newman Algorithm

Lecture 37 - Visualising Communities using Gephi

Lecture 38 - Tie Strength, Social Media and Passive Engagement

Lecture 39 - Betweenness Measures and Graph Partitioning

Lecture 40 - Strong and Weak Relationship - Summary

Lecture 41 - Introduction to Homophily - Should you watch your company ?

Lecture 42 - Selection and Social Influence

Lecture 43 - Interplay between Selection and Social Influence

Lecture 44 - Homophily - Definition and measurement

Lecture 45 - Foci Closure and Membership Closure

Lecture 46 - Introduction to Fatman Evolutionary model

Lecture 47 - Fatman Evolutionary Model - The Base Code (Adding people)

Lecture 48 - Fatman Evolutionary Model - The Base Code (Adding Social Foci)

Lecture 49 - Fatman Evolutionary Model - Implementing Homophily

Lecture 50 - Quantifying the Effect of Triadic Closure

Lecture 51 - Fatman Evolutionary Model - Implementing Closures

Lecture 52 - Fatman Evolutionary Model - Implementing Social Influence

Lecture 53 - Fatman Evolutionary Model - Storing and analyzing longitudnal data

Lecture 54 - Spatial Segregation : An Introduction

Lecture 55 - Spatial Segregation : Simulation of the Schelling Model

Lecture 56 - Spatial Segregation : Conclusion

Lecture 57 - Schelling Model Implementation - 1 (Introduction)

Lecture 58 - Schelling Model Implementation - 2 (Base Code)

Lecture 59 - Schelling Model Implementation - 3 (Visualization and Getting a list of boundary and internal nodes)

Lecture 60 - Schelling Model Implementation - 4 (Getting a list of unsatisfied nodes)

Lecture 61 - Schelling Model Implementation - 5 (Shifting the unsatisfied nodes and visualizing the final graph)

Lecture 62 - Chapter - 5 Positive and Negative Relationships (Introduction)

Lecture 63 - Structural Balance

Lecture 64 - Enemy'S Enemy is a Friend

Lecture 65 - Characterizing the Structure of Balanced Networks

Lecture 66 - Balance Theorem

Lecture 67 - Proof of Balance Theorem

Lecture 68 - Introduction to positive and negative edges

Lecture 69 - Outline of implemantation

Lecture 70 - Creating graph, displaying it and counting unstable triangles

Lecture 71 - Moving a network from an unstable to stable state

Lecture 72 - Forming two coalitions

Lecture 73 - Forming two coalitions (Continued...)

Lecture 74 - Visualizing coalitions and the evolution

Lecture 75 - The Web Graph

Lecture 76 - Collecting the Web Graph

Lecture 77 - Equal Coin Distribution

Lecture 78 - Random Coin Dropping

Lecture 79 - Google Page Ranking Using Web Graph

Lecture 80 - Implementing PageRank Using Points Distribution Method - 1

Lecture 81 - Implementing PageRank Using Points Distribution Method - 2

Lecture 82 - Implementing PageRank Using Points Distribution Method - 3

Lecture 83 - Implementing PageRank Using Points Distribution Method - 4

Lecture 84 - Implementing PageRank Using Random Walk Method - 1

Lecture 85 - Implementing PageRank Using Random Walk Method - 2

Lecture 86 - DegreeRank versus PageRank

Lecture 87 - We Follow

Lecture 88 - Why do we Follow?

Lecture 89 - Diffusion in Networks

Lecture 90 - Modeling Diffusion

Lecture 91 - Modeling Diffusion (Continued...)

Lecture 92 - Impact of Commmunities on Diffusion

Lecture 93 - Cascade and Clusters

Lecture 94 - Knowledge, Thresholds and the Collective Action

Lecture 95 - An Introduction to the Programming Screencast (Coding 4 major ideas)

Lecture 96 - The Base Code

Lecture 97 - Coding the First Big Idea - Increasing the Payoff

Lecture 98 - Coding the Second Big Idea - Key People

Lecture 99 - Coding the Third Big Idea - Impact of Communities on Cascades

Lecture 100 - Coding the Fourth Big Idea - Cascades and Clusters

Lecture 101 - Introduction to Hubs and Authorities (A Story)

Lecture 102 - Principle of Repeated Improvement (A story)

Lecture 103 - Principle of Repeated Improvement (An example)

Lecture 104 - Hubs and Authorities

Lecture 105 - PageRank Revisited - An example

Lecture 106 - PageRank Revisited - Convergence in the Example

Lecture 107 - PageRank Revisited - Conservation and Convergence

Lecture 108 - PageRank, conservation and convergence - Another example

Lecture 109 - Matrix Multiplication (Pre-requisite 1)

Lecture 110 - Convergence in Repeated Matrix Multiplication (Pre-requisite 1)

Lecture 111 - Addition of Two Vectors (Pre-requisite 2)

Lecture 112 - Convergence in Repeated Matrix Multiplication- The Details

Lecture 113 - PageRank as a Matrix Operation

Lecture 114 - PageRank Explained

Lecture 115 - Introduction to Powerlaw

Lecture 116 - Why do Normal Distributions Appear?

Lecture 117 - Power Law emerges in WWW graphs

Lecture 118 - Detecting the Presence of Powerlaw

Lecture 119 - Rich Get Richer Phenomenon

Lecture 120 - Summary So Far

Lecture 121 - Implementing Rich-getting-richer Phenomenon (Barabasi-Albert Model) - 1

Lecture 122 - Implementing Rich-getting-richer Phenomenon (Barabasi-Albert Model) - 2

Lecture 123 - Implementing a Random Graph (Erdos-Renyi Model) - 1

Lecture 124 - Implementing a Random Graph (Erdos-Renyi Model) - 2

Lecture 125 - Forced Versus Random Removal of Nodes (Attack Survivability)

Lecture 126 - Rich Get Richer - A Possible Reason

Lecture 127 - Rich Get Richer - The Long Tail

Lecture 128 - Epidemics- An Introduction

Lecture 129 - Introduction to epidemics (Continued...)

Lecture 130 - Simple Branching Process for Modeling Epidemics

Lecture 131 - Simple Branching Process for Modeling Epidemics (Continued...)

Lecture 132 - Basic Reproductive Number

Lecture 133 - Modeling epidemics on complex networks

Lecture 134 - SIR and SIS spreading models

Lecture 135 - Comparison between SIR and SIS spreading models

Lecture 136 - Basic Reproductive Number Revisited for Complex Networks

Lecture 137 - Percolation model

Lecture 138 - Analysis of basic reproductive number in branching model (The problem statement)

Lecture 139 - Analyzing basic reproductive number - 2

Lecture 140 - Analyzing basic reproductive number - 3

Lecture 141 - Analyzing basic reproductive number - 4

Lecture 142 - Analyzing basic reproductive number - 5

Lecture 143 - Small World Effect - An Introduction

Lecture 144 - Milgram's Experiment

Lecture 145 - The Reason

Lecture 146 - The Generative Model

Lecture 147 - Decentralized Search - I

Lecture 148 - Decentralized Search - II

Lecture 149 - Decentralized Search - III

Lecture 150 - Programming illustration- Small world networks : Introduction

Lecture 151 - Base code

Lecture 152 - Making homophily based edges

Lecture 153 - Adding weak ties

Lecture 154 - Plotting change in diameter

Lecture 155 - Programming illustration- Myopic Search : Introduction>

Lecture 156 - Myopic Search

Lecture 157 - Myopic Search comparision to optimal search

Lecture 158 - Time Taken by Myopic Search

Lecture 159 - PseudoCores : Introduction

Lecture 160 - How to be Viral

Lecture 161 - Who are the right key nodes?

Lecture 162 - finding the right key nodes (the core)

Lecture 163 - Coding K-Shell Decomposition

Lecture 164 - Coding cascading Model

Lecture 165 - Coding the importance of core nodes in cascading

Lecture 166 - Pseudo core

NPTEL : NOC:An Introduction to Probability in Computing (Computer Science and Engineering)

Co-ordinators : Prof. John Augustine

Lecture 1 - Introduction to Probability - A box of chocolates

Lecture 2 - Introduction to Probability - Axiomatic Approach to Probability Theory

Lecture 3 - Introduction to Probability - Verifying Matrix Multipilication (Statement,Algorithm and Independence)

Lecture 4 - Introduction to Probability - Verifying Matrix Multipilication (Correctness and Law of Total Probability)

Lecture 5 - Introduction to Probability - How Strong is your Network?

Lecture 6 - Introduction to Probability - How to Understand the World? Play with it!

Lecture 7 - Tutorial 1

Lecture 8 - Tutorial 2

Lecture 9 - Discrete Random Variables - Basic Definitions

Lecture 10 - Discrete Random Variables - Linearity of Expectation and Jensens Inequality

Lecture 11 - Discrete Random Variables - Conditional Expectation I

Lecture 12 - Discrete Random Variables - Conditional Expectation II

Lecture 13 - Discrete Random Variables - Geometric Random Variables and Collecting Coupons

Lecture 14 - Discrete Random Variables - Randomized Selection

Lecture 15 - Tail Bounds I - Markov's Inequality

Lecture 16 - Tail Bounds I - The Second Moment,Variance and Chebyshev's Inequality

Lecture 17 - Tail Bounds I - Median via Sampling

Lecture 18 - Tail Bounds I - Median via Sampling - Analysis

Lecture 19 - Tail Bounds I - Moment Generating Functions and Chernoff Bounds

Lecture 20 - Tail Bounds I - Parameter Estimation

Lecture 21 - Tail Bounds I - Control Group Selection

Lecture 22 - Applications of Tail Bounds - Routing in Sparse Networks

Lecture 23 - Applications of Tail Bounds - Analysis of Valiant's Rounting

Lecture 24 - Applications of Tail Bounds - Random Graphs

Lecture 25 - Live Session 2

Lecture 26 - Live Session

NPTEL : NOC:Introduction to Human Computer Interaction (Computer Science and Engineering)

Co-ordinators : Prof. Ponnurangam Kumaraguru

Lecture 1 - Introduction to Human Computer Interaction

Lecture 2 - What is HCI? Commonalities and Differences in Interfaces

Lecture 3 - Door handle, Elevators, Contextual Inquiry, Affinity Diagrams

Lecture 4 - Lab Session Contextual Inquiry

Lecture 5 - Lab Session Affinity Diagram

Lecture 6 - Tutorial on Photoshop

Lecture 7 - Tutorial on UI Designing using Photoshop

Lecture 8 - Institutional Review Board, Ethics committee, IRB documents / application, consent form

Lecture 9 - Tutorial on Proto.io

Lecture 10 - Tutorial on Lookback

Lecture 11 - How to understand user needs? Surveys, Questionnaire

Lecture 12 - How to understand user needs? Surveys, Questionnaire - Continues

Lecture 13 - Prototyping: Low fidelity and High fidelity

Lecture 14 - User-Centered Design

Lecture 15 - Lab Session: Task Analysis

Lecture 16 - Design Patterns

Lecture 17 - Lab Session: Material Design

Lecture 18 - Usable security

Lecture 19 - Lab Session: Task Analysis - 2

Lecture 20 - Continuity of Usable Security

Lecture 21 - Visual Design

Lecture 22 - Visual Design - 2

Lecture 23 - Crypto price Tracker App

Lecture 24 - Interacto

Lecture 25 - Tech Hinder

Lecture 26 - busKARO

Lecture 27 - MayMayMe

Lecture 28 - noWhinge

NPTEL : NOC:Information Security-IV (Computer Science and Engineering)

Co-ordinators : Prof.M J Shankar Raman, Prof. V. Kamakoti, Prof.Vasan

Lecture 1 - WISE Gen and The IT Revolution - 1

Lecture 2 - WISE Gen and The IT Revolution - 1 (Continued...)

Lecture 3 - WISE GEN - Next Step

Lecture 4 - Network Security : A Re-cap

Lecture 5 - Symmetric Key Cryptography and Digital Signatures

Lecture 6 - Basic Network Security Components

Lecture 7 - Internet Security Threats

Lecture 8 - History of Kali Linux

Lecture 9 - Penetration Testing with Kali Linux

Lecture 10 - Network Security and Forensics Introduction - I

Lecture 11 - Network Security and Forensics Introduction - II

Lecture 12 - Penetration Testing: An Introduction

Lecture 13 - Penetration testing steps in Kali Linux

Lecture 14 - Kali Linux Installation

Lecture 15 - Reconnaissance - Part I

Lecture 16 - Reconnaissance - Part II

Lecture 17 - Serverside Attacks: Tools in Kali Linux

Lecture 18 - Serverside Attacks: Tools in Kali Linux (Continued...)

Lecture 19 - Serverside Attacks: Tools in Kali Linux (Continued...)

Lecture 20 - Serverside Attacks: Tools in Kali Linux (Continued...)

Lecture 21 - Serverside Attacks: Tools in Kali Linux (Continued...)

Lecture 22 - Serverside Attacks: Tools in Kali Linux (Continued...)

Lecture 23 - Client Side Attacks - Tools in Kali Linux - 1

Lecture 24 - Client Side Attacks - Tools in Kali Linux - 2

Lecture 25 - Client Side Attacks - Tools in Kali Linux - 3

Lecture 26 - Client Side Attacks - Tools in Kali Linux - 4

Lecture 27 - Authentication Based Attacks - Tools in Kali Linux - 1

Lecture 28 - Authentication Based Attacks - Tools in Kali Linux - 2

Lecture 29 - Authentication Based Attacks - Tools in Kali Linux - 3

Lecture 30 - Authentication Based Attacks - Tools in Kali Linux - 4

Lecture 31 - Authentication Based Attacks - Tools in Kali Linux - 5

Lecture 32 - Web Attacks - Tools in Kali Linux - 1

Lecture 33 - Web Attacks - Tools in Kali Linux - 2

Lecture 34 - Penetration Testing Attacks - Defensive Countermeasures

Lecture 35 - Technical Fundamentals for Evidence Acquisition - 1

Lecture 36 - Technical Fundamentals for Evidence Acquisition - 2

Lecture 37 - Packet Capture Tools and Methods

Lecture 38 - Wireshark Introduction

Lecture 39 - Packet Analysis

Lecture 40 - Flow Analysis

Lecture 41 - Case study 1

Lecture 42 - Case study 1 (Continued...)

Lecture 43 - Wireless Forensics - Technology

Lecture 44 - Wireless Network Security Framework

Lecture 45 - Wireless Access Points - Security issues

Lecture 46 - Case Study 2 - Use of tools

Lecture 47 - Network Security Devices - IDS

Lecture 48 - IDS Evidence Acquistion and SNORT

Lecture 49 - SNORT Rules

Lecture 50 - SNORT Installation

Lecture 51 - SNORT Configuration and Demonstration

Lecture 52 - Evidence collection in Switches and Routers

Lecture 53 - Evidence collection in Routers and Firewalls

Lecture 54 - IPTables rules and tool usage

Lecture 55 - Logs, Rules and Automated Tools

Lecture 56 - Re-cap of All Topics

Lecture 57 - Introduction to Meltdown Attack

Lecture 58 - Introduction to Meltdown - Address Space Basics

Lecture 59 - Meltdown Attack - Out of Order Execution

Lecture 60 - Meltdown Attack - Recovering from Exception

NPTEL : NOC:Data Science for Engineers (Computer Science and Engineering)

Co-ordinators : Prof. Shankar Narasimhan, Prof. Ragunathan Rengasamy

Lecture 1 - Data science for engineers Course philosophy and expectation

Lecture 2 - Introduction to R

Lecture 3 - Introduction to R (Continued...)

Lecture 4 - Variables and datatypes in R

Lecture 5 - Data frames

Lecture 6 - Recasting and joining of dataframes

Lecture 7 - Arithmetic,Logical and Matrix operations in R

Lecture 8 - Advanced programming in R : Functions

Lecture 9 - Advanced Programming in R : Functions (Continued...)

Lecture 10 - Control structures

Lecture 11 - Data visualization in R Basic graphics

Lecture 12 - Linear Algebra for Data science

Lecture 13 - Solving Linear Equations

Lecture 14 - Solving Linear Equations (Continued...)

Lecture 15 - Linear Algebra - Distance,Hyperplanes and Halfspaces,Eigenvalues,Eigenvectors

Lecture 16 - Linear Algebra - Distance,Hyperplanes and Halfspaces,Eigenvalues,Eigenvectors (Continued... 1)

Lecture 17 - Linear Algebra - Distance,Hyperplanes and Halfspaces,Eigenvalues,Eigenvectors (Continued... 2)

Lecture 18 - Linear Algebra - Distance,Hyperplanes and Halfspaces,Eigenvalues,Eigenvectors (Continued... 3)

Lecture 19 - Statistical Modelling

Lecture 20 - Random Variables and Probability Mass/Density Functions

Lecture 21 - Sample Statistics

Lecture 22 - Hypotheses Testing

Lecture 23 - Optimization for Data Science

Lecture 24 - Unconstrained Multivariate Optimization

Lecture 25 - Unconstrained Multivariate Optimization (Continued...)

Lecture 26 - Gradient (Steepest) Descent (OR) Learning Rule

Lecture 27 - Multivariate Optimization With Equality Constraints

Lecture 28 - Multivariate Optimization With Inequality Constraints

Lecture 29 - Introduction to Data Science

Lecture 30 - Solving Data Analysis Problems - A Guided Thought Process

Lecture 31 - Module : Predictive Modelling

Lecture 32 - Linear Regression

Lecture 33 - Model Assessment

Lecture 34 - Diagnostics to Improve Linear Model Fit

Lecture 35 - Simple Linear Regression Model Building

Lecture 36 - Simple Linear Regression Model Assessment

Lecture 37 - Simple Linear Regression Model Assessment (Continued...)

Lecture 38 - Muliple Linear Regression

Lecture 39 - Cross Validation

Lecture 40 - Multiple Linear Regression Modelling Building and Selection

Lecture 41 - Classification

Lecture 42 - Logisitic Regression

Lecture 43 - Logisitic Regression (Continued...)

Lecture 44 - Performance Measures

Lecture 45 - Logisitic Regression Implementation in R

Lecture 46 - K-Nearest Neighbors (kNN)

Lecture 47 - K-Nearest Neighbors implementation in R

Lecture 48 - K-means Clustering

Lecture 49 - K-means implementation in R

Lecture 50 - Data Science for engineers - Summary

NPTEL : NOC:The Joy of Computing using Python (Computer Science and Engineering)

Co-ordinators : Prof. Sudarshan Iyengar

Lecture 1 - Introduction to Programming

Lecture 2 - Why Programming ?

Lecture 3 - Programming for Everybody

Lecture 4 - Any Prerequisites ?

Lecture 5 - Where to start?

Lecture 6 - Why do we have so many languages?

Lecture 7 - How to go about programming?

Lecture 8 - Why to learn programming?

Lecture 9 - What is programming?

Lecture 10 - How to give instructions ?

Lecture 11 - Introduction To Scratch

Lecture 12 - Introduction To Loops

Lecture 13 - More About Loops

Lecture 14 - Solution To Looping Problem

Lecture 15 - Scratch : Animation 1

Lecture 16 - Scratch : Animation 2

Lecture 17 - Scratch : Animation 3

Lecture 18 - More On Scratch

Lecture 19 - Introduction to Anaconda

Lecture 20 - Installation of Anaconda

Lecture 21 - Introduction to Spyder IDE

Lecture 22 - Printing statements in Python

Lecture 23 - Understanding Variables in Python

Lecture 24 - Executing a sequence of instructions in the Console

Lecture 25 - Writing your First Program

Lecture 26 - Taking inputs from the user

Lecture 27 - Discount Calculation

Lecture 28 - Motivation to if condition

Lecture 29 - A reminder on how to deal with numbers

Lecture 30 - Understanding if condition's working

Lecture 31 - Realizing the importance of syntax and indentation

Lecture 32 - Introductions to loops

Lecture 33 - Loops: Sum of numbers

Lecture 34 - Loops: Sum of numbers (Continued...)

Lecture 35 - Loops: Multiplication Tables

Lecture 36 - Introducction to While Loop

Lecture 37 - Lists Part 1 : Introduction

Lecture 38 - Lists Part 2 : Manipulation

Lecture 39 - Lists Part 3 : Operations

Lecture 40 - Lists Part 4 : Slicing

Lecture 41 - Loops and Conditionals : Fizzbuzz 01

Lecture 42 - Loops and Conditionals : Fizzbuzz 02

Lecture 43 - Crowd Computing - Just estimate 01

Lecture 44 - Crowd Computing - Just estimate 02

Lecture 45 - Crowd Computing - Just estimate 03

Lecture 46 - Crowd Computing - Just estimate 04

Lecture 47 - Crowd Computing - Just estimate 05

Lecture 48 - Crowd Computing - Just estimate 06

Lecture 49 - Permutations - Jumbled Words 01

Lecture 50 - Permutations - Jumbled Words 02

Lecture 51 - Permutations - Jumbled Words 03

Lecture 52 - Theory of Evolution 01

Lecture 53 - Theory of Evolution 02

Lecture 54 - Theory of Evolution 03

Lecture 55 - Theory of Evolution 04

Lecture 56 - Practice is the key

Lecture 57 - Magic Square Hit and Trial 01

Lecture 58 - Magic Square Hit and Trial 02

Lecture 59 - Magic Square Hit and Trial 03

Lecture 60 - Magic Square Hit and Trial 04

Lecture 61 - Magic Square Hit and Trial 05

Lecture 62 - Let's program and play

Lecture 63 - Dobble Game - Spot the similarity 01

Lecture 64 - Dobble Game - Spot the similarity 02

Lecture 65 - Dobble Game - Spot the similarity 03

Lecture 66 - Dobble Game - Spot the similarity 04

Lecture 67 - What is your date of birth?

Lecture 68 - Birthday Paradox - Find your twin 01

Lecture 69 - Birthday Paradox - Find your twin 02

Lecture 70 - Birthday Paradox - Find your twin 03

Lecture 71 - Birthday Paradox - Find your twin 04

Lecture 72 - Birthday Paradox - Find your twin 05

Lecture 73 - What's your favourite movie?

Lecture 74 - Guess the Movie Name 01

Lecture 75 - Guess the Movie Name 02

Lecture 76 - Guess the Movie Name 03

Lecture 77 - Guess the Movie Name 04

Lecture 78 - Guess the Movie Name 05

Lecture 79 - Guess the Movie Name 06

Lecture 80 - Dictionaries

Lecture 81 - Speech to Text : No need to write 01

Lecture 82 - Speech to Text : No need to write 02

Lecture 83 - Speech to Text : No need to write 03

Lecture 84 - Monte Hall : 3 doors and a twist 01

Lecture 85 - Monte Hall : 3 doors and a twist 02

Lecture 86 - Rock, Paper and Scissor : Cheating not allowed !! 01

Lecture 87 - Rock, Paper and Scissor : Cheating not allowed !! 02

Lecture 88 - Rock, Paper and Scissor : Cheating not allowed !! 03

Lecture 89 - Rock, Paper and Scissor : Cheating not allowed !! 04

Lecture 90 - Sorting and Searching : 20 questions game 01

Lecture 91 - Sorting and Searching : 20 questions game 02

Lecture 92 - Sorting and Searching : 20 questions game 03

Lecture 93 - Sorting and Searching : 20 questions game 04

Lecture 94 - Sorting and Searching : 20 questions game 05

Lecture 95 - Sorting and Searching : 20 questions game 06

Lecture 96 - Sorting and Searching : 20 questions game 07

Lecture 97 - Sorting and Searching : 20 questions game 08

Lecture 98 - Substitution Cipher -The science of secrecy

Lecture 99 - Substitution Cipher -The science of secrecy 01

Lecture 100 - Substitution Cipher -The science of secrecy 02

Lecture 101 - Substitution Cipher -The science of secrecy 03

Lecture 102 - Tic Tac Toe - Down the memory Lane

Lecture 103 - Tic Tac Toe - Down the memory Lane 01

Lecture 104 - Tic Tac Toe - Down the memory Lane 02

Lecture 105 - Tic Tac Toe - Down the memory Lane 03

Lecture 106 - Tic Tac Toe - Down the memory Lane 04

Lecture 107 - Tic Tac Toe - Down the memory Lane 05

Lecture 108 - Recursion

Lecture 109 - Recursion 01

Lecture 110 - Recursion 02

Lecture 111 - Recursion 03

Lecture 112 - Recursion 04

Lecture 113 - Recursion 05

Lecture 114 - Recursion 06

Lecture 115 - Snakes and Ladders - Not on the Board

Lecture 116 - Snakes and Ladders - Not on the Board - Part 01

Lecture 117 - Snakes and Ladders - Not on the Board - Part 02

Lecture 118 - Snakes and Ladders - Not on the Board - Part 03

Lecture 119 - Snakes and Ladders - Not on the Board - Part 04

Lecture 120 - Snakes and Ladders - Not on the Board - Part 05

Lecture 121 - Snakes and Ladders - Not on the Board - Part 06

Lecture 122 - Spiral Traversing - Let's Animate

Lecture 123 - Spiral Traversing - Let's Animate - Part 01

Lecture 124 - Spiral Traversing - Let's Animate - Part 02

Lecture 125 - Spiral Traversing - Let's Animate - Part 03

Lecture 126 - Spiral Traversing - Let's Animate - Part 04

Lecture 127 - Spiral Traversing - Let's Animate - Part 05

Lecture 128 - Spiral Traversing - Let's Animate - Part 06

Lecture 129 - Spiral Traversing - Let's Animate - Part 07

Lecture 130 - GPS - Track the route

Lecture 131 - GPS - Track the route - Part 01

Lecture 132 - GPS - Track the route - Part 02

Lecture 133 - GPS - Track the route - Part 03

Lecture 134 - GPS - Track the route - Part 04

Lecture 135 - Tuples- Python Data Structure

Lecture 136 - Lottery Simulation - Profit or Loss

Lecture 137 - Lottery Simulation - Profit or Loss - Part 01

Lecture 138 - Lottery Simulation - Profit or Loss - Part 02

Lecture 139 - Lottery Simulation - Profit or Loss - Part 03

Lecture 140 - Lottery Simulation - Profit or Loss - Part 04

Lecture 141 - Lottery Simulation - Profit or Loss - Part 05

Lecture 142 - Lottery Simulation - Profit or Loss - Part 06

Lecture 143 - Image Processing - Enhance your images

Lecture 144 - Image Processing - Enhance your images - Part 01

Lecture 145 - Image Processing - Enhance your images - Part 02

Lecture 146 - Image Processing - Enhance your images - Part 03

Lecture 147 - Anagrams

Lecture 148 - Anagrams - Part 01

Lecture 149 - Anagrams - Part 02

Lecture 150 - Anagrams - Part 03

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NPTEL : NOC:Discrete Mathematics (Computer Science and Engineering)

Co-ordinators : Prof. Sudarshan Iyengar

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NPTEL : NOC:Deep Learning (Computer Science and Engineering)

Co-ordinators : Prof.Mitesh Khapra

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Lecture 2 - From Spring to Winter of AI

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Lecture 17 - Deep Learning (CS7015): Representation Power of a Network of Perceptrons

Lecture 18 - Deep Learning (CS7015): Sigmoid Neuron

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Lecture 22 - Deep Learning (CS7015): Representation Power of Multilayer Network of Sigmoid Neurons

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Lecture 37 - Stochastic And Mini-Batch Gradient Descent

Lecture 38 - Tips for Adjusting Learning Rate and Momentum

Lecture 39 - Line Search

Lecture 40 - Gradient Descent with Adaptive Learning Rate

Lecture 41 - Bias Correction in Adam

Lecture 42 - Eigenvalues and Eigenvectors

Lecture 43 - Linear Algebra : Basic Definitions

Lecture 44 - Eigenvalue Decompositon

Lecture 45 - Principal Component Analysis and its Interpretations

Lecture 46 - PCA: Interpretation 2

Lecture 47 - PCA: Interpretation 3

Lecture 48 - PCA: Interpretation 3 (Continued...)

Lecture 49 - PCA: Practical Example

Lecture 50 - Singular Value Decomposition

Lecture 51 - Introduction to Autoncoders

Lecture 52 - Link between PCA and Autoencoders

Lecture 53 - Regularization in autoencoders (Motivation)

Lecture 54 - Denoising Autoencoders

Lecture 55 - Sparse Autoencoders

Lecture 56 - Contractive Autoencoders

Lecture 57 - Bias and Variance

Lecture 58 - Train error vs Test error

Lecture 59 - Train error vs Test error (Recap)

Lecture 60 - True error and Model complexity

Lecture 61 - L2 regularization

Lecture 62 - Dataset augmentation

Lecture 63 - Parameter sharing and tying

Lecture 64 - Adding Noise to the inputs

Lecture 65 - Adding Noise to the outputs

Lecture 66 - Early stopping

Lecture 67 - Ensemble Methods

Lecture 68 - Dropout

Lecture 69 - A quick recap of training deep neural networks

Lecture 70 - Unsupervised pre-training

Lecture 71 - Better activation functions

Lecture 72 - Better initialization strategies

Lecture 73 - Batch Normalization

Lecture 74 - One-hot representations of words

Lecture 75 - Distributed Representations of words

Lecture 76 - SVD for learning word representations

Lecture 77 - SVD for learning word representations (Continued...)

Lecture 78 - Continuous bag of words model

Lecture 79 - Skip-gram model

Lecture 80 - Skip-gram model (Continued...)

Lecture 81 - Contrastive estimation

Lecture 82 - Hierarchical softmax

Lecture 83 - GloVe representations

Lecture 84 - Evaluating word representations

Lecture 85 - Relation between SVD and Word2Vec

Lecture 86 - The convolution operation

Lecture 87 - Relation between input size, output size and filter size

Lecture 88 - Convolutional Neural Networks

Lecture 89 - Convolutional Neural Networks (Continued...)

Lecture 90 - CNNs (success stories on ImageNet)

Lecture 91 - CNNs (success stories on ImageNet) (Continued...)

Lecture 92 - Image Classification continued (GoogLeNet and ResNet)

Lecture 93 - Visualizing patches which maximally activate a neuron

Lecture 94 - Visualizing filters of a CNN

Lecture 95 - Occlusion experiments

Lecture 96 - Finding influence of input pixels using backpropagation

Lecture 97 - Guided Backpropagation

Lecture 98 - Optimization over images

Lecture 99 - Create images from embeddings

Lecture 100 - Deep Dream

Lecture 101 - Deep Art

Lecture 102 - Fooling Deep Convolutional Neural Networks

Lecture 103 - Sequence Learning Problems

Lecture 104 - Recurrent Neural Networks

Lecture 105 - Backpropagation through time

Lecture 106 - The problem of Exploding and Vanishing Gradients

Lecture 107 - Some Gory Details

Lecture 108 - Selective Read, Selective Write, Selective Forget - The Whiteboard Analogy

Lecture 109 - Long Short Term Memory (LSTM) and Gated Recurrent Units (GRUs)

Lecture 110 - How LSTMs avoid the problem of vanishing gradients

Lecture 111 - How LSTMs avoid the problem of vanishing gradients (Continued...)

Lecture 112 - Introduction to Encoder Decoder Models

Lecture 113 - Applications of Encoder Decoder models

Lecture 114 - Attention Mechanism

Lecture 115 - Attention Mechanism (Continued...)

Lecture 116 - Attention over images

Lecture 117 - Hierarchical Attention

NPTEL : NOC:Foundations to Computer Systems Design (Computer Science and Engineering)

Co-ordinators : Prof. V. Kamakoti

Lecture 1 - Introduction to the Course

Lecture 2 - CMOS Transistors and Gates

Lecture 3 - Basic Gates

Lecture 4 - Building Gates Using Simulator

Lecture 5 - Hierarchical Design and Verification

Lecture 6 - Building Blocks of a Digital Computer

Lecture 7 - Binary Number Systems

Lecture 8 - Signed Number Systems

Lecture 9 - Twos Complement Number System

Lecture 10 - Binary Adder Circuits

Lecture 11 - Building the ALU of HACK

Lecture 12 - HACK ALU Functionality

Lecture 13 - Tips for Project P1

Lecture 14 - Sequential Logic Design

Lecture 15 - Latches and Flipflops

Lecture 16 - The Memory Hierarchy

Lecture 17 - Design of Program Counter

Lecture 18 - Introduction to Computer Organization: The HACK Instruction Set Architecture (ISA)

Lecture 19 - Memory Mapped I/O

Lecture 20 - Tips for Projects P2 and P3

Lecture 21 - Tips for Project 4

Lecture 22 - Tips for Project 4

Lecture 23 - Introduction to Computer Architecture

Lecture 24 - The HACK Microarchitecture

Lecture 25 - The HACK CPU - A Deep Dive - Part 1

Lecture 26 - The HACK CPU - A Deep Dive - Part 2

Lecture 27 - The Data Memory

Lecture 28 - The HACK Computer

Lecture 29 - The Assembler Construction

Lecture 30 - Understanding the Working of Assembler

Lecture 31 - Assembler : Symbol Table Construction

Lecture 32 - Assembler : Pass 1

Lecture 33 - Assembler : Pass 2

Lecture 34 - Project 6 : Demonstration

Lecture 35 - Virtual Machines - What and Why?

Lecture 36 - The VM Instruction Set Architecture

Lecture 37 - The execution of a VM Program

Lecture 38 - How powerful is the VM?

Lecture 39 - Project 7 : VM ISA to HACK Mnemonic Translation

Lecture 40 - Project 7 : Demo

Lecture 41 - Deep Understanding of VM ISA using VM Emulator

Lecture 42 - Virtual Machine II - Program flow commands and Introduction to Function Calls

Lecture 43 - Implementation of Function Call

Lecture 44 - Working of the Virtual Machine

Lecture 45 - Project 8 : Translation of Program Flow and Function Call to HACK Mnemonic

Lecture 46 - Handling Static Variables

Lecture 47 - Project 8 : Implementation tips in a Nut Shell

Lecture 48 - Introduction to The JACK Programming Language

Lecture 49 - Project 9 : Basic Steps

Lecture 50 - Understanding Syntax of JACK using Examples

Lecture 51 - Project 9 : More Examples

Lecture 52 - The JACK Syntax - Language Specification

Lecture 53 - Application Development using JACK

Lecture 54 - JACK Compiler: Lexical Analysis - Tokenization

Lecture 55 - Project 10 : Compiler for JACK - Part-1 Demo

Lecture 56 - The JACK Grammar

Lecture 57 - Compiler for JACK: Parsing the JACK Program

Lecture 58 - The Token Analyzer

Lecture 59 - Testing the Correctness

Lecture 60 - The Jack Compiler - Back-end Introduction

Lecture 61 - The Jack Compiler - Handling Variables

Lecture 62 - The Jack Compiler - Handling Expressions

Lecture 63 - The Jack Compiler - Handling Flow of Control

Lecture 64 - The Jack Compiler - Handling Objects

Lecture 65 - The Jack Compiler - Handling Arrays

Lecture 66 - The Jack Compiler Backend: An XML guided approach

Lecture 67 - The Jack Compiler Backend: Populating the Class and Subroutine Symbol tables.

Lecture 68 - The Jack Compiler Backend: Code Generation - 1

Lecture 69 - The Jack Compiler Backend: Code Generation - 2

Lecture 70 - The Jack Compiler Backend: Code Generation - 3

Lecture 71 - The Jack Compiler Backend: Code Generation - 4

Lecture 72 - Jack Compiler: Code Generation - 5

Lecture 73 - Jack Compiler: Code Generation - 6

Lecture 74 - Jack Compiler: Code Generation - 7

Lecture 75 - Understand the Operating System - Compiler Interactions

Lecture 76 - Project 12 - One sample journey from Jack to Hack

Lecture 77 - Concluding Remarks

NPTEL : NOC:Machine Learning for Engineering and Science Applications (Computer Science and Engineering)

Co-ordinators : Prof. Ganapathy, Prof. Balaji Srinivasan

Lecture 1 - Introduction to the Course History of Artificial Intelligence

Lecture 2 - Overview of Machine Learning

Lecture 3 - Why Linear Algebra ? Scalars, Vectors, Tensors

Lecture 4 - Basic Operations

Lecture 5 - Norms

Lecture 6 - Linear Combinations Span Linear Independence

Lecture 7 - Matrix Operations Special Matrices Matrix Decompositions

Lecture 8 - Introduction to Probability Theory Discrete and Continuous Random Variables

Lecture 9 - Conditional, Joint, Marginal Probabilities Sum Rule and Product Rule Bayes' Theorem

Lecture 10 - Bayes' Theorem - Simple Examples

Lecture 11 - Independence Conditional Independence Chain Rule Of Probability

Lecture 12 - Expectation

Lecture 13 - Variance Covariance

Lecture 14 - Some Relations for Expectation and Covariance (Slightly Advanced)

Lecture 15 - Machine Representation of Numbers, Overflow, Underflow, Condition Number

Lecture 16 - Derivatives,Gradient,Hessian,Jacobian,Taylor Series

Lecture 17 - Matrix Calculus (Slightly Advanced)

Lecture 18 - Optimization 1 Unconstrained Optimization

Lecture 19 - Introduction to Constrained Optimization

Lecture 20 - Introduction to Numerical Optimization Gradient Descent - 1

Lecture 21 - Gradient Descent 2 Proof of Steepest Descent Numerical Gradient Calculation Stopping Criteria

Lecture 22 - Introduction to Packages

Lecture 23 - The Learning Paradigm

Lecture 24 - A Linear Regression Example

Lecture 25 - Linear Regression Least Squares Gradient Descent

Lecture 26 - Coding Linear Regression

Lecture 27 - Generalized Function for Linear Regression

Lecture 28 - Goodness of Fit

Lecture 29 - Bias-Variance Trade Off

Lecture 30 - Gradient Descent Algorithms

Lecture 31 - Introduction to Week 5 (Deep Learning)

Lecture 32 - Logistic Regression

Lecture 33 - Binary Entropy cost function

Lecture 34 - OR Gate Via Classification

Lecture 35 - NOR, AND, NAND Gates

Lecture 36 - XOR Gate

Lecture 37 - Differentiating the sigmoid

Lecture 38 - Gradient of logistic regression

Lecture 39 - Code for Logistic Regression

Lecture 40 - Multinomial Classification - Introduction

Lecture 41 - Multinomial Classification - One Hot Vector

Lecture 42 - Multinomial Classification - Softmax

Lecture 43 - Schematic of multinomial logistic regression

Lecture 44 - Biological neuron

Lecture 45 - Structure of an Artificial Neuron

Lecture 46 - Feedforward Neural Network

Lecture 47 - Introduction to back prop

Lecture 48 - Summary of Week 05

Lecture 49 - Introduction to Convolution Neural Networks (CNN)

Lecture 50 - Types of convolution

Lecture 51 - CNN Architecture Part 1 (LeNet and Alex Net)

Lecture 52 - CNN Architecture Part 2 (VGG Net)

Lecture 53 - CNN Architecture Part 3 (GoogleNet)

Lecture 54 - CNN Architecture Part 4 (ResNet)

Lecture 55 - CNN Architecture Part 5 (DenseNet)

Lecture 56 - Train Network for Image Classification

Lecture 57 - Semantic Segmentation

Lecture 58 - Hyperparameter optimization

Lecture 59 - Transfer Learning

Lecture 60 - Segmentation of Brain Tumors from MRI using Deep Learning

Lecture 61 - Activation Functions

Lecture 62 - Learning Rate decay, Weight initialization

Lecture 63 - Data Normalization

Lecture 64 - Batch Norm

Lecture 65 - Introduction to RNNs

Lecture 66 - Example - Sequence Classification

Lecture 67 - Training RNNs - Loss and BPTT

Lecture 68 - Vanishing Gradients and TBPTT

Lecture 69 - RNN Architectures

Lecture 70 - LSTM

Lecture 71 - Why LSTM Works

Lecture 72 - Deep RNNs and Bi- RNNs

Lecture 73 - Summary of RNNs

Lecture 74 - Introduction.

Lecture 75 - Knn

Lecture 76 - Binary decision trees

Lecture 77 - Binary regression trees

Lecture 78 - Bagging

Lecture 79 - Random Forest

Lecture 80 - Boosting

Lecture 81 - Gradient boosting

Lecture 82 - Unsupervised learning and Kmeans

Lecture 83 - Agglomerative clustering

Lecture 84 - Probability Distributions- Gaussian, Bernoulli

Lecture 85 - Covariance Matrix of Gaussian Distribution

Lecture 86 - Central Limit Theorem

Lecture 87 - NaÃƒÂ¯ve Bayes

Lecture 88 - MLE Intro

Lecture 89 - PCA - Part 1

Lecture 90 - PCA - Part 2

Lecture 91 - Support Vector Machines

Lecture 92 - MLE, MAP and Bayesian Regression

Lecture 93 - Introduction to Generative model

Lecture 94 - Generative Adversarial Networks (GAN)

Lecture 95 - Variational Auto-encoders (VAE)

Lecture 96 - Applications: Cardiac MRI - Segmentation and Diagnosis

Lecture 97 - Applications: Cardiac MRI Analysis - Tensorflow code walkthrough

Lecture 98 - Introduction to Week 12

Lecture 99 - Application 1 description - Fin Heat Transfer

Lecture 100 - Application 1 solution

Lecture 101 - Application 2 description - Computational Fluid Dynamics

Lecture 102 - Application 2 solution

Lecture 103 - Application 3 description - Topology Optimization

Lecture 104 - Application 3 solution

Lecture 105 - Application 4 Solution of PDE/ODE using Neural Networks

Lecture 106 - Summary and road ahead

NPTEL : NOC:Information Security 5 - Secure Systems Engineering (Computer Science and Engineering)

Co-ordinators : Prof. Chester Rebeiro

Lecture 1 - Secure Systems Engineering

Lecture 2 - Program Binaries

Lecture 3 - Buffer Overflows in the Stack

Lecture 4 - Buffer Overflows

Lecture 5 - Gdb - Demo

Lecture 6 - Skip instruction - Demo

Lecture 7 - Buffer Overflow - Demo

Lecture 8 - Buffer Overflow (create a shell) - Demo

Lecture 9 - Preventing buffer overflows with canaries and W^X

Lecture 10 - Return-to-libc attack

Lecture 11 - ROP Attacks

Lecture 12 - Demonstration of Canaries, W^X, and ASLR to prevent Buffer Overflow Attacks

Lecture 13 - Demonstration of a Return-to-Libc Attack

Lecture 14 - Demonstration of a Return Oriented Programming (ROP) Attack

Lecture 15 - ASLR - Part 1

Lecture 16 - ASLR - Part 2

Lecture 17 - Buffer overreads

Lecture 18 - Demonstration of Load Time Relocation

Lecture 19 - Demonstration of Position Independent Code

Lecture 20 - PLT Demonstration

Lecture 21 - Format string vulnerabilities

Lecture 22 - Integer Vulnerabilities

Lecture 23 - Heap

Lecture 24 - Heap exploits

Lecture 25 - Demo of Integer Vulnerabilites - I

Lecture 26 - Demo of Integer Vulnerabilites - II

Lecture 27 - Demo of Format String Vulnerabilities

Lecture 28 - Access Control

Lecture 29 - Access control in linux

Lecture 30 - Mandatory access Control

Lecture 31 - Confinement in Applications

Lecture 32 - Software fault isolation

Lecture 33 - Trusted Execution Environments

Lecture 34 - ARM Trustzone

Lecture 35 - SGX - Part 1

Lecture 36 - SGX - Part 2

Lecture 37 - PUF - Part 1

Lecture 38 - PUF - Part 2

Lecture 39 - PUF - Part 3

Lecture 40 - Covert Channels

Lecture 41 - Flush+Reload Attacks

Lecture 42 - Prime+Probe

Lecture 43 - Meltdown

Lecture 44 - Spectre Variant - 1

Lecture 45 - Spectre variant - 2

Lecture 46 - rowhammer

Lecture 47 - Heap demo - 1

Lecture 48 - Heap demo - 2

Lecture 49 - Heap demo - 3

Lecture 50 - PowerAnalysisAttacks

Lecture 51 - Hardware Trojans

Lecture 52 - FANCI : Identification of Stealthy Malicious Logic

Lecture 53 - Detecting Hardware Trojans in ICs

Lecture 54 - Protecting against Hardware Trojans

Lecture 55 - Side Channel Analysis

Lecture 56 - Fault Attacks on AES

Lecture 57 - Demo: Cache timing attack on T-table implementation of AES

Lecture 58 - Demo: Cache-timing based Covert Channel - Part 1

Lecture 59 - Demo: Cache-timing based Covert Channel - Part 2

NPTEL : NOC:Multimodal Interaction (Computer Science and Engineering)

Co-ordinators : Dr. Stefan Hillmann, Prof. Dr. Sebastian Moller

Lecture 1 - Introduction

Lecture 2 - Medium vs. Modality

Lecture 3 - Multimedia and Multimodality

Lecture 4 - Modality Relations

Lecture 5 - Characteristics of Multimodal Systems

Lecture 6 - Introduction

Lecture 7 - Speech Production

Lecture 8 - Hearing - Ear

Lecture 9 - Hearing - Perception

Lecture 10 - Introduction

Lecture 11 - The Human Eye

Lecture 12 - Gestlat Perception

Lecture 13 - Resolution and Sensitivity

Lecture 14 - Depth Perception

Lecture 15 - Reading

Lecture 16 - Introduction

Lecture 17 - Haptics

Lecture 18 - Smell

Lecture 19 - Taste

Lecture 20 - Memory

Lecture 21 - Motorsystem

Lecture 22 - Introduction

Lecture 23 - Processing Multiple Signals

Lecture 24 - Multimodal Dual-Tasks

Lecture 25 - Effects of Discongurent Signals

Lecture 26 - Relevance

Lecture 27 - Introduction 1

Lecture 28 - Introduction 2

Lecture 29 - Gesture to Space

Lecture 30 - Turn Taking

Lecture 31 - Conclusion

Lecture 32 - Introduction

Lecture 33 - Overview

Lecture 34 - Automatic Speech Recognition

Lecture 35 - Emotion Recognition

Lecture 36 - Text Recognition

Lecture 37 - Introduction1

Lecture 38 - Icons

Lecture 39 - Text Generation

Lecture 40 - Text to Speech

Lecture 41 - Speech Generation

Lecture 42 - Introduction .

Lecture 43 - Multimodal Interactive Systems Development

Lecture 44 - Introduction . .

Lecture 45 - Virtual Reality

Lecture 46 - Introduction to Audio for Virtual Reality

Lecture 47 - Spatial Hearing

Lecture 48 - Dummy Heads

Lecture 49 - Individuality of HRTFs

Lecture 50 - Sterophony

Lecture 51 - Crosstalk Cancelation

Lecture 52 - Ambisonics

Lecture 53 - Sound Field Synthesis

Lecture 54 - Challenges with Projection-based Systems

Lecture 55 - Capturing of Sound Scenes

Lecture 56 - Closing Remarks

NPTEL : NOC:Deep Learning - Part 2 (Computer Science and Engineering)

Co-ordinators : Prof.Mitesh Khapra

Lecture 1 - Recap of Probability Theory

Lecture 2 - Why are we interested in Joint Distributions

Lecture 3 - How do we represent a joint distribution

Lecture 4 - Can we represent the joint distribution more compactly

Lecture 5 - Can we use a graph to represent a joint distribution

Lecture 6 - Different types of reasoning encoded in a Bayesian Network

Lecture 7 - Independencies encoded by a Bayesian Network (Case 1: Node and it's parents)

Lecture 8 - Independencies encoded by a Bayesian Network (Case 2: Node and it's non-parents)

Lecture 9 - Independencies encoded by a Bayesian Network (Case 3: Node and it's descendants)

Lecture 10 - Bayesian Networks : Formal Semantics

Lecture 11 - I-Maps

Lecture 12 - Markov Networks: Motivation

Lecture 13 - Factors in Markov Network

Lecture 14 - Local Independencies in a Markov Network

Lecture 15 - Joint Distributions

Lecture 16 - The concept of a latent variable

Lecture 17 - Restricted Boltzmann Machines

Lecture 18 - RBMs as Stochastic Neural Networks

Lecture 19 - Unsupervised Learning with RBMs

Lecture 20 - Computing the gradient of the log likelihood

Lecture 21 - Motivation for Sampling

Lecture 22 - Motivation for Sampling - Part 2

Lecture 23 - Markov Chains

Lecture 24 - Why de we care about Markov Chains ?

Lecture 25 - Setting up a Markov Chain for RBMs

Lecture 26 - Training RBMs Using Gibbs Sampling

Lecture 27 - Training RBMS Using Contrastive Divergence

Lecture 28 - Revisiting Autoencoders

Lecture 29 - Variational Autoencoders: The Neural Network Perspective

Lecture 30 - Variational Autoencoders: The Graphical model perspective

Lecture 31 - Neural Autoregressive Density Estimator

Lecture 32 - Masked Autoencoder Density Estimator (MADE)

Lecture 33 - Generative Adversarial Networks - The Intuition

Lecture 34 - Generative Adversarial Networks - Architecture

Lecture 35 - Generative Adversarial Networks - The Math Behind it

Lecture 36 - Generative Adversarial Networks - Some Cool Stuff and Applications

Lecture 37 - Bringing it all together (the deep generative summary)

NPTEL : NOC:Machine Learning (Computer Science and Engineering)

Co-ordinators : Prof. Henrik Bostrom, Prof. Fredrik Kilander, Prof. Carl Gustaf Jansson

Lecture 1 - Introduction to the Machine Learning Course

Lecture 2 - Foundation of Artificial Intelligence and Machine Learning

Lecture 3 - Intelligent Autonomous Systems and Artificial Intelligence

Lecture 4 - Applications of Machine Learning

Lecture 5 - Tutorial for week 1

Lecture 6 - Characterization of Learning Problems

Lecture 7 - Objects, Categories and Features

Lecture 8 - Feature related issues

Lecture 9 - Scenarios for Concept Learning

Lecture 10 - Tutorial for week 2

Lecture 11 - Forms of Representation

Lecture 12 - Decision Trees

Lecture 13 - Bayes (ian) Belief Networks

Lecture 14 - Artificial Neural Networks

Lecture 15 - Genetic algorithm

Lecture 16 - Logic Programming

Lecture 17 - Tutorial for week 3

Lecture 18 - Inductive Learning based on Symbolic Representations and Weak Theories

Lecture 19 - Generalization as Search - Part 1

Lecture 20 - Generalization as Search - Part 2

Lecture 21 - Decision Tree Learning Algorithms - Part 1

Lecture 22 - Decision Tree Learning Algorithms - Part 2

Lecture 23 - Instance Based Learning - Part 1

Lecture 24 - Instance Based Learning - Part 2

Lecture 25 - Cluster Analysis

Lecture 26 - Tutorial for week 4

Lecture 27 - Machine Learning enabled by Prior Theories

Lecture 28 - Explanation Based Learning

Lecture 29 - Inductive Logic Programming

Lecture 30 - Reinforcement Learning - Part 1 Introduction

Lecture 31 - Reinforcement Learning - Part 2 Learning Algorithms

Lecture 32 - Reinforcement Learning - Part 3 Q-Learning

Lecture 33 - Case - Based Reasoning

Lecture 34 - Tutorial for week 5

Lecture 35 - Fundamentals of Artificial Neural Networks - Part 1

Lecture 36 - Fundamentals of Artificial Neural Networks - Part 2

Lecture 37 - Perceptrons

Lecture 38 - Model of Neuron in an ANN

Lecture 39 - Learning in a Feed Forward Multiple Layer ANN - Backpropagation

Lecture 40 - Recurrent Neural Networks

Lecture 41 - Hebbian Learning and Associative Memory

Lecture 42 - Hopfield Networks and Boltzman Machines - Part 1

Lecture 43 - Hopfield Networks and Boltzman Machines - Part 2

Lecture 44 - Convolutional Neural Networks - Part 1

Lecture 45 - Convolutional Neural Networks - Part 2

Lecture 46 - DeepLearning

Lecture 47 - Tutorial for week 6

Lecture 48 - Tools and Resources

Lecture 49 - Interdisciplinary Inspiration

Lecture 50 - Preparation for Exam and Example of Applications

NPTEL : NOC:C Programming and Assembly Language (Computer Science and Engineering)

Co-ordinators : Prof. Janakiraman Viraraghavan

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

NPTEL : NOC:Applied Natural Language Processing (Computer Science and Engineering)

Co-ordinators : Prof. Ramaseshan R

Lecture 1 - Introduction

Lecture 2 - Operations on a Corpus

Lecture 3 - Probability and NLP

Lecture 4 - Vector Space models

Lecture 5 - Sequence Learning

Lecture 6 - Machine Translation

Lecture 7 - Preprocessing

Lecture 8 - Statistical Properties of Words - Part 1

Lecture 9 - Statistical Properties of Words - Part 2

Lecture 10 - Statistical Properties of Words - Part 3

Lecture 11 - Vector Space Models for NLP

Lecture 12 - Document Similarity - Demo, Inverted index, Exercise

Lecture 13 - Vector Representation of words

Lecture 14 - Contextual understanding of text

Lecture 15 - Co-occurence matrix, n-grams

Lecture 16 - Collocations, Dense word Vectors

Lecture 17 - SVD, Dimensionality reduction, Demo

Lecture 18 - Query Processing

Lecture 19 - Topic Modeling

Lecture 20 - Examples for word prediction

Lecture 21 - Introduction to Probability in the context of NLP

Lecture 22 - Joint and conditional probabilities, independence with examples

Lecture 23 - The definition of probabilistic language model

Lecture 24 - Chain rule and Markov assumption

Lecture 25 - Generative Models

Lecture 26 - Bigram and Trigram Language models - peeking indide the model building

Lecture 27 - Out of vocabulary words and curse of dimensionality

Lecture 28 - Exercise

Lecture 29 - Naive-Bayes, classification

Lecture 30 - Machine learning, perceptron, linearly separable

Lecture 31 - Linear Models for Claassification

Lecture 32 - Biological Neural Network

Lecture 33 - Perceptron

Lecture 34 - Perceptron Learning

Lecture 35 - Logical XOR

Lecture 36 - Activation Functions

Lecture 37 - Gradient Descent

Lecture 38 - Feedforward and Backpropagation Neural Network

Lecture 39 - Why Word2Vec?

Lecture 40 - What are CBOW and Skip-Gram Models?

Lecture 41 - One word learning architecture

Lecture 42 - Forward pass for Word2Vec

Lecture 43 - Matrix Operations Explained

Lecture 44 - CBOW and Skip Gram Models

Lecture 45 - Building Skip-gram model using Python

Lecture 46 - Reduction of complexity - sub-sampling, negative sampling

Lecture 47 - Binay tree, Hierarchical softmax

Lecture 48 - Mapping the output layer to Softmax

Lecture 49 - Updating the weights using hierarchical softmax

Lecture 50 - Discussion on the results obtained from word2vec

Lecture 51 - Recap and Introduction

Lecture 52 - ANN as a LM and its limitations

Lecture 53 - Sequence Learning and its applications

Lecture 54 - Introuduction to Recurrent Neural Network

Lecture 55 - Unrolled RNN

Lecture 56 - RNN - Based Language Model

Lecture 57 - BPTT - Forward Pass

Lecture 58 - BPTT - Derivatives for W,V and U

Lecture 59 - BPTT - Exploding and vanishing gradient

Lecture 60 - LSTM

Lecture 61 - Truncated BPTT

Lecture 62 - GRU

Lecture 63 - Introduction and Historical Approaches to Machine Translation

Lecture 64 - What is SMT?

Lecture 65 - Noisy Channel Model, Bayes Rule, Language Model

Lecture 66 - Translation Model, Alignment Variables

Lecture 67 - Alignments again!

Lecture 68 - IBM Model 1

Lecture 69 - IBM Model 2

Lecture 70 - Introduction to Phrase-based translation

Lecture 71 - Symmetrization of alignments

Lecture 72 - Extraction of Phrases

Lecture 73 - Learning/estimating the phrase probabilities using another Symmetrization example

Lecture 74 - Introduction to evaluation of Machine Translation

Lecture 75 - BLEU - A short Discussion of the seminal paper

Lecture 76 - BLEU Demo using NLTK and other Metrics

Lecture 77 - Encoder-Decoder model for Neural Machine Translation

Lecture 78 - RNN Based Machine Translation

Lecture 79 - Recap and Connecting Bloom Taxonomy with Machine Learning

Lecture 80 - Introduction to Attention based Translation

Lecture 81 - Research Paper discussion on Neural machine translation by jointly learning to align and translate

Lecture 82 - Typical NMT architecture architecture and models for multi-language translation

Lecture 83 - Beam Search, Stochatic Gradient Descend, Mini Batch, Batch

Lecture 84 - Beam Search, Stochatic Gradient Descend, Mini Batch, Batch

Lecture 85 - Introduction to Conversation Modeling

Lecture 86 - A few examples in Conversation Modeling

Lecture 87 - Some ideas to Implement IR-based Conversation Modeling

Lecture 88 - Discussion of some ideas in Question Answering

Lecture 89 - Hyperspace Analogue to Language - HAL

Lecture 90 - Correlated Occurence Analogue to Lexical Semantic - COALS

Lecture 91 - Global Vectors - Glove

Lecture 92 - Evaluation of Word vectors

NPTEL : NOC:Python for Data Science (Computer Science and Engineering)

Co-ordinators : Prof. Ragunathan Rengasamy

Lecture 1 - Introduction to Python for Data Science

Lecture 2 - Introduction to Python

Lecture 3 - Introduction to Spyder - Part 1

Lecture 4 - Introduction to Spyder - Part 2

Lecture 5 - Variables and Datatypes

Lecture 6 - Operators

Lecture 7 - Jupyter setup

Lecture 8 - Sequence data - Part 1

Lecture 9 - Sequence data - Part 2

Lecture 10 - Sequence data - Part 3

Lecture 11 - Sequence data - Part 4

Lecture 12 - Numpy

Lecture 13 - Reading data

Lecture 14 - Pandas Dataframes - I

Lecture 15 - Pandas Dataframes - II

Lecture 16 - Pandas Dataframes - III

Lecture 17 - Control structures and Functions

Lecture 18 - Exploratory data analysis

Lecture 19 - Data Visualization - Part I

Lecture 20 - Data Visualization - Part II

Lecture 21 - Dealing with missing data

Lecture 22 - Introduction to Classification Case Study

Lecture 23 - Case Study on Classification - Part I

Lecture 24 - Case Study on Classification - Part II

Lecture 25 - Introduction to Regression Case Study

Lecture 26 - Case Study on Regression - Part I

Lecture 27 - Case Study on Regression - Part II

Lecture 28 - Case Study on Regression - Part III

Lecture 29 - Module : Predictive Modelling

Lecture 30 - Linear Regression

Lecture 31 - Model Assessment

Lecture 32 - Diagnostics to Improve Linear Model Fit

Lecture 33 - Cross Validation

Lecture 34 - Classification

Lecture 35 - Logistic Regression

Lecture 36 - K-Nearest Neighbors (kNN)

Lecture 37 - K-means Clustering

Lecture 38 - Logistic Regression (Continued...)

Lecture 39 - Decision Trees

Lecture 40 - Multiple Linear Regression

NPTEL : NOC:Practical Machine Learning with Tensorflow (Computer Science and Engineering)

Co-ordinators : Dr. B. Ravindran

Lecture 1 - Overview of Tensorflow

Lecture 2 - Machine Learning Refresher

Lecture 3 - Steps in Machine Learning Process

Lecture 4 - Loss Functions in Machine Learning

Lecture 5 - Gradient Descent

Lecture 6 - Gradient Descent Variations

Lecture 7 - Model Selection and Evaluation

Lecture 8 - Machine Learning Visualization

Lecture 9 - Deep Learning Refresher

Lecture 10 - Introduction to Tensors

Lecture 11 - Mathematical Foundations of Deep Learning (Continued...)

Lecture 12 - Building Data Pipelines for Tensorflow - Part 1

Lecture 13 - Building Data Pipelines for Tensorflow - Part 2

Lecture 14 - Building Data Pipelines for Tensorflow - Part 3

Lecture 15 - Text Processing with Tensorflow

Lecture 16 - Classify Images

Lecture 17 - Regression

Lecture 18 - Classify Structured Data

Lecture 19 - Text Classification

Lecture 20 - Underfitting and Overfitting

Lecture 21 - Save and Restore Models

Lecture 22 - CNNs - Part 1

Lecture 23 - CNNs - Part 2

Lecture 24 - Transfer learning with pretrained CNNs

Lecture 25 - Transfer learning with TF hub

Lecture 26 - Image classification and visualization

Lecture 27 - Estimator API

Lecture 28 - Logistic Regression

Lecture 29 - Boosted Trees

Lecture 30 - Introduction to word embeddings

Lecture 31 - Recurrent Neural Networks - Part 1

Lecture 32 - Recurrent Neural Networks - Part 2

Lecture 33 - Time Series Forecasting with RNNs

Lecture 34 - Text Generation with RNNs

Lecture 35 - TensorFlow Customization

Lecture 36 - Customizing tf.keras - Part 1

Lecture 37 - Customizing tf.keras - Part 2

Lecture 38 - TensorFlow Distributed Training

NPTEL : NOC:Introduction to Database Systems (Computer Science and Engineering)

Co-ordinators : Prof. P.Sreenivasa Kumar

Lecture 1 - Introduction

Lecture 2 - Database Architecture

Lecture 3 - RDBMS Architecture

Lecture 4 - Introduction to ER Model

Lecture 5 - Entities and Relationships

Lecture 6 - Modelling Weak Entities and Design Choices

Lecture 7 - Relational Data Model and Notion of Keys

Lecture 8 - Introduction to Relational Algebra

Lecture 9 - Operators in Relational Model

Lecture 10 - Uses of Renaming, Join and Division in Relation Algebra

Lecture 11 - Example Queries in Relation Model and Outer Join Operation

Lecture 12 - Convert ER-Model to a Relational Model

Lecture 13 - Introduction to tuple relational calculus

Lecture 14 - Example TRC queries

Lecture 15 - Data definition using SQL

Lecture 16 - Basic SQL query block and subqueries

Lecture 17 - Correlated subqueries

Lecture 18 - Aggregate functions

Lecture 19 - Views

Lecture 20 - Programmatic access of SQL

Lecture 21 - Normal forms - Introduction

Lecture 22 - Deriving new functional dependencies

Lecture 23 - Proving soundness and completeness of Armstrong's Axioms

Lecture 24 - Normal forms - 2 NF, 3NF, BCNF

Lecture 25 - Properties of decompositions

Lecture 26 - Normal forms - 4NF, 5NF

Lecture 27 - Introduction to file orgranization

Lecture 28 - File orgranization methods

Lecture 29 - Dynamic File orgranization using Hashing

Lecture 30 - Index structures

Lecture 31 - B+ trees on Disks

Lecture 32 - Performance and Reliability of Multiple Disks

Lecture 33 - Relational Query Evaluation

Lecture 34 - Join operator processing algorithms

Lecture 35 - Query optimization

Lecture 36 - ACID properties and operations in transactions

Lecture 37 - Schdeules

Lecture 38 - Concurrency control using Locks

Lecture 39 - Recovery using undo logging method

Lecture 40 - Recovery using Redo and Undo-Redo logging methods

Lecture 41 - Recoverable schdeules and transaction isolation levels

NPTEL : NOC:Foundations of Cryptography (Computer Science and Engineering)

Co-ordinators : Prof. Ashish Choudhury

Lecture 1 - Introduction

Lecture 2 - Symmetric-key Encryption

Lecture 3 - Historical Ciphers and their Cryptanalysis

Lecture 4 - Perfect Security

Lecture 5 - Limitations of Perfect Security

Lecture 6 - Introduction to Computational Security

Lecture 7 - Semantic Security

Lecture 8 - Pseudo-random Generators (PRGs)

Lecture 9 - Operations on Pseudorandom Generators

Lecture 10 - Stream Ciphers

Lecture 11 - Provably-secure Instantiation of PRG

Lecture 12 - Practical Instantiations of PRG

Lecture 13 - CPA-security

Lecture 14 - Pseudo-random Functions (PRFs)

Lecture 15 - CPA-secure Encryption from PRF

Lecture 16 - Modes of Operations of Block Ciphers - Part I

Lecture 17 - Modes of Operations of Block Ciphers - Part II

Lecture 18 - Theoretical Constructions of Block Ciphers

Lecture 19 - Practical Constructions of Block Ciphers - Part I

Lecture 20 - Practical Constructions of Block Ciphers - Part II

Lecture 21 - From Passive to Active Adversary

Lecture 22 - Message Integrity and Authentication

Lecture 23 - Message Authentication for Long Messages - Part I

Lecture 24 - Message Authentication for Long Messages - Part II

Lecture 25 - Information-theoretic MACs - Part I

Lecture 26 - Information-theoretic MACs - Part II

Lecture 27 - Cryptographic Hash Functions - Part I

Lecture 28 - Cryptographic Hash Functions - Part II

Lecture 29 - Message Authentication Using Hash Functions

Lecture 30 - Generic Attacks on Hash Functions and Additional Applications of Hash Functions

Lecture 31 - Random Oracle Model - Part I

Lecture 32 - Random Oracle Model - Part II

Lecture 33 - Authenticated Encryption

Lecture 34 - Composing CPA-secure Cipher with a Secure MAC - Part I

Lecture 35 - Composing CPA-secure Cipher with a Secure MAC - Part II

Lecture 36 - Key-Exchange Protocols - Part I

Lecture 37 - Key-Exchange Protocols - Part II

Lecture 38 - Cyclic groups

Lecture 39 - Cryptographic Hardness Assumptions in the Cyclic Groups

Lecture 40 - Candidate Cyclic Groups for Cryptographic Purposes - Part I

Lecture 41 - Candidate Cyclic Groups for Cryptographic Purposes - Part II

Lecture 42 - Cryptographic Applications of the Discrete Log Assumption

Lecture 43 - Public-key Encryption

Lecture 44 - El Gamal Public-key Encryption Scheme

Lecture 45 - RSA Assumption

Lecture 46 - RSA Public-key Cryptosystem

Lecture 47 - Hybrid Public-key Cryptosystem

Lecture 48 - CCA-Secure Public-key Ciphers

Lecture 49 - CCA-Secure Public-key Ciphers Based on Diffie-Hellman Problems

Lecture 50 - CCA-Secure Public-key Ciphers Based on RSA Assumption

Lecture 51 - Digital Signatures

Lecture 52 - RSA Signatures

Lecture 53 - Identification Schemes

Lecture 54 - Schnorr Signature Scheme and TLS/SSL

Lecture 55 - Number Theory

Lecture 56 - Secret Sharing

Lecture 57 - Zero-Knowledge Protocols - Part I

Lecture 58 - Zero-Knowledge Protocols - Part II

Lecture 59 - Good Bye for Now

NPTEL : NOC:Modern Application Development (Computer Science and Engineering)

Co-ordinators : Prof. Madhavan Mukund, Prof. Abhijat Vichare, Prof. Aamod Sane

Lecture 1 - Introduction to Modern Application Development - Part 1

Lecture 2 - Introduction to Modern Application Development - Part 2

Lecture 3 - Introduction to Modern Application Development - Part 3

Lecture 4 - Introduction to Modern Application Development - Part 4

Lecture 5 - Introduction to Modern Application Development - Part 5

Lecture 6 - Command Line - Part 1

Lecture 7 - Command Line - Part 2

Lecture 8 - Command Line - Practice Questions - Part 1

Lecture 9 - Command Line - Practice Questions - Part 2

Lecture 10 - Comparing CLI, GUI, and Web Interfaces

Lecture 11 - Producing HTML+CSS output - Part 1

Lecture 12 - Producing HTML+CSS output - Part 2

Lecture 13 - Introduction to Input in HTML

Lecture 14 - Session 2 - Part 1

Lecture 15 - Session 2 - Part 2

Lecture 16 - Session 2 - Part 3

Lecture 17 - Session 1 - Part 1 - Introduction to HTML and CSS

Lecture 18 - Session 1 - Part 2

Lecture 19 - Week6 - Session 1

Lecture 20 - Week6 - Session 2

Lecture 21 - Introduction to JDBC

Lecture 22 - Week 7 Session 1 - Part 1

Lecture 23 - Week 7 Session 1 - Part 2

Lecture 24 - Week 8 Session 1

Lecture 25 - Week 8 Session 2

Lecture 26 - Week 8 Session 3

Lecture 27 - Week 9 Session 1

Lecture 28 - Week 9 Session 3

Lecture 29 - Week 10 Part 1

Lecture 30 - Week 10 Part 2

Lecture 31 - Week 10 Part 3

Lecture 32 - Week 11 Part 1

Lecture 33 - Week 11 Part 2

Lecture 34 - Week 12 Part 1

Lecture 35 - Week 12 Part 2

Lecture 36 - Week 12 Part 3

Lecture 37 - Week 12 Part 4

NPTEL : NOC:Deep Learning for Computer Vision (Computer Science and Engineering)

Co-ordinators : Prof. Vineeth N Balasubramanian

Lecture 1 - Course Introduction

Lecture 2 - History

Lecture 3 - Image Formation

Lecture 4 - Image Representation

Lecture 5 - Linear Filtering

Lecture 6 - Image in Frequency Domain

Lecture 7 - Image Sampling

Lecture 8 - Edge Detection

Lecture 9 - From Edges to Blobs and Corners

Lecture 10 - Scale Space, Image Pyramids and Filter Banks

Lecture 11 - Feature Detectors: SIFT and Variants

Lecture 12 - Image Segmentation

Lecture 13 - Other Feature Spaces

Lecture 14 - Human Visual System

Lecture 15 - Feature Matching

Lecture 16 - Hough Transform

Lecture 17 - From Points to Images: Bag-of-Words and VLAD Representations

Lecture 18 - Image Descriptor Matching

Lecture 19 - Pyramid Matching

Lecture 20 - From Traditional Vision to Deep Learning

Lecture 21 - Neural Networks: A Review - Part 1

Lecture 22 - Neural Networks: A Review - Part 2

Lecture 23 - Feedforward Neural Networks and Backpropagation - Part 1

Lecture 24 - Feedforward Neural Networks and Backpropagation - Part 2

Lecture 25 - Gradient Descent and Variants - Part 1

Lecture 26 - Gradient Descent and Variants - Part 2

Lecture 27 - Regularization in Neural Networks - Part 1

Lecture 28 - Regularization in Neural Networks - Part 2

Lecture 29 - Improving Training of Neural Networks - Part 1

Lecture 30 - Improving Training of Neural Networks - Part 2

Lecture 31 - Convolutional Neural Networks: An Introduction - Part 1

Lecture 32 - Convolutional Neural Networks: An Introduction - Part 2

Lecture 33 - Backpropagation in CNNs

Lecture 34 - Evolution of CNN Architectures for Image Classification - Part 1

Lecture 35 - Evolution of CNN Architectures for Image Classification - Part 2

Lecture 36 - Recent CNN Architectures

Lecture 37 - Finetuning in CNNs

Lecture 38 - Explaining CNNs: Visualization Methods

Lecture 39 - Explaining CNNs: Early Methods

Lecture 40 - Explaining CNNs: Class Attribution Map Methods

Lecture 41 - Explaining CNNs: Recent Methods - Part 1

Lecture 42 - Explaining CNNs: Recent Methods - Part 2

Lecture 43 - Going Beyond Explaining CNNs

Lecture 44 - CNNs for Object Detection-I - Part 1

Lecture 45 - CNNs for Object Detection-I - Part 2

Lecture 46 - CNNs for Object Detection-II

Lecture 47 - CNNs for Segmentation

Lecture 48 - CNNs for Human Understanding: Faces - Part 1

Lecture 49 - CNNs for Human Understanding: Faces - Part 2

Lecture 50 - CNNs for Human Understanding: Human Pose and Crowd

Lecture 51 - CNNs for Other Image Tasks

Lecture 52 - Recurrent Neural Networks: Introduction

Lecture 53 - Backpropagation in RNNs

Lecture 54 - LSTMs and GRUs

Lecture 55 - Video Understanding using CNNs and RNNs

Lecture 56 - Attention in Vision Models: An Introduction

Lecture 57 - Vision and Language: Image Captioning

Lecture 58 - Beyond Captioning: Visual QA, Visual Dialog

Lecture 59 - Other Attention Models

Lecture 60 - Self-Attention and Transformers

Lecture 61 - Deep Generative Models: An Introduction

Lecture 62 - Generative Adversarial Networks - Part 1

Lecture 63 - Generative Adversarial Networks - Part 2

Lecture 64 - Variational Autoencoders

Lecture 65 - Combining VAEs and GANs

Lecture 66 - Beyond VAEs and GANs: Other Deep Generative Models - Part 1

Lecture 67 - Beyond VAEs and GANs: Other Deep Generative Models - Part 2

Lecture 68 - GAN Improvements

Lecture 69 - Deep Generative Models across Multiple Domains

Lecture 70 - VAEs and DIsentanglement

Lecture 71 - Deep Generative Models: Image Applications

Lecture 72 - Deep Generative Models: Video Applications

Lecture 73 - Few-shot and Zero-shot Learning - Part 1

Lecture 74 - Few-shot and Zero-shot Learning - Part 2

Lecture 75 - Self-Supervised Learning

Lecture 76 - Adversarial Robustness

Lecture 77 - Pruning and Model Compression

Lecture 78 - Neural Architecture Search

Lecture 79 - Course Conclusion

NPTEL : NOC:Artificial Intelligence Search Methods For Problem Solving (Computer Science and Engineering)

Co-ordinators : Prof. Deepak Khemani

Lecture 1 - Prologue

Lecture 2 - The Winograd Schema Challenge

Lecture 3 - Introduction (2013 version)

Lecture 4 - Can Machines Think?

Lecture 5 - The Turing Test

Lecture 6 - Language and Thought

Lecture 7 - The Willing Suspension of Disbelief

Lecture 8 - Machines with Wheels and Gears

Lecture 9 - The Notion of Mind in Philosophy

Lecture 10 - Reasoning = Computation

Lecture 11 - Concepts and Categories

Lecture 12 - How did AI get its name?

Lecture 13 - The Chess Saga

Lecture 14 - A Brief History of AI

Lecture 15 - The Worlds in our Minds

Lecture 16 - Epiphemona in Computers

Lecture 17 - State Space Search

Lecture 18 - Domain Independent Algorithms

Lecture 19 - Deterministic Search

Lecture 20 - DFS and BFS

Lecture 21 - Comparing DFS and BFS

Lecture 22 - Depth First Iterative Deepening

Lecture 23 - Heuristic Search

Lecture 24 - Heuristic Functions and the Search Landscape

Lecture 25 - Solution Space Search

Lecture 26 - The Traveling Salesman Problem

Lecture 27 - Escaping Local Optima

Lecture 28 - Stochastic Local Search

Lecture 29 - Genetic Algorithms: Survival of the Fittest

Lecture 30 - Genetic Algorithms and SAT

Lecture 31 - Genetic Algorithms for the TSP

Lecture 32 - Emergent Systems

Lecture 33 - Ant Colony Optimization

Lecture 34 - Finding Optimal Paths

Lecture 35 - Branch and Bound

Lecture 36 - Algorithm A*

Lecture 37 - A*: An illustrated example

Lecture 38 - Is A* Admissible?

Lecture 39 - Admissibility of A*

Lecture 40 - Higher, Faster ...

Lecture 41 - B&B - A* - wA* - Best First

Lecture 42 - A*: Leaner Admissible Variations

Lecture 43 - The Monotone Condition

Lecture 44 - DNA Sequence Alignment

Lecture 45 - Divide and Conquer Frontier Search.

Lecture 46 - Smart Memory Graph Search

Lecture 47 - Variations on A*: The story so far

Lecture 48 - Breadth First Heuristic Search

Lecture 49 - Beam Stack Search

Lecture 50 - Game Theory

Lecture 51 - Popular Recreational Games

Lecture 52 - Board Games and Game Trees

Lecture 53 - The Evaluation Function in Board Games

Lecture 54 - Algorithm Minimax and Alpha-Beta Pruning

Lecture 55 - A Cluster of Strategies

Lecture 56 - SSS*: A Best First Algorithm

Lecture 57 - SSS*: A Detailed Example

Lecture 58 - Automated Domain Independent Planning

Lecture 59 - The Blocks World Domain

Lecture 60 - State Space Planning: Forward and Backward

Lecture 61 - Goal Stack Planning (GSP)

Lecture 62 - GSP: A Detailed Example

Lecture 63 - Plan Space Planning (PSP)

Lecture 64 - PSP: A Tiny Example

Lecture 65 - Multi-Armed Robots

Lecture 66 - Means-Ends Analysis

Lecture 67 - The Planning Graph

Lecture 68 - Algorithm Graphplan

Lecture 69 - Problem Decomposition.

Lecture 70 - Algorithm AO*

Lecture 71 - AO*: An Illustration

Lecture 72 - Rule Based Expert Systems

Lecture 73 - The Inference Engine

Lecture 74 - The OPS5 Language

Lecture 75 - Conflict Resolution

Lecture 76 - Business Rule Management Systems

Lecture 77 - The Rete Net

Lecture 78 - Rete Algorithm: Optimizing the Match

Lecture 79 - Rete Algorithm: Conflict Resolution

Lecture 80 - Reasoning in Logic

Lecture 81 - Rules of Inference

Lecture 82 - Forward Reasoning

Lecture 83 - First Order Logic

Lecture 84 - Implicit Quantifier Notation

Lecture 85 - Backward Reasoning

Lecture 86 - Depth First Search on Goal Trees

Lecture 87 - Incompleteness...

Lecture 88 - Constraint Satisfaction Problems

Lecture 89 - Binary Constraint Networks

Lecture 90 - Interpreting Line Drawings

Lecture 91 - Model Based Diagnosis

Lecture 92 - Solving CSPs

Lecture 93 - Arc Consistency

Lecture 94 - Propagation = Reasoning

Lecture 95 - Lookahead Search

NPTEL : NOC:Computational Complexity (Computer Science and Engineering)

Co-ordinators : Prof. Subrahmanyam Kalyanasundaram

Lecture 1 - Introduction to Computational Complexity

Lecture 2 - The Class P

Lecture 3 - The Class NP

Lecture 4 - The Class NP - Alternate Definition

Lecture 5 - Polynomial Time Reductions

Lecture 6 - NP - Completeness

Lecture 7 - Cook Levin Theorem - Part 1

Lecture 8 - Cook Levin Theorem - Part 2

Lecture 9 - More NP Complete Problems

Lecture 10 - Polynomial Hierarchy - Part 1

Lecture 11 - Polynomial Hierarchy - Part 2

Lecture 12 - Polynomial Hierarchy - Part 3

Lecture 13 - Time Hierarchy Theorem

Lecture 14 - Introduction to Space Complexity

Lecture 15 - NL-Completeness

Lecture 16 - Savitch's Theorem

Lecture 17 - NL = co-NL - Part 1

Lecture 18 - NL = co-NL - Part 2

Lecture 19 - PSPACE Completeness

Lecture 20 - Games and PSPACE Completeness

Lecture 21 - Space Hierarchy Theorem

Lecture 22 - Ladner's Theorem

Lecture 23 - Oracle Turing Machines

Lecture 24 - Polynomial Hierarchy Using Oracles

Lecture 25 - Baker-Gill-Solovay Theorem - Part 1

Lecture 26 - Baker-Gill-Solovay Theorem - Part 2

Lecture 27 - Randomized Complexity Classes - Part 1

Lecture 28 - Randomized Complexity Classes - Part 2

Lecture 29 - Randomized Complexity Classes - Part 3

Lecture 30 - Randomized Complexity Classes - Part 4

Lecture 31 - Comparison Between Randomized Complexity Classes

Lecture 32 - BPP is in Polynomial Hierarchy

Lecture 33 - Circuit Complexity - Part 1

Lecture 34 - Circuit Complexity - Part 2

Lecture 35 - Formal Definition of Circuits

Lecture 36 - Hierarchy Theorem for Circuit Size

Lecture 37 - Complexity Class : P/Poly

Lecture 38 - Karp-Lipton Theorem

Lecture 39 - Turing Machines That Take Advice

Lecture 40 - Classes NC and AC

Lecture 41 - Parity Not in AC0 - Part 1

Lecture 42 - Parity Not in AC0 - Part 2

Lecture 43 - Adleman's Theorem

Lecture 44 - Polynomial Identity Testing and Bipartite Perfect Matching in RNC

Lecture 45 - Search Bipartite Perfect Matching is in RNC - Part 1

Lecture 46 - Search Bipartite Perfect Matching is in RNC - Part 2

Lecture 47 - Promise Problems and Valiant-Vazirani Theorem

Lecture 48 - Valiant Vazirani Theorem Continued

Lecture 49 - #P and the Complexity of Counting

Lecture 50 - Permanent is #P-Complete - Part 1

Lecture 51 - Permanent is #P-Complete - Part 2

Lecture 52 - Toda's Theorem - Part 1

Lecture 53 - Toda's Theorem - Part 2

Lecture 54 - Introduction to Communication Complexity - Part 1

Lecture 55 - Introduction to Communication Complexity - Part 2

Lecture 56 - Lower Bound Techniques

Lecture 57 - Communication Complexity of Relations

Lecture 58 - Monotone Depth Lower Bound for Matching

Lecture 59 - Interactive Proofs

Lecture 60 - #3SAT is in IP

Lecture 61 - Public Coin Interactive Proofs and AM/MA

Lecture 62 - Simulating Private Coins using Public Coins

Lecture 63 - Summary and Concluding Remarks

NPTEL : NOC:Parameterized Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. Neeldhara Misra

Lecture 1 - Invitation to FPT

Lecture 2 - Formalizing FPT

Lecture 3 - Kernelization: High Degree Rule

Lecture 4 - Kernelization: d-Hitting Set

Lecture 5 - Kernelization: Crown Reduciton

Lecture 6 - Kernelization: Nemhauser-Trotter and Expansion Lemma

Lecture 7 - Introduction to Branching

Lecture 8 - Analyzing Recurrences

Lecture 9 - High-Degree Branching for FVS

Lecture 10 - Vertex Cover above LP

Lecture 11 - Applications of Vertex Cover above Matching

Lecture 12 - Iterative Compression I: Setting Up the Method

Lecture 13 - Iterative Compression II: Vertex Cover and Tournament Feedback Vertex Set

Lecture 14 - Iterative Compression III: Feedback Vertex Set and 3-Hitting Set

Lecture 15 - Iterative Compression IV: Odd Cycle Transversal

Lecture 16 - Introduction to Randomized Algorithms via a Simple Randomized FPT Algorithm for FVS

Lecture 17 - Color Coding for Longest Path

Lecture 18 - Chromatic Coding for Feedback Arc Set on Tournaments

Lecture 19 - Random Separation and Subgraph Isomorphism

Lecture 20 - Derandomization

Lecture 21 - Divide and Conquer and Separator

Lecture 22 - Towards Defining Treewidth

Lecture 23 - Treewidth and Constructing Treedecomposition of Few Graph Classes

Lecture 24 - Structural Properties of Treedecomposition and Win-Win

Lecture 25 - Nice Tree Decomposition and Algorithm for Max Weight Independent Set

Lecture 26 - Dynamic Programming Algorithm over graphs of Bounded Treewidth

Lecture 27 - FPT Appproximation Algorithm for Computing Tree Decomposition - Part 1

Lecture 28 - FPT Appproximation Algorithm for Computing Tree Decomposition - Part 2

Lecture 29 - FPT Appproximation Algorithm for Computing Tree Decomposition and Applications - Part 1

Lecture 30 - FPT Appproximation Algorithm for Computing Tree Decomposition and Applications - Part 2

Lecture 31 - Dynamic Programming Over Subsets for Set Cover

Lecture 32 - Dynamic Programming Over Subsets for Steiner Tree

Lecture 33 - ILP for Envy-Free Allocations and Lobbying

Lecture 34 - ILP for Imbalance Parameterized by Vertex Cover

Lecture 35 - Important Cuts: Basic

Lecture 36 - Important Cuts: Enumeration and Bounds

Lecture 37 - FPT Algorithm for Multiway Cut

Lecture 38 - FPT Algorithm for Directed Feedback Edge Set

Lecture 39 - Algebraic Techniques: Inclusion Exclusion (Coloring)

Lecture 40 - Algebraic Techniques: Inclusion Exclusion (Hamiltonian Path)

Lecture 41 - Algebraic Techniques: Matrix Multiplication

Lecture 42 - Algebraic Techniques: Polynomial Method

Lecture 43 - Matroids: Representative Sets

Lecture 44 - Matroids: Representative Sets - Computation and Combinatorics

Lecture 45 - Matroids: Representative Sets - Applications (Paths and Kernels)

Lecture 46 - Matroids: Representative Sets - Applications (Directed Long Cycle)

Lecture 47 - Reductions - An Introduction

Lecture 48 - Reductions - Problems as Hard as Clique I (Clique on Regular Graphs)

Lecture 49 - Reductions - Problems as Hard as Clique (PVC, MCC, MIS)

Lecture 50 - Reductions - Problems as Hard as Clique (Dominating Set, Set Cover)

NPTEL : NOC:Getting Started with Competitive Programming (Computer Science and Engineering)

Co-ordinators : Prof. Neeldhara Misra

Lecture 0 - Welcome and Initial Setup

Lecture 1 - Reversort

Lecture 2 - Engineering Reversort

Lecture 3 - Number Game

Lecture 4 - Will It Stop?

Lecture 5 - Trouble Sort

Lecture 6 - The Meeting Place Cannot Be Changed

Lecture 7 - Magic Ship

Lecture 8 - Simple Skewness

Lecture 9 - Pancake Flipping

Lecture 10 - Islands War

Lecture 11 - Stable Marriage - I

Lecture 12 - Stable Marriage - II

Lecture 13 - When Greedy Does Not Work - Coin Change

Lecture 14 - When Greedy Does Not Work - Guarding a Museum

Lecture 15 - When Greedy Does Not Work - Traveling Salesman

Lecture 16 - DSU - Definition and Motivation

Lecture 17 - DSU via Union by Rank and Path Compression

Lecture 18 - DSU - Implementation

Lecture 19 - Destroying Array - I (Problem Statement and Solution)

Lecture 20 - Destroying Array - II (Implementation)

Lecture 21 - War-I (Problem Statement)

Lecture 22 - War-II (Solution)

Lecture 23 - War-III (Implementation)

Lecture 24 - Graph Foundations

Lecture 25 - BFS and DFS

Lecture 26 - Mahmoud and Ehab and the bipartiteness

Lecture 27 - Cover It!

Lecture 28 - Diamond Inheritance

Lecture 29 - SSSP - Overview BFS Revisited

Lecture 30 - SSSP and Dijkstra's Algorithm

Lecture 31 - Sending Email

Lecture 32 - SSSP and Modified Dijkstra

Lecture 33 - SSSP with Negative Cycles - Bellman-Ford

Lecture 34 - Wormholes

Lecture 35 - APSP and Floyd-Warshall

Lecture 36 - Page Hopping

Lecture 37 - Introduction to MSTs

Lecture 38 - Prim's Algorithm

Lecture 39 - Kruskal's Algorithm

Lecture 40 - Cherries Mesh

Lecture 41 - Heirarchy

Lecture 42 - Island Hopping

Lecture 43 - Introduction to MaxFlow

Lecture 44 - Ford-Fulkerson for MaxFlow

Lecture 45 - Implementing Edmonds-Karp

Lecture 46 - Maximum Matching via MaxFlow

Lecture 47 - Sport Elimination via MaxFlow

Lecture 48 - Maxflow-Mincut Duality

Lecture 49 - Police Chase

Lecture 50 - Sam I AM and Vertex Covers

Lecture 51 - Top-Down Dynamic Programming with Frog 1 - Part A

Lecture 52 - Top-Down Dynamic Programming with Frog 1 - Part B

Lecture 53 - Bottom-Up Dynamic Programming with Dice Combinations

NPTEL : NOC:Introduction to Quantum Computing: Quantum Algorithms and Qiskit (Computer Science and Engineering)

Co-ordinators : Prof. Prabha Mandayam

Lecture 1 - Quantum Computing Roadmap

Lecture 2 - Quantum Mission in India

Lecture 3 - A Brief Introduction to Applications of Quantum

Lecture 4 - Quantum Computing Basics

Lecture 5 - Postulates of Quantum Mechanics - Part 1

Lecture 6 - Postulates of Quantum Mechanics - Part 2

Lecture 7 - Quantum Measurements

Lecture 8 - Quantum Gates and Circuits - Part 1

Lecture 9 - Quantum Gates and Circuits - Part 2

Lecture 10 - Programming using IBM Quantum Experience and Circuit Composer

Lecture 11 - Quantum Computing Concepts: Entanglement and Interferenceâ€‹ - Part 1

Lecture 12 - Quantum Computing Concepts: Entanglement and Interferenceâ€‹ - Part 2

Lecture 13 - Programming using Qiskit - Part 1

Lecture 14 - Programming using Qiskit - Part 2

Lecture 15 - Quantum Algorithms: Deutsch Jozsa Algorithm

Lecture 16 - Quantum Algorithms: Bernstein Vazirani Algorithm

Lecture 17 - Quantum Algorithms: Grover's Search

Lecture 18 - Grover's algorithm Programming

Lecture 19 - NISQ-era quantum algorithms

Lecture 20 - Variational Quantum Algorithms

Lecture 21 - Variational Quantum Eigensolver

Lecture 22 - Quantum Generative Adversarial Networks (QGANs)

Lecture 23 - Fixing quantum errors with quantum tricks: A brief introduction to QEC - Part 1

Lecture 24 - Fixing quantum errors with quantum tricks: A brief introduction to QEC - Part 2

Lecture 25 - Fixing quantum errors with quantum tricks: A brief introduction to QEC - Part 3

NPTEL : NOC:Systems and Usable Security (Computer Science and Engineering)

Co-ordinators : Prof. Neminath Hubballi

Lecture 1 - Introduction to Computer Security - Part 1

Lecture 2 - Introduction to Computer Security - Part 2

Lecture 3 - Malcious Software - Part 1

Lecture 4 - Malcious Software - Part 2

Lecture 5 - Social Engineering and Phishing Attacks - Part 1

Lecture 6 - Social Engineering and Phishing Attacks - Part 2

Lecture 7 - Operating System Security - Part 1

Lecture 8 - Operating System Security - Part 2

Lecture 9 - Operating System Security - Part 3

Lecture 10 - Operating System Security - Part 4

Lecture 11 - Email Security - Part 1

Lecture 12 - Email Security - Part 2

Lecture 13 - Transport Layer Security - Part 1

Lecture 14 - Transport Layer Security - Part 2

Lecture 15 - IP Security - Part 1

Lecture 16 - IP Security - Part 2

Lecture 17 - Security and Usability Overview

Lecture 18 - User Privacy and Usability

NPTEL : NOC:Online Privacy (Computer Science and Engineering)

Co-ordinators : Prof. Ponnurangam Kumaraguru

Lecture 1 - Online Privacy

Lecture 2 - Privacy concepts and studies

Lecture 3 - Fair Information Practices

Lecture 4 - Right to Privacy Contextual Integrity

Lecture 5 - Privacy Policy - Part I

Lecture 6 - Privacy Policy - Part II

Lecture 7 - Privacy-based technologies and decision making

Lecture 8 - Social Media Privacy

Lecture 9 - Identity resolution

Lecture 10 - Privacy Nudges

Lecture 11 - Cookies

Lecture 12 - Ethics about studying Online Privacy

Lecture 13 - Anonymization techniques and Differential Privacy

Lecture 14 - Conducting (user, lab, online) studies

Lecture 15 - Research paper reading

Lecture 16 - Voter and Browser Privacy Leaks, Profiling form PII - Part I

Lecture 17 - Voter and Browser Privacy Leaks, Profiling form PII - Part II

Lecture 18 - Online Privacy Tools (Hands-on) - Part I

Lecture 19 - Online Privacy Tools (Hands-on) - Part II

Lecture 20 - Mobile numbers, home location, Location-based social networks

Lecture 21 - Location-based social networks

Lecture 22 - Privacy laws and regulations - Part I

Lecture 23 - Privacy laws and regulations - Part II

Lecture 24 - Privacy standards

Lecture 25 - Look back

NPTEL : NOC:Introduction to Machine Learning (Tamil) (Computer Science and Engineering)

Co-ordinators : Prof. Arun Rajkumar

Lecture 1 - Paradigms of Machine Learning

Lecture 2 - Few more examples

Lecture 3 - Types of Learning

Lecture 4 - Types of supervised learning

Lecture 5 - Mathematical tools

Lecture 6 - Three Fundamental spaces

Lecture 7 - Conditional Probability

Lecture 8 - Bayes Theorem

Lecture 9 - Continuous Probability

Lecture 10 - Introduction to vectors

Lecture 11 - Span of vectors

Lecture 12 - Linear Independence

Lecture 13 - Basis of vector space

Lecture 14 - Orthogonality and Projection

Lecture 15 - Introduction to Regression

Lecture 16 - Linear regression

Lecture 17 - Geometrical Interpretation

Lecture 18 - Visual Guide to Orthogonal Projection

Lecture 19 - Iterative solution: Gradient descent

Lecture 20 - Gradient Descent

Lecture 21 - Choosing Step size

Lecture 22 - Taylor Series

Lecture 23 - Stochastic Gradient Descent and basis functions

Lecture 24 - Regularization Techniques

Lecture 25 - Binary Classification

Lecture 26 - K-Nearest Neighbour Classification

Lecture 27 - Distance metric and Cross-Validation

Lecture 28 - Computational efficiency of KNN

Lecture 29 - Introduction to Decision Trees

Lecture 30 - Level splitting

Lecture 31 - Measure of Impurity

Lecture 32 - Entropy and Information Gain

Lecture 33 - Generative vs Discriminative models

Lecture 34 - Naive Bayes classifier

Lecture 35 - Conditional Independence

Lecture 36 - Classifying the test point and summary

Lecture 37 - Discriminative models

Lecture 38 - Logistic Regression

Lecture 39 - Summary and big picture

Lecture 40 - Maximum likelihood estimation

Lecture 41 - Linear separability

Lecture 42 - Perceptron and its learning algorithm

Lecture 43 - Perceptron : A thing of past

Lecture 44 - Support Vector Machine

Lecture 45 - Optimizing weights

Lecture 46 - Handling Outliers

Lecture 47 - Dual Formulation

Lecture 48 - Kernel formulation

Lecture 49 - Introduction to Ensemble methods

Lecture 50 - Bagging

Lecture 51 - Bootstrapping

Lecture 52 - Limitations of bagging

Lecture 53 - Introduction to boosting

Lecture 54 - Ada boost

Lecture 55 - Unsupervised learning

Lecture 56 - K-means Clustering

Lecture 57 - LLyod's Algorithms

Lecture 58 - Convergence and Initialization

Lecture 59 - Representation Learning

Lecture 60 - Orthogonal Projection

Lecture 61 - Covariance Matrix and Eigen direction

Lecture 62 - PCA and mean centering

NPTEL : Compiler Design (Prof. Rupesh Nasre) (Computer Science and Engineering)

Co-ordinators : Prof. Rupesh Nasre

Lecture 1 - Introduction - Part 1, Programming languages and compilers

Lecture 2 - Introduction - Part 2, Language translators

Lecture 3 - Introduction - Part 3, Phases of a compiler

Lecture 4 - Introduction - Part 4, Static vs Dynamic contexts,Parameter passing

Lecture 5 - Lexing - Part 1, Terminology, Regex, flex tool- Part 1

Lecture 6 - Lexing - Part 2, Lexical errors, Input buffering

Lecture 7 - flex tool- Part 2

Lecture 8 - Lexing - Part 3, Lookahead, KMP string matching

Lecture 9 - Lexing - Part 4, Regex to DFA conversion - Part 1

Lecture 10 - Lexing - Part 5, Regex to DFA conversion - Part 2, Prasing - Part 1

Lecture 11 - Parsing - Part 2, CFG, Parse tree, Precedence, Ambiguity

Lecture 12 - flex tool - Part 3

Lecture 13 - Parsing - Part 3, Sentinel forms, Error recovery, if-else ambiguity

Lecture 14 - Parsing - Part 4, Left recursion, Recursive descent parsing

Lecture 15 - Parsing - Part 5, First and Follow, Predicitive parsing table

Lecture 16 - Parsing - Part 6, Predictive parsing table, LL(1) grammars

Lecture 17 - Discussions and doubts clarification - Part 1

Lecture 18 - Parsing - Part 6, Bottom-up, Shift-reduce parsing, SLR parsing

Lecture 19 - Parsing - Part 6, LR(0) automaton, SLR parsing using automaton

Lecture 20 - Parsing - Part 7, SLR(1) parsing table, SLR(1) parsing algorithm

Lecture 21 - Parsing - Part 8, Viable prefixes, LR(1) parsing, LR(1) automaton

Lecture 22 - Parsing - Part 9, LALR parsing, SDT- Part 1, attributes

Lecture 23 - Syntax Directed Translation - Part 2, S- and L-attributed SDD

Lecture 24 - Syntax Directed Translation - Part 3, L-attributed SDD, Applications

Lecture 25 - Syntax Directed Translation - Part 4, Actions within productions

Lecture 26 - Discussions and doubts clarification - Part 2

Lecture 27 - Quiz-1 discussion, SDT - Part 5, Code generation for while loop

Lecture 28 - Intermdiate Code Generation - Part 1, Syntax trees and DAGs

Lecture 29 - Intermdiate Code Generation - Part 2, Three-address code

Lecture 30 - Discussions and doubts clarification Part 3

Lecture 31 - Intermdiate Code Generation - Part 3, Static single assignment

Lecture 32 - Intermdiate Code Generation - Part 4, IR for type expressions

Lecture 33 - Intermdiate Code Generation - Part 4, IR for array expressions

Lecture 34 - Intermdiate Code Generation - Part 4, IR for boolean expressions

Lecture 35 - Intermdiate Code Generation - Part 4, IR for break, continue, switch

Lecture 36 - Code Generator - Part 1, Introduction, IR and target code

Lecture 37 - Code Generator - Part 2, Instruction selection, ordering

Lecture 38 - Code Generator - Part 2, Basic blocks and CFG

Lecture 39 - x86 assembly code

Lecture 40 - Code optimizer - Part 1, Local optimizations within a basic block

Lecture 41 - Code optimizer - Part 2, Array references, Peephole optimization

Lecture 42 - Discussions and doubts clarification - Part 4

Lecture 43 - Code optimizer - Part 3, Register allocation, Liveness

Lecture 44 - Code optimizer - Part 4, Register allocation as graph coloring

Lecture 45 - Discussions and doubts clarification - Part 5

Lecture 46 - Code optimizer - Part 5, Data flow analysis, Reaching definitions

Lecture 47 - Discussions and doubts clarification - Part 6

Lecture 48 - Code optimizer - Part 6, DFA for reaching definitions,Live variables

NPTEL : NOC:Applied Accelerated Artificial Intelligence (Computer Science and Engineering)

Co-ordinators : Prof. Satyadhyan Chickerur, Prof. Bharatkumar Sharma, Prof. Adesuyi Tosin, Prof. Satyajit Das

Lecture 1 - Introduction to AI Systems Hardware - Part 1

Lecture 2 - Introduction to AI Systems Hardware - Part 2

Lecture 3 - Introduction to AI Accelerators, GPUs

Lecture 4 - Introduction to Operating Systems, Virtualization, Cloud - Part 1

Lecture 5 - Introduction to Operating Systems, Virtualization, Cloud - Part 2

Lecture 6 - Introduction to Containers and IDE Dockers - Part 1

Lecture 7 - Introduction to Containers and IDE Dockers - Part 2

Lecture 8 - Scheduling and Resource Management - Part 1

Lecture 9 - Scheduling and Resource Management - Part 2

Lecture 10 - DeepOps: Deep Dive into Kubernetes with deployment of various AI based Services - Part 1

Lecture 11 - DeepOps: Deep Dive into Kubernetes with deployment of various AI based Services - Part 2

Lecture 12 - DeepOps: Deep Dive into Kubernetes with deployment of various AI based Services Session II - Part 1

Lecture 13 - DeepOps: Deep Dive into Kubernetes with deployment of various AI based Services Session II - Part 2

Lecture 14 - Design principles for Building High Performance Clusters - Part 1

Lecture 15 - Design principles for Building High Performance Clusters - Part 2

Lecture 16 - Design principles for Building High Performance Clusters - Part 3

Lecture 17 - Design principles for Building High Performance Clusters - Part 4

Lecture 18 - Introduction to Pytorch - Part 1

Lecture 19 - Introduction to Pytorch - Part 2

Lecture 20 - Introduction to Pytorch - Part 3

Lecture 21 - Introduction to Pytorch - Part 4

Lecture 22 - Profiling with DLProf Pytorch Catalyst - Part 1

Lecture 23 - Profiling with DLProf Pytorch Catalyst - Part 2

Lecture 24 - Introduction to TensorFlow - Part 1

Lecture 25 - Introduction to TensorFlow - Part 2

Lecture 26 - Accelerated TensorFlow - Part 1

Lecture 27 - Accelerated TensorFlow - Part 2

Lecture 28 - Accelerated TensorFlow - XLA Approach - Part 1

Lecture 29 - Accelerated TensorFlow - XLA Approach - Part 2

Lecture 30 - Optimizing Deep learning Training: Automatic Mixed Precision - Part 1

Lecture 31 - Optimizing Deep learning Training: Automatic Mixed Precision - Part 2

Lecture 32 - Optimizing Deep learning Training: Transfer Learning - Part 1

Lecture 33 - Optimizing Deep learning Training: Transfer Learning - Part 2

Lecture 34 - Fundamentals of Distributed AI Computing Session 1 - Part 1

Lecture 35 - Fundamentals of Distributed AI Computing Session 1 - Part 2

Lecture 36 - Fundamentals of Distributed AI Computing Session 2 - Part 1

Lecture 37 - Fundamentals of Distributed AI Computing Session 2 - Part 2

Lecture 38 - Distributed Deep Learning using Tensorflow and Horovod

Lecture 39 - Challenges with Distributed Deep Learning Training Convergence

Lecture 40 - Fundamentals of Accelerating Deployment - Part 1

Lecture 41 - Fundamentals of Accelerating Deployment - Part 2

Lecture 42 - Accelerating neural network inference in PyTorch and TensorFlow - Part 1

Lecture 43 - Accelerating neural network inference in PyTorch and TensorFlow - Part 2

Lecture 44 - Accelerated Data Analytics - Part 1

Lecture 45 - Accelerated Data Analytics - Part 2

Lecture 46 - Accelerated Data Analytics - Part 3

Lecture 47 - Accelerated Data Analytics - Part 4

Lecture 48 - Accelerated Machine Learning

Lecture 49 - Scale Out with DASK

Lecture 50 - Web visualizations to GPU accelerated crossfiltering - Part 1

Lecture 51 - Web visualizations to GPU accelerated crossfiltering - Part 2

Lecture 52 - Accelerated ETL Pipeline with SPARK - Part 1

Lecture 53 - Accelerated ETL Pipeline with SPARK - Part 2

Lecture 54 - Applied AI: Smart City (Intelligent Video Analytics) Session 1 - Part 1

Lecture 55 - Applied AI: Smart City (Intelligent Video Analytics) Session 1 - Part 2

Lecture 56 - Applied AI: Smart City (Intelligent Video Analytics) Session 2 Deepstream - Part 1

Lecture 57 - Applied AI: Smart City (Intelligent Video Analytics) Session 2 Deepstream - Part 2

Lecture 58 - Applied AI: Health care Session I - Part 1

Lecture 59 - Applied AI: Health care Session I - Part 2

Lecture 60 - Applied AI: Health care Session II - Part 1

Lecture 61 - Applied AI: Health care Session II - Part 2

NPTEL : NOC:Social Network Analysis (Computer Science and Engineering)

Co-ordinators : Prof. Tanmoy Chakraborty

Lecture 1 - Chapter 1 Lectuer 1

Lecture 2 - Chapter 1 Lectuer 2

Lecture 3 - Chapter 1 Lectuer 3

Lecture 4 - Tutorial 1: Introduction to Python/Colab

Lecture 5 - Tutorial 2: Introduction to NetworkX - Part I

Lecture 6 - Chapter 2 Lectuer 1

Lecture 7 - Chapter 2 Lectuer 2

Lecture 8 - Chapter 2 Lectuer 3

Lecture 9 - Chapter 2 Lectuer 4

Lecture 10 - Chapter 2 Lectuer 5

Lecture 11 - Chapter 2 Lectuer 6

Lecture 12 - Tutorial 3: Introduction to NetworkX - Part II

Lecture 13 - Chapter 3 Lectuer 1

Lecture 14 - Chapter 3 Lectuer 2

Lecture 15 - Chapter 3 Lectuer 3

Lecture 16 - Chapter 3 Lectuer 4

Lecture 17 - Chapter 3 Lectuer 5

Lecture 18 - Chapter 3 Lectuer 6

Lecture 19 - Chapter 3 Lectuer 7

Lecture 20 - Chapter 4 Lectuer 1

Lecture 21 - Chapter 4 Lectuer 2

Lecture 22 - Chapter 4 Lectuer 3

Lecture 23 - Chapter 4 Lectuer 4

Lecture 24 - Chapter 4 Lectuer 5

Lecture 25 - Chapter 4 Lectuer 6

Lecture 26 - Tutorial 4

Lecture 27 - Chapter 5 Lectuer 1

Lecture 28 - Chapter 5 Lectuer 2

Lecture 29 - Chapter 5 Lectuer 3

Lecture 30 - Chapter 5 Lectuer 4

Lecture 31 - Chapter 5 Lectuer 5

Lecture 32 - Chapter 5 Lectuer 6

Lecture 33 - Chapter 5 Lectuer 7

Lecture 34 - Chapter 5 Lectuer 8

Lecture 35 - Chapter 5 Lectuer 9

Lecture 36 - Chapter 5 Lectuer 10

Lecture 37 - Chapter 6 Lectuer 1

Lecture 38 - Chapter 6 Lectuer 2

Lecture 39 - Chapter 6 Lectuer 3

Lecture 40 - Chapter 6 Lectuer 4

Lecture 41 - Chapter 6 Lectuer 5

Lecture 42 - Chapter 7 Lectuer 1

Lecture 43 - Chapter 7 Lectuer 2

Lecture 44 - Chapter 7 Lectuer 3

Lecture 45 - Chapter 7 Lectuer 4

Lecture 46 - Chapter 7 Lectuer 5

Lecture 47 - Chapter 7 Lectuer 6

Lecture 48 - Chapter 7 Lectuer 7

Lecture 49 - Chapter 7 Lectuer 8

Lecture 50 - chapter 8 Lectuer 1

Lecture 51 - chapter 8 Lectuer 2

Lecture 52 - Chapter 8 Lectuer 3

Lecture 53 - Chapter 8 Lectuer 4

Lecture 54 - Chapter 8 Lectuer 5

Lecture 55 - Chapter 8 Lectuer 6

Lecture 56 - Chapter 9 Lectuer 1

Lecture 57 - Chapter 9 Lectuer 2

Lecture 58 - Chapter 9 Lectuer 3

Lecture 59 - Chapter 9 Lectuer 4

Lecture 60 - Chapter 9 Lectuer 5

Lecture 61 - Chapter 9 Lectuer 6

Lecture 62 - Chapter 9 Lectuer 7

Lecture 63 - Chapter 9 Lectuer 8

Lecture 64 - Chapter 9 Lectuer 9

Lecture 65 - Chapter 9 Lectuer 10

Lecture 66 - Chapter 9 Lectuer 11

Lecture 67 - Tutorial 5

Lecture 68 - Chapter 10 Lectuer 1

Lecture 69 - Chapter 10 Lectuer 2

Lecture 70 - Chapter 10 Lectuer 3

Lecture 71 - Chapter 10 Lectuer 4

Lecture 72 - Chapter 10 Lectuer 5

Lecture 73 - Conclusion - Panel discussion

Lecture 74 - Conclusion

NPTEL : NOC:Quantum Algorithms and Cryptography (Computer Science and Engineering)

Co-ordinators : Prof. Shweta Agrawal

Lecture 1 - Quantum Algorithms and Cryptography

Lecture 2 - Basics of Quantum Information - Part 1

Lecture 3 - Basics of Quantum Information - Part 2

Lecture 4 - Computation and No-Cloning - Part 1

Lecture 5 - Computation and No-Cloning - Part 2

Lecture 6 - Computation and No-Cloning - Part 3

Lecture 7 - Going beyond classical - Part 1

Lecture 8 - Going beyond classical - Part 2

Lecture 9 - Going beyond classical - Part 3

Lecture 10 - Going beyond classical- Deutsch and Deutsch-Jozsa - Part 1

Lecture 11 - Going beyond classical- Deutsch and Deutsch-Jozsa - Part 2

Lecture 12 - Simon's and Bernstein's Vazirani Algorithm - Part 1

Lecture 13 - Simon's and Bernstein's Vazirani Algorithm - Part 2

Lecture 14 - Introduction to Cryptography - Part 1

Lecture 15 - Introduction to Cryptography - Part 2

Lecture 16 - Introduction to Cryptography - Part 3

Lecture 17 - Building Cryptography - Part 1

Lecture 18 - Building Cryptography - Part 2

Lecture 19 - Building Cryptography - Part 3

Lecture 20 - Building Cryptography - Part 4

Lecture 21 - Building Cryptography - Part 5

Lecture 22 - Building Public Key Encryption - Part 1

Lecture 23 - Building Public Key Encryption - Part 2

Lecture 24 - RSA Encryption - Part 1

Lecture 25 - RSA Encryption - Part 2

Lecture 26 - Finishing RSA, Fourier Transform - Part 1

Lecture 27 - Finishing RSA, Fourier Transform - Part 2

Lecture 28 - Finishing RSA, Fourier Transform - Part 3

Lecture 29 - Grover's Algorithm - Part 1

Lecture 30 - Grover's Algorithm - Part 2

Lecture 31 - Grover's Algorithm - Part 3

Lecture 32 - Simon's Algorithm over Z_n - Part 1

Lecture 33 - Simon's Algorithm over Z_n - Part 2

Lecture 34 - Simon's Algorithm over Z_n - Part 3

Lecture 35 - Simon's Algorithm over Z_n - Part 4

Lecture 36 - Simon's Algorithm over Z_n - Part 5

Lecture 37 - Simon's Algorithm over Z_n - Part 6

Lecture 38 - Shor's Algorithm - Part 1

Lecture 39 - Shor's Algorithm - Part 2

Lecture 40 - Hidden Subgroup Problem - Part 1

Lecture 41 - Hidden Subgroup Problem - Part 2

Lecture 42 - Introduction to Lattices - Part 1

Lecture 43 - Introduction to Lattices - Part 2

Lecture 44 - Public Key Encryption from LWE - Part 1

Lecture 45 - Public Key Encryption from LWE - Part 2

Lecture 46 - Public Key Encryption from LWE - Part 3

Lecture 47 - Fully Homomorphic Encryption - Part 1

Lecture 48 - Fully Homomorphic Encryption - Part 2

Lecture 49 - Fully Homomorphic Encryption - Part 3

Lecture 50 - Quantum Cryptography - Part 1

Lecture 51 - Quantum Cryptography - Part 2

Lecture 52 - Quantum Cryptography - Part 3

Lecture 53 - Quantum Cryptography - Part 4

Lecture 54 - Quantum Cryptography - Part 5

Lecture 55 - Quantum PKE and FHE - Part 1

Lecture 56 - Quantum PKE and FHE - Part 2

Lecture 57 - Quantum PKE and FHE - Part 3

Lecture 58 - Quantum PKE and FHE - Part 4

Lecture 59 - Quantum PKE and FHE - Part 5

NPTEL : NOC:Theory of Computation (2023) (Computer Science and Engineering)

Co-ordinators : Prof. Subrahmanyam Kalyanasundaram

Lecture 1 - An Introduction to The Theory of Computation

Lecture 2 - Notations and Terminology in Theory of Computation

Lecture 3 - An Introduction to Finite Automata and Regular Languages - Part 1

Lecture 4 - An Introduction to Finite Automata and Regular Languages - Part 2

Lecture 5 - Significance of Regular Languages and Regular Operations

Lecture 6 - Closure Properties of Regular Languages Under Union, Concatenation and Kleene Star Operation - Part 1

Lecture 7 - Closure Properties of Regular Languages Under Union, Concatenation and Kleene Star Operation - Part 2

Lecture 8 - An Introduction to Non-Deterministic Finite Automata (NFA)

Lecture 9 - Formal Definitions and Examples of Non-Deterministic Finite Automata (NFA)

Lecture 10 - Equivalence of NFA and DFA

Lecture 11 - Closure of Regular Languages Under Regular Operations (Using NFA)

Lecture 12 - Regular Expressions - Part 1

Lecture 13 - Regular Expressions - Part 2

Lecture 14 - Proving Equivalence of Regular Expression and DFA Through a GNFA

Lecture 15 - Pumping Lemma for Regular Languages - Part 1

Lecture 16 - Pumping Lemma for Regular Languages - Part 2

Lecture 17 - Distinguishability of Strings and Myhill-Nerode Theorem

Lecture 18 - Proving the Myhill-Nerode Theorem

Lecture 19 - An Introduction to Context-Free Languages - Part 1

Lecture 20 - An Introduction to Context-Free Languages - Part 2

Lecture 21 - Chomsky Normal Form

Lecture 22 - CYK Algorithm - Part 1

Lecture 23 - CYK Algorithm - Part 2 (Example)

Lecture 24 - Closure Properties of Context Free Languages

Lecture 25 - An Introduction to Push Down Automata

Lecture 26 - Normalizations in PDA and Intersection of Regular Language and CFL

Lecture 27 - Equivalence of Context Free Grammars and Push Down Automata - Part 1

Lecture 28 - Equivalence of Context Free Grammars and Push Down Automata - Part 2

Lecture 29 - Equivalence of Context Free Grammars and Push Down Automata - Part 3

Lecture 30 - Pumping Lemma for Context Free Languages

Lecture 31 - Examples of Pumping Lemma Usage for Context Free Languages

Lecture 32 - Formal Definition of a Turing Machine

Lecture 33 - Turing Recognizable and Decidable Languages and TM Examples

Lecture 34 - Multitape Turing Machine

Lecture 35 - Non-Deterministic Turing Machines

Lecture 36 - Equivalence of Deterministic and Nondeterministic TM

Lecture 37 - Church-Turing Thesis

Lecture 38 - Decidable Problems Concerning Regular Languages

Lecture 39 - Decidable Problems Concerning Context Free Languages

Lecture 40 - Countability of Sets

Lecture 41 - Proof of Existence of Undecidable Languages

Lecture 42 - Halting Problem

Lecture 43 - Co-Turing Recognizability

Lecture 44 - An Introduction to Mapping Reducibility

Lecture 45 - Examples of Proving Undecidability Using Reductions

Lecture 46 - Rice Theorem

Lecture 47 - Computation Histories

Lecture 48 - The Post Correspondence Problem

Lecture 49 - Checking Ambiguity in CFG is Undecidable

Lecture 50 - Time Complexity - Part 1

Lecture 51 - Time Complexity - Part 2

Lecture 52 - Non-Deterministic Polynomial Time - Part 1

Lecture 53 - Non-Deterministic Polynomial Time - Part 2

Lecture 54 - Verifiability and NP

Lecture 55 - Polynomial Time Reductions - Part 1

Lecture 56 - Polynomial Time Reductions - Part 2

Lecture 57 - NP-Completeness

Lecture 58 - Cook-Levin Theorem

Lecture 59 - Cook-Levin Theorem - Proof and Implications

Lecture 60 - CLIQUE and VERTEX-COVER is NP-Complete

Lecture 61 - HAM-PATH is NP-Complete

Lecture 62 - SUBSET-SUM is NP-Complete

Lecture 63 - Knapsack Problem

Lecture 64 - Integer Linear Program is NP-Complete

Lecture 65 - Space Complexity and its Complexity Classes

Lecture 66 - Logspace Reductions and NL-Completeness

Lecture 67 - Savitch's theorem

Lecture 68 - Results in Space Complexity

Lecture 69 - Summary and Concluding Remarks

NPTEL : NOC:Advanced Computer Networks (Computer Science and Engineering)

Co-ordinators : Prof. Neminath Hubballi, Prof. Sameer Kulkarni

Lecture 1 - An Introduction to High Performance Switching and Routing - Part 1

Lecture 2 - An Introduction to High Performance Switching and Routing - Part 2

Lecture 3 - IP Table Lookup - Part 1

Lecture 4 - IP Table Lookup - Part 2

Lecture 5 - IP Table Lookup: Trie Based Data Structures - Part 1

Lecture 6 - IP Table Lookup: Trie Based Data Structures - Part 2

Lecture 7 - IP Table Lookup: Optimized Trie based Data Structures - Part 1

Lecture 8 - IP Table Lookup: Optimized Trie based Data Structures - Part 2

Lecture 9 - Packet Classification - Part 1

Lecture 10 - Packet Classification - Part 2

Lecture 11 - Packet Classification - Part 3

Lecture 12 - Packet Classification Implementation - Part 1

Lecture 13 - Packet Classification Implementation - Part 2

Lecture 14 - Traffic Management - Part 1

Lecture 15 - Traffic Management - Part 2

Lecture 16 - Traffic Management - Part 3

Lecture 17 - Traffic Management - Part 4

Lecture 18 - Traffic Management - Part 5

Lecture 19 - Traffic Management - Part 6

Lecture 20 - Traffic Management - Part 7

Lecture 21 - Packet Switching Fabric Design - Part 1

Lecture 22 - Packet Switching Fabric Design - Part 2

Lecture 23 - Introduction to Network Softwarization

Lecture 24 - Internet Impasse and Nework Ossification

Lecture 25 - Network Ossification

Lecture 26 - Network Virtualization - Part 1

Lecture 27 - Network Virtualization - Part 2

Lecture 28 - Road to SDN

Lecture 29 - Active Networks

Lecture 30 - Data and Control Plane Separation

Lecture 31 - Control Plane Abstractions

Lecture 32 - Software Defined Networking - I

Lecture 33 - Software Defined Networking - II

Lecture 34 - Software Defined Networking - III

Lecture 35 - OpenFlow

Lecture 36 - SND Prospects and Challenges

Lecture 37 - Introduction to Network Function Virtualization - I

Lecture 38 - Introduction to Network Function Virtualization - II

Lecture 39 - Network Function Virtualization - Concepts, Framework and Architecture - I

Lecture 40 - Network Function Virtualization - Concepts, Framework and Architecture - II

Lecture 41 - Network Function Virtualization - Road ahead and Key challenges

Lecture 42 - High Performance Network Packet Processing

Lecture 43 - Summary and Comparision of NFV and SDN

Lecture 44 - Programmable Networks - Data Plane Programmability - Overview I

Lecture 45 - Programmable Networks - Data Plane Programmability - Overview II

Lecture 46 - Reconfigurable Match Action Tables

Lecture 47 - P4 Programming

Lecture 48 - Data Center Networking - Introduction - Part 1

Lecture 49 - Data Center Networking - Introduction - Part 2

Lecture 50 - Data Center Networking - Characteristics and Challenges

Lecture 51 - Data Center Networking - Topologies and Architecture - Part 1

Lecture 52 - Data Center Networking - Topologies and Architecture - Part 2

Lecture 53 - Data Center Networking - Protocol Innovations - Part 1

Lecture 54 - Data Center Networking - Protocol Innovations - Part 2

Lecture 55 - Network Telemetry

Lecture 56 - Serverless Computing - Part 1

Lecture 57 - Serverless Computing - Part 2

Lecture 58 - SmartNICs and In-band Network Telemetry, Future of Network Softwarization, SDN 3.0

Lecture 59 - QUIC

Lecture 60 - Green and Sustainable Data Centers

Lecture 61 - Content Distribution in IP Networks - Part 1

Lecture 62 - Content Distribution in IP Networks - Part 2

Lecture 63 - Information Centric Networking - Part 1

Lecture 64 - Information Centric Networking - Part 2

Lecture 65 - Information Centric Networking - Part 3

Lecture 66 - Named Data Networking - Part 1

Lecture 67 - Named Data Networking - Part 2

NPTEL : NOC:Affective Computing (Computer Science and Engineering)

Co-ordinators : Prof. Jainendra Shukla, Prof. Abhinav Dhal

Lecture 1 - Fundamentals of Affective computing

Lecture 2 - Fundamentals of Affective computing Applications

Lecture 3 - Emotion Psychology

Lecture 4 - Emotion Theory

Lecture 5 - Brain and Asymmetry

Lecture 6 - Emotional Design

Lecture 7 - Affect Elicitation

Lecture 8 - Experimental Methodology

Lecture 9 - Tutorial

Lecture 10 - Introduction to Facial Expression Recognition

Lecture 11 - Facial Feature Extraction

Lecture 12 - Group Level Emotion

Lecture 13 - Applications of Facial Expression Recognition

Lecture 14 - Tutorial

Lecture 15 - Tutorial

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20 - Tutorial

Lecture 21 - Emotions in Physiological Signals

Lecture 22 - Tutorial

Lecture 23 - Emotions via Skin Conductance

Lecture 24 - Emotions Via EEG

Lecture 25 - Multimodal Affect Recognition

Lecture 26 - Multimodal Analysis

Lecture 27 - MM Tutorial

Lecture 28 - Tutorial

Lecture 29

Lecture 30

Lecture 31

Lecture 32 - Emotionally Intelligent Machines - Part 1

Lecture 33 - Emotionally Intelligent Machines - Part 2

Lecture 34 - Case Study

Lecture 35

Lecture 36

Lecture 37 - Ethics in Affective Computing - 1

Lecture 38 - Ethics in Affective Computing - 2

Lecture 39 - Course Finale

NPTEL : NOC:Optimisation for Machine Learning: Theory and Implementation (Hindi) (Computer Science and Engineering)

Co-ordinators : Prof. Pravesh Biyani

Lecture 1 - Basics of Linear Algebra: Linear Independence

Lecture 2 - Linear Algebra: Rank of a matrix

Lecture 3 - Linear Algebra - Subspaces of a matrix - 1

Lecture 4 - Linear Algebra - Subspaces of a matrix - 2

Lecture 5 - Linear Algebra - Null space

Lecture 6 - Linear Algebra - Eigen Vectors/Values of a matrix - 1

Lecture 7 - Linear Algebra - Eigen Vectors/Values of a matrix - 2

Lecture 8 - Programming Eigen Decomposition using Python

Lecture 9 - Singular Value Decomposition - 1

Lecture 10 - Singular Value Decomposition - 2

Lecture 11 - Principal Component Analysis - 1

Lecture 12 - Principal Component Analysis - 2

Lecture 13 - Principal Component Analysis - 3

Lecture 14 - Principal Component Analysis - Coding

Lecture 15 - Machine Learning - Overview

Lecture 16 - Optimisation Problems

Lecture 17 - Gradient of a Vector Valued Function - 1

Lecture 18 - Gradient of a Vector Valued Function - 2

Lecture 19 - Neural Netowrks - Overview

Lecture 20 - Neural Netowrks - Backpropagation

Lecture 21 - Optimisation - Introduction to optimisation problems

Lecture 22 - Optimisation - Relaxation and approximate convergence

Lecture 23 - Optimisation - First Order Optimality Condition

Lecture 24 - Optimisation - Second Order Optimality Condition

Lecture 25 - Proof of Second Order Optimality Condition, Gradient Methods

Lecture 26 - Gradient Descent - 2

Lecture 27 - Variants of Gradient Descent - 1

Lecture 28 - Variants of Gradient Descent - 2

Lecture 29 - Variants of Gradient Descent - 3

Lecture 30 - Convex Sets

Lecture 31 - Convex Functions

Lecture 32 - Duality and Lagrangian - Part 1

Lecture 33 - Duality and Lagrangian - Part 2

Lecture 34 - Duality and Lagrangian - Part 3

Lecture 35 - Coding: Introduction to Pytorch

Lecture 36 - Guest Lecture: Support Vector Machine

NPTEL : ACM India - RBCDSAI Summer School on DS-AI-ML (Computer Science and Engineering)

Co-ordinators : Multi-Faculty

Lecture 1 - Introduction to AI/ML/DS

Lecture 2 - Introduction to Probability; Introduction to machine learning - Part 1

Lecture 3 - Introduction to Probability; Introduction to machine learning - Part 2

Lecture 4 - Introduction to Probability; Introduction to machine learning - Part 3

Lecture 5 - Introduction to Probability; Introduction to machine learning - Part 4

Lecture 6 - Python for AI/ML/DS - Part 1

Lecture 7 - Python for AI/ML/DS - Part 2

Lecture 8 - Descriptive statistics and Inferential statistics - Part 1

Lecture 9 - Descriptive statistics and Inferential statistics - Part 2

Lecture 10 - Descriptive statistics and Inferential statistics - Part 3

Lecture 11 - Descriptive statistics and Inferential statistics - Part 4

Lecture 12 - Descriptive statistics and Inferential statistics - Part 5

Lecture 13 - Distribution, Data visualization, Plotting libraries - Part 1

Lecture 14 - Distribution, Data visualization, Plotting libraries - Part 2

Lecture 15 - Distribution, Data visualization, Plotting libraries - Part 3

Lecture 16 - Linear Algebra for Data science

Lecture 17 - Identification of linear relationship among attributes

Lecture 18 - Solving Linear Equations - 1

Lecture 19 - Solving Linear Equations - 2

Lecture 20 - Linear Algebra - Distance, Hyperplanes and Halfspaces, Eigenvalues, Eigenvectors - Part 1

Lecture 21 - Linear Algebra - Distance, Hyperplanes and Halfspaces, Eigenvalues, Eigenvectors - Part 2

Lecture 22 - Linear Algebra - Part 1

Lecture 23 - Linear Algebra - Part 2

Lecture 24 - Linear Algebra - Part 3

Lecture 25 - Regression Models, Models Selection and Evaluation - Part 1

Lecture 26 - Regression Models, Models Selection and Evaluation - Part 2

Lecture 27 - Regression Models, Models Selection and Evaluation - Part 3

Lecture 28 - Regression Models, Models Selection and Evaluation - Part 4

Lecture 29 - Regression - Part 1

Lecture 30 - Regression - Part 2

Lecture 31 - Regression - Part 3

Lecture 32 - Classification Naive Bayes, Logistic Regression, K-NN - Part 1

Lecture 33 - Classification Naive Bayes, Logistic Regression, K-NN - Part 2

Lecture 34 - Classification Naive Bayes, Logistic Regression, K-NN - Part 3

Lecture 35 - Classification Naive Bayes, Logistic Regression, K-NN - Part 4

Lecture 36 - Classification - Part 1

Lecture 37 - Classification - Part 2

Lecture 38 - Classification - Part 3

Lecture 39 - Linear Models for Classification - Part 1

Lecture 40 - Linear Models for Classification - Part 2

Lecture 41 - Kernel Machines

Lecture 42 - Solving Langrange Dual in SVM

Lecture 43 - Classification and SVM - Part 1

Lecture 44 - Classification and SVM - Part 2

Lecture 45 - Tree - Based methods, Boosting bagging - Part 1

Lecture 46 - Tree - Based methods, Boosting bagging - Part 2

Lecture 47 - Tree - Based methods, Boosting bagging - Part 3

Lecture 48 - Tree - Based methods, Boosting bagging - Part 4

Lecture 49 - Tree-based approaches for regression and classification - Part 1

Lecture 50 - Tree-based approaches for regression and classification - Part 2

Lecture 51 - Supervised Learning Using K Nearest Neighbors - Part 1

Lecture 52 - Supervised Learning Using K Nearest Neighbors - Part 2

Lecture 53 - Supervised Learning Using K Nearest Neighbors - Part 3

Lecture 54 - Supervised Learning Using K Nearest Neighbors - Part 4

Lecture 55 - Clustering methods - Part 1

Lecture 56 - Clustering methods - Part 2

Lecture 57 - Induction to Neural Networks, Perceptrons, Multilayer Perceptrons, Feedforward Neural Networks - Part 1

Lecture 58 - Induction to Neural Networks, Perceptrons, Multilayer Perceptrons, Feedforward Neural Networks - Part 2

Lecture 59 - Induction to Neural Networks, Perceptrons, Multilayer Perceptrons, Feedforward Neural Networks - Part 3

Lecture 60 - Induction to Neural Networks, Perceptrons, Multilayer Perceptrons, Feedforward Neural Networks - Part 4

Lecture 61 - Neural Networks and Feedforward NN - Part 1

Lecture 62 - Neural Networks and Feedforward NN - Part 2

Lecture 63 - Neural Networks and Feedforward NN - Part 3

Lecture 64 - Backpropagation (Intuition)

Lecture 65 - Backpropagation: Computing Cradients w.r.t the Output Units

Lecture 66 - Learning Parameters: Gradient Descent

Lecture 67 - Contours

Lecture 68 - Nesterov Accelerated Gradient Descent

Lecture 69 - Stochastic and Mini-Batch Gradient Descent

Lecture 70 - Tips for Adjusting learning Rate and Momentum

Lecture 71 - Line Search

Lecture 72 - The convolution operation

Lecture 73 - Convolutional Neural Networks

Lecture 74 - CNN and DL models - Part 1

Lecture 75 - CNN and DL models - Part 2

Lecture 76 - CNN and DL models - Part 3

Lecture 77 - CNN and DL models - Part 4

Lecture 78 - AI/ML/DS Industry Use Cases - Part 1

Lecture 79 - AI/ML/DS Industry Use Cases - Part 2

Lecture 80 - AI/ML - Case Studies in Industry - Part 1

Lecture 81 - AI/ML - Case Studies in Industry - Part 2

Lecture 82 - Q and A on career in research a woman faculty representative from PSGTech and RBCDSAI

NPTEL : NOC:Machine Learning (ML) in Hindi (Computer Science and Engineering)

Co-ordinators : Prof. Anubha Gupta

Lecture 1 - Introduction to Machine Learning

Lecture 2 - Linear Algebra: Review (Vector Spaces)

Lecture 3 - Linear Algebra: Review (Matrices)

Lecture 4 - Probability Theory: Review (Basics of Probability)

Lecture 5 - Probability Theory: Review (Random Variables)

Lecture 6 - Linear Regression

Lecture 7 - Linear Regression

Lecture 8 - Tutorial: Linear Regression

Lecture 9 - Linear Regression

Lecture 10 - Linear Kernel Regression

Lecture 11 - k-Nearest Neighbour (k-NN) Regression

Lecture 12 - Tutorial: k-NN Regression

Lecture 13 - Tutorial: Kernel Regression

Lecture 14 - Logistic Regression: Classification Evaluation Metrics

Lecture 15 - Logistic Regression

Lecture 16 - Logistic Regression: Examples

Lecture 17 - Tutorial: Logistic Regression

Lecture 18 - Neural Networks

Lecture 19 - Neural Networks

Lecture 20 - Neural Networks: Examples

Lecture 21 - Tutorial: Neural Networks

Lecture 22 - Practical Machine Learning - Part 1

Lecture 23 - Practical Machine Learning - Part 2

Lecture 24 - Practical Machine Learning - Part 3

Lecture 25 - Practical Machine Learning - Part 4

Lecture 26 - Support Vector Machines (SVM)

Lecture 27 - Tutorial: Support Vector Machines (SVM)

Lecture 28 - Kernel Support Vector Machines (k-SVM)

Lecture 29 - NaÃ¯ve Bayes Classification

Lecture 30 - Decision Trees - Part 1

Lecture 31 - Decision Trees - Part 2

Lecture 32 - Tutorial: Naive Bayes Classification

Lecture 33 - Tutorial: Decision Trees

Lecture 34 - k-NN Classifier

Lecture 35 - Ensemble Learning

Lecture 36 - Random Forests

Lecture 37 - Bagging (Bootstrap AGGregatING)

Lecture 38 - Tutorial: Random Forests

Lecture 39 - Tutorial: k-NN Classifier and Bootstrap AGGregatING (Bagging)

Lecture 40 - Boosting

Lecture 41 - Clustering

Lecture 42 - k-means Clustering

Lecture 43 - Tutorial: Boosting

Lecture 44 - Spectral Clustering

Lecture 45 - Mixture of Models (Gaussian Mixture Models-GMM)

Lecture 46 - Dimensionality Reduction: Principal Component Analysis (PCA) and kernel PCA

Lecture 47 - Tutorial: k-means and Spectral Clustering

Lecture 48 - Tutorial: Principal Component Analysis (PCA) and Gaussian Mixture Models (GMM)

Lecture 49 - Introduction to Deep Learning (DL)

Lecture 50 - Convolutional Neural Networks (CNN) - Part A

Lecture 51 - Convolutional Neural Networks (CNN) - Part B

Lecture 52 - Autoencoders

Lecture 53 - Applications of ML in Healthcare Problems - Part 1

Lecture 54 - Applications of ML in Healthcare Problems - Part 2

Lecture 55 - Tutorial: CNN and Autoencoder

NPTEL : NOC:Cyber Security and Privacy (Computer Science and Engineering)

Co-ordinators : Prof. Saji K Mathew

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Introduction - Part 3

Lecture 4 - Foundations - Part 1

Lecture 5 - Foundations - Part 2

Lecture 6 - Foundations - Part 3

Lecture 7 - Security management, GRC - Part 1

Lecture 8 - Security management, GRC - Part 2

Lecture 9 - Security management, GRC - Part 3

Lecture 10 - Contingency planning - Part 1

Lecture 11 - Contingency Planning - Part 2

Lecture 12 - Contingency Planning - Part 3

Lecture 13 - Cybersecurity policy - Part 1

Lecture 14 - Cybersecurity policy - Part 2

Lecture 15 - Cybersecurity policy - Part 3

Lecture 16 - Risk Management - Part 1

Lecture 17 - Risk Management - Part 2

Lecture 18 - Risk Management - Part 3

Lecture 19 - Cybersecurity: Industry perspective - Part 1

Lecture 20 - Cybersecurity: Industry perspective - Part 2

Lecture 21 - Cybersecurity: Industry perspective - Part 3

Lecture 22 - Cyber security technologies - Part 1

Lecture 23 - Cyber security technologies - Part 2

Lecture 24 - Cyber security technologies - Part 3

Lecture 25 - Foundations of privacy - Part 1

Lecture 26 - Foundations of privacy - Part 2

Lecture 27 - Foundations of privacy - Part 3

Lecture 28 - Privacy regulation - Part 1

Lecture 29 - Privacy regulation - Part 2

Lecture 30 - Privacy regulation - Part 3

Lecture 31 - Privacy regulation in Europe - Part 1

Lecture 32 - Privacy regulation in Europe - Part 2

Lecture 33 - Privacy regulation in Europe - Part 3

Lecture 34 - Privacy: The Indian Way - Part 1

Lecture 35 - Privacy: The Indian Way - Part 2

Lecture 36 - Privacy: The Indian Way - Part 3

Lecture 37 - Information privacy: Economics and strategy - Part 1

Lecture 38 - Information privacy: Economics and strategy - Part 2

Lecture 39 - Information privacy: Economics and strategy - Part 3

Lecture 40 - Privacy: Strategy and safety - Part 1

Lecture 41 - Privacy: Strategy and safety - Part 2

Lecture 42 - Privacy: Strategy and safety - Part 3

NPTEL : NOC:Business Intelligence and Analytics (Computer Science and Engineering)

Co-ordinators : Prof. Saji K Mathew

Lecture 1 - Introduction to Business Intelligence and Analytics

Lecture 2 - Patterns in Data

Lecture 3 - Vocabulary of Business Analytics

Lecture 4 - Course Overview

Lecture 5 - Case: Bizocity Scoring at AT&T

Lecture 6 - Business Intelligence Architecture

Lecture 7 - Data Management

Lecture 8 - Online Transaction Processing

Lecture 9 - Introduction To SQL

Lecture 10 - Normalisation

Lecture 11 - Shopsense Case in MySQL Workbench

Lecture 12 - Online Analytical Processing

Lecture 13 - Descriptive Data Analytics

Lecture 14 - Churn Analysis

Lecture 15 - Customer Lifetime Value

Lecture 16 - NPV-CLV Spreadsheet Analysis

Lecture 17 - Analytics Process

Lecture 18 - Introduction to Statistical Learning and Data Pre-Processing

Lecture 19 - Data Mining Process

Lecture 20 - Overview of Data Mining Techniques

Lecture 21 - Analytics Process Case

Lecture 22 - Introduction to Classification

Lecture 23 - Scoring Models

Lecture 24 - Classifier Performance

Lecture 25 - Decision Trees

Lecture 26 - Attribute Selection

Lecture 27 - Growing a Decision Tree

Lecture 28 - Decision Tree Application - Part 1

Lecture 29 - Decision Tree Application - Part 2

Lecture 30 - Classification Demo - 1

Lecture 31 - Classification Demo - 2

Lecture 32 - Cluster Analysis

Lecture 33 - Clustering Techniques - Part 1

Lecture 34 - Clustering Techniques - Part 2

Lecture 35 - K-Means Clustering

Lecture 36 - Implementation in Python: Clustering for segmentation and profiling

Lecture 37 - RFM Analysis

Lecture 38 - Trendhub Case on RFM

Lecture 39 - RFM and Clustering

Lecture 40 - Artificial Neural Network

Lecture 41 - ANN Training

Lecture 42 - ANN for Financial Time Series Modelling

Lecture 43 - Implementation in Python: ANN

Lecture 44 - Introduction Text Mining

Lecture 45 - Text Mining Process

Lecture 46 - Text mining Using R - The Case of a Movie Discussion Forum

NPTEL : NOC:Responsible and Safe AI Systems (Computer Science and Engineering)

Co-ordinators : Prof. Ponnurangam Kumaraguru, Prof. Balaraman Ravindran, Prof. Arun Rajkumar

Lecture 1 - Introduction

Lecture 2 - AI Capabilities - Part 1

Lecture 3 - AI Capabilities - Part 2

Lecture 4 - AI Risk - Part 1

Lecture 5 - AI Risk - Part 2

Lecture 6 - AI Risk - Part 3

Lecture 7 - AI Risk Part 4"Risks associated with AI, getting harmful outputs from AI, biases

Lecture 8 - Robustness - Part 1

Lecture 9 - Robustness - Part 2

Lecture 10 - Robustness Hands-On

Lecture 11 - RLHF

Lecture 12 - AI Alignment

Lecture 13 - Transformers - Part 1

Lecture 14 - Transformers - Part 2

Lecture 15 - Hugging face

Lecture 16 - Unlearning

Lecture 17 - Approximate unlearning

Lecture 18 - Evaluation of Unlearning and Graph Unlearning - Part 1

Lecture 19 - Evaluation of Unlearning and Graph Unlearning - Part 2

Lecture 20 - Representation Engineering - Hands on

Lecture 21 - Introduction to ML - Part 1

Lecture 22 - Introduction to ML - Part 2

Lecture 23 - Basics of Neural Networks and PyTorch - Part 1

Lecture 24 - Basics of Neural Networks and PyTorch - Part 2

Lecture 25 - PyTorch - Basic Workflow

Lecture 26 - PyTorch - Classification

Lecture 27 - Bias - I

Lecture 28 - Bias - II

Lecture 29 - Source of Bias

Lecture 30 - Bias - Handson

Lecture 31 - Bias - III

Lecture 32 - Bias - IV

Lecture 33 - Bias in VLM's

Lecture 34 - Bias Handson - Part 1

Lecture 35 - Bias Handson - Part 2

Lecture 36 - Data Privacy

Lecture 37 - Differential Privacy

Lecture 38 - Approximate Differential Privacy

Lecture 39 - Exponential Mechanism

Lecture 40 - Fairness in Machine Learning

Lecture 41 - Interpretability - I

Lecture 42 - Interpretability - II

Lecture 43 - Interpretability Hands-on - Part 1

Lecture 44 - Interpretability Hands-on - Part 2

Lecture 45 - AI Policies, Regulations, AGI - Part 1

Lecture 46 - AI Policies, Regulations, AGI - Part 2

Lecture 47 - AI Policies, Regulations, AGI - Part 3

Lecture 48 - AI Policies, AGI with Prof. David Krueger - Part 1

Lecture 49 - AI Policies, AGI with Prof. David Krueger - Part 2

Lecture 50 - Finetuning and Jailbreaking: Hands-on

Lecture 51 - AI Governance

Lecture 52 - Research Overview: SaGE- Quantifying moral consistency in LLMs

Lecture 53 - Research Overview: Higher Order Structures for Graph Explanations

Lecture 54 - Research Overview: Representation Surgery

Lecture 55 - Summary - Part 1

Lecture 56 - Summary - Part 2

NPTEL : NOC:Introduction to Cryptology (Computer Science and Engineering)

Co-ordinators : Dr. Sugata Gangopadhyay

Lecture 1 - Introduction Caeser cipher

Lecture 2 - Modular arithmetic, shift cipher

Lecture 3 - Affine Cipher, Vigenere Cipher

Lecture 4 - Prefect secrecy, Application of Shift Cipher

Lecture 5 - Problem Discussion on Affine cipher and Perfect Secrecy

Lecture 6 - Product Cipher, Block Cipher, Modes of Operation for Block Cipher

Lecture 7 - Substitution Permutation network, Fiestel Cipher

Lecture 8 - S-Box Theory

Lecture 9 - Cryptanalysis and its Variants, Linear Attack

Lecture 10 - Problem Discussion

Lecture 11 - Public Key Cryptology Introduction RSA Cryptosystem

Lecture 12 - Complexity analysis of Euclidian Algorithm and RSA Cryptosystem square and multiply algorithm

Lecture 13 - Primality testing: Miler-Rabin Algorithm, Legendre Symbol and Jacobi Symbol

Lecture 14 - Efficien Computation of Jacobi Symbol Primality Testing:Solovay-Stassen Algorithm

Lecture 15 - Problem Discussion on Jacobi Symbol Calculation and RSA Cryptosystem

Lecture 16 - Cryptographic hash function: Introduction

Lecture 17 - Random Oracle model, Security of hash functions

Lecture 18 - Randomized Algorithm and its application on Preimage resistance and collision resistance

Lecture 19 - Iterated Hash Functions

Lecture 20 - Problem Discussionn

NPTEL : NOC:Data Analytics with Python (Computer Science and Engineering)

Co-ordinators : Prof. A. Ramesh

Lecture 1 - Introduction to data analytics

Lecture 2 - Python Fundamentals - I

Lecture 3 - Python Fundamentals - II

Lecture 4 - Central Tendency and Dispersion - I

Lecture 5 - Central Tendency and Dispersion - II

Lecture 6 - Introduction to Probability - I

Lecture 7 - Introduction to Probability - II

Lecture 8 - Probability Distributions - I

Lecture 9 - Probability Distributions - II

Lecture 10 - Probability Distributions - III

Lecture 11 - Python Demo for Distributions

Lecture 12 - Sampling and Sampling Distribution

Lecture 13 - Distribution of Sample Means, population, and variance

Lecture 14 - Confidence interval estimation: Single population - I

Lecture 15 - Confidence interval estimation: Single population - II

Lecture 16 - Hypothesis Testing - I

Lecture 17 - Hypothesis Testing - II

Lecture 18 - Hypothesis Testing - III

Lecture 19 - Errors in Hypothesis Testing

Lecture 20 - Hypothesis Testing: Two sample test - I

Lecture 21 - Hypothesis Testing: Two sample test - II

Lecture 22 - Hypothesis Testing: Two sample test - III

Lecture 23 - ANOVA - I

Lecture 24 - ANOVA - II

Lecture 25 - Post Hoc Analysis (Tukeyâ€™s test)

Lecture 26 - Randomize block design (RBD)

Lecture 27 - Two Way ANOVA

Lecture 28 - Linear Regression - I

Lecture 29 - Linear Regression - II

Lecture 30 - Linear Regression - III

Lecture 31 - Estimation, Prediction of Regression Model Residual Analysis - I

Lecture 32 - Estimation, Prediction of Regression Model Residual Analysis - II

Lecture 33 - Multiple Regression Model - I

Lecture 34 - Multiple Regression Model - II

Lecture 35 - Categorical variable regression

Lecture 36 - Maximum Likelihood Estimation - I

Lecture 37 - Maximum Likelihood Estimation - II

Lecture 38 - Logistic Regression - I

Lecture 39 - Logistic Regression - II

Lecture 40 - Linear Regression Model Vs Logistic Regression Model

Lecture 41 - Confusion matrix and ROC - I

Lecture 42 - Confusion Matrix and ROC - II

Lecture 43 - Performance of Logistic Model - III

Lecture 44 - Regression Analysis Model Building - I

Lecture 45 - Regression Analysis Model Building (Interaction) - II

Lecture 46 - Chi - Square Test of Independence - I

Lecture 47 - Chi-Square Test of Independence - II

Lecture 48 - Chi-Square Goodness of Fit Test

Lecture 49 - Cluster analysis: Introduction - Part I

Lecture 50 - Clustering analysis - Part II

Lecture 51 - Clustering analysis - Part III

Lecture 52 - Cluster analysis - Part IV

Lecture 53 - Cluster analysis - Part V

Lecture 54 - K- Means Clustering

Lecture 55 - Hierarchical method of clustering - I

Lecture 56 - Hierarchical method of clustering - II

Lecture 57 - Classification and Regression Trees (CART) - I

Lecture 58 - Measures of attribute selection

Lecture 59 - Attribute selection Measures in (CART) - II

Lecture 60 - Classification and Regression Trees (CART) - III

NPTEL : Combinatorics (Computer Science and Engineering)

Co-ordinators : Dr. L. Sunil Chandran

Lecture 1 - Pigeon hole principle - (Part 1)

Lecture 2 - Pigeon hole principle - (Part 2)

Lecture 3 - Pigeon hole principle - (Part 3)

Lecture 4 - Pigeon hole principle - (Part 4)

Lecture 5 - Elementary concepts and basic counting principles

Lecture 6 - Elementary concepts; Binomial theorem; Bijective proofs - Part (1)

Lecture 7 - Bijective proofs â€“ Part (2)

Lecture 8 - Bijective proofs - Part (3); Properties of binomial coefficients; Combinatorial identities - Part (1)

Lecture 9 - Combinatorial identities - Part (2); Permutations of multisets â€“ Part (1)

Lecture 10 - Permutations of multisets â€“ Part (2)

Lecture 11 - Multinomial Theorem, Combinations of Multisets â€“ Part (1)

Lecture 12 - Combinations of Multisets - Part (2)

Lecture 13 - Combinations of Multisets â€“ Part (3), Bounds for binomial coefficients

Lecture 14 - Sterlingâ€™s Formula, Generalization of Binomial coefficients - Part (1)

Lecture 15 - Generalization of Binomial coefficients - Part (2)

Lecture 16 - Generalization of Binomial coefficients - Part (3); Double counting - Part (1)

Lecture 17 - Double counting - Part (2)

Lecture 18 - Hallâ€™s Theorem for regular bipartite graphs; Inclusion exclusion principle - Part (1)

Lecture 19 - Inclusion exclusion principle - Part (2)

Lecture 20 - Inclusion exclusion principle - Part (3)

Lecture 21 - Inclusion exclusion principle - Part (4)

Lecture 22 - Inclusion exclusion principle - Part (5)

Lecture 23 - Recurrence Relations - Part (1)

Lecture 24 - Recurrence Relations - Part (2)

Lecture 25 - Recurrence Relations - Part (3)

Lecture 26 - Recurrence Relations - Part (4)

Lecture 27 - Recurrence Relations - Part (5)

Lecture 28 - Generating functions - Part (1)

Lecture 29 - Generating functions - Part (2)

Lecture 30 - Solving recurrence relations using generating functions - Part (1)

Lecture 31 - Solving recurrence relations using generating functions - Part (2)

Lecture 32 - Exponential generating functions - Part (1)

Lecture 33 - Exponential generating functions - Part (2), Partition Number - Part (1)

Lecture 34 - Partition Number - Part (2)

Lecture 35 - Partition Number - Part (3)

Lecture 36 - Partition Number - Part (4); Catalan Numbers - Part (1)

Lecture 37 - Catalans Numbers - Part (2)

Lecture 38 - Catalan Numbers - Part (3), Sterling numbers of the 2nd kind

Lecture 39 - Difference Sequences

Lecture 40 - Sterling Numbers

Lecture 41 - Summary

NPTEL : Compiler Design (Prof. Y.N. Srikanth) (Computer Science and Engineering)

Co-ordinators : Prof. Y.N. Srikanth

Lecture 1 - An Overview of a Compiler - Part 1

Lecture 2 - An Overview of a Compiler - Part 2 and Run-Time Environments - Part 1

Lecture 3 - An Overview of a Compiler - Part 2 and Run-Time Environments - Part 1

Lecture 4 - Run-Time Environments - Part 2

Lecture 5 - Run-Time Environments - Part 3 and Local Optimizations - Part 1

Lecture 6 - Run-Time Environments - Part 3 and Local Optimizations - Part 1

Lecture 7 - Local Optimizations - Part 2 and Code Generation - Part 1

Lecture 8 - Local Optimizations - Part 2 and Code Generation - Part 1

Lecture 9 - Code Generation - Part 1

Lecture 10 - Code Generation - Part 2

Lecture 11 - Code Generation - Part 3 and Global Register Allocation - Part 1

Lecture 12 - Code Generation - Part 3 and Global Register Allocation - Part 1

Lecture 13 - Global Register Allocation - Part 2

Lecture 14 - Global Register Allocation - Part 3 and Implementing Object-Oriented Languages - Part 1

Lecture 15 - Global Register Allocation - Part 3 and Implementing Object-Oriented Languages - Part 1

Lecture 16 - Implementing Object-Oriented Languages - Part 2 and Introduction to Machine-Independent Optimizations - Part 1

Lecture 17 - Implementing Object-Oriented Languages - Part 2 and Introduction to Machine-Independent Optimizations - Part 1

Lecture 18 - Introduction to Machine-Independent Optimizations - Part 2 and Data-Flow Analysis - Part 1

Lecture 19 - Introduction to Machine-Independent Optimizations - Part 2 and Data-Flow Analysis - Part 1

Lecture 20 - Data-Flow Analysis - Part 2

Lecture 21 - Data-Flow Analysis - Part 3 and Control-Flow Analysis - Part 1

Lecture 22 - Data-Flow Analysis - Part 3 and Control-Flow Analysis - Part 1

Lecture 23 - Control-Flow Analysis - Part 2

Lecture 24 - Machine-Independent Optimizations - Part 1

Lecture 25 - Machine-Independent Optimizations - Part 2

Lecture 26 - Machine-Independent Optimizations - Part 3 and Data-Flow Analysis: Theoretical Foundation - Part 1

Lecture 27 - Machine-Independent Optimizations - Part 3 and Data-Flow Analysis: Theoretical Foundation - Part 1

Lecture 28 - Data-Flow Analysis: Theoretical Foundation - Part 2 and Partial Redundancy Elimination - Part 1

Lecture 29 - Data-Flow Analysis: Theoretical Foundation - Part 2 and Partial Redundancy Elimination - Part 1

Lecture 30 - Partial Redundancy Elimination - Part 2

Lecture 31 - The Static Single Assignment Form: Construction and Application to Program Optimizations - Part 1

Lecture 32 - The Static Single Assignment Form: Construction and Application to Program Optimizations - Part 2

Lecture 33 - The Static Single Assignment Form: Construction and Application to Program Optimizations - Part 3

Lecture 34 - Automatic Parallelization - Part 1

Lecture 35 - Automatic Parallelization - Part 2

Lecture 36 - Automatic Parallelization - Part 3

Lecture 37 - Automatic Parallelization - Part 4

Lecture 38 - Instruction Scheduling - Part 1

Lecture 39 - Instruction Scheduling - Part 2

Lecture 40 - Instruction Scheduling - Part 3

Lecture 41 - Software Pipelining

Lecture 42 - Energy-Aware Software Systems - Part 1

Lecture 43 - Energy-Aware Software Systems - Part 2

Lecture 44 - Energy-Aware Software Systems - Part 3

Lecture 45 - Energy-Aware Software Systems - Part 4

Lecture 46 - Just-In-Time Compilation and Optimizations for .NET CLR

Lecture 47 - Garbage Collection

Lecture 48 - Interprocedural Data-Flow Analysis

Lecture 49 - Worst Case Execution Time - Part 1

Lecture 50 - Worst Case Execution Time - Part 2

NPTEL : Graph Theory (Computer Science and Engineering)

Co-ordinators : Dr. L. Sunil Chandran

Lecture 1 - Introduction: Vertex cover and independent set

Lecture 2 - Matchings: Konigâ€™s theorem and Hallâ€™s theorem

Lecture 3 - More on Hallâ€™s theorem and some applications

Lecture 4 - Tutteâ€™s theorem on existence of a perfect matching

Lecture 5 - More on Tutteâ€™s theorem

Lecture 6 - More on Matchings

Lecture 7 - Dominating set, path cover

Lecture 8 - Gallai â€“ Millgram theorem, Dilworthâ€™s theorem

Lecture 9 - Connectivity: 2-connected and 3-connected graphs

Lecture 10 - Mengerâ€™s theorem

Lecture 11 - More on connectivity: k- linkedness

Lecture 12 - Minors, topological minors and more on k- linkedness

Lecture 13 - Vertex coloring: Brooks theorem

Lecture 14 - More on vertex coloring

Lecture 15 - Edge coloring: Vizingâ€™s theorem

Lecture 16 - Proof of Vizingâ€™s theorem, Introduction to planarity

Lecture 17 - 5- coloring planar graphs, Kuratowskyâ€™s theorem

Lecture 18 - Proof of Kuratowskyâ€™s theorem, List coloring

Lecture 19 - List chromatic index

Lecture 20 - Adjacency polynomial of a graph and combinatorial Nullstellensatz

Lecture 21 - Chromatic polynomial, k - critical graphs

Lecture 22 - Gallai-Roy theorem, Acyclic coloring, Hadwigerâ€™s conjecture

Lecture 23 - Perfect graphs: Examples

Lecture 24 - Interval graphs, chordal graphs

Lecture 25 - Proof of weak perfect graph theorem (WPGT)

Lecture 26 - Second proof of WPGT, Some non-perfect graph classes

Lecture 27 - More special classes of graphs

Lecture 28 - Boxicity,Sphericity, Hamiltonian circuits

Lecture 29 - More on Hamiltonicity: Chvatalâ€™s theorem

Lecture 30 - Chvatalâ€™s theorem, toughness, Hamiltonicity and 4-color conjecture

Lecture 31 - Network flows: Max flow mincut theorem

Lecture 32 - More on network flows: Circulations

Lecture 33 - Circulations and tensions

Lecture 34 - More on circulations and tensions, flow number and Tutteâ€™s flow conjectures

Lecture 35 - Random graphs and probabilistic method: Preliminaries

Lecture 36 - Probabilistic method: Markovâ€™s inequality, Ramsey number

Lecture 37 - Probabilistic method: Graphs of high girth and high chromatic number

Lecture 38 - Probabilistic method: Second moment method, Lovasz local lemma

Lecture 39 - Graph minors and Hadwigerâ€™s conjecture

Lecture 40 - More on graph minors, tree decompositions

NPTEL : High Performance Computing (Computer Science and Engineering)

Co-ordinators : Prof. Mathew Jacob

Lecture 1 - Programs and Data

Lecture 2 - Data Representation

Lecture 3 - Registers and Memory

Lecture 4 - Instructions, Addressing Modes

Lecture 5 - A RISC Instruction Set

Lecture 6 - A RISC Instruction Set (Continued...)

Lecture 7 - Function Call and Return

Lecture 8 - Function Call and Return (Continued...)

Lecture 9 - Instruction Execution

Lecture 10 - Instruction Execution (Continued...)

Lecture 11 - Software organization

Lecture 12 - System Calls

Lecture 13 - Virtual memory

Lecture 14 - Virtual memory (Continued...)

Lecture 15 - Virtual Memory (Continued...)

Lecture 16 - Process

Lecture 17 - Process scheduling

Lecture 18 - Process lifetime

Lecture 19 - Interprocess communication

Lecture 20 - Concurrent programming

Lecture 21 - Pipelining

Lecture 22 - Pipeline hazards

Lecture 23 - Pipeline hazards (Continued...)

Lecture 24 - Pipeline hazards (Continued...)

Lecture 25 - Cache memory

Lecture 26 - Memory hierarchy

Lecture 27 - Cache operation

Lecture 28 - Cache operation (Continued)

Lecture 29 - Cache aware programming

Lecture 30 - Cache aware programming (Continued...)

Lecture 31 - More on cache

Lecture 32 - Measuring time

Lecture 33 - Program Profiling

Lecture 34 - Secondary storage

Lecture 35 - Files and disks

Lecture 36 - Directories

Lecture 37 - Protection and Performance

Lecture 38 - Parallel architecture

Lecture 39 - Cache coherence

Lecture 40 - MPI programming

Lecture 41 - MPI programming (Continued...)

NPTEL : Numerical Optimization (Computer Science and Engineering)

Co-ordinators : Dr. Shirish K. Shevade

Lecture 1 - Introduction

Lecture 2 - Mathematical Background

Lecture 3 - Mathematical Background (Continued...)

Lecture 4 - One Dimensional Optimization - Optimality Conditions

Lecture 5 - One Dimensional Optimization (Continued...)

Lecture 6 - Convex Sets

Lecture 7 - Convex Sets (Continued...)

Lecture 8 - Convex Functions

Lecture 9 - Convex Functions (Continued...)

Lecture 10 - Multi Dimensional Optimization - Optimality Conditions, Conceptual Algorithm

Lecture 11 - Line Search Techniques

Lecture 12 - Global Convergence Theorem

Lecture 13 - Steepest Descent Method

Lecture 14 - Classical Newton Method

Lecture 15 - Trust Region and Quasi-Newton Methods

Lecture 16 - Quasi-Newton Methods - Rank One Correction, DFP Method

Lecture 17 - i) Quasi-Newton Methods - Broyden Family ii) Coordinate Descent Method

Lecture 18 - Conjugate Directions

Lecture 19 - Conjugate Gradient Method

Lecture 20 - Constrained Optimization - Local and Global Solutions, Conceptual Algorithm

Lecture 21 - Feasible and Descent Directions

Lecture 22 - First Order KKT Conditions

Lecture 23 - Constraint Qualifications

Lecture 24 - Convex Programming Problem

Lecture 25 - Second Order KKT Conditions

Lecture 26 - Second Order KKT Conditions (Continued...)

Lecture 27 - Weak and Strong Duality

Lecture 28 - Geometric Interpretation

Lecture 29 - Lagrangian Saddle Point and Wolfe Dual

Lecture 30 - Linear Programming Problem

Lecture 31 - Geometric Solution

Lecture 32 - Basic Feasible Solution

Lecture 33 - Optimality Conditions and Simplex Tableau

Lecture 34 - Simplex Algorithm and Two-Phase Method

Lecture 35 - Duality in Linear Programming

Lecture 36 - Interior Point Methods - Affine Scaling Method

Lecture 37 - Karmarkar's Method

Lecture 38 - Lagrange Methods, Active Set Method

Lecture 39 - Active Set Method (Continued...)

Lecture 40 - Barrier and Penalty Methods, Augmented Lagrangian Method and Cutting Plane Method

Lecture 41 - Summary

NPTEL : Storage Systems (Computer Science and Engineering)

Co-ordinators : Dr. K. Gopinath

Lecture 1 - Overview

Lecture 2 - Storage, Processing, Networking

Lecture 3 - Naming and Storing

Lecture 4 - Storage Filesystems

Lecture 5 - Access Architecture, Hard Disks

Lecture 6 - SCSI

Lecture 7 - Fibre Channel Protocol (FCP)

Lecture 8 - FCP, 10Gb Ethernet, iSCSI, TCP

Lecture 9 - NFS, NFSv2

Lecture 10 - NFSv2, NFSv3, NFSv4, CIFS

Lecture 11 - USB Storage

Lecture 12 - Tiering

Lecture 13 - Mobile/Personal/Organizational - type Storage

Lecture 14 - Parallel/Cloud/Web-scale Storage

Lecture 15 - Long-term Storage

Lecture 16 - Storage interfaces

Lecture 17 - User-Memory-CPU interactions

Lecture 18 - Spinlock, Concurrency

Lecture 19 - Block Layer design

Lecture 20 - FAT, TFAT, F2FS, LFS, FTL

Lecture 21 - Data Structures

Lecture 22 - Abstractions

Lecture 23 - Link & Write Operations

Lecture 24 - ZFS

Lecture 25 - RAID in Filesystems

Lecture 26 - RAID-Z, NetApp RAID4, Flash Filesystems

Lecture 27 - Reliability

Lecture 28 - Performance

Lecture 29 - Security

Lecture 30 - CAP Theorem

Lecture 31 - POSIX/NFS/S3/Zookeeper, ACID Vs. BASE

Lecture 32 - Consistency & Commit problems

Lecture 33 - Paxos

Lecture 34 - Group Communication problem

Lecture 35 - Message Ordering

Lecture 36 - Ordering Models

Lecture 37 - Orderings in Filesystems

Lecture 38 - Semantics of highly scalable filesystems

Lecture 39 - GFS

Lecture 40 - GFS Model

Lecture 41 - GFS functions and operations

Lecture 42 - GFS problems, BigTable

Lecture 43 - Lessons to learn

NPTEL : System Analysis and Design (Computer Science and Engineering)

Co-ordinators : Prof. V. Rajaraman

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Principles of Compiler Design (Computer Science and Engineering)

Co-ordinators : Prof. Y.N. Srikanth

Lecture 1 - An Overview of a Compiler

Lecture 2 - Lexical Analysis - Part 1

Lecture 3 - Lexical Analysis - Part 2

Lecture 4 - Lexical Analysis - Part 3

Lecture 5 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 1

Lecture 6 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 2

Lecture 7 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 3

Lecture 8 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 4

Lecture 9 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 5

Lecture 10 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 6

Lecture 11 - Syntax Analysis: Context-free Grammars, Pushdown Automata and Parsing Part - 7

Lecture 12 - Semantic Analysis with Attribute Grammars Part - 1

Lecture 13 - Semantic Analysis with Attribute Grammars Part - 2

Lecture 14 - Semantic Analysis with Attribute Grammars Part - 3

Lecture 15 - Semantic Analysis with Attribute Grammars Part - 4

Lecture 16 - Semantic Analysis with Attribute Grammars Part - 5

Lecture 17 - Intermediate code generation Part - 1

Lecture 18 - Intermediate code generation Part - 2

Lecture 19 - Intermediate code generation Part - 3

Lecture 20 - Intermediate code generation Part - 4 (first half of lecture)

Lecture 21 - Run-time environments - 1 (second half of lecture)

Lecture 22 - Run-time environments - 2

Lecture 23 - Run-time environments - 3

Lecture 24 - Run-time environments - 4 (first half of lecture)

Lecture 25 - Control-Flow Graph and Local Optimizations - Part 1 (second half of lecture)

Lecture 26 - Control-Flow Graph and Local Optimizations - Part 2 (first half of lecture)

Lecture 27 - Machine code generation - 1 (second half of lecture)

Lecture 28 - Machine code generation - 2

Lecture 29 - Machine code generation - 3

Lecture 30 - Machine code generation - 4 (first half of lecture), Implementing object-oriented languages 1 (second half of lecture)

Lecture 31 - Implementing object-oriented languages 2 (first half of lecture)

Lecture 32 - Global register allocation - 1 (second half of lecture)

Lecture 33 - Global register allocation - 2

Lecture 34 - Global register allocation - 3

Lecture 35 - Introduction to Machine-Independent Optimizations - 1

Lecture 36 - Introduction to Machine-Independent Optimizations - 2

Lecture 37 - Introduction to Machine-Independent Optimizations - 3

Lecture 38 - Introduction to Machine-Independent Optimizations - 4

Lecture 39 - Introduction to Machine-Independent Optimizations - 5

Lecture 40 - Introduction to Machine-Independent Optimizations - 6

Lecture 41 - Introduction to Machine-Independent Optimizations - 7 (first half of lecture)

Lecture 42 - Instruction Scheduling and Software Pipelining - 1 (second half of lecture)

Lecture 43 - Instruction Scheduling and Software Pipelining - 2

Lecture 44 - Instruction Scheduling and Software Pipelining - 3 (first part of lecture)

Lecture 45 - Automatic parallelization - 1 (second half of lecture)

Lecture 46 - Automatic parallelization - 2

NPTEL : NOC:Discrete Mathematics (IIITB) (Computer Science and Engineering)

Co-ordinators : Prof. Ashish Choudhury

Lecture 1 - Introduction to Mathematical Logic

Lecture 2 - Logical Equivalence

Lecture 3 - SAT Problem

Lecture 4 - Rules of Inference

Lecture 5 - Resolution

Lecture 6 - Tutorial 1 - Part I

Lecture 7 - Tutorial 1 - Part II

Lecture 8 - Predicate Logic

Lecture 9 - Rules of Inferences in Predicate Logic

Lecture 10 - Proof Strategies - I

Lecture 11 - Proof Strategies - II

Lecture 12 - Induction

Lecture 13 - Tutorial 2 - Part I

Lecture 14 - Tutorial 2 - Part II

Lecture 15 - Sets

Lecture 16 - Relations

Lecture 17 - Operations on Relations

Lecture 18 - Transitive Closure of Relations

Lecture 19 - Warshallâ€™s Algorithm for Computing Transitive Closure

Lecture 20 - Tutorial - 3

Lecture 21 - Equivalence Relation

Lecture 22 - Equivalence Relations and Partitions

Lecture 23 - Partial Ordering

Lecture 24 - Functions

Lecture 25 - Tutorial 4 - Part I

Lecture 26 - Tutorial 4 - Part II

Lecture 27 - Countable and Uncountable Sets

Lecture 28 - Examples of Countably Infinite Sets

Lecture 29 - Cantorâ€™s Diagonalization Argument

Lecture 30 - Uncomputable Functions

Lecture 31 - Tutorial - 5

Lecture 32 - Basic Rules of Counting

Lecture 33 - Permutation and Combination

Lecture 34 - Counting Using Recurrence Equations

Lecture 35 - Solving Linear Homogeneous Recurrence Equations - Part I

Lecture 36 - Solving Linear Homogeneous Recurrence Equations - Part II

Lecture 37 - Tutorial 6 - Part I

Lecture 38 - Tutorial 6 - Part II

Lecture 39 - Solving Linear Non-Homogeneous Recurrence Equations

Lecture 40 - Catalan Numbers

Lecture 41 - Catalan Numbers - Derivation of Closed Form Formula

Lecture 42 - Counting Using Principle of Inclusion-Exclusion

Lecture 43 - Tutorial - 7

Lecture 44 - Graph Theory Basics

Lecture 45 - Matching

Lecture 46 - Proof of Hallâ€™s Marriage Theorem

Lecture 47 - Various Operations on Graphs

Lecture 48 - Vertex and Edge Connectivity

Lecture 49 - Tutorial - 8

Lecture 50 - Euler Path and Euler Circuit

Lecture 51 - Hamiltonian Circuit

Lecture 52 - Vertex and Edge Coloring

Lecture 53 - Tutorial 9 - Part I

Lecture 54 - Tutorial 9 - Part II

Lecture 55 - Modular Arithmetic

Lecture 56 - Prime Numbers and GCD

Lecture 57 - Properties of GCD and BÃ©zoutâ€™s Theorem

Lecture 58 - Linear Congruence Equations and Chinese Remainder Theorem

Lecture 59 - Uniqueness Proof of the CRT

Lecture 60 - Fermatâ€™s Little Theorem, Primality Testing and Carmichael Numbers

Lecture 61 - Group Theory

Lecture 62 - Cyclic Groups

Lecture 63 - Subgroups

Lecture 64 - Discrete Logarithm and Cryptographic Applications

Lecture 65 - More Applications of Groups

Lecture 66 - Rings, Fields and Polynomials

Lecture 67 - Polynomials Over Fields and Properties

Lecture 68 - Finite Fields and Properties - I

Lecture 69 - Finite Fields and Properties - II

Lecture 70 - Primitive Element of a Finite Field

Lecture 71 - Applications of Finite Fields

Lecture 72 - Goodbye and Farewell

NPTEL : NOC:Secure Computation: Part I (Computer Science and Engineering)

Co-ordinators : Prof. Ashish Choudhury

Lecture 1 - What is Secure MPC

Lecture 2 - Real-World Examples of Secure MPC

Lecture 3 - Various Dimensions to Study Secure MPC

Lecture 4 - Recap of Basic Concepts from Abstract Algebra

Lecture 5 - Recap of Basic Concepts from Abstract Algebra (Continued...)

Lecture 6 - Recap of Basic Concepts from Cryptography

Lecture 7 - Secret sharing

Lecture 8 - Additive Secret Sharing

Lecture 9 - Inefficient Threshold Secret Sharing

Lecture 10 - Polynomials Over Fields

Lecture 11 - Shamir Secret-Sharing

Lecture 12 - Linear secret-sharing

Lecture 13 - Linear Secret Sharing (Continued...)

Lecture 14 - General Secret Sharing

Lecture 15 - Perfectly-Secure Message Transmission

Lecture 16 - A Toy MPC Protocol

Lecture 17 - A Toy MPC Protocol (Continued...)

Lecture 18 - A Toy MPC Protocol (Continued...)

Lecture 19 - The BGW MPC Protocol

Lecture 20 - The BGW MPC Protocol for Linear Functions

Lecture 21 - The BGW MPC Protocol for Linear Functions: Security Analysis

Lecture 22 - The BGW MPC Protocol: The Case of Non-Linear Gates

Lecture 23 - The Degree-Reduction Problem

Lecture 24 - The Gennaro-Rabin-Rabin (GRR) Degree-Reduction Method

Lecture 25 - Analysis of the GRR, Degree-Reduction Method

Lecture 26 - Shared Circuit-Evaluation via GRR Degree-Reduction Method

Lecture 27 - Shared Circuit-Evaluation in the Pre-processing Model

Lecture 28 - Optimality of Corruption Bound for Perfectly-Secure MPC

Lecture 29 - Perfectly-Secure MPC Tolerating General (Non-Threshold) Adversaries

Lecture 30 - Perfectly-Secure MPC Tolerating General (Non-Threshold) Adversaries with Q^((2)) Condition

Lecture 31 - Perfectly-Secure MPC for Small Number of Parties

Lecture 32 - Perfectly-Secure 3PC (Continued...)

Lecture 33 - More Efficient Perfectly-Secure 3PC

Lecture 34 - More Efficient Perfectly-Secure 3PC (Continued...)

Lecture 35 - Towards Cryptographically-Secure MPC

Lecture 36 - GMW MPC protocol

Lecture 37 - Oblivious Transfer (OT)

Lecture 38 - RSA Assumption and RSA Hard-Core Predicate

Lecture 39 - Bit OT Based on RSA Assumption and Hard-Core Predicate

Lecture 40 - Discrete Logarithm and DDH Assumption

Lecture 41 - OT Based on the DDH Assumption

Lecture 42 - Pre-Processing Phase for the GMW Protocol

Lecture 43 - Pre-Processing Phase for the GMW Protocol: The n-Party Case

Lecture 44 - Pre-Processing Phase for the GMW Protocol (Continued...)

Lecture 45 - Pre-Processing of OT

Lecture 46 - OT Extension

Lecture 47 - Analysis of IKNP OT Extension

Lecture 48 - Yaoâ€™s Protocol for Secure 2PC

Lecture 49 - Yaoâ€™s Garbling Scheme

Lecture 50 - Yaoâ€™s Protocol for Secure 2PC

Lecture 51 - Optimizations for Yaoâ€™s Garbling

Lecture 52 - Interpreting Yaoâ€™s Secure 2PC Protocol as a Secret-Sharing Based Protocol

Lecture 53 - Mixed Protocols for Secure 2PC

Lecture 54 - The Arithmetic, Boolean and Yao Sharing for Secure 2PC

Lecture 55 - The ABY Conversions

Lecture 56 - The ABY Conversions (Continued...)

Lecture 57 - The ABY Conversions (Continued...)

Lecture 58 - ABY Computations : Example

Lecture 59 - Goodbye and Farewell

NPTEL : NOC:Secure Computation - Part II (Computer Science and Engineering)

Co-ordinators : Prof. Ashish Choudhury

Lecture 1 - What is Secure Multi-Party Computation (MPC)?

Lecture 2 - Reliable Broadcast and Byzantine Agreement

Lecture 3 - EIG Protocol for Perfectly-Secure Byzantine Agreement

Lecture 4 - EIG Protocol for Perfectly-Secure Byzantine Agreement: Illustration

Lecture 5 - EIG Protocol for Perfectly-Secure Byzantine Agreement: Analysis - Part I

Lecture 6 - EIG Protocol for Perfectly-Secure Byzantine Agreement: Analysis - Part II

Lecture 7 - Efficient Protocols for Perfectly-Secure Byzantine Agreement - Part I

Lecture 8 - Efficient Protocols for Perfectly-Secure Byzantine Agreement - Part II

Lecture 9 - Domain Extension for Perfectly-Secure Byzantine Agreement

Lecture 10 - Cryptographically/Statistically-Secure Reliable Broadcast

Lecture 11 - Dolev-Strong Reliable Broadcast Protocol: Analysis

Lecture 12 - Randomized Protocol for Byzantine Agreement - Part I

Lecture 13 - Randomized Protocol for Byzantine Agreement - Part II

Lecture 14 - Randomized Protocol for Byzantine Agreement - Part III

Lecture 15 - Lower Bound for Number of Parties for Byzantine Agreement - Part I

Lecture 16 - Lower Bound for Number of Parties for Byzantine Agreement - Part II

Lecture 17 - Lower Bound for Number of Parties for Byzantine Agreement - Part III

Lecture 18 - Recap of Basic Concepts from Abstract Algebra

Lecture 19 - Reed-Solomon Error-Correcting Codes

Lecture 20 - Perfectly-Secure Message Transmission

Lecture 21 - Properties of Polynomials Over a Field - I

Lecture 22 - Properties of Polynomials Over a Field - II

Lecture 23 - One Round PSMT Protocol

Lecture 24 - Multi-Round PSMT Protocol - I

Lecture 25 - Multi-Round PSMT Protocol - II

Lecture 26 - Domain Extension for Perfectly-Secure Broadcast Based on RS Error-Correcting Codes - I

Lecture 27 - Domain Extension for Perfectly-Secure Broadcast Based on RS Error-Correcting Codes - II

Lecture 28 - Domain Extension for Perfectly-Secure Broadcast Based on RS Error-Correcting Codes - III

Lecture 29 - (n,t) - Star Structure

Lecture 30 - Domain Extension for Perfectly-Secure Broadcast Based on RS Error-Correcting Codes - IV

Lecture 31 - The BGW MPC Protocol for Passive Corruptions: Recap

Lecture 32 - The BGW MPC Protocol for Byzantine Corruptions: Challenges

Lecture 33 - Perfectly-Secure VSS: Necessary Condition

Lecture 34 - Bivariate Polynomials Over Finite Fields - I

Lecture 35 - Bivariate Polynomials Over Finite Fields - II

Lecture 36 - Bivariate Polynomials Over Finite Fields - III

Lecture 37 - Bivariate Polynomials Over Finite Fields - IV

Lecture 38 - Perfectly-Secure VSS with n greater than 3t - Part I

Lecture 39 - Perfectly-Secure VSS with n greater than 3t - Part II

Lecture 40 - Perfectly-Secure VSS with n greater than 3t - Part III

Lecture 41 - Perfectly-Secure VSS with n greater than 3t - A Round-Reducing Technique

Lecture 42 - Perfectly-Secure VSS with n greater than 4t - Part I

Lecture 43 - Perfectly-Secure VSS with n greater than 4t - Part II

Lecture 44 - The BGW MPC Protocol for Linear Functions

Lecture 45 - The BGW MPC Protocol for Linear Functions: Security Analysis

Lecture 46 - The BGW MPC Protocol: The Case of Non-Linear Gates

Lecture 47 - The Degree-Reduction Problem

Lecture 48 - Generating Random Multiplication-Triples - I

Lecture 49 - Generating Random Multiplication-Triples - II

Lecture 50 - Generating Random Multiplication-Triples - III

Lecture 51 - Perfectly-Secure Protocol for Verifying Multiplicative Relationship

Lecture 52 - Perfectly-Secure Verifiable Triple-Sharing Protocol

Lecture 53 - Perfectly-Secure Triple-Extraction Protocol

Lecture 54 - Towards Secure MPC with an Honest Majority

Lecture 55 - ICP from Information-Theoretic MAC - I

Lecture 56 - ICP from Information-Theoretic MAC - II

Lecture 57 - Ingredients for Statistically-Secure MPC

Lecture 58 - Statistically-Secure VSS

Lecture 59 - Cyclic Groups and Discrete Logarithm

Lecture 60 - Pedersen Commitment Scheme

Lecture 61 - Cryptographically-secure VSS and MPC

Lecture 62 - Goodbye and Farewell

NPTEL : NOC:Introduction to Graph Algorithms (Computer Science and Engineering)

Co-ordinators : Prof. C. Pandu Rangan

Lecture 1 - Introduction and Principles of Algorithms - Part 1

Lecture 2 - Principles of Algorithms - Part 2

Lecture 3 - Shortest Path Algorithms

Lecture 4 - Undirected Graph

Lecture 5 - Algorithms for finding Shortest Path - Part 1

Lecture 6 - Algorithms for finding Shortest Path - Part 2

Lecture 7 - Single source shortest path problem

Lecture 8 - Properties of shortest path distances - Part 1

Lecture 9 - Properties of shortest path distances - Part 2

Lecture 10 - Belman Equation - Part 1

Lecture 11 - Belman Equation - Part 2

Lecture 12 - Belman Equation - Part 3

Lecture 13 - Belman Equation - Part 4

Lecture 14 - Bellman Ford - Part 1

Lecture 15 - Bellman Ford - Part 2

Lecture 16 - Dijkstra Algorithm - Part 1

Lecture 17 - Dijkstra Algorithm - Part 2

Lecture 18 - Dijkstra Algorithm - Part 3

Lecture 19 - All Pair Shortest - Path 1

Lecture 20 - All Pair Shortest - Path 2

Lecture 21 - All Pair Shortest - Path 3 and 4

Lecture 22 - All Pair Shortest - Path 5

Lecture 23 - Prims Algorithm - Part 1

Lecture 24 - Prims Algorithm - Part 2

Lecture 25 - Kruskal's Algorithm - Part 1

Lecture 26 - Kruskal's Algorithm - Part 2

Lecture 27 - Kruskal's Algorithm - Part 3

Lecture 28 - DFS

Lecture 29 - DFS

Lecture 30 - Algorithm for Cut Vertex

Lecture 31 - Iterative DFS

Lecture 32 - DFS in Directed Graph

Lecture 33 - Strong Connected Components - Part 1

Lecture 34 - Strong Connected Components - Part 2

Lecture 35 - Strong Connected Components - Part 3

Lecture 36 - Strong Connected Components - Part 4

Lecture 37 - BFS

NPTEL : NOC:Linear Algebra Through Geometry (Computer Science and Engineering)

Co-ordinators : Prof. Ashok Rao, Prof. M Krishna Kumar, Prof. Arulalan M R

Lecture 1 - Introduction to Linear Algebra and Matrices

Lecture 2 - Geometry of System of linear equations - Straight lines andplanes, Matrix Definitions

Lecture 3 - Some Interpretations to solutions of system of linear equations

Lecture 4 - Matrix Operations, Homogeneous system of equations

Lecture 5 - Matrix Operations, Homogeneous system of equations

Lecture 6 - Elementary Row Operations

Lecture 7 - Elementary Row operations - How do they work?

Lecture 8 - Determinant and Inverse of a matrix

Lecture 9 - Interpreting the inverse of a matrix

Lecture 10 - Cramer's rule

Lecture 11 - Points and Vectors in 2D

Lecture 12 - Vector Length and properties

Lecture 13 - Combining Vectors

Lecture 14 - Linearly Independent and Dependent vectors, Dot Product of vectors

Lecture 15 - Angle between two vectors, Orthogonal projections

Lecture 16 - Lines and Parametric Equations of lines, Linear Maps

Lecture 17 - Rotation, Shear and Projection transformations

Lecture 18 - Determinant of 2x2 matrix as Area of Parallelogram,Determinant of linear transformations

Lecture 19 - System of 2 linear equations in 2 unknowns from vector perspective

Lecture 20 - Eigenvalues and eigenvectors

Lecture 21 - Vectors in 3D, Linear combination of vectors in 3D

Lecture 22 - Projectionvector on another vector, line passing through origin, plane passing through origin

Lecture 23 - Area of a parallelogram in 3D, Cross product

Lecture 24 - Interpreting the cross-product, Properties of cross-product

Lecture 25 - Volume of a parallelepiped, Lines in 3D, Intersection of line and plane

Lecture 26 - Linear Maps in 3D - Scaling and Reflection

Lecture 27 - Linear Maps in 3D - Reflection about a plane, Shear

Lecture 28 - Rotation in 3D

Lecture 29 - Determinant and its properties

Lecture 30 - eigenvalues and eigenvectors in 3D

Lecture 31 - Linear systems in 3D and geometric perspective

Lecture 32 - Homogeneous system in 3D

Lecture 33 - LU Decomposition

Lecture 34 - Least Squares Solution, Gram-Schmidt Orthogonalization, QRDecomposition

Lecture 35 - Orthogonal Matrix, Linear Independence, eigenvalues and eigenvectors in 3D

Lecture 36 - Vector Space and Properties

Lecture 37 - Examples of vector spaces - Polynomial space, planes and lines through origin

Lecture 38 - Vector Subspaces and their geometry

Lecture 39 - Combining vectors in a vector space, Linear Independence

Lecture 40 - Span, Basis, Dimension of a vector space, Fourier Expansion

Lecture 41 - Homogeneous system of linear equations and null space of a matrix

Lecture 42 - Column Space of A

Lecture 43 - Subspaces associated matrix A transpose, Nullity, Rank

Lecture 44 - Orthogonal Complement of a subspace

Lecture 45 - Orientation of the four fundamental subspaces of a matrix A

Lecture 46 - System of linear equations with no solution - Inconsistent systems

Lecture 47 - Least squares solution, Pseudoinverse of A

Lecture 48 - Projection and Projection Matrices

Lecture 49 - Pseudoinverse of special matrices

Lecture 50 - Eigendecomposition

Lecture 51 - Eigensubspace and dimension

Lecture 52 - Real Symmetric matrix and properties

Lecture 53 - Eigenvalues and eigenvectors of real symmetric matrices

Lecture 54 - Effect of a real symmetric matrix - Geometric Interpretation

Lecture 55 - Spectral Theorem, Quadratic Forms

Lecture 56 - Singular Value Decomposition

Lecture 57 - Relationship between SVD and Eigen Decomposition

Lecture 58 - An Interpretation of SVD

Lecture 59 - Fourier Series and Transform through Linear Algebra

Lecture 60 - Practical Applications of Linear Algebra - 1

Lecture 61 - Practical Applications of Linear Algebra - 2

Lecture 62 - Summary and Credits

NPTEL : NOC:Microfoundations of Macroeconomics (Economics)

Co-ordinators : Prof. Wasim Ahmad

Lecture 1 - One Period Model - I

Lecture 2 - One Period Model - II

Lecture 3 - One Period Model - III

Lecture 4 - One Period Model - IV

Lecture 5 - One Period Model - V

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Lecture 8 - Two Period Model - III

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Lecture 13 - Ricardian Equivalence - II

Lecture 14 - Credit Market Imperfection - I

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Lecture 16 - Search and Unemployment - I

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Lecture 19 - Schools of Macroeconomic Thought

Lecture 20 - Rational Expectations and Economic Policy I

Lecture 21 - Sticky Prices - I

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Lecture 27 - New Keynesian Sticky Prices - I

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NPTEL : NOC:Introduction to Microeconomics in Hindi and without Calculus (Economics)

Co-ordinators : Prof. Vimal Kumar

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Lecture 7 - Economic Models - I

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Lecture 9 - Example

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Lecture 37 - Utility Function

Lecture 38 - Continuity

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Lecture 47 - Optimization Precaution

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Lecture 51 - Income and Substitution Effect

Lecture 52 - Income Effect and Substitution Effect (Continued...)

Lecture 53 - Expenditure Minimization

Lecture 54 - Duality

Lecture 55 - Compensated and Uncompensated Demand

Lecture 56 - DBT vs Subsidy

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Lecture 58 - Types of Firm

Lecture 59 - Technology and Its Representation

Lecture 60 - Average Product and Marginal Product

Lecture 61 - An Example to Demonstrate the Relationship between AP, MP and TP

Lecture 62 - Examples of Production Function

Lecture 63 - Time Constraint and Production Function

Lecture 64 - Returns to Scale

Lecture 65 - Profit Maximization An Introduction

Lecture 66 - Profit Maximization II

Lecture 67 - Profit Maximization Short Run and Long Run

Lecture 68 - Profit Maximization (Continued...)

Lecture 69 - Cost Minimization

Lecture 70 - Cost Minimization Some Examples

Lecture 71 - Returns to Scale and Cost Minimization

Lecture 72 - Cost Minimization Long Run vs Short Run

Lecture 73 - Fixed Cost Quasi Fixed Cost and Variable Cost

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Lecture 76 - Cost Curve - III

Lecture 77 - Cost Curve - IV

Lecture 78 - Market Structure An Introduction

Lecture 79 - Perfect Competition An Introduction

Lecture 80 - Demand Curve Facing the Firm

Lecture 81 - Supply From a Competitive Firm

Lecture 82 - Obtaining Supply Function

Lecture 83 - Profit Function And Producer's Surplus

Lecture 84 - Free Entry and Exit In Perfectly Competitive Market

Lecture 85 - Conditions for Profitability and Production in a Perfectly Competitive Market

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Lecture 88 - Upward Sloping Supply Function in Long Run

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Lecture 90 - Reasons for Monopoly

Lecture 91 - Profit Maximization by the Monopolist

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Lecture 93 - A Monopolist doesn't have a supply curve

Lecture 94 - Monopoly Power

Lecture 95 - The Impact of Taxes on a Monopolist

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Lecture 97 - A Monopolist in Multimarket

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Lecture 99 - First Degree Price Discrimination

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Lecture 104 - Monopolistic Competition in Short Run and Long Run

Lecture 105 - Monopolistic Competition Vs Perfect Competition in Long Run

Lecture 106 - Product Differentiation

Lecture 107 - Game Theory : An Introduction

Lecture 108 - Nash Equilibrium

Lecture 109 - Matching Pennies

Lecture 110 - Extensive form Game

Lecture 111 - Game Theory Summary

Lecture 112 - Oligopoly An Introduction

Lecture 113 - Duopoly

Lecture 114 - Equilibrium in Cournot Competition

Lecture 115 - Equilibrium in Bertrand Competition

Lecture 116 - Stackelberg Competition

Lecture 117 - Collusion and Cartel

Lecture 118 - Comparison of Different Market Structures

NPTEL : NOC:Economics of Banking and Finance Markets (Economics)

Co-ordinators : Prof. Sukumar Vellakkal

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NPTEL : NOC:Introduction to Econometrics (Economics)

Co-ordinators : Prof. Sabuj Kumar Mandal

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Lecture 2 - Introduction to econometrics and econometric analysis - Part 2

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Lecture 8 - Classical Linear Regression Model - Part 2

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Lecture 13 - Goodness of fit measure, Anova and hypothesis testing - Part 2

Lecture 14 - Goodness of fit measure, Anova and hypothesis testing - Part 3

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Lecture 16 - Goodness of fit measure, Anova and hypothesis testing - Part 5

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Lecture 18 - Application of STATA for hypothesis testing and introduction to multiple linear regression model - Part 2

Lecture 19 - Application of STATA for hypothesis testing and introduction to multiple linear regression model - Part 3

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Lecture 21 - Application of STATA for hypothesis testing and introduction to multiple linear regression model - Part 5

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Lecture 30 - Structural break analysis using Chow test - Part 3

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Lecture 37 - Dummy Variable analysis and Application of Difference-inDifference for impact evaluation - Part 5

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Lecture 44 - Relaxing the assumptions of CLRM - Multicollinearity and Autocorrelation - Part 1

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Lecture 53 - Relaxing the assumptions of CLRM - Autocorrelation and Heteroscedasticity - Part 4

Lecture 54 - Relaxing the assumptions of CLRM - Autocorrelation and Heteroscedasticity - Part 5

Lecture 55 - Relaxing the assumptions of CLRM - Autocorrelation and Heteroscedasticity - Part 6

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NPTEL : NOC:Environmental and Resource Economics (Economics)

Co-ordinators : Prof. Sabuj Kumar Mandal

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Lecture 19 - Market Failure and Coase Theorem Part - 2

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Lecture 35 - Effectiveness of Incentive design and Economic valuation of Environmental goods and service Part - 6

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Lecture 37 - Economic Valuation of Environmental Goods and Services - Different Valuation Approaches Part - 1

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Lecture 47 - Economic Valuation of Environmental Goods and Services - Different Valuation Approaches Part - 7

Lecture 48 - Economic Valuation of Environmental Goods and Services - Different Valuation Approaches Part - 8

Lecture 49 - Economic Valuation of Environmental Goods and Services - Different Valuation Approaches Part - 9

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NPTEL : NOC:Spatial Statistics and Spatial Econometrics (Economics)

Co-ordinators : Prof. Gaurav Arora

Lecture 1 - Introduction to Spatial Data Analysis

Lecture 2 - Spatial Patters and Data Generating Process

Lecture 3 - Spatial Data Structures

Lecture 4 - A short exercise: Land Use Land Cover Analysis

Lecture 5 - A general spatial data model

Lecture 6 - Spatial Statistics: measures of variation; spatial random function

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Lecture 8 - Entropy - II

Lecture 9 - Spatial Entropy - I

Lecture 10 - Spatial Entropy - II

Lecture 11 - Introduction to Spatial Aucorrelation

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Lecture 13 - Spatial Autocorrelation Implications for Inference - II

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Lecture 22 - Covariogram and Correlogram

Lecture 23 - The experimental variogram

Lecture 24 - The experimental variogram on an irregular lattice

Lecture 25 - Variogram estimation

Lecture 26 - Variogram model fitting

Lecture 27 - Variogram model fitting

Lecture 28 - Non-stationary spatial domains

Lecture 29 - Spatial interpolation and Kriging

Lecture 30 - Spatial Regression Analysis

Lecture 31 - Spatial Regression Analysis

Lecture 32 - Spatial dependence in a regression model

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Lecture 34 - Generalized least squares estimation in the presence of spatial dependence

Lecture 35 - Spatial weights matrix

Lecture 36 - Causal Inference in spatial regression models

Lecture 37 - Endogenous effects in a spatial regression model

Lecture 38 - Spatially lagged variables in regression models

Lecture 39 - Spatially lagged variables in regression models

Lecture 40 - LISA statistics

Lecture 41 - Lagrange Multiplier Test for Spatial Regresison Model

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Lecture 45 - Computing experimental variograms in R - II

Lecture 46 - Fitting model variograms in R

Lecture 47 - Kriging and cross-validation in R

Lecture 48 - Spatial linear regression in R - I

Lecture 49 - Spatial linear regression in R - II

NPTEL : NOC:Economics of Innovation (Economics)

Co-ordinators : Prof. Ruchi Sharma

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Lecture 2 - Stylized facts of Innovation

Lecture 3 - Innovation in the History of Economic Thought

Lecture 4 - Types of Innovation - I

Lecture 5 - Types of Innovation - II

Lecture 6 - Types of Innovation - III

Lecture 7 - Revisiting Some Key Concepts

Lecture 8 - Innovation Models

Lecture 9 - An Innovative Firm

Lecture 10 - An Innovative Firm in History

Lecture 11 - Market Stucture: An Introduction

Lecture 12 - Innovation and Market Structure - I

Lecture 13 - Innovation and Market Structure - II

Lecture 14 - Innovation and Market Structure - III

Lecture 15 - Innovation and Firm Size

Lecture 16 - R&D in Indian Industry

Lecture 17 - National Innovation System - I

Lecture 18 - Basics of IPRs

Lecture 19 - Internationalization of Patents

Lecture 20 - Economics of Patents

Lecture 21 - Universities in the NIS

Lecture 22 - Foreign Direct Investment (FDI): Concept and Definition

Lecture 23 - Theories explaining FDI

Lecture 24 - Market for Technology - I

Lecture 25 - Market for Technology - II

Lecture 26 - Innovation and Employment - I

Lecture 27 - Innovation and Employment - II

Lecture 28 - Innovation and Development - I

Lecture 29 - Innovation and Development - II

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Lecture 31 - Diffusion of innovation - 2

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Lecture 33 - Innovation in Service Sector - II

Lecture 34 - Science, Technology, and Innovation Policy - I

Lecture 35 - Science, Technology, and Innovation Policy - II

Lecture 36 - Science, Technology, and Innovation Policy - III

NPTEL : NOC:Principles of Economics (Economics)

Co-ordinators : Prof. Sabuj Kumar Mandal

Lecture 1 - Ten Principles of Economics - Part 1

Lecture 2 - Ten Principles of Economics - Part 2

Lecture 3 - Ten Principles of Economics - Part 3

Lecture 4 - Ten Principles of Economics - Part 4

Lecture 5 - Thinking like an Economist; Interdependence and the gains from Trade - Part 1

Lecture 6 - Thinking like an Economist; Interdependence and the gains from Trade - Part 2

Lecture 7 - Thinking like an Economist; Interdependence and the gains from Trade - Part 3

Lecture 8 - Thinking like an Economist; Interdependence and the gains from Trade - Part 4

Lecture 9 - Market forces of Supply and Elasticity - Part 1

Lecture 10 - Market forces of Supply and Elasticity - Part 2

Lecture 11 - Market forces of Supply and Elasticity - Part 3

Lecture 12 - Market forces of Supply and Elasticity - Part 4

Lecture 13 - Market forces of Supply and Elasticity - Part 5

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Lecture 15 - Application of elasticity:Supply, Demand and Government policies - Part 2

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Lecture 17 - Consumer and producer surplus; cost of taxation and international trade - Part 2

Lecture 18 - Consumer and producer surplus; cost of taxation and international trade - Part 3

Lecture 19 - Consumer and producer surplus; cost of taxation and international trade - Part 4

Lecture 20 - Consumer and producer surplus; cost of taxation and international trade - Part 5

Lecture 21 - Externalities and cost of production - Part 1

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Lecture 33 - Game theory and oligopoly, Measures national income, measuring cost of living - Part 3

Lecture 34 - Game theory and oligopoly, Measures national income, measuring cost of living - Part 4

Lecture 35 - Production and growth; Saving, Investment and the financial system - Part 1

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Lecture 37 - Production and growth; Saving, Investment and the financial system - Part 3

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Lecture 47 - Application of theory - Part 6

NPTEL : NOC:Health Economics (Economics)

Co-ordinators : Prof. Pratap C. Mohanty

Lecture 1 - Health Economics: Overview, Structure, and Beneficiaries

Lecture 2 - Concepts and Terminologies in Health Economics

Lecture 3 - Health as an Economic Good

Lecture 4 - Economics of Health v/s Economics of Healthcare

Lecture 5 - Arrow's Perspective of Healthcare

Lecture 6 - Utility and Health

Lecture 7 - Demand for Health care

Lecture 8 - Demand for Health: Grossman model - I

Lecture 9 - Demand for Health: Grossman model - II

Lecture 10 - Grossman model and Health disparities

Lecture 11 - Physicians as Health Provider - I

Lecture 12 - Physicians as Health Provider - II

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Lecture 14 - Production and Costs of Health Care

Lecture 15 - Profit and Non-profit Maximization Models in Health care

Lecture 16 - Equity in Healthcare

Lecture 17 - Equity and Redistribution: Theory

Lecture 18 - Equity in Health Financing

Lecture 19 - Equity in Distribution

Lecture 20 - Equity Measurement: A Practical

Lecture 21 - Health Care Financing

Lecture 22 - Uncertainty and Risk: Health Insurance - I

Lecture 23 - Uncertainty and Risk: Health Insurance - II

Lecture 24 - Information Economics in Health: Moral Hazard

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Lecture 26 - Introduction of Behavioral Economics

Lecture 27 - Expected Utility Theory

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Lecture 29 - Nudge Theory

Lecture 30 - Time Inconsistency and Health: Discounting

Lecture 31 - Health Systems

Lecture 32 - Tax and Social Health Insurance Mechanism - I

Lecture 33 - Tax and Social Health Insurance Mechanism - II

Lecture 34 - Private Financing Mechanisms

Lecture 35 - Health Systems Around the World

Lecture 36 - Theoretical Foundations of Economic Evaluation - I

Lecture 37 - Theoretical Foundations of Economic Evaluation - II

Lecture 38 - Principles of Economic Evaluation: Introduction

Lecture 39 - Principles of Economic Evaluation: CMA, CCA, Cost-Benefit Analysis (CBA)

Lecture 40 - Principles of Economic Evaluation: Cost-Effectiveness Analysis (CEA)

Lecture 41 - Principles of Economic Evaluation: Cost-Utility Analysis (CUA)

Lecture 42 - Monetary Valuation of Health

Lecture 43 - Non-monetary Valuation of Health: QALY

Lecture 44 - Non-monetary Valuation of Health: DALY and HLYE

Lecture 45 - Costing, Discounting and Evaluation under Uncertainty

Lecture 46 - Markov modelling and Sensitivity analysis in Healthcare

Lecture 47 - Concepts of Productivity and Efficiency

Lecture 48 - Data Envelopment Analysis: Introduction

Lecture 49 - Data Envelopment Analysis: CCR Model

Lecture 50 - Data Envelopment Analysis: BCC Model

Lecture 51 - Introduction to DEAP Software

Lecture 52 - Application of DEA in Healthcare Using DEAP

Lecture 53 - Data in Health: Sources and Indicators - I

Lecture 54 - Data in Health: Sources and Indicators - II

Lecture 55 - Econometric Modelling in Health

Lecture 56 - Health Data Handling Packages: Open Source

Lecture 57 - Health Data Handling Packages: Licensed

Lecture 58 - Introduction to Public Health

Lecture 59 - Healthcare Provisioning and Responsiveness

Lecture 60 - Indian Health System and Challenges

NPTEL : NOC:Labour Economics-Theory and Practice (Economics)

Co-ordinators : Porf. Falguni Pattanaik

Lecture 1 - Evolution and Growth of Labour Economics

Lecture 2 - Overview of the Labour Market - I

Lecture 3 - Overview of the Labour Market - II

Lecture 4 - Overview of the Labour Market - III

Lecture 5 - Labour Supply - I

Lecture 6 - Labour Supply - II

Lecture 7 - Labour Supply - III

Lecture 8 - Labour Supply - IV

Lecture 9 - Labour Demand - I

Lecture 10 - Labour Demand - II

Lecture 11 - Labour Demand - III

Lecture 12 - Labour Demand - IV

Lecture 13 - Labour Demand - V

Lecture 14 - Labour Market Equilibrium - I

Lecture 15 - Labour Market Equilibrium - II

Lecture 16 - Labour Market Equilibrium - III

Lecture 17 - Labour Market Equilibrium - IV

Lecture 18 - Labour Market Equilibrium - V

Lecture 19 - Labour Market Equilibrium - VI

Lecture 20 - Labour Market Equilibrium - VII

Lecture 21 - Labour Market Equilibrium - VIII

Lecture 22 - Human Capital - I

Lecture 23 - Human Capital - II

Lecture 24 - Human Capital - III

Lecture 25 - Human Capital - IV

Lecture 26 - Wage Differentials - I

Lecture 27 - Wage Differentials - II

Lecture 28 - Wage Differentials - III

Lecture 29 - Wage Structure - I

Lecture 30 - Wage Structure - II

Lecture 31 - Labour Market Discrimination - I

Lecture 32 - Labour Market Discrimination - II

Lecture 33 - Labour Market Discrimination - III

Lecture 34 - Labour Mobility - I

Lecture 35 - Labour Mobility - II

Lecture 36 - Unemployment - I

Lecture 37 - Unemployment - II

Lecture 38 - Unemployment - III

Lecture 39 - Labour Market Dynamics in India - I

Lecture 40 - Labour Market Dynamics in India - II

NPTEL : Nonlinear Dynamical Systems (Electrical Engineering)

Co-ordinators : Prof. Harish K. Pillai, Prof. Madhu N. Belur

Lecture 1 - Introduction

Lecture 2 - First Order systems

Lecture 3 - Classification of Equilibrium points

Lecture 4 - Lipschitz Functions

Lecture 5 - Existence/uniqueness theorems

Lecture 6 - Existence/uniqueness of solutions to differential equations

Lecture 7 - Lyapunov theorem on stability

Lecture 8 - Extension of Lyapunov's Theorem in different contexts

Lecture 9 - LaSalle's Invariance principle, Barbashin and Krasovski theorems, periodic orbits

Lecture 10 - Bendixson criterion and Poincare-Bendixson criterion. Example: Lotka Volterra predator prey model

Lecture 11 - Bendixson and Poincare-Bendixson criteria van-der-Pol Oscillator

Lecture 12 - Scilab simulation of Lotka Volterra predator prey model, van-der-Pol Oscillator Review of linearization, operating point/operating trajectory

Lecture 13 - Signals, operators

Lecture 14 - Norms of signals, systems (operators), Finite gain L2 stable

Lecture 15 - Nyquist plots and Nyquist criterion for stability

Lecture 16 - Interconnection between linear system & non-linearity, passive filters

Lecture 17 - Passive filters, Dissipation equality, positive real lemma

Lecture 18 - Positive real lemma proof

Lecture 19 - Definition for positive realness and Kalman Yakubovich-Popov Theorem

Lecture 20 - Kalman-Yakubovich-Popov Lemma/theorem and memoryless nonlinearities

Lecture 21 - Loop tranformations and circle criterion

Lecture 22 - Nonlinearities based on circle criterion

Lecture 23 - Limit cycles

Lecture 24 - Popov criterion continuous, frequency-domain theorem

Lecture 25 - Popov criterion continuous, frequency-domain theorem

Lecture 26 - Describing function method

Lecture 27 - Describing Function : 2

Lecture 28 - Describing : optimal gain

Lecture 29 - Describing : optimal gain

Lecture 30 - Describing functions : Jump Hysteresis

Lecture 31 - Describing functions : sufficient conditions for existence of periodic orbits non existence of periodic orbits

Lecture 32 - Describing functions for nonlinearities

Lecture 33 - Ideal relay with Hysteresis and dead zone

Lecture 34 - Dynamical systems on manifolds-1

Lecture 35 - Dynamical systems on manifolds-2

NPTEL : Power System Dynamics and Control (Electrical Engineering)

Co-ordinators : Dr. A.M. Kulkarni

Lecture 1 - Introduction

Lecture 2 - Introduction

Lecture 3 - Analysis of Dynamical Systems

Lecture 4 - Analysis of Dynamical Systems (Continued.)

Lecture 5 - Analysis of LINEAR Time Invariant Dynamical Systems

Lecture 6 - Analysis of LINEAR Time Invariant Dynamical Systems (Continued.)

Lecture 7 - Stiff Systems, Multi Time Scale Modeling

Lecture 8 - Numerical Integration

Lecture 9 - Numerical Integration (Continued.)

Lecture 10 - Numerical Integration (Continued.)

Lecture 11 - Modeling of Synchronous Machines

Lecture 12 - Modeling of Synchronous Machines (Continued.)

Lecture 13 - Modeling of Synchronous Machines (Continued.)

Lecture 14 - Modeling of Synchronous Machines. dq0 transformation (Continued.)

Lecture 15 - Modeling of Synchronous Machines. Standard Parameters

Lecture 16 - Modeling of Synchronous Machines. Standard Parameters

Lecture 17 - Synchronous Generator Models using Standard Parameters

Lecture 18 - Synchronous Generator Models using Standard Parameters. PER UNIT REPRESENTATION

Lecture 19 - Open Circuit Response of a Synchronous Generator

Lecture 20 - Synchronous Machine Modeling. Short Circuit Analysis (Continued.)

Lecture 21 - Synchronous Machine Modeling. Short Circuit Analysis (Continued.) Synchronization of a Synchronous Machine

Lecture 22 - Synchronization of a Synchronous Machine (Continued.)

Lecture 23 - Simplified Synchronous Machine Models

Lecture 24 - Excitation Systems

Lecture 25 - Excitation System Modeling

Lecture 26 - Excitation System Modeling. Automatic Voltage Regulator

Lecture 27 - Excitation System Modeling. Automatic Voltage Regulator (Continued.)

Lecture 28 - Excitation System Modeling. Automatic Voltage Regulator (Simulation)

Lecture 29 - Excitation System Modeling. Automatic Voltage Regulator (Simulation) â€“ (Continued.)

Lecture 30 - Excitation System Modeling. Automatic Voltage Regulator. Linearized Analysis

Lecture 31 - Load Modeling

Lecture 32 - Induction Machines, Transmission Lines

Lecture 33 - Transmission Lines. Prime Mover Systems

Lecture 34 - Transmission Lines (Continued.) Prime Mover Systems

Lecture 35 - Prime Mover Systems. Stability in Integrated Power System

Lecture 36 - Stability in Integrated Power System: Two Machine Example

Lecture 37 - Two Machine System (Continued.)

Lecture 38 - Stability in Integrated Power System: Large Systems

Lecture 39 - Frequency/Angular Stability Programs. Stability Phenomena: Voltage Stability Example

Lecture 40 - Voltage Stability Example (Continued.). Fast Transients: Tools and Phenomena

Lecture 41 - Torsional Transients: Phenomena of Sub-Synchronous Resonance

Lecture 42 - Sub-Synchronous Resonance. Stability Improvement

Lecture 43 - Stability Improvement

Lecture 44 - Stability Improvement. Power System Stabilizers

Lecture 45 - Stability Improvement (Large Disturbance Stability)

NPTEL : Control Engineering (Prof. S.D. Agashe) (Electrical Engineering)

Co-ordinators : Prof. S.D. Agashe

Lecture 1 - The Control Problem

Lecture 2 - Some More Examples

Lecture 3 - Different Kinds of Control Systems

Lecture 4 - History of Feedback

Lecture 5 - Modern Control Problems

Lecture 6 - DC Motor Speed Control

Lecture 7 - System Modelling, Analogy

Lecture 8 - Causes of System Error

Lecture 9 - Calculation of Error

Lecture 10 - Control System Sensitivity

Lecture 11 - Automatic Control of DC Motor

Lecture 12 - Proportional Control

Lecture 13 - Non-Unity Feedback

Lecture 14 - Signal-Flow Graph

Lecture 15 - Mason's Gain Formula

Lecture 16 - Signal-Flow Graph for DC Motor Control

Lecture 17 - Steady-State Calculations

Lecture 18 - Differential Equation Model and Laplace Transformation Model

Lecture 19 - D-Operator Method

Lecture 20 - Second-Order System Response

Lecture 21 - Frequency Response

Lecture 22 - Laplace Transformation Theorems

Lecture 23 - Final Value Theorem

Lecture 24 - Transfer Function and Pole-Zero Diagram

Lecture 25 - 'Good' Poles and 'Bad' Poles

Lecture 26 - Signal Flow Graph with Transfer Functions

Lecture 27 - s-Domain and t-Domain

Lecture 28 - Second-Order System Response in s-Domain

Lecture 29 - Integral Feedback

Lecture 30 - Root-Locus Method

Lecture 31 - Root-Locus Rules

Lecture 32 - Asymptotes of Root Locus

Lecture 33 - Routh Array

Lecture 34 - Singular Cases

Lecture 35 - Closed Loop Poles

Lecture 36 - Controller in the Forwarded Path

Lecture 37 - Mapping of Control in the Complex-Plane

Lecture 38 - Encirclement by a Curve

Lecture 39 - Nyquist Criterion

Lecture 40 - Application of the Nyquist Criterion

Lecture 41 - Polar Plot and Bode Plots

Lecture 42 - Logarithmic Scale for Frequency

Lecture 43 - 'Asymptotic' DB Gain

Lecture 44 - Compensating Network

Lecture 45 - Nichols' Chart

Lecture 46 - Time Domain Methods of Analysis and Design

Lecture 47 - State-Variable Equations

NPTEL : Power Electronics (Electrical Engineering)

Co-ordinators : Prof. Kishore Chatterjee, Prof. B.G. Fernandes

Lecture 1 - Power Electronics

Lecture 2 - Power Electronics

Lecture 3 - Power Electronics

Lecture 4 - Power Electronics

Lecture 5 - Power Electronics

Lecture 6 - Power Electronics

Lecture 7 - Power Electronics

Lecture 8 - Power Electronics

Lecture 9 - Power Electronics

Lecture 10 - Power Electronics

Lecture 11 - Power Electronics

Lecture 12 - Power Electronics

Lecture 13 - Power Electronics

Lecture 14 - Power Electronics

Lecture 15 - Power Electronics

Lecture 16 - Power Electronics

Lecture 17 - Power Electronics

Lecture 18 - Power Electronics

Lecture 19 - Power Electronics

Lecture 20 - Power Electronics

Lecture 21 - Power Electronics

Lecture 22 - Power Electronics

Lecture 23 - Power Electronics

Lecture 24 - Power Electronics

Lecture 25 - Power Electronics

Lecture 26 - Power Electronics

Lecture 27 - Power Electronics

Lecture 28 - Power Electronics

Lecture 29 - Power Electronics

Lecture 30 - Power Electronics

Lecture 31 - Power Electronics

Lecture 32 - Power Electronics

Lecture 33 - Power Electronics

Lecture 34 - Power Electronics

Lecture 35 - Power Electronics

Lecture 36 - Power Electronics

Lecture 37 - Power Electronics

Lecture 38 - Power Electronics

Lecture 39 - Power Electronics

Lecture 40 - Power Electronics

Lecture 41 - Power Electronics

Lecture 42 - Power Electronics

Lecture 43 - Power Electronics

NPTEL : Fabrication of Silicon VLSI Circuits using the MOS technology (Electrical Engineering)

Co-ordinators : Prof. A.N. Chandorkar

Lecture 1 - Introduction Micro to Nano A Journey into Intergrated Circuit Technology

Lecture 2 - Introduction Micro to Nano A Journey into Intergrated Circuit Technology

Lecture 3 - Crystal Properties and Silico Growth

Lecture 4 - Crystal Properties and Silico Growth (Continued...)

Lecture 5 - IC Fab Labs and Fabrication of IC

Lecture 6 - Diffusion

Lecture 7 - Diffusion (Continued...)

Lecture 8 - Solid State Diffusion

Lecture 9 - Solid State Diffusion (Continued...)

Lecture 10 - Solid State Diffusion (Continued...)

Lecture 11 - Thermal Oxidation of Silicons

Lecture 12 - Thermal Oxidation of Silicons

Lecture 13 - Thermal Oxidation of Silicons

Lecture 14 - Thermal Oxidation of Silicons (Continued...)

Lecture 15 - Thermal Oxidation of Silicons (Continued...)

Lecture 16 - Lithography

Lecture 17 - Lithography

Lecture 18 - Lithography

Lecture 19 - ION Implantation

Lecture 20 - ION Implantation

Lecture 21 - ION Implantation and Silicon IC Processing Flow for CMOS Technology

Lecture 22 - ION Implantation and Silicon IC Processing Flow for CMOS Technology

Lecture 23 - Silicon IC Processing Flow for CMOS Technology

Lecture 24 - Thin Film Deposition

Lecture 25 - Thin Film Deposition

Lecture 26 - Thin Film Deposition

Lecture 27 - Thin Film Deposition and Etching in VLSI Processing

Lecture 28 - Etching in VLSI Processing and Back -End Technology

NPTEL : NOC:Computational Electromagnetics and Applications (Electrical Engineering)

Co-ordinators : Prof.Krish Sankaran

Lecture 1 - Lecture 1

Lecture 2 - Lecture 2

Lecture 3 - Lecture 3

Lecture 4 - Exercise 1

Lecture 5 - Exercise 2

Lecture 6 - Exercise 3

Lecture 7 - Lab Tour 1

Lecture 8 - Summary week 1

Lecture 9 - Lecture 4

Lecture 10 - Lecture 5

Lecture 11 - Exercise 4

Lecture 12 - Exercise 5

Lecture 13 - Exercise 6

Lecture 14 - Summary Week 2

Lecture 15 - Lecture 6

Lecture 16 - Lecture 7

Lecture 17 - Lecture 8

Lecture 18 - Exercise 7

Lecture 19 - Exercise 8

Lecture 20 - Summary Week 3

Lecture 21 - Lecture 9

Lecture 22 - Lecture 10

Lecture 23 - Lecture 11

Lecture 24 - Lecture 12

Lecture 25 - Lecture 13

Lecture 26 - Lecture 14

Lecture 27 - Exercise 9

Lecture 28 - Lab Tour - 2

Lecture 29 - Summary Week 4

Lecture 30 - Lecture 15

Lecture 31 - Lecture 16

Lecture 32 - Lecture 17

Lecture 33 - Lecture 18

Lecture 34 - Exercise 10

Lecture 35 - Summary week 5

Lecture 36 - Lecture 19

Lecture 37 - Lecture 20

Lecture 38 - Lecture 21

Lecture 39 - Lecture 22

Lecture 40 - Exercise 11

Lecture 41 - Summary week 6

Lecture 42 - Exercise 12

Lecture 43 - Exercise 13

Lecture 44 - Exercise 14

Lecture 45 - Exercise 15

Lecture 46 - Exercise 16

Lecture 47 - Exercise 17

Lecture 48 - Summary week 7

Lecture 49 - Lecture 23

Lecture 50 - Lecture 24

Lecture 51 - Lecture 25

Lecture 52 - Exercise 18

Lecture 53 - Exercise 19

Lecture 54 - Lab tour 3

Lecture 55 - Summary week 8

Lecture 56 - Lecture 26

Lecture 57 - Lecture 27

Lecture 58 - Lecture 28

Lecture 59 - Lecture 29

Lecture 60 - Lecture 30

Lecture 61 - Lecture 31

Lecture 62 - Lab tour 4

Lecture 63 - Summary week 9

Lecture 64 - Lecture 32

Lecture 65 - Lecture 33

Lecture 66 - Lecture 34

Lecture 67 - Lecture 35

Lecture 68 - Exercise 20

Lecture 69 - Lab tour 5

Lecture 70 - Summary week 10

Lecture 71 - Lecture 36

Lecture 72 - Lecture 37

Lecture 73 - Lecture 38

Lecture 74 - Lecture 39

Lecture 75 - Lecture 40

Lecture 76 - Summary week 11

Lecture 77 - Lecture 41

Lecture 78 - Lecture 42

Lecture 79 - Lecture 43

Lecture 80 - Lecture 44

Lecture 81 - Exercise 21

Lecture 82 - Exercise 22

Lecture 83 - Summary week 12

NPTEL : NOC:Basic Electronics (Electrical Engineering)

Co-ordinators : Prof. Mahesh B. Patil

Lecture 1 - A brief history of electronics

Lecture 2 - Superposition

Lecture 3 - Useful circuit techniques - 1

Lecture 4 - Useful circuit techniques - 2

Lecture 5 - Phasors - 1

Lecture 6 - Phasors - 2

Lecture 7 - RC/RL circuits in time domain - 1

Lecture 8 - RC/RL circuits in time domain - 2

Lecture 9 - RC/RL circuits in time domain - 3

Lecture 10 - RC/RL circuits in time domain - 4

Lecture 11 - RC/RL circuits in time domain - 5

Lecture 12 - Simulation of RC circuit

Lecture 13 - Diode circuits - 1

Lecture 14 - Diode circuits - 2

Lecture 15 - Diode circuits - 3

Lecture 16 - Diode circuits - 4

Lecture 17 - Diode circuits - 5

Lecture 18 - Diode circuits - 6

Lecture 19 - Diode rectifiers - 1

Lecture 20 - Diode rectifiers - 2

Lecture 21 - Diode rectifiers - 3

Lecture 22 - Bipolar Junction Transistor - 1

Lecture 23 - Bipolar Junction Transistor - 2

Lecture 24 - Bipolar Junction Transistor - 3

Lecture 25 - BJT amplifier - 1

Lecture 26 - BJT amplifier - 2

Lecture 27 - BJT amplifier - 3

Lecture 28 - BJT amplifier - 4

Lecture 29 - BJT amplifier - 5

Lecture 30 - BJT amplifier - 6

Lecture 31 - BJT amplifier - 7

Lecture 32 - Introduction to op-amps

Lecture 33 - Op-amp circuits - 1

Lecture 34 - Op-amp circuits - 2

Lecture 35 - Op-amp circuits - 3

Lecture 36 - Difference amplifier

Lecture 37 - Instrumentation amplifier - 1

Lecture 38 - Instrumentation amplifier - 2

Lecture 39 - Op-amp nonidealities - 1

Lecture 40 - Op-amp nonidealities - 2

Lecture 41 - Bode plots - 1

Lecture 42 - Bode plots - 2

Lecture 43 - Bode plots - 3

Lecture 44 - Op-amp filters

Lecture 45 - Simulation of op-amp filter

Lecture 46 - Precision rectifiers - 1

Lecture 47 - Precision rectifiers - 2

Lecture 48 - Precision rectifiers - 3

Lecture 49 - Simulation of triangle-to-sine converter

Lecture 50 - Schmitt triggers - 1

Lecture 51 - Schmitt triggers - 2

Lecture 52 - Schmitt triggers - 3

Lecture 53 - Sinusoidal oscillators - 1

Lecture 54 - Sinusoidal oscillators - 2

Lecture 55 - Introduction to digital circuits

Lecture 56 - Boolean algebra

Lecture 57 - Karnaugh maps

Lecture 58 - Combinatorial circuits - 1

Lecture 59 - Combinatorial circuits - 2

Lecture 60 - Combinatorial circuits - 3

Lecture 61 - Introduction to sequential circuits

Lecture 62 - Latch and flip-flop

Lecture 63 - JK flip-flop

Lecture 64 - D flip-flop

Lecture 65 - Shift registers

Lecture 66 - Counters - 1

Lecture 67 - Counters - 2

Lecture 68 - Simulation of a synchronous counter

Lecture 69 - 555 timer

Lecture 70 - Digital-to-analog conversion - 1

Lecture 71 - Digital-to-analog conversion - 2

Lecture 72 - Analog-to-digital conversion

NPTEL : NOC:Antennas (Electrical Engineering)

Co-ordinators : Prof. Girish Kumar

Lecture 1 - Antenna Introduction - I

Lecture 2 - Antenna Introduction - II

Lecture 3 - Antenna Introduction - III

Lecture 4 - Antenna Fundamentals - I

Lecture 5 - Antenna Fundamentals - II

Lecture 6 - Antenna Radiation Hazards - I

Lecture 7 - Antenna Radiation Hazards - II

Lecture 8 - Dipole Antennas - I

Lecture 9 - Dipole Antennas - II

Lecture 10 - Dipole Antennas - III

Lecture 11 - Monopole Antennas - I

Lecture 12 - Monopole Antennas - II

Lecture 13 - Loop Antennas

Lecture 14 - Slot Antennas

Lecture 15 - Linear Arrays - I

Lecture 16 - Linear Arrays - II

Lecture 17 - Linear Arrays - III

Lecture 18 - Planar Arrays

Lecture 19 - Microstrip Antennas (MSA)

Lecture 20 - Rectangular MSA

Lecture 21 - MSA Parametric Analysis - I

Lecture 22 - MSA Parametric Analysis - II

Lecture 23 - Circular MSA

Lecture 24 - Broadband MSA - I

Lecture 25 - Broadband MSA - II

Lecture 26 - Broadband MSA - III

Lecture 27 - Broadband MSA - IV

Lecture 28 - Broadband MSA - V

Lecture 29 - Compact MSA - I

Lecture 30 - Compact MSA - II

Lecture 31 - Compact MSA - III

Lecture 32 - Tunable MSA - I

Lecture 33 - Tunable MSA - II

Lecture 34 - Circularly Polarized MSA - I

Lecture 35 - Circularly Polarized MSA - II

Lecture 36 - Circularly Polarized MSA - III

Lecture 37 - MSA Arrays - I

Lecture 38 - MSA Arrays - II

Lecture 39 - MSA Arrays - III

Lecture 40 - Helical Antennas - I

Lecture 41 - Helical Antennas - II

Lecture 42 - Helical Antennas - III

Lecture 43 - Helical Antennas - IV

Lecture 44 - Helical Antennas - V

Lecture 45 - Horn Antennas - I

Lecture 46 - Horn Antennas - II

Lecture 47 - Horn Antennas - III

Lecture 48 - Horn Antennas - IV

Lecture 49 - Horn Antennas - V

Lecture 50 - Yagi-Uda and Log-Periodic Antennas - I

Lecture 51 - Yagi-Uda and Log-Periodic Antennas - II

Lecture 52 - Yagi-Uda and Log-Periodic Antennas - III

Lecture 53 - IE3D Session TA - I

Lecture 54 - IE3D Session TA - II

Lecture 55 - IE3D Session TA - III

Lecture 56 - Reflector Antennas - I

Lecture 57 - Reflector Antennas - II

Lecture 58 - Reflector Antennas - III

Lecture 59 - Reflector Antennas - IV

Lecture 60 - Lab Session

NPTEL : NOC:Fundamentals of Wavelets, Filter Banks and Time Frequency Analysis (Electrical Engineering)

Co-ordinators : Prof. V.M. Gadre

Lecture 1 - Module 1 - Lecture 1 - Introduction

Lecture 2 - Module 1 - Lecture 2 - Origin of Wavelets

Lecture 3 - Module 1 - Lecture 3 - Haar Wavelet

Lecture 4 - Module 2 - Lecture 1 - Dyadic Wavelet

Lecture 5 - Module 2 - Lecture 2 - Dilates and Translates of Haar Wavelets

Lecture 6 - Module 2 - Lecture 3 - L2 Norm of a Function

Lecture 7 - Module 3 - Lecture 1 - Piecewise Constant Representation of a Function

Lecture 8 - Module 3 - Lecture 2 - Ladder of Subspaces

Lecture 9 - Module 3 - Lecture 3 - Scaling Function for Haar Wavelet Demo

Lecture 10 - Demonstration 1: Piecewise constant approximation of functions

Lecture 11 - Module 4 - Lecture 1 - Vector Representation of Sequences

Lecture 12 - Module 4 - Lecture 2 - Properties of Norm

Lecture 13 - Module 4 - Lecture 3 - Parseval's Theorem

Lecture 14 - Module 5 - Lecture 1 - Equivalence of sequences and functions

Lecture 15 - Module 5 - Lecture 2 - Angle between Functions and their Decomposition

Lecture 16 - Demonstration 2: Additional Information on Direct-Sum

Lecture 17 - Module 6 - Lecture 1 - Introduction to filter banks

Lecture 18 - Module 6 - Lecture 2 - Haar Analysis Filter Bank in Z-domain

Lecture 19 - Module 6 - Lecture 3 - Haar Synthesis Filter Bank in Z-domain

Lecture 20 - Module 7 - Lecture 1 - Moving from Z-domain to frequency domain

Lecture 21 - Module 7 - Lecture 2 - Frequency Response of Haar Analysis Low pass Filter bank

Lecture 22 - Module 7 - Lecture 3 - Frequency Response of Haar Analysis High pass Filter bank

Lecture 23 - Module 8 - Lecture 1 - Ideal two-band filter bank

Lecture 24 - Module 8 - Lecture 2 - Disqualification of Ideal filter bank

Lecture 25 - Module 8 - Lecture 3 - Realizable two-band filter bank

Lecture 26 - Demonstration 3: Demonstration: DWT of images

Lecture 27 - Module 9 - Lecture 1 - Relating Fourier transform of scaling function to filter bank

Lecture 28 - Module 9 - Lecture 2 - Fourier transform of scaling function

Lecture 29 - Module 9 - Lecture 3 - Construction of scaling and wavelet functions from filter bank

Lecture 30 - Demonstration 4: Demonstration: Constructing scaling and wavelet functions

Lecture 31 - Module 10 - Lecture 1 - Introduction to upsampling and down sampling as Multirate operations

Lecture 32 - Module 10 - Lecture 2 - Up sampling by a general factor M- a Z-domain analysis.

Lecture 33 - Module 10 - Lecture 3 - Down sampling by a general factor M- a Z-domain analysis

Lecture 34 - Module 11 - Lecture 1 - Z domain analysis of 2 channel filter bank.

Lecture 35 - Module 11 - Lecture 2 - Effect of X (-Z) in time domain and aliasing

Lecture 36 - Module 11 - Lecture 3 - Consequences of aliasing and simple approach to avoid it

Lecture 37 - Module 12 - Lecture 1 - Revisiting aliasing and the Idea of perfect reconstruction

Lecture 38 - Module 12 - Lecture 2 - Applying perfect reconstruction and alias cancellation on Haar MRA

Lecture 39 - Module 12 - Lecture 3 - Introduction to Daubechies family of MRA

Lecture 40 - Module 13 - Lecture 1 - Power Complementarity of low pass filter

Lecture 41 - Module 13 - Lecture 2 - Applying perfect reconstruction condition to obtain filter coefficient

Lecture 42 - Module 14 - Lecture 1 - Effect of minimum phase requirement on filter coefficients

Lecture 43 - Module 14 - Lecture 2 - Building compactly supported scaling functions

Lecture 44 - Module 14 - Lecture 3 - Second member of Daubechies family

Lecture 45 - Module 15 - Lecture 1 - Fourier transform analysis of Haar scaling and Wavelet functions

Lecture 46 - Module 15 - Lecture 2 - Revisiting Fourier Transform and Parseval's theorem

Lecture 47 - Module 15 - Lecture 3 - Transform Analysis of Haar Wavelet function

Lecture 48 - Module 16 - Lecture 1 - Nature of Haar scaling and Wavelet functions in frequency domain

Lecture 49 - Module 16 - Lecture 2 - The Idea of Time-Frequency Resolution

Lecture 50 - Module 16 - Lecture 3 - Some thoughts on Ideal time- frequency domain behavior

Lecture 51 - Module 17 - Lecture 1 - Defining Probability Density function

Lecture 52 - Module 17 - Lecture 2 - Defining Mean, Variance and Â“containment in a given domainÂ”

Lecture 53 - Module 17 - Lecture 3 - Example: Haar Scaling function

Lecture 54 - Module 17 - Lecture 4 - Variance from a slightly different perspective

Lecture 55 - Module 18 - Lecture 1 - Signal transformations: effect on mean and variance

Lecture 56 - Module 18 - Lecture 2 - Time-Bandwidth product and its properties

Lecture 57 - Module 18 - Lecture 3 - Simplification of Time-Bandwidth formulae

Lecture 58 - Module 19 - Lecture 1 - Introduction

Lecture 59 - Module 19 - Lecture 2 - Evaluation of Time-Bandwidth product

Lecture 60 - Module 19 - Lecture 3 - Optimal function in the sense of Time-Bandwidth product

Lecture 61 - Module 20 - Lecture 1 - Discontent with the Â“Optimal functionÂ”.

Lecture 62 - Module 20 - Lecture 2 - Journey from infinite to finite Time-Bandwidth product of Haar scaling function

Lecture 63 - Module 20 - Lecture 3 - More insights about Time-Bandwidth product

Lecture 64 - Module 20 - Lecture 4 - Time-frequency plane

Lecture 65 - Module 20 - Lecture 5 - Tiling the Time-frequency plane

Lecture 66 - Module 21 - Lecture 1 - STFT: Conditions for valid windows

Lecture 67 - Module 21 - Lecture 2 - STFT: Time domain and frequency domain formulations

Lecture 68 - Module 21 - Lecture 3 - STFT: Duality in the interpretations

Lecture 69 - Module 21 - Lecture 4 - Continuous Wavelet Transform (CWT)

Lecture 70 - Demonstration 5

Lecture 71 - StudentÂ's Presentation

NPTEL : NOC:Analog Circuits (2017) (Electrical Engineering)

Co-ordinators : Prof. Jayanta Mukherjee

Lecture 1 - Module 1 - Introduction

Lecture 2 - Module 2 - Poles and zeros

Lecture 3 - Module 3 - OP-AMPs

Lecture 4 - Module 4 - Application of Op-Amps

Lecture 5 - Module 5 - Inverting amplifier and Non Inverting amplifier

Lecture 6 - Module 1 - Non Idealities in Op-AMP (Finite Gain, Finite Bandwidth and Slew Rate)

Lecture 7 - Module 2 - Non Idealities in Op-AMP (Offset Voltage and Bias Current)

Lecture 8 - Module 3 - Bode Plot

Lecture 9 - Module 4 - Frequency Response

Lecture 10 - Module 1 - Frequency Response (High Frequency Response)

Lecture 11 - Module 2 - Frequency Response example

Lecture 12 - Module 3 - Feedback

Lecture 13 - Module 4 - Effects of Feedback

Lecture 14 - Tutorial 1 and 2

Lecture 15 - Module 1 - Effect of feedback and stability

Lecture 16 - Module 2 - Stability

Lecture 17 - Module 3 - Stability and pole location

Lecture 18 - Module 4 - Stability and Pole location continuation

Lecture 19 - Tutorial 3

Lecture 20 - Module 1 - Gain Margin Â– An example

Lecture 21 - Module 2 - Frequency Compensation

Lecture 22 - Module 3 - Filters

Lecture 23 - Module 4 - Filter prototypes

Lecture 24 - Tutorial 4

Lecture 25 - Tutorial 5

Lecture 26 - Tutorial 6

Lecture 27 - Module 1 - Chebyshev Prototype, Filter transformation

Lecture 28 - Module 2 - Filter Transformations (Continued....)

Lecture 29 - Module 3 - Active Filters

Lecture 30 - Module 4 - Non Linear Applications of OPAMPS

Lecture 31 - Module 5 - Limiter, Diodes

Lecture 32 - Module 1 - Oscillators

Lecture 33 - Module 2 - Oscillator Amplitude Control , Quadrature Oscillator

Lecture 34 - Module 3 - Multivibators

Lecture 35 - Module 4 - Multivibrators (Continued...)

Lecture 36 - Module 5 - Monostable Multivibator

Lecture 37 - Module 1 - Zener Effect, Rectifiers

Lecture 38 - Module 2 - Rectifiers

Lecture 39 - Module 3 - Clamper, Peak Rectifier, Super diodes

Lecture 40 - Module 4 - BJT DC Circuits

Lecture 41 - Module 5 - Current Mirror

NPTEL : NOC:Microwave Theory and Techniques (Electrical Engineering)

Co-ordinators : Prof. Girish Kumar

Lecture 1 - Microwave Theory and Techniques Introduction - I

Lecture 2 - Microwave Theory and Techniques Introduction - II

Lecture 3 - Microwave Theory and Techniques Introduction - III

Lecture 4 - Effects of Microwaves on Human Body - I

Lecture 5 - Effects of Microwaves on Human Body - II

Lecture 6 - Waveguides - I: Parallel Plane Waveguides

Lecture 7 - Waveguides - II: Parallel Plane Waveguides

Lecture 8 - Waveguides - III: Rectangular Waveguides

Lecture 9 - Transmission Lines - I: Coaxial Cables, Strip Lines and Microstrip Lines

Lecture 10 - Transmission Lines - II: Transmission Line Model, Open and Short Circuited Lossless Transmission Lines

Lecture 11 - Smith Chart and Impedance Matching - I: using Quarter Wave Transformer

Lecture 12 - Smith Chart and Impedance Matching - II: using Lumped Components

Lecture 13 - Smith Chart and Impedance Matching - III: using Short and Open Circuited Stubs

Lecture 14 - ABCD - Parameters

Lecture 15 - S - Parameters

Lecture 16 - Power Dividers - I: Two-way, Three-way and Four-way Equal Power Dividers

Lecture 17 - Power Dividers - II: Unequal, Broadband and Compact Power Dividers

Lecture 18 - Microwave Couplers - I: Coupled Line Directional Couplers

Lecture 19 - Microwave Couplers - II: Branch Line Couplers

Lecture 20 - Microwave Couplers - III: Rat race Coupler and Applications

Lecture 21 - Microwave Filters - I: Filters and Low Pass Butterworth Filter

Lecture 22 - Microwave Filters - II: Low Pass Chebyshev Filters

Lecture 23 - Microwave Filters - III: Microstrip Realization, Transformation from LPF to other Filters

Lecture 24 - Microwave Filters - IV: Band Pass Filters

Lecture 25 - Microwave Filters - V: Coupled Line and Tunable Band Pass Filters

Lecture 26 - Microwave Diodes: PN Junction , Varactor, Schottky, PIN, Tunnel, and GUNN Diodes

Lecture 27 - Microwave Attenuators: Fixed and Variable Attenuators

Lecture 28 - Microwave RF Switches: Series and Shunt SPST

Lecture 29 - Series and Shunt SPDT Switches and Introduction to Phase Shifters

Lecture 30 - Microwave Phase Shifters: Switched and Loaded Line

Lecture 31 - Microwave Transistors: BJT, HBT, JFET, MOSFET, MESFET and HEMT

Lecture 32 - Microwave Amplifiers - I: Basics and Power Gain Expressions

Lecture 33 - Microwave Amplifiers - II: Stability and Constant Gain Circles

Lecture 34 - Microwave Amplifiers - III: Design Example

Lecture 35 - Low Noise Amplifiers - I: Noise Sources and Noise Figure

Lecture 36 - Low Noise Amplifiers - II: NF Circles and LNA Design

Lecture 37 - Power Amplifiers

Lecture 38 - Microwave Tubes - I : Linear Beam Tubes- Two Cavity Klystron

Lecture 39 - Microwave Tubes - II: Linear Beam Tubes- Reflex Klystron and TWT

Lecture 40 - Microwave Tubes - III: Crossed Field Tubes- Magnetron

Lecture 41 - Microwave Oscillators - I

Lecture 42 - Microwave Oscillators - II

Lecture 43 - Microwave Mixers - I: Fundamentals

Lecture 44 - Microwave Mixers - II: Circuits

Lecture 45 - Microwave Mixers - III: Design

Lecture 46 - Fundamentals of Antennas

Lecture 47 - Dipole, Monopole, loop and Slot Antennas

Lecture 48 - Linear and Planar Arrays

Lecture 49 - Microstrip Antennas

Lecture 50 - Horn and Helical Antennas

Lecture 51 - Yagi - Uda, Log-Periodic and Reflector Antennas

Lecture 52 - RF MEMS and Microwave Imaging

Lecture 53 - Microwave Systems

Lecture 54 - Microwave Measurements and Lab Demonstration

Lecture 55 - CST Software Introduction with Filter Design

Lecture 56 - Power Divider and Combiner Design in CST

Lecture 57 - Hybrid Coupler Design

Lecture 58 - Antenna Design and Amplifier Simulation in CST

Lecture 59 - Mixer Design in NI AWR Software - I

Lecture 60 - Mixer Design in NI AWR Software - II

NPTEL : NOC:Principles of Digital Communications (Electrical Engineering)

Co-ordinators : Prof. S.N. Merchant

Lecture 1 - Course Overview

Lecture 2 - Introduction to Information Theory

Lecture 3 - Entropy and its properties

Lecture 4 - Lossless Source Coding Theorem

Lecture 5 - Prefix Codes and Kraftâ€™s Inequality

Lecture 6 - Huffman Coding

Lecture 7 - Discrete Memory-less Channels : Mutual Information

Lecture 8 - Channel Capacity - I

Lecture 9 - Channel Capacity - II

Lecture 10 - Channel Coding Theorem

Lecture 11 - Differential Entropy - I

Lecture 12 - Differential Entropy - II

Lecture 13 - Channel Capacity - III

Lecture 14 - Channel Capacity - IV

Lecture 15 - Summary of Information Theory

Lecture 16 - Signal Space Representations - I

Lecture 17 - Signal Space Representations - II

Lecture 18 - Vector Representation of a Random Process

Lecture 19 - AWGN Vector Channel

Lecture 20 - Basics of Signal Detection: ML,MAP Detection

Lecture 21 - ML,MAP Detectors for AWGN Channel

Lecture 22 - Optimal Receiver: Matched Filter

Lecture 23 - Probability of error for Optimal Receiver

Lecture 24 - Probability of Error for M-ary Scheme

Lecture 25 - Pulse Code Modulation: Quantization

Lecture 26 - Uniform Quantizer

Lecture 27 - Step Size and Quantization Noise

Lecture 28 - Non-uniform Quantizer (Lloyd-Max Quantizer)

Lecture 29 - Companded Quantization - I

Lecture 30 - Companded Quantization - II

Lecture 31 - Differential Pulse Code Modulation DPCM - I

Lecture 32 - DPCM-II (Linear Prediction)

Lecture 33 - Delta Modulation

Lecture 34 - M-ary PCM/PAM - I

Lecture 35 - M-ary PCM/PAM - II

Lecture 36 - Line Coding - I

Lecture 37 - Line Coding - II

Lecture 38 - Line Coding - III

Lecture 39 - Pulse Shaping for Zero ISI - I

Lecture 40 - Pulse Shaping for Zero ISI - II

Lecture 41 - Pulse Shaping for Zero ISI - III

Lecture 42 - Partial Response Signaling - I

Lecture 43 - Partial Response Signaling - II

Lecture 44 - Principle of Invariance of Probability of Error

Lecture 45 - Binary ASK and PSK

Lecture 46 - Binary Frequency Shift Keying - I

Lecture 47 - Binary Frequency Shift Keying - II

Lecture 48 - Quadrature Phase Shift Keying - I

Lecture 49 - Quadrature Phase Shift Keying - II

Lecture 50 - Quadrature Phase Shift Keying - III

Lecture 51 - Continuous Phase Frequency Shift Keying

Lecture 52 - Minimum Shift Keying - I

Lecture 53 - Minimum Shift Keying - II

Lecture 54 - M-ary Coherent ASK (M-ASK)

Lecture 55 - M-ary PSK

Lecture 56 - M-ary Quadrature Amplitude Modulation (M-QAM)

Lecture 57 - M-ary FSK

Lecture 58 - Comparison of M-ary Schemes

Lecture 59 - Non-coherent BFSK

Lecture 60 - Differential Phase Shift Keying

Lecture 61 - Channel Coding - I

Lecture 62 - Channel Coding - II

Lecture 63 - Channel Coding - III

Lecture 64 - Channel Coding: Hamming Codes

Lecture 65 - Channel Coding: Decoding using Standard Arrays

NPTEL : NOC:Fundamental of Power Electronics (Electrical Engineering)

Co-ordinators : Prof. Vivek Agarwal

Lecture 1 - Familiarization with Power Electronic Systems

Lecture 2 - Overview of Basic Power Electronic Circuits from Laymans Point of View

Lecture 3 - Applications, Definitions, and Nature of Power Electronic Circuits

Lecture 4 - Components of a Power Electronic System

Lecture 5 - Analysis of Switched Networks

Lecture 6 - Review of engineering maths for power electronic circuit analysis

Lecture 7 - Review of semiconductor physics

Lecture 8 - P-N Junction

Lecture 9 - Power Diodes

Lecture 10 - Thyristors

Lecture 11 - Motivation for rectifier capacitor filter

Lecture 12 - Circuit Operation

Lecture 13 - Designing the circuit

Lecture 14 - Simulation setup for NgSpice and gEDA schematic capture

Lecture 15 - Simulating the circuit

Lecture 16 - Practicals

Lecture 17 - Inrush current limiting - Intro

Lecture 18 - Inrush current limiting - Resistor solution

Lecture 19 - Inrush current limiting - Thermistor solution

Lecture 20 - Inrush current limiting - Transformer solution

Lecture 21 - Inrush current limiting - MOSFET solution

Lecture 22 - Inrush current limiting - Relay, contactor

Lecture 23 - Three phase rectifier capacitor filter

Lecture 24 - Simulation - 3 phase rectifier capacitor filter

Lecture 25 - Power factor - Motivation

Lecture 26 - Power factor - Discussion

Lecture 27 - Power factor - Sinusoidal

Lecture 28 - Power factor for rectifier cap filter

Lecture 29 - Passive power improvement circuit

Lecture 30 - Simulation - power factor improvement

Lecture 31 - Linear regulators - Intro

Lecture 32 - Shunt regulator

Lecture 33 - Example on shunt regulator

Lecture 34 - Non-ideality and solution

Lecture 35 - Applications of shunt regulator

Lecture 36 - Series regulator

Lecture 37 - Efficiency of series

Lecture 38 - Negative and dual voltage regulators

Lecture 39 - Over current limiting circuits

Lecture 40 - Improvements to series regulator

Lecture 41 - Regulator performance parameters

Lecture 42 - Datasheet of few IC regulators

Lecture 43 - Common IC regulator circuits

Lecture 44 - Practicals 1

Lecture 45 - Switched mode DC-DC converter intro

Lecture 46 - Volt-sec and Amp-sec balance

Lecture 47 - Input-output relationship

Lecture 48 - Buck converter - operation and waveforms

Lecture 49 - Buck converter - component selection

Lecture 50 - Primary configurations

Lecture 51 - Boost converter

Lecture 52 - Buck-Boost converter

Lecture 53 - Simulating the primary converters

Lecture 54 - Forward converter

Lecture 55 - Core reset in forward converter

Lecture 56 - Simulating with lossy core reset

Lecture 57 - Simulating with lossless core reset

Lecture 58 - Flyback converter

Lecture 59 - Simulating the flyback converter

Lecture 60 - Octave mfile for design

Lecture 61 - Magnetics design intro

Lecture 62 - Magnetics review

Lecture 63 - Permeance

Lecture 64 - Inductor value and energy storage

Lecture 65 - Inductor area product

Lecture 66 - Inductor design

Lecture 67 - Inductor example

Lecture 68 - Transformer design

Lecture 69 - Transformer example

Lecture 70 - Forward converter design mfile

Lecture 71 - Pushpull converter

Lecture 72 - Flux walking in pushpull

Lecture 73 - PWM generation

Lecture 74 - Simulation of pushpull converter

Lecture 75 - Half bridge converter

Lecture 76 - Simulation of halfbridge converter

Lecture 77 - Full bridge converter

Lecture 78 - Simulation of fullbridge converter

Lecture 79 - Area products and mfiles

Lecture 80 - Intro for drive circuits

Lecture 81 - BJT base drive

Lecture 82 - BJT base drive example

Lecture 83 - Multi-stage base drive

Lecture 84 - Base drive with speed-up circuit

Lecture 85 - Base drive with isolation

Lecture 86 - MOSFET gate drive

Lecture 87 - MOSFET drive with isolation

Lecture 88 - Over-current protection

Lecture 89 - Snubber circuits

Lecture 90 - Intro for close loop control

Lecture 91 - Close looping dc-dc converters

Lecture 92 - Simulation of close loop control

Lecture 93 - Current control for battery charger application

Lecture 94 - Instability in current control and slope compensation

Lecture 95 - Slope compensated current control

Lecture 96 - Simulation of current control

Lecture 97 - Single phase inverter with sinusoidal pwm

Lecture 98 - Simulation of sinusoidal PWM

NPTEL : NOC:Electrical Equipment and Machines: Finite Element Analysis (Electrical Engineering)

Co-ordinators : Prof. Shrikrishna V. Kulkarni

Lecture 1 - Course Outline and Introduction

Lecture 2 - Analytical and Numerical Methods

Lecture 3 - Revisiting EM Concepts: Vector Algebra and Coordinate Systems

Lecture 4 - Revisiting EM Concepts: Vector Calculus and Electrostatics

Lecture 5 - Revisiting EM Concepts: Current Densities and Electric Fields in Materials

Lecture 6 - Revisiting EM Concepts: Electrostatic Boundary Conditions and Shielding

Lecture 7 - Revisiting EM Concepts: Magnetostatics

Lecture 8 - Revisiting EM Concepts: Magnetic Forces and Materials

Lecture 9 - Revisiting EM Concepts: Time Varying Fields

Lecture 10 - Revisiting EM Concepts: Theory of Eddy Currents

Lecture 11 - FEM: Variational Approach

Lecture 12 - Finding Functional for PDEs

Lecture 13 - Whole Domain Approximation

Lecture 14 - 1D FEM: Problem Definition and Shape Function

Lecture 15 - 1D FEM: Procedure

Lecture 16 - 1D FEM: Scilab Code

Lecture 17 - 2D FEM: Problem Definition and Shape Functions

Lecture 18 - 2D FEM: Procedure

Lecture 19 - 2D FEM Scilab Code: Manual Meshing

Lecture 20 - 2D FEM Code: Gmsh and Scilab

Lecture 21 - Computation of B and H Field and Method of Weighted Residuals

Lecture 22 - Galerkin Method

Lecture 23 - Calculation of Leakage Inductance of a Transformer

Lecture 24 - Calculation of Inductance of an Induction Motor and a Gapped-Core Shunt Reactor

Lecture 25 - Insulation Design Using FE Analysis

Lecture 26 - Quadratic Finite Elements

Lecture 27 - Time Harmonic FE Analysis

Lecture 28 - Calculation of Eddy Current Losses

Lecture 29 - Eddy Losses in Transformer Windings

Lecture 30 - Torque Speed Characteristics of an Induction Motor and FE Analysis of Axisymmetric Problem

Lecture 31 - Permanent Magnets: Theory

Lecture 32 - Permanent Magnets: FEM Implementation

Lecture 33 - Periodic and Antiperiodic Boundary Conditions in Rotating Machines

Lecture 34 - FE Analysis of Rotating Machines

Lecture 35 - Voltage Fed Coupled Circuit Field Analysis

Lecture 36 - Current Fed Coupled Circuit Field Analysis

Lecture 37 - Transient FE Analysis

Lecture 38 - Nonlinear FE Analysis

Lecture 39 - Computation of Forces using Maxwell Stress Tensor

Lecture 40 - Computation of force using virtual work method

NPTEL : NOC:Digital Signal Processing and its Applications (Electrical Engineering)

Co-ordinators : Prof. V. M. Gadre

Lecture 1 - Introduction: Digital signal processing and its objectives

Lecture 2 - Introduction to sampling and Fourier Transform

Lecture 3 - Sampling of sine wave and associate complication

Lecture 4 - Review of Sampling Theorem

Lecture 5 - Idealized Sampling, Reconstruction

Lecture 6 - Filters And Discrete System

Lecture 7 - Answering questions from previous lectures

Lecture 8 - Desired requirements for discrete system

Lecture 9 - Introduction to phasors

Lecture 10 - Advantages of phasors in discrete systems

Lecture 11 - What do we want from a discrete system?

Lecture 12 - Linearity - Homogeneity and Additivity

Lecture 13 - Shift Invariance and Characterization of LTI systems

Lecture 14 - Characterization of LSI system using itâ€™s impulse response

Lecture 15 - Introduction to convolution

Lecture 16 - Convolution: Deeper ideas and understanding

Lecture 17 - Characterisation of LSI systems, Convolution-properties

Lecture 18 - Response of LSI Systems to Complex Sinusoids

Lecture 19 - Convergence of Convolution and Bibo Stability

Lecture 20 - Commutativity and Associativity

Lecture 21 - BIBO Stability of an LSI system

Lecture 22 - Causality and memory of an LSI system

Lecture 23 - Frequency response of an LSI system

Lecture 24 - Introduction and conditions of Stability

Lecture 25 - Vectors and Inner Product

Lecture 26 - Interpretation of Frequency Response as Dot Product

Lecture 27 - Interpretation of Frequency Response as Eigenvalues

Lecture 28 - Discrete time fourier transform

Lecture 29 - DTFT in LSI System and Convolution Theorem.

Lecture 30 - Definitions of sequences and Properties of DTFT

Lecture 31 - Introduction to DTFT, IDTFT

Lecture 32 - Dual to convolution property

Lecture 33 - Multiplication Property, Introduction to Parsevalâ€™s theorem

Lecture 34 - Introduction and Property of DTFT

Lecture 35 - Review of Inverse DTFT

Lecture 36 - Parsevalâ€™s Theorem and energy and time spectral density

Lecture 37 - Discussion on Unit Step

Lecture 38 - Introduction to Z transform

Lecture 39 - Example of Z transform

Lecture 40 - Region of Convergence

Lecture 41 - Properties of Z transform

Lecture 42 - Z- Transform

Lecture 43 - Rational System

Lecture 44 - Introduction and Examples of Rational Z Transform and their Inverses

Lecture 45 - Double Pole Examples and their Inverse Z Transform

Lecture 46 - Partial Fraction Decomposition

Lecture 47 - LSI System Examples

Lecture 48 - Why are Rational Systems so important?

Lecture 49 - Solving Linear constant coefficient difference equations which are valid over a finite range of time

Lecture 50 - Introduction to Resonance in Rational Systems

Lecture 51 - Characterization of Rational LSI system

Lecture 52 - Causality and stability of the ROC of the system function

Lecture 53 - Recap of Rational Systems and Discrete Time Filters

Lecture 54 - Specifications for Filter Design

Lecture 55 - Four Ideal Piecewise Constant Filters

Lecture 56 - Important Characteristics Of Ideal Filters

Lecture 57 - Synthesis of Discrete Time Filters, Realizable specifications

Lecture 58 - Realistic Specifications for low pass filter. Filter Design Process

Lecture 59 - Introduction to Filter Design. Analog IIR Filter,FIR discrete-time filter, IIR discrete-time filter

Lecture 60 - Analog to discrete transform

Lecture 61 - Intuitive transforms, Bilinear Transformation

Lecture 62 - Steps for IIR filter design

Lecture 63 - Analog filter design using Butterworth Approximation

Lecture 64 - Butterworth filter Derivation And Analysis of butterworth system function

Lecture 65 - Chebychev filter Derivation

Lecture 66 - Midsem paper review discussion

Lecture 67 - The Chebyschev Approximation

Lecture 68 - Next step in design: Obtain poles

Lecture 69 - Introduction to Frequency Transformations in the Analog Domain

Lecture 70 - High pass transformation

Lecture 71 - Band pass transformation

Lecture 72 - Frequency Transformation

Lecture 73 - Different types of filters

Lecture 74 - Impulse invariant method and ideal impulse response

Lecture 75 - Design of FIR of length (2N+1) by the truncation method,Plotting the function V(w)

Lecture 76 - IIR filter using rectangular window, IIR filter using triangular window

Lecture 77 - Proof that frequency response of an fir filter using rectangular window function centred at 0 is real

Lecture 78 - Introduction to window functions

Lecture 79 - Examples of window functions

Lecture 80 - Explanation of Gibbâ€™s Phenomenon and itâ€™s application

Lecture 81 - Comparison of FIR And IIR Filterâ€™s

Lecture 82 - Comparison of FIR And IIR Filterâ€™s

Lecture 83 - Comparison of FIR And IIR Filterâ€™s

Lecture 84 - Introduction and approach to realization (causal rational system)

Lecture 85 - Comprehension of Signal Flow Graphs and Achievement of Pseudo Assembly Language Code

Lecture 86 - Introduction to IIR Filter Realization and Cascade Structure

Lecture 87 - Cascade Parallel Structure

Lecture 88 - Lattice Structure

Lecture 89 - Recap And Review of Lattice Structure, Realization of FIR Function

Lecture 90 - Backward recursion, Change in the recursive equation of lattice

Lecture 91 - Lattice structure for an arbitrary rational system

Lecture 92 - Example realization of lattice structure for rational system

Lecture 93 - Introductory Remarks of Discrete Fourier Transform and Frequency Domain Sampling

Lecture 94 - Principle of Duality, The Circular Convolution

NPTEL : NOC:Stochastic Control and Communication (Electrical Engineering)

Co-ordinators : Prof. Ankur A. Kulkarni

Lecture 1 - Decision Making under Uncertainty

Lecture 2 - Expected Utility Theory - I

Lecture 3 - Expected Utility Theory - II

Lecture 4 - Expected Utility Theory - III

Lecture 5 - Role of Information in Decision Making

Lecture 6 - State Space Modelling of Sequential Decision Making, Example of Inventory Control

Lecture 7 - Inventory Control Problem (Continued...)

Lecture 8 - Policy-A Closed Loop Solution to Stochastic Control Problem

Lecture 9 - Introduction to Markov Decision Processes (MDP)

Lecture 10 - Types of Policy in MDP

Lecture 11 - Interpreting randomised decision rules

Lecture 12 - Stationary Transition Probability: State Diagram Representation and example of Markov policies

Lecture 13 - Example of History Dependent Policies

Lecture 14 - Complexity of the problem using brute force approach

Lecture 15 - Principle of Optimality

Lecture 16 - Dynamic Programming Algorithm

Lecture 17 - DP Algo applied to Inventory Control Problem

Lecture 18 - DP Algo applied to Inventory Control Problem (Continued...)

Lecture 19 - DP Algo applied to Inventory Control Problem (Continued...)

Lecture 20 - Optimal Stopping Problem

Lecture 21 - Optimal Stopping Example: Secretary Problem

Lecture 22 - Optimal Stopping Example: Secretary Problem (Continued...)

Lecture 23 - Optimal Stopping Example: Secretary Problem (Continued...)

Lecture 24 - Linear System Quadratic Cost Problem

Lecture 25 - Linear System Quadratic Cost Problem (Continued...)

Lecture 26 - Solving it via DP algorithm (Continued...)

Lecture 27 - Equivalence between Optimal HR Policyand optimal Markov Deterministic Policy

Lecture 28 - Stochastic Control under incomplete state information

Lecture 29 - Stochastic Control under incomplete state information (Continued...)

Lecture 30 - Stochastic Control under incomplete state information: Example

Lecture 31 - Stochastic Control under incomplete state information: Example (Continued...)

Lecture 32 - Stochastic Control under incomplete state information: Example (Continued...)

Lecture 33 - Stochastic Control under incomplete state information: Example (Continued...)

Lecture 34 - LQ systems with Imperfect Information - I

Lecture 35 - LQ systems with Imperfect Information - II

Lecture 36 - LQ systems with Imperfect Information - III

Lecture 37 - LQ systems with Imperfect Information - IV

Lecture 38 - Filtering - I

Lecture 39 - Filtering - II

Lecture 40 - Kalman Filtering - I

Lecture 41 - Kalman Filtering - II

Lecture 42 - Kalman Filtering - III

Lecture 43 - Belief State Formulation - I

Lecture 44 - Belief State Formulation - II

Lecture 45 - Information Structures - I

Lecture 46 - Information Structures - II

Lecture 47 - Witsenhausen Problem - I

Lecture 48 - Witsenhausen Problem - II

Lecture 49 - Witsenhausen Problem - III

Lecture 50 - Witsenhausen Problem - IV

Lecture 51 - Witsenhausen Problem - V

Lecture 52 - Witsenhausen Problem - VI

Lecture 53 - Witsenhausen Problem - VII

Lecture 54 - Team Decision Theory - I

Lecture 55 - Team Decision Theory - II

Lecture 56 - Team Decision Theory - III

Lecture 57 - Team Decision Theory - IV

Lecture 58 - Team Decision Theory - V

Lecture 59 - Team Decision Theory - VI

Lecture 60 - Team Decision Theory - VII

Lecture 61 - Communication Theory - I

Lecture 62 - Communication Theory - II

Lecture 63 - Communication Theory - III

Lecture 64 - Communication Theory - IV

Lecture 65 - Communication Theory - V

NPTEL : NOC:Applied Linear Algebra (2024) (Electrical Engineering)

Co-ordinators : Prof. Dwaipayan Mukherjee

Lecture 1 - Introduction - Part A

Lecture 2 - Introduction - Part B

Lecture 3 - Introduction - Part C

Lecture 4 - Equivalent Systems - Part A

Lecture 5 - Equivalent Systems - Part B

Lecture 6 - Equivalent Systems - Part C

Lecture 7 - Solution of Ax = b - Part A

Lecture 8 - Solution of Ax = b - Part B

Lecture 9 - Solution of Ax = b - Part C

Lecture 10 - Rings, Integral Domains and Fields - Part A

Lecture 11 - Rings, Integral Domains and Fields - Part B

Lecture 12 - Rings, Integral Domains and Fields - Part C

Lecture 13 - Vector Spaces and Subspaces - Part A

Lecture 14 - Vector Spaces and Subspaces - Part B

Lecture 15 - Vector Spaces and Subspaces - Part C

Lecture 16 - Unions, Intersection, Sums of Subspaces - Part A

Lecture 17 - Unions, Intersection, Sums of Subspaces - Part B

Lecture 18 - Generating sets, Linear independence and basis - Part A

Lecture 19 - Generating sets, Linear independence and basis - Part B

Lecture 20 - Generating sets, Linear independence and basis - Part C

Lecture 21 - Ordered basis and co-ordinates - Part A

Lecture 22 - Ordered basis and co-ordinates - Part B

Lecture 23 - Ordered basis and co-ordinates - Part C

Lecture 24 - Rank-Nullity Theorem (Matrices) - Part A

Lecture 25 - Rank-Nullity Theorem (Matrices) - Part B

Lecture 26 - Rank-Nullity Theorem (Matrices) - Part C

Lecture 27 - Rank-Nullity Theorem (Linear Transformation) - Part A

Lecture 28 - Rank-Nullity Theorem (Linear Transformation) - Part B

Lecture 29 - Rank-Nullity Theorem (Linear Transformation) - Part C

Lecture 30 - Isomorphism and Inverses - Part A

Lecture 31 - Isomorphism and Inverses - Part B

Lecture 32 - Isomorphism and Inverses - Part C

Lecture 33 - Dual Basis and Annihilator - Part A

Lecture 34 - Dual Basis and Annihilator - Part B

Lecture 35 - Dual Basis and Annihilator - Part C

Lecture 36 - Dual maps and double dual - Part A

Lecture 37 - Dual maps and double dual - Part B

Lecture 38 - Dual maps and double dual - Part C

Lecture 39 - Quotient spaces and quotient map - Part A

Lecture 40 - Quotient spaces and quotient map - Part B

Lecture 41 - Quotient spaces and quotient map - Part C

Lecture 42 - Inner Product Spaces - Part A

Lecture 43 - Inner Product Spaces - Part B

Lecture 44 - Inner Product Spaces - Part C

Lecture 45 - Gram Schmidt Procedure - Part A

Lecture 46 - Gram Schmidt Procedure - Part B

Lecture 47 - Gram Schmidt Procedure - Part C

Lecture 48 - Best Approximation of a Vector - Part A

Lecture 49 - Best Approximation of a Vector - Part B

Lecture 50 - Best Approximation of a Vector - Part C

Lecture 51 - Projection map and summary of Ax = b - Part A

Lecture 52 - Projection map and summary of Ax = b - Part B

Lecture 53 - Projection map and summary of Ax = b - Part C

Lecture 54 - Linear Differential Equations - Part A

Lecture 55 - Linear Differential Equations - Part B

Lecture 56 - Introduction to Eigen values and Eigen vectors - Part A

Lecture 57 - Introduction to Eigen values and Eigen vectors - Part B

Lecture 58 - Introduction to Eigen values and Eigen vectors - Part C

Lecture 59 - Singular Value Decomposition - Part A

Lecture 60 - Singular Value Decomposition - Part B

Lecture 61 - Singular Value Decomposition - Part C

Lecture 62 - Algebraic and geometric multiplicities - Part A

Lecture 63 - Algebraic and geometric multiplicities - Part B

Lecture 64 - A-Invariant Subspaces - Part A

Lecture 65 - A-Invariant Subspaces - Part B

Lecture 66 - A-Invariant Subspaces - Part C

Lecture 67 - Minimal Polynomial-I - Part A

Lecture 68 - Minimal Polynomial-I - Part B

Lecture 69 - Minimal Polynomial-I - Part C

Lecture 70 - Minimal Polynomial-I - Part D

Lecture 71 - Minimal Polynomial-II - Part A

Lecture 72 - Minimal Polynomial-II - Part B

Lecture 73 - Minimal Polynomial-II - Part C

Lecture 74 - Minimal Polynomial-II - Part D

Lecture 75 - Cayley Hamilton Theorem - Part A

Lecture 76 - Cayley Hamilton Theorem - Part B

Lecture 77 - Cayley Hamilton Theorem - Part C

Lecture 78 - Jordan Canonical Form - Part A

Lecture 79 - Jordan Canonical Form - Part B

Lecture 80 - Jordan Canonical Form - Part C

Lecture 81 - Algebraic Graph Theory and Consensus - Part A

Lecture 82 - Algebraic Graph Theory and Consensus - Part B

Lecture 83 - Algebraic Graph Theory and Consensus - Part C

Lecture 84 - Positive Matrices and Leontieff's Model - Part A

Lecture 85 - Positive Matrices and Leontieff's Model - Part B

NPTEL : NOC:Digital Communication using GNU Radio (Electrical Engineering)

Co-ordinators : Prof. Kumar Appaiah

Lecture 1 - Introduction to Digital Communication

Lecture 2 - Understanding GNU Radio features for Digital Communication: Basic blocks, input and output

Lecture 3 - Understanding GNU Radio features for Digital Communication: Advanced blocks, hardware interfacing

Lecture 4 - Fundamentals of Digital Communication: Signal Processing methods, vectors, and relevant GNU Radio Examples - Part 1

Lecture 5 - Fundamentals of Digital Communication: Signal Processing methods, vectors, and relevant GNU Radio Examples - Part 2

Lecture 6 - Complex Baseband Signal Representation

Lecture 7 - Real Passband Signal Representation, Up and Down Conversion of Complex Baseband Signals

Lecture 8 - Random Variables and Random Processes

Lecture 9 - Fundamentals of Digital Modulation

Lecture 10 - Linear Modulation Methods: Amplitude Shift Keying (ASK)

Lecture 11 - Linear Modulation Methods: Phase Shift Keying (PSK)

Lecture 12 - Linear Modulation Methods: Quadrature Amplitude Modulation (QAM) and Frequency Shift Keying (FSK)

Lecture 13 - Pulse Shaping for ISI Free Signaling

Lecture 14 - ASK using Raised Cosine (RC) and Root-Raised Cosine (RRC) Pulse Shaping

Lecture 15 - Basics of Detection: Properties of Gaussian Random Variables

Lecture 16 - Basics of Detection: Gaussian Random Vectors and Hypothesis Testing

Lecture 17 - Optimal Receivers for M-ary Signaling

Lecture 18 - Gram-Schmidt Orthogonalisation

Lecture 19 - Optimal Reception of M-ary Signals in AWGN

Lecture 20 - Detection and Optimal Decision for On-Off Signaling in AWGN Channel

Lecture 21 - Detection and Optimal Decision for M-ary Signaling

Lecture 22 - Python for GNU Radio

Lecture 23 - Extending GNU Radio Features using Python

Lecture 24 - Constructing and Visualising Constellations using GNU Radio

Lecture 25 - Understanding matched filtering using GNU Radio

Lecture 26 - Histograms in GNU Radio

Lecture 27 - Visualising Symbol Error Rate in GNU Radio

Lecture 28 - Signal-to-Noise Ratio and Symbol Error Probability - Part 1

Lecture 29 - Signal-to-Noise Ratio and Symbol Error Probability - Part 2

Lecture 30 - Symbol error rate and Bit error rate

Lecture 31 - Computing bit error rates in GNU Radio

Lecture 32 - End-to-end Digital Communication System Simulation in GNU Radio

Lecture 33 - Parameter Estimation for Practical Receivers - Part 1

Lecture 34 - Parameter Estimation for Practical Receivers - Part 2

Lecture 35 - Phase Locked Loop and Differential Modulation

Lecture 36 - Maximum Likelihood delay estimate for a single symbol in GNU Radio

Lecture 37 - Maximum Likelihood delay estimate for multiple symbols in GNU Radio

Lecture 38 - Phase offse estimation in GNU Radio

Lecture 39 - Phase Locked Loop in GNU Radio

Lecture 40 - Costas Loop and Differential PSK in GNU Radio

Lecture 41 - Channel Equalisation

Lecture 42 - Detection Strategy for Dispersive Channels

Lecture 43 - Maximum Likelihood sequence estimation: Viterbi Algorithm

Lecture 44 - Suboptimal Channel Equalisation: Zero-forcing Receiver

Lecture 45 - Zero forcing Receiver in GNU Radio

Lecture 46 - Suboptimal Channel Equalisation: Linear Minimum mean-square error receiver

Lecture 47 - LMMSE Receiver in GNU Radio

Lecture 48 - Parallelising Frequency Selective Channels

Lecture 49 - Orthogonal Frequency Division Multiplexing (OFDM)

Lecture 50 - OFDM in the prescence of dispersive channels

Lecture 51 - Equalisation using OFDM in GNU Radio

Lecture 52 - Error Control Coding: Parity Check Codes

Lecture 53 - Error Control Coding: Repetition Codes

Lecture 54 - Error Control Coding: Linear Block Codes

Lecture 55 - Repetition Codes in GNU Radio

Lecture 56 - Error Control Coding: Perfect Codes

Lecture 57 - Error Control Coding: Hamming Codes

Lecture 58 - (7,4) Hamming Code in GNU Radio

Lecture 59 - Rate and error-free Communication

Lecture 60 - Quantisation

Lecture 61 - Visualising Quantisation in GNU Radio

Lecture 62 - Course Summary

NPTEL : Circuit Theory (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

Lecture 1 - Review of Signals and Systems

Lecture 2 - Review of Signals and Systems

Lecture 3 - Network Equations; Initial and Final Conditions

Lecture 4 - Problem Session 1

Lecture 5 - Step, Impulse and Complete Responses

Lecture 6 - 2nd Order Circuits:Magnetically Coupled Circuits

Lecture 7 - Transformer Transform Domain Analysis

Lecture 8 - Problem Session 2 : Step,Impulse

Lecture 9 - Network Theorems and Network Functions

Lecture 10 - Network Functions (Continued.)

Lecture 11 - Amplitude and Phase of Network Functions

Lecture 12 - Problem Session 3 : Network Theorems Transform

Lecture 13 - Poles, Zeros and Network Response

Lecture 14 - Single Tuned Circuits

Lecture 15 - Single Tuned Circuits (Continued.)

Lecture 16 - Double Tuned Circuits

Lecture 17 - Double Tuned Circuits (Continued.)

Lecture 18 - Problem Session 4 : Network Functions, Analysis

Lecture 19 - Double Tuned Circuits (Continued.)

Lecture 20 - Concept of Delay and Introduction

Lecture 21 - Two-port Networks (Continued.)

Lecture 22 - Problem Session 5

Lecture 23 - Minor - 1

Lecture 24 - The Hybrid & Transmission Parameters of 2 ports

Lecture 25 - Problem Session 6 : Two - port networks

Lecture 26 - Two - port Network parameters

Lecture 27 - Two-port Interconnections

Lecture 28 - Interconnection of Two-port Networks (Continued.)

Lecture 29 - Problem Session 7 : Two-port Networks (Continued.)

Lecture 30 - Scattering Matrix

Lecture 31 - Scattering Parameters of a Two-port

Lecture 32 - Problem Session 8 : Two- port Parameters

Lecture 33 - Solutions of Minor - 2 Problems

Lecture 34 - Insertion Loss

Lecture 35 - Example of Insertion Loss and Elements

Lecture 36 - Elements of Realizability Theory (Continued.)

Lecture 37 - Positive Real Functions

Lecture 38 - Testing of Positive Real Functions

Lecture 39 - Problem Session 9

Lecture 40 - More on PRF's and their Synthesis

Lecture 41 - LC Driving Point Functions

Lecture 42 - LC Driving Point Synthesis (Continued.)

Lecture 43 - RC and RL Driving Point Synthesis

Lecture 44 - Problem Session 10 : LC Driving Point Synthesis

Lecture 45 - RC & RL One-port Synthesis (Continued.)

Lecture 46 - Elementary RLC One-port Synthesis

Lecture 47 - Properties and Synthesis of Transfer Parameters

Lecture 48 - Resistance Terminated LC Ladder

Lecture 49 - Resistance Terminated LC Ladder (Continued.)

Lecture 50 - Problem session 11: Two-port Synthesis

Lecture 51 - Network Transmission Criteria

NPTEL : Control Engineering (Prof. M. Gopal) (Electrical Engineering)

Co-ordinators : Prof. M. Gopal

Lecture 1 - Introduction to control problem

Lecture 2 - Basic Feedback Structure

Lecture 3 - Introduction to Control Problem (Continued.)

Lecture 4 - Dynamic Systems and Dynamic Response

Lecture 5 - Dynamic Systems and Dynamic Response (Continued.)

Lecture 6 - Dynamic Systems and Dynamic Response (Continued.)

Lecture 7 - Dynamic Systems and Dynamic Response (Continued.)

Lecture 8 - Dynamic Systems and Dynamic Response (Continued.)

Lecture 9 - Dynamic Systems and Dynamic Response (Continued.)

Lecture 10 - Models of Industrial Control Devices and Systems

Lecture 11 - Models of Industrial Control Devices and Systems (Continued.)

Lecture 12 - Models of Industrial Control Devices and Systems(Continued.)

Lecture 13 - Models of Industrial Control Devices and Systems(Continued.)

Lecture 14 - Models of Industrial Control Devices and Systems(Continued.)

Lecture 15 - Models of Industrial Control Devices and Systems(Continued.)

Lecture 16 - Models of Industrial Control Devices and Systems (Continued.)

Lecture 17 - Models of Industrial Control Devices and Systems (Continued.)

Lecture 18 - Models of Industrial Control Devices and Systems (Continued.)

Lecture 19 - Basic Principles of Feedback Control

Lecture 20 - Basic Principles of Feedback Control (Continued.)

Lecture 21 - Basic Principles of Feedback Control (Continued.)

Lecture 22 - Basic Principles of Feedback Control (Continued.)

Lecture 23 - Concepts of stability and Routh Stability Criterion

Lecture 24 - Concepts of stability and Routh Stability Criterion (Continued.)

Lecture 25 - Concepts of stability and Routh Stability Criterion (Continued.)

Lecture 26 - The Performance of Feedback Systems

Lecture 27 - The Performance of Feedback Systems (Continued.)

Lecture 28 - The Performance of Feedback Systems (Continued.)

Lecture 29 - The Performance of Feedback Systems (Continued.)

Lecture 30 - Compensator Design Using Root Locus Plots

Lecture 31 - Compensator Design Using Root Locus Plots (Continued.)

Lecture 32 - Compensator Design Using Root Locus Plots (Continued.)

Lecture 33 - Compensator Design Using Root Locus Plots (Continued.)

Lecture 34 - Compensator Design Using Root Locus Plots (Continued.)

Lecture 35 - The Nyquist Stability Criterion and Stability Margins

Lecture 36 - The Nyquist Stability Criterion and Stability Margins (Continued.)

Lecture 37 - The Nyquist Stability Criterion and Stability Margins (Continued.)

Lecture 38 - The Nyquist Stability Criterion and Stability Margins (Continued.)

Lecture 39 - Feedback System Performance Based on the Frequency Response

Lecture 40 - Feedback System Performance Based on the Frequency Response (Continued.)

Lecture 41 - Compensator Design Using Frequency Response Plots

NPTEL : Embedded Systems (Electrical Engineering)

Co-ordinators : Prof. Santanu Chaudhary

Lecture 1 - Embedded Systems: Introduction

Lecture 2 - Embedded Hardware

Lecture 3 - PIC: Instruction Set

Lecture 4 - PIC Peripherals On Chip

Lecture 5 - ARM Processor

Lecture 6 - More ARM Instructions

Lecture 7 - ARM: Interrupt Processing

Lecture 8 - Digital Signal Processors

Lecture 9 - More on DSP Processors

Lecture 10 - System On Chip (SOC)

Lecture 11 - Memory

Lecture 12 - Memory Organization

Lecture 13 - Virtual Memory and Memory Management Unit

Lecture 14 - Bus Structure

Lecture 15 - Bus Structure - 2

Lecture 16 - Bus Structure - 3 Serial Interfaces

Lecture 17 - Serial Interfaces

Lecture 18 - Power Aware Architecture

Lecture 19 - Software for Embedded Systems

Lecture 20 - Fundamentals of Embedded Operating Systems

Lecture 21 - Scheduling Policies

Lecture 22 - Resource Management

Lecture 23 - Embedded - OS

Lecture 24 - Networked Embedded Systems - I

Lecture 25 - Networked Embedded Systems - II

Lecture 26 - Networked Embedded Systems - III

Lecture 27 - Networked Embedded Systems - IV

Lecture 28 - Designing Embedded Systems - I

Lecture 29 - Designing Embedded Systems - II

Lecture 30 - Designing Embedded Systems- III

Lecture 31 - Embedded System Design - IV

Lecture 32 - Designing Embedded Systems - V

Lecture 33 - Platform Based Design

Lecture 34 - Compilers for Embedded Systems

Lecture 35 - Developing Embedded Systems

Lecture 36 - Building Dependable Embedded Systems

Lecture 37 - Pervasive and Ubiquitous Computing

NPTEL : Power System Generation, Transmission and Distribution (Encapsulated from earlier Video) (Electrical Engineering)

Co-ordinators : Prof. D.P. Kothari

Lecture 1 - Electric Energy Systems A Perspective

Lecture 2 - Structure of Power Systems

Lecture 3 - Conventional Sources of Electric Energy

Lecture 4 - Hydroelectric Power Generation

Lecture 5 - Non Conventional Energy Sources

Lecture 6 - Renewable Energy (Continued.)

Lecture 7 - Energy Storage

Lecture 8 - Deregulation

Lecture 9 - Air Pollutants

Lecture 10 - Transmission Line Parameters

Lecture 11 - Capacitance of Transmission Lines

Lecture 12 - Characteristics and Performance of Transmission Lines

Lecture 13 - Voltage Regulation (VR)

Lecture 14 - Power Flow through a Line

Lecture 15 - Methods of Voltage Control

Lecture 16 - Compensation of Transmission Lines

Lecture 17 - Compensation of Transmission Lines (Continued.)

Lecture 18 - Underground Cables

Lecture 19 - Cables (Continued.)

Lecture 20 - Insulators for Overhead Lines

Lecture 21 - HVDC

Lecture 22 - HVDC (Continued.)

Lecture 23 - Distribution Systems

Lecture 24 - Automatic Generation Control

Lecture 25 - Automatic Generation Control (Continued.)

Lecture 26 - Load Flow Studies

Lecture 27 - Load Flow Problem

Lecture 28 - Load Flow Analysis (Continued.), Gauss Siedel Method

Lecture 29 - Newton Raphson (NR), Load Flow Method

Lecture 30 - Fast Decoupled Load Flow

Lecture 31 - Control of Voltage Profile

Lecture 32 - Optimal System Operation (Economic Operation)

Lecture 33 - Optimal Unit Commitment

Lecture 34 - Optimal Generation Scheduling

Lecture 35 - Optimal Load Flow (Continued.) and Hydro Thermal Scheduling

NPTEL : Power System Dynamics (Electrical Engineering)

Co-ordinators : Dr. M.L. Kothari

Lecture 1 - Introduction to Power System Stability Problem - Part-1

Lecture 2 - Introduction to Power System Stability Problem - Part-2

Lecture 3 - Introduction to Power System Stability Problem - Part-3

Lecture 4 - Solution of Switching Equation

Lecture 5 - The Equal Area Criterion for Stability - Part-1

Lecture 6 - The Equal Area Criterion for Stability - Part-2

Lecture 7 - Transient Stability Analysis of a Multi Machine System

Lecture 8 - Modeling of Synchronous Machine - Part-1

Lecture 9 - Modeling of Synchronous Machine - Part-2

Lecture 10 - Modeling of Synchronous Machine - Part-3

Lecture 11 - Modeling of Synchronous Machine - Part-4

Lecture 12 - Synchronous Machine Representation for Stability Studies - Part-1

Lecture 13 - Synchronous Machine Representation for Stability Studies - Part-2

Lecture 14 - Excitation Systems - Part-1

Lecture 15 - Excitation Systems - Part-2

Lecture 16 - Modeling of Excitation Systems - Part-1

Lecture 17 - Modeling of Excitation Systems - Part-2

Lecture 18 - Small Signal Stability of a Single Machine Infinite Bus System - Part-1

Lecture 19 - Small Signal Stability of a Single Machine Infinite Bus System - Part-2

Lecture 20 - Small Signal Stability of a Single Machine Infinite Bus System - Part-3

Lecture 21 - Small Signal Stability of a Single Machine Infinite Bus System - Part-4

Lecture 22 - Small Signal Stability of a Single Machine Infinite Bus System - Part-5

Lecture 23 - Dynamic Modeling of Steam turbines and Governors

Lecture 24 - Dynamic modeling of Hydro Turbines and Governors

Lecture 25 - Load modeling for Stability Studies

Lecture 26 - Numerical Integration Methods for Solving a Set of Ordinary Nonlinear Differential Equation

Lecture 27 - Simulation of Power System Dynamic Response

Lecture 28 - Dynamic Equivalents for Large Scale Systems - Part-1

Lecture 29 - Dynamic Equivalents for Large Scale Systems - Part-2

Lecture 30 - Dynamic Equivalents for Large Scale Systems - Part-3

Lecture 31 - Direct Method of Transient Stability Analysis - Part-1

Lecture 32 - Direct Method of Transient Stability Analysis - Part-2

Lecture 33 - Sub Synchronous Oscillations - Part-1

Lecture 34 - Sub Synchronous Oscillations - Part-2

Lecture 35 - Voltage Stability - Part-1

Lecture 36 - Voltage Stability - Part-2

Lecture 37 - Voltage Stability - Part-3

Lecture 38 - Voltage Stability - Part-4

Lecture 39 - Methods of Improving Stability - Part-1

Lecture 40 - Methods of Improving Stability - Part-2

NPTEL : Analog Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

Lecture 1 - Review of DC Models of Diodes & BJT's

Lecture 2 - Review of DC Models of BJT (Continued...) and FET

Lecture 3 - FET Characteristics and Models

Lecture 4 - Problem Session-1 on DC Analysis of BJT Circuits

Lecture 5 - BJT Biasing and Bias Stability

Lecture 6 - BJT Bias Stability (Continued...)

Lecture 7 - FET Biasing, Current Sources

Lecture 8 - Problem Session-2 on FET and BJT Characteristics and Biasing

Lecture 9 - Current Mirrors; BJT Small Signal Models

Lecture 10 - Small Signal Amplifiers: Mid Frequency Analysis

Lecture 11 - Mid Frequency Analysis of the CE and CB Amplifier

Lecture 12 - Problem Session-3 on Mid- Frequency Analysis of CE Amplifiers

Lecture 13 - Midband Analysis of CB and CC Amplifiers

Lecture 14 - Midband Analysis of FET Amplifiers

Lecture 15 - Problem Session-4 on Midband Analysis of Amplifiers

Lecture 16 - High Frequency Response of Small Signal Amplifiers

Lecture 17 - High Frequency Response of Small Signal Amplifiers (Continued...)

Lecture 18 - Low Frequency Response of Small Signal Amplifiers

Lecture 19 - Problem Session-5 on Frequency Response of Small Signal Amplifiers

Lecture 20 - Differential Amplifiers

Lecture 21 - Differential Amplifiers (Continued...)

Lecture 22 - Discussion on Minor-1 Problems and Differential Amplifiers (Continued...)

Lecture 23 - Problem Session-6 on Frequency Response of Small Signal Amplifiers (Continued...) and Differential Amplifiers

Lecture 24 - Use of Current Mirrors in Differential Amplifiers

Lecture 25 - FET Differential Amplifiers and Introduction to Power Amplifiers

Lecture 26 - Class B, Class AB and Class A Power Amplifiers

Lecture 27 - Class A Power Amplifiers; Efficiency Considerations

Lecture 28 - Problem Session-7 on Deferential and Power Amplifiers

Lecture 29 - Introduction to Feedback Amplifiers

Lecture 30 - Advantages of Negative Feedback Amplifiers

Lecture 31 - Analysis of Feedback Amplifiers

Lecture 32 - Analysis of the Series - Series and Other Feedback Configurations

Lecture 33 - Problem Session-8 on Feedback Amplifiers

Lecture 34 - Sinusoidal Oscillators : An Example of Positive Feedback

Lecture 35 - More on Oscillators

Lecture 36 - Solutions to Minor-2 Exam and Concluding Discussions on Oscillators

Lecture 37 - Problem Session-9 on Oscillators

Lecture 38 - Tuned (or Narrowband) Amplifiers

Lecture 39 - Widebanding Techniques : Introduction & Use of Inductors

Lecture 40 - Widebanding By Using an Inductance

Lecture 41 - Problem Session-10 on Tuned Amplifiers

Lecture 42 - Widebanding by Using Compound Devices

Lecture 43 - Cascode Configuration as Wideband Amplifier

Lecture 44 - Widebanding by Local Feedback

Lecture 45 - Problem Session-11 on Minor-3 Problems & Widebanding by Compound Devices

Lecture 46 - Widebanding by Local Feedback and Feedback Cascades

Lecture 47 - Widebanding by Overall Feedback and Dual Loop Feedback

Lecture 48 - The Differential Pair and the Gilbert Cell as Wideband Amplifiers

Lecture 49 - Correction to Gilbert Cell Analysis and Operational Amplifier Imperfections

Lecture 50 - Op-Amp offsets, Compensation and Slew Rate

Lecture 51 - Op-Amp Compensation, Slew Rate and Some Problems

NPTEL : Digital Communication (Electrical Engineering)

Co-ordinators : Prof. Surendra Prasad

Lecture 1 - Introduction to the Course

Lecture 2 - Digital Representation of Analog Signals, Delta Modulation

Lecture 3 - Digital Representation of Analog Signals, Pulse Code Modulation

Lecture 4 - Digital Representation of Analog Signals

Lecture 5 - Quantization Noise in Delta Modulation (Continued...) and Time Division Multiplexing

Lecture 6 - Introduction to Line Coding

Lecture 7 - Spectral Properties of Line Codes: General Relations

Lecture 8 - Spectral Properties of Line Codes: On-off / Polar / Bipolar Signalling

Lecture 9 - Spectral Properties of Line Codes: Duobinary Manchester and HDB Codes

Lecture 10 - Baseband Pulse Shaping: Nyquist's First Criterion

Lecture 11 - Baseband Pulse Shaping; Raised Cosine Family of Pulses

Lecture 12 - Partial Response Signalling: Duobinary and Modified Duobinary Pulse Shaping

Lecture 13 - Precoding for Duobinary and Modified Duobinary Systems

Lecture 14 - Precoding for Modified Duobinary Systems (Continued...) and General Partial Response Signalling

Lecture 15 - Binary Baseband Digital Modulation Techniques

Lecture 16 - Mâ€™ary Baseband Digital Modulation Techniques

Lecture 17 - Passband Digital Modulations - I : PSK and QPSK

Lecture 18 - Passband Digital Modulations - II : Offset QPSK

Lecture 19 - Passband Digital Modulations - III : Minimum Shift Keying (MSK)

Lecture 20 - Passband Digital Modulations - IV : MSK (Continued...) : Passband Waveforms for Mâ€™ary Signalling

Lecture 21 - Passband Modulations for Band Limited Channels

Lecture 22 - Baseband and Passband Digital Demodulations : General Issues and Concepts

Lecture 23 - Digital Modulation Part - II Matched Filters

Lecture 24 - Matched Filters and Coherent Demodulation-I

Lecture 25 - Coherent Demodulation for Binary Wave Form

Lecture 26 - Demodulators for Binary Waveforms (Continued...) : Coherent and Noncoherent Receivers for Orthogonal Signalling (OOK and FSK)

Lecture 27 - Performance Analysis of Binary Digital Modulations: Signal and Noise Statistics in Coherent and Noncoherent Receivers

Lecture 28 - Error Rates for Binary Signalling : Coherent Receivers

Lecture 29 - Performance of Non Coherent FSK and Differential Phase Shift Keying

Lecture 30 - Demodulation of DPSK and M\'ary Signals

Lecture 31 - Performance of M\'ary Digital Modulations

Lecture 32 - Performance of M\'ary Digital Modulations (Continued...)

Lecture 33 - Introduction to Information Theory, Part-1

Lecture 34 - Source Coding

Lecture 35 - Error Free Communication Over a Noisy Channel

Lecture 36 - The Concept of Channel Capacity

Lecture 37 - Error Correcting Codes

Lecture 38 - Error Correcting Codes (Continued...)

NPTEL : Introduction To Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

Lecture 1 - Introduction to the Course and Basic Electrical Quantity

Lecture 2 - R.L.C. Components, Energy Considerations, Sources and Circuit Laws

Lecture 3 - KCL, KVL and Network Analysis

Lecture 4 - Networks Theorems (Thevenin's Norton's)

Lecture 5 - Source Transformation; Super Position Theorem and Non-Linear One-Ports

Lecture 6 - Signal Wave Forms

Lecture 7 - Periodic Wave Forms and Elements of Amplifiers

Lecture 8 - Operational Amplifiers and Diodes

Lecture 9 - Rectifiers and Power Supplies

Lecture 10 - Wave Shaping Circuits

Lecture 11 - More on Wave Shaping Circuits and Introduction to Natural Response of Circuits

Lecture 12 - Natural Response (Continued...)

Lecture 13 - Natural Response of 2nd Order Circuit

Lecture 14 - Natural Response of 2nd Order Circuit (Continued...)

Lecture 15 - Impedance Functions, Poles, Zeros and their Applications

Lecture 16 - Natural Response and Poles and Zeros and Introduction to Forced Response

Lecture 17 - Phasors and their Applications in AC Ckts, analysis

Lecture 18 - More About Phasors and Introduction to Complete Response

Lecture 19 - Complete Response of Electrical Circuits

Lecture 20 - AC Circuit Analysis

Lecture 21 - Filter Circuits and Resonance

Lecture 22 - Resonance (Continued...)

Lecture 23 - General Network Analysis

Lecture 24 - Two-Port Networks

Lecture 25 - Semiconductor Physics

Lecture 26 - Semiconductor Physics (Continued...)

Lecture 27 - More About Diodes Including Zener Diodes

Lecture 28 - Bipolar Junction Transistors

Lecture 29 - Transistors Characteristics and Biasing

Lecture 30 - BJT Biasing and Introduction to Power Amplifiers

Lecture 31 - BJT Power Amplifiers

Lecture 32 - Power Amplifier

Lecture 33 - Power Amplifiers (Continued...) and an Introduction to Small Signal Modelling of BJT

Lecture 34 - Small Signal Model and Small Signal Amplifiers

Lecture 35 - Small Signal Amplifiers (Continued...)

Lecture 36 - Small Signal Amplifier (Continued...)

Lecture 37 - Small Signal Amplifiers (Continued...)

Lecture 38 - Negative Feedback

Lecture 39 - Digital Circuits

Lecture 40 - Digital Circuits (Continued...)

NPTEL : NOC:Analog Electronic Circuit (Electrical Engineering)

Co-ordinators : Dr. Shouribrata Chatterjee

Lecture 1 - Introduction to Analog Circuits Introduction to the Diode

Lecture 2 - Diodes, Introduction to The Transistor

Lecture 3 - MOS Device, Characteristics

Lecture 4 - DC operating point

Lecture 5 - DC operating point, amplifier design

Lecture 6 - Common source amplifier, small signal analysis

Lecture 7 - Common gate, common drain

Lecture 8 - Common gate circuit

Lecture 9 - Source degenerated amplifier

Lecture 10 - Swing limits

Lecture 11 - Swing limits (Continued...), multi transistor amplifiers

Lecture 12 - Multi-transistor amplifiers

Lecture 13 - Introduction to current sources

Lecture 14 - Current sources/mirrors (Continued...)

Lecture 15 - Current sources, biasing

Lecture 16 - Differential circuits

Lecture 17 - Differential amplifiers-I

Lecture 18 - Differential amplifiers-II

Lecture 19 - Differential amplifiers-III

Lecture 20 - Self biased active load diff. amp

Lecture 21 - Diff. Cascode amplifier, two stage amplifiers

Lecture 22 - Two stage diff. amps, op-amps

Lecture 23 - Op-amps, OTAs

Lecture 24 - Circuits with op-amps

Lecture 25 - Capacitance in MOS devices

Lecture 26 - Common source, drain, gate-revisited

Lecture 27 - Common gate, common drain with capacitances

Lecture 28 - Cascode, cascade-revisit with capacitance

Lecture 29 - Cascade amplifier (with capacitance)

Lecture 30 - Diversion: 2-pole systems phase margin

Lecture 31 - Diversion Continued: Two Pole Systems

Lecture 32 - Compensation

Lecture 33 - Op-amp Design with Compensation

Lecture 34 - Unity Gain Bandwidth

Lecture 35 - Power Amplification

Lecture 36 - Power Amplifiers-2

Lecture 37 - Power Amplifiers- Class A,B,AB,C ClassD

Lecture 38 - Class D Amplifiers, Push-pull Amplifiers

Lecture 39 - Introduction to Voltage Regulators

Lecture 40 - Voltage Regulators- line, load; Conclusion Regulation

NPTEL : NOC:Nonlinear and Adaptive Control (Electrical Engineering)

Co-ordinators : Prof. Shubhendu Bhasin

Lecture 1 - Introduction

Lecture 2 - Preliminaries

Lecture 3 - Model Reference Adaptive Control - Part 1

Lecture 4 - Model Reference Adaptive Control - Part 2

Lecture 5 - Model Reference Adaptive Control - Part 3

Lecture 6 - Adaptive Command Tracking

Lecture 7 - Robust Model Reference Adaptive Control - Part 1

Lecture 8 - Robust Model Reference Adaptive Control - Part 2

Lecture 9 - Robust Model Reference Adaptive Control - Part 3

Lecture 10 - Robust Model Reference Adaptive Control - Part 4

NPTEL : NOC:Information Theory, Coding and Cryptography (Electrical Engineering)

Co-ordinators : Prof. Ranjan Bose

Lecture 1 - Introduction to Information Theory

Lecture 2 - Entropy, Mutual Information, Conditional and Joint Entropy

Lecture 3 - Measures for Continuous, Random Variable, Relative Entropy

Lecture 4 - Variable Length Codes, Prefix Codes

Lecture 5 - Source Coding Theorem

Lecture 6 - various source coding Techniques: Huffman, Arithmetic, Lempel Ziv, Run Length

Lecture 7 - Optimum Quantizer, Practical Application of Source Coding: JPEG Compression

Lecture 8 - Introduction to Super Information

Lecture 9 - Channel Models and Channel Capacity

Lecture 10 - Noisy Channel Coding Theorem

Lecture 11 - Gaussian Channel and Information Capacity Theorem

Lecture 12 - Capacity of MIMO Channels

Lecture 13 - Introduction to Error Control Coding

Lecture 14 - Introduction to Galois Field

Lecture 15 - Equivalent Codes, Generator Matrix and Parity Check Matrix

Lecture 16 - Systematic Codes, Error Detections and Correction

Lecture 17 - Erasure and Errors, Standard Array and Syndrome Decoding

Lecture 18 - Probability of Error, Coding Gain and Hamming Bound

Lecture 19 - Hamming Codes, LDPC Codes and MDS Codes

Lecture 20 - Introduction to Cyclic Codes

Lecture 21 - Generator Polynomial, Syndrome Polynomial and Matrix Representation

Lecture 22 - Fire Code, Golay Code, CRC Codes and Circuit Implementation of Cyclic Codes

Lecture 23 - Introduction to BCH Codes: Generator Polynomials

Lecture 24 - Multiple Error Correcting BCH Codes, Decoding of BCH Codes

Lecture 25 - Introduction to Reed Solomon (RS) Codes

Lecture 26 - Introduction to Convolutional Codes

Lecture 27 - Trellis Codes: Generator Polynomial Matrix and Encoding using Trellis

Lecture 28 - Vitrebi Decoding and Known good Convolutional Codes

Lecture 29 - Introduction to Turbo Codes

Lecture 30 - Introduction to Trellis Coded Modulation (TCM)

Lecture 31 - Ungerboek's Design Rules and Performance Evaluation of TCM Schemes

Lecture 32 - TCM for Fading Channel and Space Time Trellis Codes (STTC)

Lecture 33 - Introduction to Space Time Block Codes (STBC)

Lecture 34 - Space Time Codes

Lecture 35 - Space Time Codes (Continued...)

Lecture 36 - Introduction to Cryptography: Symmetric key and Asymmetric Key Cryptography

Lecture 37 - Some Well-Known Algorithms: DES, IDEA, PGP, DH Protocol

Lecture 38 - Introduction to Physical Layer Security: Notion of Secrecy Capacity

Lecture 39 - Secrecy Outage Capacity, Secrecy Outage Probability, Cooperative Jamming

NPTEL : Engineering Electromagnetics (Electrical Engineering)

Co-ordinators : Prof. Sheel Aditya

Lecture 1 - Introduction

Lecture 2 - Transmission Lines : Wave Propagation

Lecture 3 - Transmission Lines : Reflection,Transmission; Travelling Waves

Lecture 4 - Transmission Lines : Travelling Waves (Continued...); Sinusoidal Signals; Impedence Transformation

Lecture 5 - Transmission Lines : Standing Wave Ratio:Measurement of Impedence

Lecture 6 - Transmission Lines : General Transmission Lines Equations,Low loss,Transmission Lines,Transmission Lines as Circuit Elements

Lecture 7 - Transmission Lines : Section as Circuit Elements

Lecture 8 - Transmission Lines : Velocities of Propagation, Transmission Lines Charts

Lecture 9 - Transmission Lines : Smith Chart

Lecture 10 - Transmission Lines : Impedance Matching using Stub-Lines

Lecture 11 - Transmission Lines : Transmission Lines Parameters; (primary Constants)

Lecture 12 - Wave Propagation

Lecture 13 - Wave Propagation (Continued...)

Lecture 14 - Wave Propagation : Polarisation,Poynting Vector

Lecture 15 - Wave Propagation : Power Flow,Complex Poynting vector,wave equation for a conducting Medium

Lecture 16 - Wave Propagation : Conducting Medium;Conductors and Dielectrics Depth of Penetration;Surface Impedance

Lecture 17 - Wave Propagation : Surface Impedance; Power Loss in a Conductor Reflection at a Perfect conductor (Normal Inc.)

Lecture 18 - Reflection and Refraction of waves : Reflection at the Surface of a Conducting Medium,Reflection at a Perfect Conductor (Oblique Inc.)

Lecture 19 - Reflection and Refraction of waves (Continued...)

Lecture 20 - Reflection and Refraction of waves (Continued...) - 1

Lecture 21 - Reflection and Refraction of waves (Continued...); The Plane slab

Lecture 22 - Reflection and Refraction of waves (Continued...); Transmission Line Analogy for Planes Waves

Lecture 23 - Wave Guides

Lecture 24 - Wave Guides (Continued...) Parallel plane Guide,Transverse Electric Waves,Field Distribution,Superposition of Plane Waves

Lecture 25 - Wave Guides (Continued...)

Lecture 26 - Wave Guides (Continued...) Parallel plane Guide,Characteristics of TE and Tm Waves,TEM Waves,Wave Impedances

Lecture 27 - Wave Guides (Continued...) - 1

Lecture 28 - Wave Guides (Continued...) - 2

Lecture 29 - Wave Guides (Continued...) Rectangular Wave Guides

Lecture 30 - Wave Guides (Continued...)

Lecture 31 - Wave Guides (Continued...) Rectangular Wave Guides - 1

Lecture 32 - Resonators General Properties

Lecture 33 - Resonators (Continued...) Transmission Line Resonators

Lecture 34 - Resonators (Continued...) Wave Guide Resonators

Lecture 35 - Radiation

Lecture 36 - Radiation (Continued...)

Lecture 37 - Radiation (Continued...) - 1

Lecture 38 - Radiation (Continued...) - 2

Lecture 39 - Radiation (Continued...) Monopole Antennas half Wave Dipole Antenna

Lecture 40 - Radiation (Continued...)

Lecture 41 - Radiation (Continued...) 2 - Element Arrays,Yagi-Uda Array

NPTEL : NOC:Principles of Digital Communications (2018) (Electrical Engineering)

Co-ordinators : Prof. Abhishek Dixit

Lecture 1 - Introduction

Lecture 2 - Signal Spaces : Waveforms and Vector Spaces

Lecture 3 - Inner Product and Orthogonal Expansion

Lecture 4 - Signal Spaces : Gram Schmidt Orthogonalization and Receiver Structures

Lecture 5 - Signal Spaces : Fourier Series and Related expansions

Lecture 6 - Signal Spaces : Bandwidth and Degree of Freedom

Lecture 7 - Random Variables and Random Processes : Discrete Random Variable

Lecture 8 - Random Variables and Random Processes : Continuous Random Variable

Lecture 9 - Random Variables and Random Processes : Multiple Random Variable

Lecture 10 - Random Variables and Random Processes : Random Vectors

Lecture 11 - Random Variables and Random Processes : Introduction to Random Process

Lecture 12 - Random Variables and Random Processes : Properties of Random Process

Lecture 13 - Random Variables and Random Processes : Gaussian Random Process - Part 1

Lecture 14 - Random Variables and Random Processes : Gaussian Random Process - Part 2

Lecture 15 - Random Variables and Random Processes : Types of Random Process

Lecture 16 - Random Variables and Random Processes : Random Process through an LTI system

Lecture 17 - Random Variables and Random Processes : Spectral description of Random Process

Lecture 18 - Waveform Coding

Lecture 19 - Modulation : Complex Baseband Representation of Passband Signals - Part 1

Lecture 20 - Modulation : Complex Baseband Representation of Passband Signals - Part 2

Lecture 21 - Modulation : Complex Baseband Representation of Passband Signals - Part 3

Lecture 22 - Modulation : Spectral Description of Sources - Part 1

Lecture 23 - Modulation : Spectral Description of Sources - Part 2

Lecture 24 - Modulation : Spectral Description of Sources using Markov Chains and Cyclostationary Random Processes

Lecture 25 - Modulation : Nyquist Pulses

Lecture 26 - Modulation : Pulse Amplitude Modulation and Quadrature Amplitude Modulation - Part 1

Lecture 27 - Modulation : Pulse Amplitude Modulation and Quadrature Amplitude Modulation - Part 2

Lecture 28 - Modulation : Orthogonal Modulation Schemes

Lecture 29 - Modulation : Differential Modulation Schemes

Lecture 30 - Detection : Maximum Aposteriori Probability (MAP) Detector and Maximum Likelihood (ML) Detector

Lecture 31 - Detection : Vector Detection

Lecture 32 - Detection : Theorem of Irrelevance and Waveform Detection

Lecture 33 - Detection : Sequence Detection

Lecture 34 - Detection : Performance of Binary Signalling Schemes

Lecture 35 - Detection : Performance of M-ary Signaling Schemes

Lecture 36 - Detection : Performance of Orthogonal Modulation Schemes and Bit-Level Demodulation

Lecture 37 - Detection : Performance of Non-Coherent Systems Systems

Lecture 38 - Detection : Fading Channel

NPTEL : NOC:Electric Vehicles - Part 1 (Electrical Engineering)

Co-ordinators : Prof. Amit Jain

Lecture 1 - Introduction - EV Historical Background

Lecture 2 - Introduction - EV Benefits of Using EVs

Lecture 3 - Introduction - EV Overview of types of EVs and its Challenges

Lecture 4 - Introduction - EV Motor Drive Technologies

Lecture 5 - Introduction - EV Energy Source Technologies

Lecture 6 - Introduction - EV Battery Charging Technologies

Lecture 7 - Introduction - EV Vehicle to Grid

Lecture 8 - Introduction - EV Subsystems and Configurations

Lecture 9 - Introduction - HEV Subsystems and Configurations

Lecture 10 - Introduction - HEV Subsystems and Modes of Operation

Lecture 11 - Vehicle Dynamics Introduction and tractive effort

Lecture 12 - Vehicle Dynamics and dynamic equation

Lecture 13 - Vehicle Dynamics simulation dynamic equation constant Fte

Lecture 14 - Vehicle Dynamics dynamic equation variable Fte

Lecture 15 - Vehicle Dynamics simulation dynamic equation variable Fte

Lecture 16 - Vehicle Dynamics Modelling and simulation in Simulink

Lecture 17 - Summary Electric Vehicles Part 1 Course

Lecture 18 - Basics of DC Motor Drive

Lecture 19 - Realization of DC Chopper

Lecture 20 - Open Loop Operation of Chopper Fed DC Motor Drive

Lecture 21 - Review of Control Theory

Lecture 22 - Modeling and Current Controller Design for Separately Excited DC Motor Drive

Lecture 23 - Speed Controller Design and Performance Evaluation of DC Motor Drive

Lecture 24 - Fundamentals of Three Phase Induction Motor

Lecture 25 - Equivalent Circuit and Torque-Speed Characteristics of Induction Motor

Lecture 26 - Starting and Speed Control of Induction Motor

Lecture 27 - Realisation of DC to AC Power Converter

Lecture 28 - Impact of Non-Sinusoidal Voltage on Induction Motor

Lecture 29 - Selective Harmonic Elimination and Optimal Pulse Width Modulation Techniques

Lecture 30 - Switching Energy Losses and Sine-Triangle PWM

Lecture 31 - Analysis of Sine-Triangle PWM

Lecture 32 - Simulation Studies on Open Loop Induction Motor Drive

NPTEL : NOC:Power Electronics (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

Lecture 1 - Introduction to Power Electronics

Lecture 2 - Power Devices: Diodes and SCR

Lecture 3 - Power Devices: SCR, Triac, GTO and BJT

Lecture 4 - Power Devices: BJT, MOSFET and IGBT

Lecture 5 - Single-phase Uncontrolled Rectifiers

Lecture 6 - Single-phase Controlled Rectifiers - I

Lecture 7 - Single-phase Controlled Rectifiers - II

Lecture 8 - Three Phase Rectifiers - I

Lecture 9 - Numericals on devices and Single-phase Rectifiers

Lecture 10 - Three Phase Rectifiers - II

Lecture 11 - Dual Converter and Communication Overlap

Lecture 12 - Communication Overlap - II and AC-AC Converter-Introduction

Lecture 13 - Single-Phase and Three-Phase AC Voltage Controllers

Lecture 14 - Three-Phase AC Voltage Controllers and Cycloconverters

Lecture 15 - Non-Isolated DC-DC Converters - I

Lecture 16 - Non-Isolated DC-DC Converters - II

Lecture 17 - Isolated DC-DC Converters - I

Lecture 18 - Isolated DC-DC Converters - II and Cuk Converters

Lecture 19 - Voltage Source Inverters

Lecture 20 - VSI PWM Techniques - I

Lecture 21 - VSI PWM Techniques - II

Lecture 22 - SPWM and SVM Technique

Lecture 23 - Current Source Inverter

Lecture 24 - Power Electronics Applications

NPTEL : NOC:Electrical Machines (Electrical Engineering)

Co-ordinators : Prof. G.Bhuvaneshwari

Lecture 1 - Introduction to Electrical Machines - I

Lecture 2 - Single-phase and Three-phase AC Circuits, Magnetic circuits

Lecture 3 - Magnetic Circuit - II

Lecture 4 - Magnetic Circuit - III

Lecture 5 - Transformers - Introduction

Lecture 6 - Transformers - Amp-Turn Balance, Ideal and practical transformers

Lecture 7 - Transformer Equivalent circuit and Reducing leakage

Lecture 8 - Transformer equivalent circuit parameter determination

Lecture 9 - Transformers - Voltage regulation and efficiency

Lecture 10 - Auto-transformers

Lecture 11 - PU notation and Intoduction to Instrument transformers

Lecture 12 - Instrument Transformers and All Day Efficiency

Lecture 13 - Three Phase Transformers - I

Lecture 14 - Three Phase Transformers - II

Lecture 15 - Electromechanical Energy Conversion - I

Lecture 16 - Electromechanical Energy Conversion - II

Lecture 17 - Electromechanical Energy Conversion - III

Lecture 18 - DC Machines-Introduction, Constructional Features

Lecture 19 - DC Machines - EMF and Torque Equations and Generator Operation

Lecture 20 - DC Machines - OCC and Load Charactristics Classification

Lecture 21 - DC Machines - Armature Reaction

Lecture 22 - DC Machines - Voltage Build-up and Load Characteristics

Lecture 23 - DC Generator Characteristics and Introduction to DC Motors

Lecture 24 - DC Motors: Basics and Speed-Torque Relationship

Lecture 25 - DC Motor: Speed Control (Shunt and Separately Exicited Motor)

Lecture 26 - DC Motor: Speed Control (Series and Compound Motor)

Lecture 27 - DC Machine: Starting and Braking

Lecture 28 - DC Machine: Comutation

Lecture 29 - 3 Phase Induction Machine: Constructional Features and Principle of Operation

Lecture 30 - 3 Phase Induction Machine: Equivalent Circuit

Lecture 31 - 3 Phase Induction Machine: Speed Torque Characteristics

Lecture 32 - Testing of Induction Motor: OC and SC Test

Lecture 33 - 3 Phase Induction Machine: Starting Methods

Lecture 34 - Synchronous Machines: Introduction

Lecture 35 - Synchronous Machines: Constructional Features

Lecture 36 - Numerical Session

Lecture 37 - Synchronization of Alternators

Lecture 38 - Synchronous Machines: Equivalent Circuit and Phasor Diagram

Lecture 39 - Synchronous Machines: OC and SC Test

Lecture 40 - Synchronous Machines: Power Angle Relationship, V and Inverted V Curves

Lecture 41 - Single Phase Induction Motors

NPTEL : Special Electromechanical Systems (Electrical Engineering)

Co-ordinators : Prof. S.S. Murthy

Lecture 1 - Special Electromechanical Systems (Introduction)

Lecture 2 - Classification of Machines

Lecture 3 - Single and Two-Phase Motors

Lecture 4 - Single-Phase Induction Motors-Analysis

Lecture 5 - Starting of Single-Phase Induction Motors

Lecture 6 - Single-Phase Induction Motors Analysis

Lecture 7 - Induction Motors Analysis by Symmetrical Components

Lecture 8 - Modelling of 1-Phase Induction Motor (One and Two Windings)

Lecture 9 - Asymmetrical Induction Motor Generalized Rotating Field Theory

Lecture 10 - Generalized Rotating Field Theory (Continued...)

Lecture 11 - Generalized Rotating Field Theory (Continued...)

Lecture 12 - Generalized Rotating Field Theory (Continued...)

Lecture 13 - Analysis of Asymmetrical Machine by Generalized Rotating Field Theory

Lecture 14 - Analysis of Asymmetrical Machine

Lecture 15 - Analysis of Asymmetrical Induction Machine

Lecture 16 - Generalised Rotating-Field Theory of Wound Rotor Ind. Machine Having Asymmetry in Stator and Rotor Windings

Lecture 17 - Generalised Rotating-Field Theory of Wound Rotor Ind. Machine Having Asymmetry in Stator and Rotor Windings (Continued...)

Lecture 18 - Testing of Small Electrical Machines

Lecture 19 - Testing of 1-Phase Induction Motors

Lecture 20 - Variable Reluctance (VR) Motors

Lecture 21 - Switched Reluctance Motor (Continued...)

Lecture 22 - Switched Reluctance Motor (Continued...)

Lecture 23 - Switched Reluctance Motor (Continued...)

Lecture 24 - Stepper Motors

Lecture 25 - Stepper Motors (Continued...)

Lecture 26 - Induction Generators

Lecture 27 - Induction Generators (Continued...)

Lecture 28 - Doubly Fed Induction Generators

Lecture 29 - Self Excited Induction Generators

Lecture 30 - Self Excited Induction Generators (Continued...)

Lecture 31 - Permanent Magnet Machines

Lecture 32 - Squareware Permanent Magnet Brushless Motor Drive

Lecture 33 - Sine Wave Permanent Magnet Brushless Motor Drives

Lecture 34 - Permanent Magnet Synchronous Motors

NPTEL : NOC:High Power Multilevel Converters - Analysis, Design and Operational Issues (Electrical Engineering)

Co-ordinators : Prof. Anand Rup

Lecture 1 - Basic Understanding of Converter (Introduction to Power Converters)

Lecture 2 - Basic Understanding of Converter (Half Bridge and Full Bridge Circuit Operation)

Lecture 3 - Basic Understanding of Converter (Sinusoidal Pulse width Modulation and Three Phase Circuit)

Lecture 4 - Basic Understanding of Converter (Harmonics in Sinusoidal PWM)

Lecture 5 - Third harmonic addition in Sine PWM

Lecture 6 - Introduction to Space Vectors

Lecture 7 - Space Vector PWM - Timing Calculation

Lecture 8 - Space Vector PWM - Switching Sequence

Lecture 9 - Space Vector PWM - Using Carriers

Lecture 10 - Basic Introduction to Power Devices

Lecture 11 - Introduction to Multilevel Converters

Lecture 12 - Cascaded H-bridge Multilevel Converters

Lecture 13 - Output Voltage Waveform Synthesis in CHB Converter and Basic of Asymmetrical CHB Converters

Lecture 14 - Cascaded H-Bridge Converters: Phase-Shifted PWM

Lecture 15 - Cascaded H-Bridge Converters: Level-Shifted PWM

Lecture 16 - Fault Tolerant Operation of Cascaded H-Bridge Converter - Part I

Lecture 17 - Fault Tolerant Operation of Cascaded H-Bridge Converter - Part II

Lecture 18 - Modular Multilevel Converter - Topology and Operation

Lecture 19 - Modular Multilevel Converter - Arm and Cell Voltage Ratings

Lecture 20 - Modular Multilevel Converter - Arm Currents

Lecture 21 - Modular Multilevel Converter - Arm Energy Balancing

Lecture 22 - Modular Multilevel Converter - Different Circuit Topologies

Lecture 23 - Modular Multilevel Converter - PWM Technique and Capacitor Voltage Balancing

Lecture 24 - Modular Multilevel Converter - Fault Tolerant Operation and Commercial Production

Lecture 25 - Design of Components in MMC

Lecture 26 - Neutral Point Clamped Converter - Circuit Topology - Part I

Lecture 27 - Neutral Point Clamped Converter - Circuit Topology - Part II

Lecture 28 - Neutral Point Clamped Converter - Space Vector Diagram

Lecture 29 - Neutral Point Clamped Converter - Space Vector PWM

Lecture 30 - NPC - Sinusoidal PWM and Space Vector PWM using Single Carrier Strategy

Lecture 31 - Neutral Point Clamped Converter - Mid-point Voltage Fluctuations

Lecture 32 - Neutral Point Clamped Converter - Capacitor Voltage Balancing

Lecture 33 - Neutral Point Clamped Converter - Another Strategy of Capacitor Voltage Balancing

Lecture 34 - Other Topologies of NPC Converters - Higher Level NPC, TNPC and Active NPC

Lecture 35 - Multipulse Transformer - Part I

Lecture 36 - Multipulse Transformer - Part II

Lecture 37 - A Case Study on MMC and CHB

Lecture 38 - Basics of Gate Driver Circuits

Lecture 39 - Gate Driver Circuits - Turn-on and Turn-off Process

Lecture 40 - Gate Driver Circuits - Features of Gate Drivers and Basics of Bootstrap Functionality

Lecture 41 - Condition Monitoring of Converters

Lecture 42 - Other Converter Topologies

Lecture 43 - Summary of the Course

NPTEL : NOC:Introduction to Embedded System Design (Electrical Engineering)

Co-ordinators : Prof. Badri N Subudhi, Prof.Dhananjay V. Gadre

Lecture 1 - Introduction

Lecture 2 - Introduction continued with Project demos

Lecture 3 - Modular Approach to ESD

Lecture 4 - Modular Approach to ESD (Continued...)

Lecture 5 - Salient Features of Modern Microcontrollers

Lecture 6 - Salient Features of Modern Microcontrollers (Continued...)

Lecture 7 - Elements of Microcontroller Ecosystem

Lecture 8 - Elements of Microcontroller Ecosystem (Continued...)

Lecture 9 - Power Supply for Embedded Systems

Lecture 10 - Power Supply for Embedded Systems (Continued...)

Lecture 11 - Introduction to MSP430

Lecture 12 - MSP430 Architecture

Lecture 13 - MSP430 Architecture- (Continued...) And Introduction to Lunchbox

Lecture 14 - Programming Methods for MSP430

Lecture 15 - Physical Interfacing - 1

Lecture 16 - Physical Interfacing - 2

Lecture 17 - Physical Interfacing - 3

Lecture 18 - Physical Interfacing - 4

Lecture 19 - Physical Interfacing - 5

Lecture 20 - Physical Interfacing - 6

Lecture 21 - GIT, CCS Installation and Embedded C

Lecture 22 - MSP430 Digital I/O

Lecture 23 - MSP430 Digital I/O: Switch Interfacing

Lecture 24 - MSP430 Clock System and Reset

Lecture 25 - Interrupts in MSP430

Lecture 26 - Interrupts in MSP430 (Continued...)

Lecture 27 - Interfacing Seven Segment Displays with MSP430; Low Power Modes in MSP430

Lecture 28 - Interfacing Liquid Crystal Displays (LCD)

Lecture 29 - MSP430 Timer Module: Introduction and Timer Capture

Lecture 30 - Pulse Width Modulation, PWM using Timer Capture

Lecture 31 - Analog to Digital Converter in the MSP430

Lecture 32 - ADC and DAC using R2R Ladder and Random number generation using LFSR

Lecture 33 - Serial Communication Protocols, USCI Module in MSP430

Lecture 34 - MSP430 Timer in Capture Mode

Lecture 35 - Coding Ninja

Lecture 36 - Building an Electronics Project

Lecture 37 - Circuit Prototyping Techniques

Lecture 38 - Single Purpose Computers

Lecture 39 - Single Purpose Computers (Continued...)

Lecture 40 - Recap of Course Coverage and Project Demonstration from Concept to Final

NPTEL : NOC:Power Quality (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

Lecture 1 - Power Quality - An Introduction

Lecture 2 - Power Quality Standards and Monitoring

Lecture 3 - Power Quality Standards and Monitoring (Continued...)

Lecture 4 - Passive Shunt and Series Compensations

Lecture 5 - Passive Shunt and Series Compensations (Continued...)

Lecture 6 - Passive Shunt and Series Compensations (Continued...)

Lecture 7 - Active Shunt Compensation

Lecture 8 - Active Shunt Compensation (Continued...)

Lecture 9 - Active Shunt Compensation (Continued...)

Lecture 10 - Active Series Compensation

Lecture 11 - Active Series Compensation (Continued...)

Lecture 12 - Unified Power Quality Compensators

Lecture 13 - Unified Power Quality Compensators (Continued...)

Lecture 14 - Unified Power Quality Compensators (Continued...)

Lecture 15 - Loads Which Cause Power Quality Problems

Lecture 16 - Loads Which Cause Power Quality Problems (Continued...)

Lecture 17 - Passive Power Filters

Lecture 18 - Passive Power Filters (Continued...)

Lecture 19 - Passive Power Filters (Continued...)

Lecture 20 - Shunt Active Power Filters

Lecture 21 - Shunt Active Power Filters (Continued...)

Lecture 22 - Shunt Active Power Filters (Continued...)

Lecture 23 - Active Series Power Filters

Lecture 24 - Active Series Power Filters (Continued...)

Lecture 25 - Active Series Power Filters (Continued...)

Lecture 26 - Hybrid Power Filters

Lecture 27 - Hybrid Power Filters (Continued...)

Lecture 28 - Hybrid Power Filters (Continued...)

Lecture 29 - AC-DC Converters That Cause Power Quality

Lecture 30 - Improved Power Quality Converters - AC-DC Boost Converters

Lecture 31 - Improved Power Quality Converters - AC-DC Boost Converters (Continued...)

Lecture 32 - Improved Power Quality Converters - AC-DC Buck Converters

Lecture 33 - Improved Power Quality Converters - AC-DC Buck-Boost Converters

Lecture 34 - Improved Power Quality Converters - AC-DC Buck-Boost Converters (Continued...)

Lecture 35 - Improved Power Quality Converters - AC-DC Buck-Boost Converters (Continued...)

Lecture 36 - Three Phase AC-DC Improved Power Quality Converters

Lecture 37 - Multipulse Converters

Lecture 38 - Multipulse Converters (Continued...)

Lecture 39 - Multipulse Converters (Continued...)

Lecture 40 - Power Quality Improvement in Solar Energy Conversion System

Lecture 41 - Power Quality Improvement in Solar Energy Conversion System (Continued...)

Lecture 42 - Power Quality Improvement in Wind Energy Conversion System

Lecture 43 - Power Quality Improvement in Diesel Generator Set Based Power Supply System

Lecture 44 - Power Quality Improvement in Diesel Generator Set Based Power Supply System (Continued...)

Lecture 45 - Power Quality Improvement in Distributed Generation Sources Based Microgrids

NPTEL : NOC:Introduction to Electrical Engineering (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

NPTEL : NOC:Transducers for Instrumentation (Electrical Engineering)

Co-ordinators : Ankur Gupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

NPTEL : NOC:Computer-Aided Design of Electrical Machines (Electrical Engineering)

Co-ordinators : Prof. Bhim Singh

Lecture 1 - Course Outline and Introduction

Lecture 2 - Fundamental - I

Lecture 3 - Equivalent Circuit Approach to Design

Lecture 4 - Transformer Design - I

Lecture 5 - Transformer Design - II

Lecture 6 - Transformer Design - III

Lecture 7 - Transformer Design - IV

Lecture 8 - Windings in Electrical Machines

Lecture 9 - Design of DC Machine - I

Lecture 10 - Design of DC Machine - II

Lecture 11 - Design of DC Machine - III

Lecture 12 - Design of Three-Phase Induction Motors - I

Lecture 13 - Design of Three-Phase Induction Motors - II

Lecture 14 - Design of Three-Phase Induction Motors - III

Lecture 15 - Design of Three-Phase Induction Motors - IV

Lecture 16 - Design of Single-Phase Induction Machine - I

Lecture 17 - Design of Single-Phase Induction Machine - II

Lecture 18 - Design of Single-Phase Induction Machine - III

Lecture 19 - Design of Three-Phase Synchronous Machines - I

Lecture 20 - Design of Three-Phase Synchronous Machines - II

Lecture 21 - Design of Three-Phase Synchronous Machines - III

Lecture 22 - Design of Three-Phase Synchronous Machines - IV

Lecture 23 - Design of Synchronous Reluctance Machines - I

Lecture 24 - Design of Synchronous Reluctance Machines - II

Lecture 25 - Design of Synchronous Reluctance Machines - III

Lecture 26 - Design of Brushless PM Machines - I

Lecture 27 - Design of Brushless PM Machines - II

Lecture 28 - Design of Brushless PM Machines - III

Lecture 29 - Design of Brushless PM Machines - IV

Lecture 30 - Design of Brushless PM Machines - V

Lecture 31 - Design of Switched Reluctance Machines - I

Lecture 32 - Design of Switched Reluctance Machines - II

Lecture 33 - Design of Switched Reluctance Machines - III

Lecture 34 - Design of Stepper Machines - I

Lecture 35 - Design of Stepper Machines - II

Lecture 36 - Design of Axial Flux Machines - I

Lecture 37 - Design of Axial Flux Machines - II

Lecture 38 - Computer Aided Design and Analysis Method - I

Lecture 39 - Computer Aided Design and Analysis Method - II

Lecture 40 - Case Studies and Tutorials - I and II

Lecture 41 - Tutorial-III : Determination of Transformer Operating Point

Lecture 42 - Tutorial-IV

NPTEL : NOC:Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software (Electrical Engineering)

Co-ordinators : Prof. Ankur Gupta

Lecture 1 - Introduction

Lecture 2 - Passive Circuit Elements: R, L and C

Lecture 3 - Resistor color coding, Surface mount capacitors and inductors on PCBs

Lecture 4 - Active Circuit Elements: MOSFET, BJTs

Lecture 5 - Network Analysis: Kirchoff's Laws

Lecture 6 - Network Theorems: Thevenin, Norton, Maximum Power Transfer etc

Lecture 7 - Circuit Simulations using SPICE : Operating point analysis

Lecture 8 - DC Simulations and Importing Third-Party Models

Lecture 9 - Small-Signal Simulations, Transient Simulations

Lecture 10 - PCB Substrate and layers

Lecture 11 - Interconnect design

Lecture 12 - CMOS inverter basics

Lecture 13 - CMOS inverter design

Lecture 14 - Combinational Circuit Design - Part 1

Lecture 15 - Combinational Circuit Design - Part 2

Lecture 16 - Dynamic Logic Circuit Design

Lecture 17 - Sequential Logic Circuit Design

Lecture 18 - Digital Design : Boolean Algebra

Lecture 19 - Logic Families, Component Datasheets

Lecture 20 - TTL/CMOS logic Interfacing Constraints

Lecture 21 - Hardware Description Languages : VHDL and Verilog

Lecture 22 - Introduction to Verilog Simulations Software

Lecture 23 - Combinational Circuit Simulation using iVerilog

Lecture 24 - Adders, Multiplexer Simulation using iVerilog

Lecture 25 - High-Speed PCBs

Lecture 26 - Signal Integrity in PCBs

Lecture 27 - Signal Cross-Talk, Skews and Jitter in PCBs

Lecture 28 - KiCad Software Workflow

Lecture 29 - KiCad Design Modules

Lecture 30 - KiCad Schematic Design Steps

Lecture 31 - KiCad PCB Design Steps

Lecture 32 - KiCad Custom Symbol and Footprints Creation

Lecture 33 - KiCad Example : PCB design using OpAmp IC

Lecture 34 - KiCad Example : PCB design using 555 Timer IC

Lecture 35 - RF PCB Design Guidelines

Lecture 36 - RF PCB Example

NPTEL : Advanced Control Systems (Electrical Engineering)

Co-ordinators : Prof. S. Majhi

Lecture 1 - Introduction

Lecture 2 - Control structures and performance measures

Lecture 3 - Time and frequency domain performance measures

Lecture 4 - Design of controller

Lecture 5 - Design of controller for SISO system

Lecture 6 - Controller design for TITO processes

Lecture 7 - Limitations of PID controllers

Lecture 8 - PI-PD controller for SISO system

Lecture 9 - PID-P controller for Two Input Two Output system

Lecture 10 - Effects of measurement noise and load

Lecture 11 - Identification of dynamic models of plants

Lecture 12 - Relay control system for identification

Lecture 13 - Off-line identification of process dynamics

Lecture 14 - On-line identification of plant dynamics

Lecture 15 - State space based identification

Lecture 16 - State space analysis of systems

Lecture 17 - State space based identification of systems - 1

Lecture 18 - State space based identification of systems - 2

Lecture 19 - Identification of simple systems

Lecture 20 - Identification of FOPDT model

Lecture 21 - Identification of second order plus dead time model

Lecture 22 - Identification of SOPDT model

Lecture 23 - Steady state gain from asymmetrical relay test

Lecture 24 - Identification of SOPDT model with pole multiplicity

Lecture 25 - Existence of limit cycle for unstable system

Lecture 26 - Identification procedures

Lecture 27 - Identification of underdamped systems

Lecture 28 - Off-line identification of TITO systems

Lecture 29 - On-line identification of TITO systems

Lecture 30 - Review of time domain based identification

Lecture 31 - DF based analytical expressions for on-line identification

Lecture 32 - Model parameter accuracy and sensitivity

Lecture 33 - Improved identification using Fourier series and wavelet transform

Lecture 34 - Reviews of DF based identification

Lecture 35 - Advanced Smith predictor controller

Lecture 36 - Design of controllers for the advanced Smith predictor

Lecture 37 - Model-free controller design

Lecture 38 - Model Based PID controller Design - I

Lecture 39 - Model Based PI-PD controller Design - II

Lecture 40 - Tuning of reconfigurable PID controllers

NPTEL : NOC:Optimization Techniques for Digital VLSI Design (Electrical Engineering)

Co-ordinators : Dr. Santosh Biswas, Prof. Chandan Karfa

Lecture 1 - Introduction to Digital VLSI Design Flow

Lecture 2 - High-level Synthesis (HLS) flow with an example

Lecture 3 - Automation of High-level Synthesis Steps

Lecture 4 - Impact of Coding Style on HLS Results

Lecture 5 - Impact of Compiler Optimizations on HLS Results

Lecture 6 - RTL Optimizations for Timing

Lecture 7 - Retiming

Lecture 8 - RTL Optimizations for Area

Lecture 9 - RTL Optimizations for Power

Lecture 10 - High Level Synthesis: Introduction to Logic Synthesis

Lecture 11 - Overview of FPGA Technology Mapping

Lecture 12 - Introduction to Physical Synthesis

Lecture 13 - Introduction to Digital VLSI Testing - I

Lecture 14 - Introduction to Digital VLSI Testing - II

Lecture 15 - Optimization Techniques for ATPG - Part I

Lecture 16 - Optimization Techniques for ATPG - Part II

Lecture 17 - Optimization Techniques for Design for Testability

Lecture 18 - High-level fault modeling and RTL level Testing

Lecture 19 - LTL/CTL based Verification

Lecture 20 - Verification of Large Scale Systems

Lecture 21 - BDD based verification

Lecture 22 - Verification: ADD based verification, HDD based verification

Lecture 23 - Verification: Symbolic Model Checking

Lecture 24 - Verification: Bounded Model Checking

NPTEL : NOC:Advanced Topics in Probability and Random Processes (Electrical Engineering)

Co-ordinators : Prof. Prabin K Bora

Lecture 1 - Probability Basics

Lecture 2 - Random Variable - I

Lecture 3 - Random Variable - II

Lecture 4 - Random Vectors and Random Processes

Lecture 5 - Infinite Sequence of Events - I

Lecture 6 - Infinite Sequence of Events - II

Lecture 7 - Convergence of Sequence of Random Variables

Lecture 8 - Weak Convergence - I

Lecture 9 - Weak Convergence - II

Lecture 10 - Laws of Large Numbers

Lecture 11 - Central Limit Theorem

Lecture 12 - Large Deviation Theory

Lecture 13 - Crammer's Theorem for Large Deviation

Lecture 14 - Introduction to Markov Processes

Lecture 15 - Discrete Time Markov Chain - 1

Lecture 16 - Discrete Time Markov Chain - 2

Lecture 17 - Discrete Time Markov Chain - 3

Lecture 18 - Discrete Time Markov Chain - 4

Lecture 19 - Discrete Time Markov Chain - 5

Lecture 20 - Continuous Time Markov Chain - 1

Lecture 21 - Continuous Time Markov Chain - 2

Lecture 22 - Continuous Time Markov Chain - 3

Lecture 23 - Martingale Process - 1

Lecture 24 - Martingale Process - 2

NPTEL : NOC:Microwave Engineering (Electrical Engineering)

Co-ordinators : Dr. Ratnajit Bhattacharjee

Lecture 1 - Introduction to Microwave Engineering

Lecture 2 - Introduction to Transmission Line Theory

Lecture 3 - Lossy Transmission Line

Lecture 4 - Smith Chart

Lecture 5 - Introduction to Waveguides and Rectangular Waveguide

Lecture 6 - Circular Waveguide

Lecture 7 - Attenuation Waveguide

Lecture 8 - N-port microwave networks and equivalent voltages and currents

Lecture 9 - Scattering Matrix (S-Parameters) Part-1

Lecture 10 - Scattering Matrix (S-parameters) Part-2 and Transmission Matrix (ABCD-Parameters)

Lecture 11 - Impedance Matching Using L-Section and Series Stub Networks

Lecture 12 - Impedance Matching Using Shunt Stub, Double Stub and Quarter wave Transformer

Lecture 13 - Multisection Matching Networks and Tapered Lines

Lecture 14 - Series and Parallel RLC Resonators

Lecture 15 - Transmission Line Resonators

Lecture 16 - Waveguide Resonators

Lecture 17 - Introduction to power dividers

Lecture 18 - Directional couplers

Lecture 19 - Microwave Filters - Part 1

Lecture 20 - Microwave Filters - Part 2

Lecture 21 - Characteristics of Microwave BJT and FET

Lecture 22 - PIN Diodes and Control Circuits

Lecture 23 - Schottky Diodes and Detectors and Tunnel Diodes

Lecture 24 - Gunn Diodes, IMPATT Diodes and Varactor Diodes

Lecture 25 - Two-Port Power Gain and Stability

Lecture 26 - Design of single stage transistor amplifier (for maximum gain, specified gain, low noise)

Lecture 27 - RF oscillator

Lecture 28 - Limitations of Conventional Tubes at Microwave Ranges

Lecture 29 - Introduction to Klystron

Lecture 30 - Reflex Klystron, Magnetron and TWT

Lecture 31 - Ferrite Devices

Lecture 32 - Planar transmission lines for MIC

Lecture 33 - Lumped elements for MIC

Lecture 34 - Lumped inductor, HMIC and MMIC

Lecture 35 - Overview of Radar

Lecture 36 - Cellular Communication

Lecture 37 - Satellite Communication and Applications of Microwave

NPTEL : NOC:Microprocessors and Interfacing (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

Lecture 1 - Microprocessor Operations

Lecture 2 - 8086 Flags

Lecture 3 - Functional Diagram of 8086

Lecture 4 - 8086 Common and Minimum Mode Signals

Lecture 5 - 8086 Maximum Mode Signals

Lecture 6 - 8086 Data Transfer Instructions

Lecture 7 - 8086 Arithmetic Instructions - I

Lecture 8 - 8086 Arithmetic Instructions - II

Lecture 9 - 8086 Logical Instructions

Lecture 10 - 8086 Branch and String Instructions

Lecture 11 - 8086 Interrupt and Machine Control Instructions

Lecture 12 - Sum of Products, Multi-byte addition

Lecture 13 - Largest number, 2's complement Programs

Lecture 14 - Programs on Subroutines

Lecture 15 - ROM, RAM

Lecture 16 - Example I

Lecture 17 - Example II

Lecture 18 - Architecture, Interfacing to Simple I/O

Lecture 19 - Keyboard Interface

Lecture 20 - 7-segment Display Interface

Lecture 21 - Multiplexed 7-sgment Display Interface

Lecture 22 - Stepper motor, Liquid level control

Lecture 23 - Traffic light control, A/D converter

Lecture 24 - D/A converter

Lecture 25 - Electronic weighing machine

Lecture 26 - Programable Interval Timer (8254)

Lecture 27 - Modes of 8254

Lecture 28 - Architecture of 8259

Lecture 29 - Initialization command words of 8259

Lecture 30 - Operational command words of 8259

Lecture 31 - 8237 Architecture, interfacing and Programming

Lecture 32 - Basic Concepts of serial I/O

Lecture 33 - Basic Concepts of serial I/O (Continued...)

Lecture 34 - Architecture of 8251

NPTEL : NOC:Statistical Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Prabin Kumar Bora

Lecture 1 - Overview of Statistical Signal Processing

Lecture 2 - Probability and Random Variables

Lecture 3 - Linear Algebra of Random Variables

Lecture 4 - Random Processes

Lecture 5 - Linear Shift Invariant Systems with Random Inputs

Lecture 6 - White Noise and Spectral Factorization Theorem

Lecture 7 - Linear Models of Random Signals

Lecture 8 - Estimation Theory - 1

Lecture 9 - Estimation Theory - 2: MVUE and Cramer Rao Lower Bound

Lecture 10 - Cramer Rao Lower Bound 2

Lecture 11 - MVUE through Sufficient Statistic - 1

Lecture 12 - MVUE through Sufficient Statistic - 2

Lecture 13 - Method of Moments and Maximum Likelihood Estimators

Lecture 14 - Properties of Maximum Likelihood Estimator (MLE)

Lecture 15 - Bayesian Estimators - 1

Lecture 16 - Bayesian Estimators - 2

Lecture 17 - Optimal linear filters: Wiener Filter

Lecture 18 - FIR Wiener filter

Lecture 19 - Non-Causual IIR Wiener Filter

Lecture 20 - Causal IIR Wiener Filter

Lecture 21 - Linear Prediction of Signals - 1

Lecture 22 - Linear Prediction of Signals - 2

Lecture 23 - Linear Prediction of Signals - 3

Lecture 24 - Review Assignment - 1

Lecture 25 - Adaptive Filters - 1

Lecture 26 - Adaptive Filters - 2

Lecture 27 - Adaptive Filters - 3

Lecture 28 - Review Assignment - 2

Lecture 29 - Adaptive Filters - 4

Lecture 30 - Adaptive Filters - 4 (Continued...)

Lecture 31 - Review Assignment - 3

Lecture 32 - Recursive Least Squares (RLS) Adaptive Filter - 1

Lecture 33 - Recursive Least Squares (RLS) Adaptive Filter - 2

Lecture 34 - Review Assignment - 4

Lecture 35 - Kalman Filter - 1

Lecture 36 - Vector Kalman Filter

Lecture 37 - Linear Models of Random Signals

Lecture 38 - Review - 1

Lecture 39 - Review - 2

NPTEL : NOC:Computer Vision and Image Processing - Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. M. K. Bhuyan

Lecture 1 - Introduction to Digital Image Processing

Lecture 2 - Introduction to Computer Vision

Lecture 3 - Introduction to Computer Vision and Basic Concepts of Image Formation

Lecture 4 - Shape From Shading

Lecture 5 - Image Formation: Geometric Camera Models - I

Lecture 6 - Image Formation: Geometric Camera Models - II

Lecture 7 - Image Formation: Geometric Camera Models - III

Lecture 8 - Image Formation in a Stereo Vision Setup

Lecture 9 - Image Reconstruction from a Series of Projections

Lecture 10 - Image Reconstruction from a Series of Projections

Lecture 11 - Image Transforms - I

Lecture 12 - Image Transforms - II

Lecture 13 - Image Transforms - III

Lecture 14 - Image Transforms - IV

Lecture 15 - Image Enhancement

Lecture 16 - Image Filtering - I

Lecture 17 - Image Filtering - II

Lecture 18 - Colour Image Processing - I

Lecture 19 - Colour Image Processing - II

Lecture 20 - Image Segmentation

Lecture 21 - Image Features and Edge Detection

Lecture 22 - Edge Detection

Lecture 23 - Hough Transform

Lecture 24 - Image Texture Analysis - I

Lecture 25 - Image Texture Analysis - II

Lecture 26 - Object Boundary and Shape Representations - I

Lecture 27 - Object Boundary and Shape Representations - II

Lecture 28 - Interest Point Detectors

Lecture 29 - Image Features - HOG and SIFT

Lecture 30 - Introduction to Machine Learning - I

Lecture 31 - Introduction to Machine Learning - II

Lecture 32 - Introduction to Machine Learning - III

Lecture 33 - Introduction to Machine Learning - IV

Lecture 34 - Introduction to Machine Learning - V

Lecture 35 - Artificial Neural Network for Pattern Classification - I

Lecture 36 - Artificial Neural Network for Pattern Classification - II

Lecture 37 - Introduction to Deep Learning

Lecture 38 - Gesture Recognition

Lecture 39 - Background Modelling and Motion Estimation

Lecture 40 - Object Tracking

Lecture 41 - Programming Examples

NPTEL : NOC:System Design through VERILOG (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

Lecture 1 - Verilog Operators and Modules

Lecture 2 - Verilog Ports, Data types and Assignments

Lecture 3 - Basics of gate level modeling

Lecture 4 - Half adder, full adder and ripple carry adder

Lecture 5 - Parallel adder/subtractor

Lecture 6 - Multiplier and comparator

Lecture 7 - Decoder, encoder and multiplexer

Lecture 8 - Demultiplexer, read only memory

Lecture 9 - Review of flip-flops

Lecture 10 - Verilog modeling of flip-flops

Lecture 11 - Modeling of CMOS gates and Boolean functions

Lecture 12 - Modeling using transmission gates, CMOS dalay times

Lecture 13 - Signal strengths

Lecture 14 - Basics of dataflow modeling

Lecture 15 - Examples of dataflow modeling

Lecture 16 - Basics of behavioral modeling

Lecture 17 - Examples of behavioral modeling

Lecture 18 - Verilog modeling of counters

Lecture 19 - Verilog modeling of sequence detector

Lecture 20 - Verilog modeling FSMs and shift registers

Lecture 21 - Combinational circuit examples

Lecture 22 - Sequential circuit examples

Lecture 23 - Arithmetic and Logic Unit (ALU)

Lecture 24 - Static RAM and Braun Multiplier

Lecture 25 - FIR filter implementation

Lecture 26 - Baugh-Wooley signed multiplier architecture

Lecture 27 - IIR filter implementation

NPTEL : NOC:Usability Engineering (Electrical Engineering)

Co-ordinators : Prof. Debayan Dhar

Lecture 1 - Introduction to Usability

Lecture 2 - Usability - Historical Foundations

Lecture 3 - Standard Terminologies

Lecture 4 - Elements of User Experience

Lecture 5 - Usability in software development - I

Lecture 6 - Usability in software development - II

Lecture 7 - User Centered Design Process - I

Lecture 8 - User Centered Design Process - II

Lecture 9 - User Centered Design Process - III

Lecture 10 - Requirement Analysis - I (A)

Lecture 11 - Requirement Analysis - I (B)

Lecture 12 - Requirement Analysis - I (C)

Lecture 13 - Requirement Analysis - I (D)

Lecture 14 - Requirement Analysis - I (E)

Lecture 15 - Requirement Analysis - I (F)

Lecture 16 - Requirement Analysis - II (A)

Lecture 17 - Requirement Analysis - II (B)

Lecture 18 - Requirement Analysis - II (C)

Lecture 19 - Requirement Analysis - II (D)

Lecture 20 - Requirement Analysis - III (A)

Lecture 21 - Eye Tracker

Lecture 22 - Demonstration of an Eye tracking device

Lecture 23 - Requirement Analysis - III (B)

Lecture 24 - Mapping Experiences

Lecture 25 - Cognitive Issues - I

Lecture 26 - Cognitive Issues - II

Lecture 27 - Cognitive Issues - III

Lecture 28 - Cognitive Issues - IV

Lecture 29 - Competitive analysis and preparing for design briefing - I

Lecture 30 - Competitive analysis and preparing for design briefing - II

Lecture 31 - Conceptualization and Prototyping - I (A)

Lecture 32 - Conceptualization and Prototyping - I (B)

Lecture 33 - Conceptualization and Prototyping - I (C)

Lecture 34 - Conceptualization and Prototyping - II (A)

Lecture 35 - Conceptualization and Prototyping - II (B)

Lecture 36 - Usability heuristics and testing - I

Lecture 37 - Usability heuristics and testing - II

Lecture 38 - Usability heuristics and testing - III

Lecture 39 - Usability Testing (A)

Lecture 40 - Usability Testing (B)

Lecture 41 - Usability Testing (C)

Lecture 42 - UI/UX design based on Garret model: a case study

Lecture 43 - Effective contextual enquiry

Lecture 44 - Contextual enquiry: case study

NPTEL : NOC:Probability and Random Processes (Electrical Engineering)

Co-ordinators : Prof. Ribhu, Prof. Rohit Sinha

Lecture 1 - Introduction

Lecture 2 - Algebra of Events

Lecture 3 - Axioms of Probability

Lecture 4 - Example 1

Lecture 5 - Example 2

Lecture 6 - Example 3

Lecture 7 - Example 4

Lecture 8 - Example 5

Lecture 9 - Conditional Probability

Lecture 10 - Bayes Theorem 1

Lecture 11 - Bayes Theorem 2

Lecture 12 - A Brief Review

Lecture 13 - Example 1

Lecture 14 - Example 2

Lecture 15 - Example 3

Lecture 16 - Example 4

Lecture 17 - Example 5

Lecture 18 - Independent Events

Lecture 19 - A Brief Review

Lecture 20 - Example 1

Lecture 21 - Example 2

Lecture 22 - Example 3

Lecture 23 - Example 4

Lecture 24 - Discrete Random Variables

Lecture 25 - Expectation

Lecture 26 - Moments

Lecture 27 - Variance

Lecture 28 - Binomial Random Variables

Lecture 29 - Poisson Random Variables

Lecture 30 - More on Poission Random Variables

Lecture 31 - Properties of the CDF

Lecture 32 - A Brief Review - I

Lecture 33 - A Brief Review - II

Lecture 34 - Example 1

Lecture 35 - Example 2

Lecture 36 - Example 3

Lecture 37 - Example 4

Lecture 38 - Example 5

Lecture 39 - Example 6

Lecture 40 - Example 7

Lecture 41 - Example 8

Lecture 42 - Example 9

Lecture 43 - Continuous Random Variables

Lecture 44 - Expectation of Continuous random variables

Lecture 45 - The uniform and the Gaussian Random variables

Lecture 46 - The mean and variance of a Gaussian Random Variable

Lecture 47 - The exponential random variable and other continuous distributions

Lecture 48 - A Brief Review

Lecture 49 - Example 1

Lecture 50 - Example 2

Lecture 51 - Example 3

Lecture 52 - Example 4

Lecture 53 - Example 5

Lecture 54 - Functions of a random varible

Lecture 55 - Functions of a random varible

Lecture 56 - The moment generating function

Lecture 57 - Conditional Distributions

Lecture 58 - Bivariate Distributions

Lecture 59 - Independence of Random Varibles

Lecture 60 - Jointly Gaussian Random Varibales and Circular symmetry

Lecture 61 - Jointly Discrete Random Variables

Lecture 62 - One Function of two random variables

Lecture 63 - Order Statistics

Lecture 64 - Two functions of two random variables

Lecture 65 - Joint Moments

Lecture 66 - Joint Charactristic Functions

Lecture 67 - Conditional Distributions for multiple random variables

Lecture 68 - Conditional Expectations

Lecture 69 - Examples

Lecture 70 - Random Vectors

Lecture 71 - Independence of Random Varibles

Lecture 72 - Complex Random Varibales

Lecture 73 - Covariance Matrices

Lecture 74 - Conditional Densities

Lecture 75 - Gaussianity

Lecture 76 - Chi Squared Densities

Lecture 77 - Examples

Lecture 78 - Estimation Theory

Lecture 79 - Measurements

Lecture 80 - Sequences of Random Variables

Lecture 81 - Laws of large numbers

Lecture 82 - Random processes

Lecture 83 - Stationarity, Cyclostationarity, Ergodicity

Lecture 84 - Random Processes as Signals (PSD and LTI Response)

Lecture 85 - White and Gaussian Processes Noise

NPTEL : NOC:Simulation of Communication Systems using Matlab (Electrical Engineering)

Co-ordinators : Dr. Ribhu

Lecture 1 - Introduction

Lecture 2 - Basics of MATLAB

Lecture 3 - Data Types

Lecture 4 - Floating Point Numbers

Lecture 5 - Scripts and Flow of Control

Lecture 6 - The For Loop

Lecture 7 - Arrays

Lecture 8 - Indexing

Lecture 9 - Some Reuslts from Linear Algebra

Lecture 10 - Matrix Multiplication

Lecture 11 - Eigenvalues and Eigenvectors

Lecture 12 - Complex Numbers

Lecture 13 - Hermitian Matrices

Lecture 14 - Matrix Inversion

Lecture 15 - Signals

Lecture 16 - Convolution

Lecture 17 - Probability

Lecture 18 - Bayes Theorem

Lecture 19 - Random Varibles

Lecture 20 - Clinical Trials - I

Lecture 21 - Clinical Trials - II

Lecture 22 - Random Numbers

Lecture 23 - Random Disttributions

Lecture 24 - Histograms - I

Lecture 25 - Histograms - II

Lecture 26 - Functions of Random Variables

Lecture 27 - Generating Random Disttributions

Lecture 28 - Laws of Large numbers

Lecture 29 - Random Processes

Lecture 30 - Properties of Random Processes

Lecture 31 - Power Spectra

Lecture 32 - Signals and Noise

Lecture 33 - Stochastic Models

Lecture 34 - The AR-1 Process

Lecture 35 - Stochastic Models II

Lecture 36 - Yule Walker Equations

Lecture 37 - Markov Chains - I

Lecture 38 - Markov Chains - II

Lecture 39 - Markov Chains - III

Lecture 40 - Analog to Digital Coversion

Lecture 41 - K Means

Lecture 42 - Correlation

Lecture 43 - Predictive Coding

Lecture 44 - Image Compression

Lecture 45 - Transform Domain Compression

Lecture 46 - Multi Resolution Coding

Lecture 47 - Introduction to Communications

Lecture 48 - Low Pass and BandPass Signals

Lecture 49 - Signal Spaces

Lecture 50 - PAM

Lecture 51 - Detection

Lecture 52 - Effects of AWGN

Lecture 53 - ML Detection - I

Lecture 54 - ML Detection - II

Lecture 55 - The Union Bound

Lecture 56 - Symbol Error Rates

Lecture 57 - Choosing Constellations

Lecture 58 - Orthogonal Signalling

Lecture 59 - Non-Coherent Dection - 1

Lecture 60 - Non-Coherent Dection - 2

Lecture 61 - DPSK - I

Lecture 62 - DPSK - II

Lecture 63 - Introduction to Wireless Communications

Lecture 64 - Conclusion

NPTEL : NOC:Machine Learning and Deep Learning - Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. M.K. Bhuyan

Lecture 1 - Introduction to Machine Learning

Lecture 2 - Performance Measures of Classification

Lecture 3 - Bias-Variance Tradeoff

Lecture 4 - Regression

Lecture 5 - Bayesian Decision Theory - 1

Lecture 6 - Bayesian Decision Theory - 2

Lecture 7 - Bayes Decision Theory - Binary Features

Lecture 8 - Bayesian Decision Theory - 3

Lecture 9 - Bayesian Decision Theory - 4

Lecture 10 - Bayesian Belief Networks

Lecture 11 - Parameter Estimation and Maximum Likelihood Estimation

Lecture 12 - Parameter Estimation and Bayesian Estimation

Lecture 13 - Concept of non-parametric techniques

Lecture 14 - Density Estimation by Parzen Window

Lecture 15 - Parzen Window and K nearest neighbor algorithm

Lecture 16 - Linear Discriminant Functions and Perceptron Criteria - Part I

Lecture 17 - Linear Discriminant Functions and Perceptron Criteria - Part II

Lecture 18 - Linear Discriminant Functions and Perceptron Criteria - Part III

Lecture 19 - Support Vector Machine - Part I

Lecture 20 - Support Vector Machine - Part II

Lecture 21 - Logistic Regression

Lecture 22 - Decision Tree

Lecture 23 - Hidden Markov Model (HMM)

Lecture 24 - Ensemble Classifiers - Part I

Lecture 25 - Ensemble Classifiers - Part II

Lecture 26 - Dimensionality Problem and Principal Component Analysis

Lecture 27 - Principal Component Analysis

Lecture 28 - Linear Discriminant Analysis (LDA) - Part I

Lecture 29 - Linear Discriminant Analysis (LDA) - Part II

Lecture 30 - Gaussian Mixture Model and EM Algorithm

Lecture 31 - K-means clustering.

Lecture 32 - Fuzzy K-means clustering

Lecture 33 - Hierarchical Agglomerative Clustering and Mean-shift Clustering

Lecture 34 - Artificial Neural Networks for Pattern Classification - Part 1

Lecture 35 - Artificial Neural Networks for Pattern Classification - Part 2

Lecture 36 - Artificial Neural Networks for Pattern Classification - Part 3

Lecture 37 - Introduction to Deep Learning and Convolutional Neural Network (CNN)

Lecture 38 - Vanishing and Exploding Gradients in Deep Neural Networks

Lecture 39 - CNN Architectures - LeNet-5 and AlexNet

Lecture 40 - CNN Architectures - VGG 16, GoogLeNet and ResNet

Lecture 41 - Generative Adversarial Networks (GAN) - Fundamentals and Applications

Lecture 42 - U-Net: Convolutional Networks for Image Segmentation

Lecture 43 - Introduction to Autoencoder and Recurrent Neural Networks (RNN)

Lecture 44 - Programming Concepts - 1

Lecture 45 - Programming Concepts - 2

Lecture 46 - Problem Solving Session - 1

Lecture 47 - Problem Solving Session - 2

Lecture 48 - Problem Solving Session - 3

NPTEL : NOC:Integrated Circuits and Applications (Electrical Engineering)

Co-ordinators : Prof. Shaik Rafi Ahamed

Lecture 1 - Introduction to Integrated Circuits

Lecture 2 - Summing and Difference Amplifiers

Lecture 3 - Instrumentation Amplifier

Lecture 4 - Integrator and Diffrentiator

Lecture 5 - Precision Half Wave and Full Wave Rectifiers

Lecture 6 - Clipper and Clamper circuits

Lecture 7 - Logarithmic and Anti-logarithmic Amplifiers

Lecture 8 - DC Characteristics (Offset Currents and Voltages)

Lecture 9 - AC Charcterstics (Frequency Response)

Lecture 10 - AC Charcterstics (Compensation Techniques and Slew Rate)

Lecture 11 - Examples on Design of Adder and Subtractor Circuits

Lecture 12 - Examples on Transfer Function Computation

Lecture 13 - Examples on Instrumentation Amplifier

Lecture 14 - Examples on CMRR Computation

Lecture 15 - First Order Low Pass Filter

Lecture 16 - Second Order Low Pass Filter

Lecture 17 - Design of Butterworth Low Pass Filter

Lecture 18 - Design of Butterworth High Pass Filter

Lecture 19 - Design of Band Pass Filter

Lecture 20 - Design of Band Stop Filter

Lecture 21 - All Pass Filter

Lecture 22 - RC Phase Shift Oscillator

Lecture 23 - Wien Bridge, Colpitt's and Hartley Oscillators

Lecture 24 - Comparator and Schmitt Trigger Circuits

Lecture 25 - Square Wave and Triangular Waveform Generators

Lecture 26 - Monostable operation

Lecture 27 - Monostable applications - I

Lecture 28 - Monostable applications - II

Lecture 29 - Astable operation

Lecture 30 - Phase detectors

Lecture 31 - Voltage Controlled oscillator

Lecture 32 - PLL IC 565 operation

Lecture 33 - PLL Applications

Lecture 34 - Fixed Voltage Regulator

Lecture 35 - Adjastable Voltage Regulator

Lecture 36 - Switching Regulators

Lecture 37 - Weighted Resistor D/A Converter

Lecture 38 - R-2R Ladder D/A Converter

Lecture 39 - Inverted R-2R Ladder D/A Converter

Lecture 40 - Analog to Digital Converters

Lecture 41 - CMOS Inverter

Lecture 42 - CMOS NAND Gate

Lecture 43 - Transient Response of CMOS NAND and NOR Gates

Lecture 44 - Boolean function Realization using CMOS and Sizing

NPTEL : NOC:Photonic Crystals: Fundamentals and Applications (Electrical Engineering)

Co-ordinators : Prof. Debabrata Sikdar

Lecture 1 - Motivation and Introduction to Photonic Crystals

Lecture 2 - Overview of Photonic Crystal technology

Lecture 3 - Fundamentals of EM theory of Light

Lecture 4 - Electromagnetic Properties of Materials

Lecture 5 - Scaling Properties of Maxwell's Equaltions

Lecture 6 - Electromagnetism as an Eigenvalue Problem

Lecture 7 - Symmetries for Classification of EM Modes

Lecture 8 - Real and Reciprocal lattices

Lecture 9 - Photonic band Structure: Computation and Analysis

Lecture 10 - Fundamentals of 1D Photonic Crystal

Lecture 11 - Analysis and Engineering of 1D Photonic Band Structure

Lecture 12 - Applications of 1D Photonic Crystal

Lecture 13 - Fundamentals of 2D photonic crystals

Lecture 14 - Analysis and Engineering of 2D Photonic Band Structure

Lecture 15 - Applications of 2D photonic crystals

Lecture 16 - Overview of different 3D Photonic Crystals

Lecture 17 - Crystals with complete bandgap

Lecture 18 - Applications of 2D and 3D photonic crystals

Lecture 19 - Overview and Modelling of Periodic Dielectric Waveguides

Lecture 20 - Point Defects in Periodic Dielectric Waveguides and Q-factors of Lossy Cavities

Lecture 21 - Applications: Fiber Bragg Grating

Lecture 22 - Overview of Photonic Crystal Slabs

Lecture 23 - Different types of defects in Photonic Cruystal Slabs

Lecture 24 - Engineering High-Q resonant Cavity

Lecture 25 - Overview of photonic crystal fibers

Lecture 26 - Index-guiding photonic crystal fibers

Lecture 27 - Band-gap guidance in Holey Fibers

Lecture 28 - Overview of Bragg Fibers

Lecture 29 - Losses in Hollow-core Fibers

Lecture 30 - Applications of Photonic Crystal Fibers

Lecture 31 - Designing a mirror, waveguide, acavity

Lecture 32 - Temporal Coupled Mode Theory: Fundamentals and Applications

Lecture 33 - Waveguide Splitters, Non-linear Filters, and Bistability

Lecture 34 - Unusual Refraction and Diffraction Effects

Lecture 35 - Photonic Crystal Devices for Slow Wave Phenomena

Lecture 36 - Next Generation Devices based on Photonic Crystals

Lecture 37 - Simulation Demonstration of Topological Photonic Crystals Based Waveguides - Part 1

Lecture 38 - Simulation Demonstration of Topological Photonic Crystals Based Waveguides - Part 2

NPTEL : Advanced Electric Drives (Electrical Engineering)

Co-ordinators : Dr. S.P. Das

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

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Lecture 24

Lecture 25

Lecture 26

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Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : High Voltage DC Transmission (Electrical Engineering)

Co-ordinators : Dr. S.N. Singh

Lecture 1 - High Voltage DC Transmission

Lecture 2 - High Voltage DC Transmission

Lecture 3 - High Voltage DC Transmission

Lecture 4 - High Voltage DC Transmission

Lecture 5 - High Voltage DC Transmission

Lecture 6 - High Voltage DC Transmission

Lecture 7 - High Voltage DC Transmission

Lecture 8 - High Voltage DC Transmission

Lecture 9 - High Voltage DC Transmission

Lecture 10 - High Voltage DC Transmission

Lecture 11 - High Voltage DC Transmission

Lecture 12 - High Voltage DC Transmission

Lecture 13 - High Voltage DC Transmission

Lecture 14 - High Voltage DC Transmission

Lecture 15 - High Voltage DC Transmission

Lecture 16 - High Voltage DC Transmission

Lecture 17 - High Voltage DC Transmission

Lecture 18 - High Voltage DC Transmission

Lecture 19 - High Voltage DC Transmission

Lecture 20 - High Voltage DC Transmission

Lecture 21 - High Voltage DC Transmission

Lecture 22 - High Voltage DC Transmission

Lecture 23 - High Voltage DC Transmission

Lecture 24 - High Voltage DC Transmission

Lecture 25 - High Voltage DC Transmission

Lecture 26 - High Voltage DC Transmission

Lecture 27 - High Voltage DC Transmission

Lecture 28 - High Voltage DC Transmission

Lecture 29 - High Voltage DC Transmission

Lecture 30 - High Voltage DC Transmission

Lecture 31 - High Voltage DC Transmission

Lecture 32 - High Voltage DC Transmission

Lecture 33 - High Voltage DC Transmission

Lecture 34 - High Voltage DC Transmission

Lecture 35 - High Voltage DC Transmission

Lecture 36 - High Voltage DC Transmission

Lecture 37 - High Voltage DC Transmission

NPTEL : Intelligent Systems and Control (Electrical Engineering)

Co-ordinators : Prof. Laxmidhar Behera

Lecture 1 - Introduction to Intelligent Systems and Control

Lecture 2 - Linear Neural networks

Lecture 3 - Multi layered Neural Networks

Lecture 4 - Back Propagation Algorithm revisited

Lecture 5 - Non Linear System Analysis - Part I

Lecture 6 - Non Linear System Analysis - Part II

Lecture 7 - Radial Basis Function Networks

Lecture 8 - Adaptive Learning rate

Lecture 9 - Weight update rules

Lecture 10 - Recurrent networks Back propagation through time

Lecture 11 - Recurrent networks Real time recurrent learning

Lecture 12 - Self organizing Map - Multidimensional networks

Lecture 13 - Fuzzy sets - A Primer

Lecture 14 - Fuzzy Relations

Lecture 15 - Fuzzy Rule base and Approximate Reasoning

Lecture 16 - Introduction to Fuzzy Logic Control

Lecture 17 - Neural Control A review

Lecture 18 - Network inversion and Control

Lecture 19 - Neural Model of a Robot manipulator

Lecture 20 - Indirect Adaptive Control of a Robot manipulator

Lecture 21 - Adaptive neural control for Affine Systems SISO

Lecture 22 - Adaptive neural control for Affine systems MIMO

Lecture 23 - Visual Motor Coordination with KSOM

Lecture 24 - Visual Motor coordination - quantum clustering

Lecture 25 - Direct Adaptive control of Manipulators - Intro

Lecture 26 - NN based back stepping control

Lecture 27 - Fuzzy Control - a Review

Lecture 28 - Mamdani type flc and parameter optimization

Lecture 29 - Fuzzy Control of a pH reactor

Lecture 30 - Fuzzy Lyapunov controller - Computing with words

Lecture 31 - Controller Design for a T-S Fuzzy model

Lecture 32 - Linear controllers using T-S fuzzy model

NPTEL : Power Systems Operation and Control (Electrical Engineering)

Co-ordinators : Dr. S.N. Singh

Module 1 - Lecture 1

Module 1 - Lecture 2

Module 1 - Lecture 3

Module 2 - Lecture 1

Module 2 - Lecture 2

Module 2 - Lecture 3

Module 2 - Lecture 4

Module 2 - Lecture 5

Module 2 - Lecture 6

Module 2 - Lecture 7

Module 2 - Lecture 8

Module 2 - Lecture 9

Module 2 - Lecture 10

Module 2 - Lecture 11

Module 2 - Lecture 12

Module 2 - Lecture 13

Module 2 - Lecture 14

Module 3 - Lecture 1

Module 3 - Lecture 2

Module 3 - Lecture 3

Module 3 - Lecture 4

Module 3 - Lecture 5

Module 3 - Lecture 6

Module 3 - Lecture 7

Module 3 - Lecture 8

Module 3 - Lecture 9

Module 3 - Lecture 10

Module 4 - Lecture 1

Module 4 - Lecture 2

Module 4 - Lecture 3

Module 4 - Lecture 4

Module 5 - Lecture 1

Module 5 - Lecture 2

Module 6 - Lecture 1

Module 6 - Lecture 2

NPTEL : NOC:Electromagnetic theory (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Introduction to EMT

Lecture 2 - Coulombs law

Lecture 3 - Vector analysis-I and Introduction to coordinate system

Lecture 4 - Rectangular coordinate system

Lecture 5 - Vector analysis-II

Lecture 6 - Introduction to Electric field

Lecture 7 - Electric field-I

Lecture 8 - Cylindrical coordinate system

Lecture 9 - Transformation and Electric field-II

Lecture 10 - Electric Potential-I

Lecture 11 - Spherical co-ordinate system and Electric potential-II

Lecture 12 - Vector Analysis-III and Electric potential-III

Lecture 13 - GaussÂ's law and its application-I

Lecture 14 - GaussÂ's law and its application-II

Lecture 15 - Divergence and PoissonÂ's and LaplaceÂ's equation

Lecture 16 - GaussÂ's law and its application -III

Lecture 17 - Vector analysis Â–III (curl and its significance)

Lecture 18 - Conductor and dielectric-I

Lecture 19 - Polarization - I

Lecture 20 - Polarization - II

Lecture 21 - Polarization - II (Continued...)

Lecture 22 - Boundary condition

Lecture 23 - Continuity equation and Conductors - III

Lecture 24 - Conductors Â– IV

Lecture 25 - Conductors Â– IV (Continued...) and Capacitor - I

Lecture 26 - Capacitor - II

Lecture 27 - Capacitor - II (Continued...) and Equipotential Surfaces

Lecture 28 - Solution of LaplaceÂ's equation-I

Lecture 29 - Solution of LaplaceÂ's equation-I I and method of images-I

Lecture 30 - Method of images-II

Lecture 31 - Solution of LaplaceÂ's equation-III

Lecture 32 - Solution of LaplaceÂ's equation-IV

Lecture 33 - Introduction of magnetic field

Lecture 34 - Biot savart law and its application

Lecture 35 - Biot savart lawandits application-II

Lecture 36 - Magnetic vector potential

Lecture 37 - Magnetic force, torque and dipole

Lecture 38 - Magnetic force, torque and dipole (Continued...)

Lecture 39 - Magnetic materials-I

Lecture 40 - Magnetic materials-I (Continued...) and Magnetic moment

Lecture 41 - Magnetic materials-I (Continued...) and Boundary condition for Magnetic fields

Lecture 42 - Inductor and calculation of inductance for different shapes

Lecture 43 - Inductor and calculation of inductance for different shapes (Continued...)

Lecture 44 - Faradays law and its application-I

Lecture 45 - Faradays law and its application-II

Lecture 46 - Displacement current

Lecture 47 - MaxwellÂ's equation

Lecture 48 - Wave propagation

Lecture 49 - Solution of Helmholtz equation

Lecture 50 - Uniform plane waves

Lecture 51 - Polarization and Poynting Vector

Lecture 52 - Wave reflections (Normal incidence)

Lecture 53 - Waves in imperfect dielectrics and Good conductors

Lecture 54 - Skin depth/effect

Lecture 55 - Oblique incidence of waves

Lecture 56 - Oblique incidence of waves (Continued...)

Lecture 57 - Transmission line

Lecture 58 - Transmission line model

Lecture 59 - Steady state sinusoidal response of T-line-I

Lecture 60 - Steady state sinusoidal response of T-line-II

Lecture 61 - Steady state sinusoidal response of T-line-IIand Smith chart

Lecture 62 - Application of smith chart-I

Lecture 63 - Application of smith chart-II

Lecture 64 - Impedance matching

Lecture 65 - Transients on Transmission line-I

Lecture 66 - Transients on Transmission line-II

Lecture 67 - Pulse on Transmission line

Lecture 68 - Capacitive termination in Transmission line

Lecture 69 - Waveguide

Lecture 70 - Waveguide Analysis

Lecture 71 - TM modes in Waveguide

Lecture 72 - Rectangular waveguide: TM modes

Lecture 73 - Rectangular waveguide: TE modes

Lecture 74 - Waveguide: Wavelength, Impedance and power calculation

Lecture 75 - Waveguide losses

Lecture 76 - Dielectric Waveguide

Lecture 77 - Dielectric Waveguide (Continued...)

Lecture 78 - Radiation and Antenna

Lecture 79 - Hertzian Dipole Antenna

Lecture 80 - Hertzian Dipole Antenna (Continued...)

Lecture 81 - Quasi-statistics-I

Lecture 82 - Quasi-statistics-II

Lecture 83 - Long wire Antenna

Lecture 84 - Group velocity and Phase velocity

Lecture 85 - Numerical solution of Laplace's equation

NPTEL : NOC:Principles of Communication - Part 1 (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Basics - Definition of Energy and Power of Signals

Lecture 2 - Frequency Domain Representation and Introduction to Discrete Fourier Series

Lecture 3 - Discrete Fourier Series Example and Parseval's Theorem for Periodic Signals

Lecture 4 - Fourier Transform (FT), Inverse Fourier Transform (IFT) of Continuous Signals, Example of FT of Pulse and Sinc Function

Lecture 5 - Modulation Property of Fourier Transform, Dirac Delta or Unit Impulse Function - Definition and Fourier Transform

Lecture 6 - Duality Property of Fourier Transform and Introduction to Linear Time Invatiant (LTI) Systems

Lecture 7 - Transmission of Signal through Linear Time Invariant (LTI) Systems and Cross- Correlation of Signals

Lecture 8 - Auto-Correlation of Signal and Energy Spectral Density (ESD)

Lecture 9 - Example for Auto-Correlation of Signal and Energy Spectral Density (ESD)

Lecture 10 - Introduction to Amplitude Modulation (AM), Modulation Index, Envelope Distortion and Over Modulation

Lecture 11 - Spectrum of Amplitude Modulated(AM) Signals and Introduction to Envelope Detection

Lecture 12 - Envelope Detection for Amplitude Modulated (AM) Signals and Time Constant for Capacitor in Envelope Detector

Lecture 13 - Power of Amplitude Modulated (AM) Signals and Power Efficiency of AM Signals

Lecture 14 - Double Sideband (DSB) Suppressed Carrier (SC) Modulation, Spectrum of DSB-SC Signals and Coherent Demodulation

Lecture 15 - Double Sideband(DSB) Suppressed Carrier (SC) Demodulation, Non-coherent demodulation, Impact of Carrier Phase Offset

Lecture 16 - Carrier Phase Offset Example for Double Sideband (DSB) Suppressed Carrier (SC) Demodulation- Wireless Cellular Communication with User Mobility

Lecture 17 - Phase Synchronization using Costas Receiver for Double Sideband (DSB) Suppressed Carrier (SC) Demodulation

Lecture 18 - Introduction to Quadrature Carrier Multiplexing (QCM) and Demodulation of QCM Signals.

Lecture 19 - Introduction to Single Sideband (SSB) Modulation

Lecture 20 - Generation of Single Sideband (SSB) Modulation Signals through Frequency Discrimination

Lecture 21 - Frequency Domain Description of Hilbert Transform Â– Fourier Spectrum of the Hilbert Transformer

Lecture 22 - Time Domain Description of Hilbert Transform Â– Impulse Response of the Hilbert Transformer

Lecture 23 - Phase Shifting Method for Generation of Single Sideband (SSB) Modulated Signals based on Hilbert Transform

Lecture 24 - Complex Pre-Envelope and Complex Envelope of Passband Signals

Lecture 25 - Complex Pre- Envelope and Complex Envelope of QCM (Quadrature Carrier Modulated) Signals

Lecture 26 - Introduction to Vestigial Side Band(VSB) Modulation and Non- Ideal Filtering, Spectral Efficiency

Lecture 27 - Properties of Vestigial Side Band Filter for Reconstruction of Message Signal without Distortion

Lecture 28 - Introduction to Angle Modulation, Description of Phase Modulation (PM) and Frequency Modulation (FM)

Lecture 29 - Frequency Modulation (FM) with Sinusoidal Modulation Signal and Pictorial Examples, Insights of PM and FM signals

Lecture 30 - Indirect Method for Generation of FM Signals - Generation of Narrowband FM Signal

Lecture 31 - Indirect Method for Generation of FM Signals - Generation of Wideband FM Signal through Frequency Multiplication

Lecture 32 - Spectrum of Frequency Modulated (FM) Signals

Lecture 33 - Bandwidth of Frequency Modulated (FM) Signals - Carson's Rule

Lecture 34 - Demodulation of Frequency Modulated (FM) Signals, Condition of Envelope Detection

Lecture 35 - Analog to Digital Conversion of Signals and Introduction to Sampling

Lecture 36 - Spectrum of Sampled Signal, Aliasing and Nyquist Sampling Theorem

Lecture 37 - Ideal Impluse Train Sampling, Reconstruction of Original Signal from Samples, Sinc Interpolation

Lecture 38 - Introduction to Pulse Amplitude Modulation (PAM), Sample and Hold, Flat Top Sampling

Lecture 39 - Pulse Amplitude Modulation (PAM), Spectrum of PAM Signal , Reconstruction of Original Signal from PAM Signal, Equalization

Lecture 40 - Introduction to Quantization, Uniform Quantizer, Mid- Tread Quantizer

Lecture 41 - Quantization, Mid- Rise Quantizer, PDF and Power of Quantization Noise, Quantization Noise Power versus Quantizer Resolution

Lecture 42 - Introduction to Lloyd- Max Quantization Algorithm, Optimal Quantizer Design

Lecture 43 - Lloyd- Max Quantization Algorithm, Iterative Computation of Optimal Quantization Levels and Intervals

Lecture 44 - Companding for Non- Uniform Quantization, Mu-law Compressor, A- Law Compressor

Lecture 45 - Introduction to Delta Modulation, One-bit Quantizer

Lecture 46 - Signal Reconstruction in Delta Modulation, Schematic Diagrams, Slope Overload Distortion and Granular Noise

Lecture 47 - Differential Pulse Coded Modulation (DPCM), DPCM Signal Reconstruction and Schematic Diagram

Lecture 48 - Frequency Mixing and Translation in Communication Systems, Heterodyne and Super Heterodyne Receivers

Lecture 49 - Frequency Translation and Super Heterodyne Receivers, Problem of Image Frequency

Lecture 50 - Frequency Division Multiplexing (FDM), Carrier Spacing in FDM

Lecture 51 - Time Division Multiplexing (TDM), Operation of TDM, Sample Spacing in TDM

Lecture 52 - Bandwidth Requirements for Time Division Multiplexing (TDM), The T1 TDM System : A Case Study

NPTEL : NOC:An Introduction to Coding Theory (Electrical Engineering)

Co-ordinators : Dr. Adrish Banerjee

Lecture 1 - Introduction to Error Control Coding - I

Lecture 2 - Introduction to Error Control Coding - II

Lecture 3 - Introduction to Error Control Coding - III

Lecture 4 - Introduction to Linear Block Codes, Generator Matrix and Parity Check Matrix

Lecture 5 - Syndrome, Error Correction and Error Detection

Lecture 6 - Problem Solving Session - I

Lecture 7 - Decoding of Linear Block Codes

Lecture 8 - Distance Properties of Linear Block Codes - I

Lecture 9 - Distance Properties of Linear Block Codes - II

Lecture 10 - Problem Solving Session - II

Lecture 11 - Some Simple Linear Block Codes - I

Lecture 12 - Some Simple Linear Block Codes - II: Reed Muller Codes

Lecture 13 - Bounds on the Size of a Code

Lecture 14 - Problem Solving Session - III

Lecture 15 - Introduction to Convolutional Codes - I: Encoding

Lecture 16 - Introduction to Convolutional Codes - II: State Diagram, Trellis Diagram

Lecture 17 - Convolutional Codes: Classification, Realization

Lecture 18 - Convolutional Codes:Distance Properties

Lecture 19 - Decoding of Convolutional Codes - I: Viterbi Algorithm

Lecture 20 - Decoding of Convolutional Codes - II: BCJR Algorithm

Lecture 21 - Problem solving session - IV

Lecture 22 - Problem solving session - V

Lecture 23 - Performance Bounds for Convolutional Codes

Lecture 24 - Low Density Parity Check Codes

Lecture 25 - Decoding of Low Density Parity Check Codes - I

Lecture 26 - Decoding of Low Density Parity Check Codes - II: Belief Propagation Algorithm

Lecture 27 - Turbo Codes

Lecture 28 - Turbo Decoding

Lecture 29 - Problem Solving Sessions - VI

Lecture 30 - Distance Properties of Turbo Codes

Lecture 31 - Convergence of Turbo Codes

Lecture 32 - Automatic Repeat reQuest (ARQ) Schemes

Lecture 33 - Applications of Linear Codes

NPTEL : NOC:Principles of Communication Systems - Part II (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Introduction to Digital Communication Systems

Lecture 2 - Spectrum of Transmitted Digital Communication Signal and Wide Sense Stationarity

Lecture 3 - Spectrum of Transmitted Digital Communication Signal, Autocorrelation Function and Power Spectral Density

Lecture 4 - Spectrum of Transmitted Digital Communication Signal, Relation to Energy Spectral Density and Introduction to AWGN Channel

Lecture 5 - Additive White Gaussian Noise (AWGN) Properties, Gaussian Noise and White Noise

Lecture 6 - Structure of Digital Communication Receiver, Receiver Filter and Signal-to-Noise Power Ratio (SNR)

Lecture 7 - Digital Communication Receiver, Noise Properties and Output Noise Power

Lecture 8 - Digital Communication Receiver, Optimal SNR and Matched Filter

Lecture 9 - Probability of Error in Digital Communication and Probability Density Functions of Output

Lecture 10 - Probability of Error in Digital Communication, Optimal Decison Rule and Gaussian Q function

Lecture 11 - Introduction to Binary Phase Shift Keying (BPSK) Modulation, Optimal Decision Rule and Probability of Bit-Error or Bit-Error Rate (BER)

Lecture 12 - Introduction to Amplitude Shift Keying (ASK) Modulation

Lecture 13 - Optimal Decision Rule for Amplitude Shift Keying (ASK), Bit Error Rate (BER) and Comparison with Binary Phase Shift Keying (BPSK) Modulation

Lecture 14 - Introduction to Signal Space Concept and Orthonormal Basis Signals

Lecture 15 - Introduction to Frequency Shift Keying (FSK)

Lecture 16 - Optimal Decision Rule for FSK, Bit Error Rate (BER) and Comparison with BPSK, ASK

Lecture 17 - Introduction to Quadrature Phase Shift Keying (QPSK)

Lecture 18 - Waveforms of Quadrature Phase Shift Keying (QPSK)

Lecture 19 - Matched Filtering, Bit Error Rate and Symbol Error Rate for Quadrature Phase Shift Keying (QPSK)

Lecture 20 - Introduction to M-ary PAM (Pulse Amplitude Modulation), Average Symbol Power and Decision rules

Lecture 21 - M-ary PAM (Pulse Amplitude Modulation) -Part-II, Optimal Decision Rule and Probability of Error

Lecture 22 - M-ary QAM (Quadrature Amplitude Modulation) Part-I, Introduction, Transmitted Waveform and Average Symbol Energy

Lecture 23 - M-ary QAM (Quadrature Amplitude Modulation) - Part-II, Optimal Decision Rule, Probability of Error and Contellation Diagram

Lecture 24 - M-ary PSK (Phase Shift Keying) Part-I, Introduction , Transmitted Waveform and Constellation Diagram

Lecture 25 - M-ary PSK (Phase Shift Keying) - Part-II, Optimal Decision Rule, Nearest Neighbor Criterion and Approximate Probability of Error

Lecture 26 - Introduction to Information Theory, Relevance of Information Theory and Characterization of Information

Lecture 27 - Definition of Entropy, Average of Information / Uncertainity of source and Properties of Entropy

Lecture 28 - Entropy Example- Binary Source Maximum and Minimum Entropy of Binary Source

Lecture 29 - Maximum Entropy of Source with M-ary Alphabet, Concave/Convex Functions and Jensens Inequality

Lecture 30 - Joint Entropy , Definition of Joint Entropy of Two Sources and Simple Examples for Joint Entropy Computation

Lecture 31 - Properties of Joint Entropy and Relation between Joint Entropy and Marginal Entropies

Lecture 32 - Conditional Entropy, Example of Conditional Entropy and Properties of Conditional Entropy

Lecture 33 - Mutual Information, Diagrammatic Representation and Properties of Mutual Information

Lecture 34 - Simple Example of Mutual Information and Practical Example of Mutual Information-Binary Symmetric Channel

Lecture 35 - Channel Capacity, Implications of Channel Capacity, Claude E. Shannon- Father of Information Theory and Example of Capacity of Binary Symmetric Channel

Lecture 36 - Differential Entropy and Example for Uniform Probability Density function

Lecture 37 - Differential Entropy of Gaussian Source and Insights

Lecture 38 - Joint Conditional/ Differential Entropies and Mutual Information

Lecture 39 - Capacity of Gaussian channel - Part I

Lecture 40 - Capacity of Gaussian Channel - Part-II, Practical Implications and Maximum rate in bits\sec

Lecture 41 - Introduction to Source Coding and Data Compression, Variable Length codes and Unique Decodability

Lecture 42 - Uniquely Decodable Codes, Prefix-free code, Instantaneous Code and Average Code length

Lecture 43 - Binary Tree Representation of Code, Example and Kraft Inequality

Lecture 44 - Lower Bound on Average Code Length and Kullback-Leibler Divergence

Lecture 45 - Optimal Code length, Constrained Optimization and Morse Code Example

Lecture 46 - Approaching Lower Bound on Average code length and Block Coding

Lecture 47 - Huffman Code, Algorithm, Example and Average Code Length

Lecture 48 - Introduction to channel coding, Rate of Code, Repetition Code and Hamming Distance

Lecture 49 - Introduction to Convolutional Codes, Binary Field Arithmetic and Linear Codes

Lecture 50 - Example of Convolutional Code Output and Convolution Operation for Code generation

Lecture 51 - Matrix Representation of Convolutional Codes, Generator Matrix, Transform Domain Representation and Shift Register Architecture

Lecture 52 - State Diagram Representation of Convolutional Code, State transitions and Example of Code Generation using State transitions

Lecture 53 - Trellis Representation of Convolutional Code and Valid Code Words

Lecture 54 - Decoding of the Convolutional Code, Minimum Hamming distance and Maximum Likelihood Codeword Estimate

Lecture 55 - Principle of Decoding of Convolutional code

Lecture 56 - Viterbi Decoder for Maximum Likelihood Decoding of Convolutional Code Using Trellis Representation, Branch Metric Calculation, State Metric Calculation and Example

NPTEL : NOC:Applied Engineering Electromagnetics (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Introduction to Applied Elecromagnetics

Lecture 2 - Introduction to Transmission lines

Lecture 3 - Sinusoidal waves on Transmission lines

Lecture 4 - Terminating T-lines: Reflection and Transmission coefficient

Lecture 5 - Circuit parameters of a T-line

Lecture 6 - Lossy Transmission lines and primary constants

Lecture 7 - When to apply T-line Theory?

Lecture 8 - Standing Waves on T-lines

Lecture 9 - Lumped equivalent circuits of T-lines

Lecture 10 - Impedance transformation and power flow on T-lines

Lecture 11 - Graphical aid: Smith Chart Derivation

Lecture 12 - Smith chart applications

Lecture 13 - Further applications of Smith chart - Part 1

Lecture 14 - Further applications of Smith chart - Part 2

Lecture 15 - Impedance matching techniques - Part 1

Lecture 16 - Impedance matching techniques - Part 2

Lecture 17 - Impedance matching techniques - Part 3

Lecture 18 - T-lines in time domain: Lattice diagrams

Lecture 19 - Further examples of use of lattice diagrams

Lecture 20 - High-speed digital signal propagation on T-lines

Lecture 21 - Transient analysis with reactive termination and Time-domain reflectometry

Lecture 22 - Fault detection using TDR

Lecture 23 - Why Electromagnetics?

Lecture 24 - Rectangular coordinate systems

Lecture 25 - Cylindrical coordinate systems

Lecture 26 - Review of vector fields and Gradient

Lecture 27 - Divergence, Curl, and Laplacian operations

Lecture 28 - Towards Maxwells equations - Part 1

Lecture 29 - Towards Maxwells equations - Part 2

Lecture 30 - Faradays law

Lecture 31 - Completing Maxwells equations and Boundary conditions

Lecture 32 - Boundary conditions for Electromagnetic fields

Lecture 33 - Electrostatics-I: Laplace and Poissons equations

Lecture 34 - Electrostatics-II: Solving Laplaces equation in 1D

Lecture 35 - Electrostatics-III: Solving Laplaces equation in 2D

Lecture 36 - Electrostatics-IV: Finite Difference method for solving Laplaces equation

Lecture 37 - Magnetostatic fields-I: Biot-Savart Law

Lecture 38 - Magnetostatic fields-II: Calculation of magnetic fields

Lecture 39 - Inductance calculations

Lecture 40 - From Maxwells equations to uniform plane waves

Lecture 41 - Plane wave propagation in lossless dielectric media

Lecture 42 - Polarization of plane waves

Lecture 43 - Can an Ideal capacitor exist?

Lecture 44 - Skin effect in conductors

Lecture 45 - Skin effect in round wires

Lecture 46 - Finite difference method

Lecture 47 - Reflection of uniform plane waves

Lecture 48 - Application: Reflection from multiple media and anti-reflection coating.

Lecture 49 - Oblique incidence of plane waves

Lecture 50 - Total internal reflection

Lecture 51 - Application: Matrix analysis of reflection from multiple boundaries

Lecture 52 - Application: Fabry-Perot cavity and Multi-layer films

Lecture 53 - Introduction to waveguides

Lecture 54 - Rectangular waveguides

Lecture 55 - Attenuation and Dispersion in rectangular waveguides

Lecture 56 - Planar optical waveguides

Lecture 57 - Application: Optical Fibers

Lecture 58 - Application: WDM Optical Components

Lecture 59 - Mach-Zehnder Modulator

Lecture 60 - Wave Propagation in Anisotropic Medium

Lecture 61 - Wave Propagation in Ferrites

Lecture 62 - Magnetic Vector Potential - Part 1

Lecture 63 - Magnetic Vector Potential - Part 2

Lecture 64 - Fields of a Dipole Antenna

Lecture 65 - Antenna Parameters and Long wire Antenna

Lecture 66 - Friis Transmission Formula

NPTEL : NOC:Principles of Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Principles of Signals and Systems- Introduction to Signals and Systems, Signal Classification - Continuous and Discrete Time Signals

Lecture 2 - Analog and Digital Signals

Lecture 3 - Energy and Power Signals

Lecture 4 - Real Exponential Signals

Lecture 5 - Memory/Memory-less and Causal/Non-Causal Systems

Lecture 6 - Properties of Linear Systems

Lecture 7 - Example Problems - 1

Lecture 8 - Example Problems - 2

Lecture 9 - Example Problems - 3

Lecture 10 - Properties and Analysis of LTI Systems - I

Lecture 11 - Properties and Analysis of LTI Systems - II

Lecture 12 - Properties and Analysis of LTI Systems - III

Lecture 13 - Properties of Discrete Time LTI Systems

Lecture 14 - Example Problems LTI Systems - I

Lecture 15 - Example Problems LTI Systems - II

Lecture 16 - Example Problems DT-LTI Systems

Lecture 17 - Laplace Transform

Lecture 18 - Laplace Transform Properties - I

Lecture 19 - Laplace Transform Properties - II

Lecture 20 - Laplace Transform of LTI Systems

Lecture 21 - Laplace Transform Example Problems - I

Lecture 22 - Laplace Transform Example Problems - II

Lecture 23 - Laplace Transform of RL, RC Circuit

Lecture 24 - Z-Transform

Lecture 25 - Z-Transform Properties - I

Lecture 26 - Z-Transform Properties - II

Lecture 27 - Z-Transform of LTI Systems

Lecture 28 - Z-Transform Examples - I

Lecture 29 - Z-Transform Examples - II

Lecture 30 - Z-Transform Examples - III

Lecture 31 - Z-Transform Examples - IV

Lecture 32 - Inverse Z-Transform

Lecture 33 - Fourier Analysis Introduction

Lecture 34 - Complex Exponential and Trigonometric FS

Lecture 35 - Conditions for Existence of FS

Lecture 36 - Fourier Transform (FT) Introduction

Lecture 37 - Properties of Fourier Transform - I

Lecture 38 - Properties of Fourier Transform - II

Lecture 39 - Fourier Transform - Parsevalâ€™s Relation

Lecture 40 - Fourier Transform of LTI Systems

Lecture 41 - FT- Ideal and Non-Ideal Filters

Lecture 42 - Fourier Analysis Examples - I

Lecture 43 - Fourier Analysis Examples - II

Lecture 44 - Fourier Analysis Examples - III

Lecture 45 - Fourier Analysis Examples - IV

Lecture 46 - Fourier Analysis Examples - V

Lecture 47 - Fourier Analysis Examples - VI

Lecture 48 - Fourier Analysis Bode Plot - I

Lecture 49 - Fourier Analysis Bode Plot - II

Lecture 50 - Fourier Transform Examples: Filtering - Ideal Low Pass Filter

Lecture 51 - Fourier Transform Problems: Unit Step Response of RC Circuit, Sampling of Continuous Signal

Lecture 52 - Sampling: Spectrum of Sampled Signal, Nyquist Criterion

Lecture 53 - Sampling: Reconstruction from Sampled Signal

Lecture 54 - Fourier Analysis of Discrete Time Signals and Systems - Introduction

Lecture 55 - Fourier Analysis of Discrete Time Signals - Duality, Parsevalâ€™s Theorem

Lecture 56 - Discrete Time Fourier Transform: Definition, Inverse DTFT, Convergence, Relation between DTFT and z-Transform, DTFT of Common Signals

Lecture 57 - Discrete Time Fourier Transform: Properties of DTFT - Linearity, Time Shifting, Frequency Shifting, Conjugation, Time-Reversal, Duality

Lecture 58 - Discrete Time Fourier Transform: Properties of DTFT - Differentiation in Frequency, Difference in Time, Convolution, Multiplication, Parsevalâ€™s Relation

Lecture 59 - DTFT: Discrete Time LTI Systems - LTI Systems Characterized by Difference Equations

Lecture 60 - Discrete Fourier Transform - Definition, Inverse DFT, Relation between DFT and DFS, Relation between DFT and DTFT, Properties - Linearity, Time Shifting

Lecture 61 - Discrete Fourier Transform: Properties - Conjugation, Frequency Shift, Duality, Circular Convolution, Multiplication, Parsevalâ€™s Relation, Example Problems for Fourier Analysis of Discrete Time Signals

Lecture 62 - Example Problems: DFS Analysis of Discrete Time Signals, Problems on DTFT

Lecture 63 - Example Problems: DTFT of Cosine, Unit Step Signals

Lecture 64 - DTFT Example Problems - III

Lecture 65 - DTFT Example Problems - IV

Lecture 66 - DTFT Example Problems - V

Lecture 67 - DFT Example Problems - I

Lecture 68 - Example Problems: DFT, IDFT in Matrix form

Lecture 69 - Group/Phase Delay - Part I

Lecture 70 - Group/Phase Delay - Part II

Lecture 71 - IIR Filter Structures: DF-I, DF-II

Lecture 72 - IIR Filter Structures: Transpose Form

Lecture 73 - IIR Filter Structures: Example

Lecture 74 - IIR Filter Structures: Cascade Form

Lecture 75 - IIR Filter: Parallel Form-I and II

NPTEL : NOC:Applied Optimization for Wireless, Machine Learning, Big Data (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Vectors and Matrices - Linear Independence and Rank

Lecture 2 - Eigenvectors and Eigenvalues of Matrices and their Properties

Lecture 3 - Positive Semidefinite (PSD) and Postive Definite (PD) Matrices and their Properties

Lecture 4 - Inner Product Space and it's Properties: Linearity, Symmetry and Positive Semi-definite

Lecture 5 - Inner Product Space and it's Properties: Cauchy Schwarz Inequality

Lecture 6 - Properties of Norm, Gaussian Elimination and Echleon form of matrix

Lecture 7 - Gram Schmidt Orthogonalization Procedure

Lecture 8 - Null Space and Trace of Matrices

Lecture 9 - Eigenvalue Decomposition of Hermitian Matrices and Properties

Lecture 10 - Matrix Inversion Lemma (Woodbury identity)

Lecture 11 - Introduction to Convex Sets and Properties

Lecture 12 - Affine Set Examples and Application

Lecture 13 - Norm Ball and its Practical Applications

Lecture 14 - Ellipsoid and its Practical Applications

Lecture 15 - Norm Cone,Polyhedron and its Applications

Lecture 16 - Applications: Cooperative Cellular Transmission

Lecture 17 - Positive Semi Definite Cone And Positive Semi Definite (PSD) Matrices

Lecture 18 - Introduction to Affine functions and examples

Lecture 19 - norm balls and Matrix properties:Trace,Determinant

Lecture 20 - Inverse of a Positive Definite Matrix

Lecture 21 - Example Problems: Property of Norms,Problems on Convex Sets

Lecture 22 - Problems on Convex Sets (Continued...)

Lecture 23 - Introduction to Convex and Concave Functions

Lecture 24 - Properties of Convex Functions with examples

Lecture 25 - Test for Convexity: Positive Semidefinite Hessian Matrix

Lecture 26 - Application: MIMO Receiver Design as a Least Squares Problem

Lecture 27 - Jensen's Inequality and Practical Application

Lecture 28 - Jensen's Inequality application

Lecture 29 - Properties of Convex Functions

Lecture 30 - Conjugate Function and Examples to prove Convexity of various Functions

Lecture 31 - Examples on Operations Preserving Convexity

Lecture 32 - Examples on Test for Convexity, Quasi-Convexity

Lecture 33 - Examples on Convex Functions

Lecture 34 - Practical Application: Beamforming in Multi-antenna Wireless Communication

Lecture 35 - Practical Application: Maximal Ratio Combiner for Wireless Systems

Lecture 36 - Practical Application: Multi-antenna Beamforming with Interfering User

Lecture 37 - Practical Application: Zero-Forcing (ZF) Beamforming with Interfering User

Lecture 38 - Practical Application: Robust Beamforming With Channel Uncertainity for Wireless Systems

Lecture 39 - Practical Application: Robust Beamformer Design for Wireless Systems

Lecture 40 - Practical Application: Detailed Solution for Robust Beamformer Computation in Wireless Systems Text

Lecture 41 - Linear modeling and Approximation Problems: Least Squares

Lecture 42 - Geometric Intuition for Least Squares

Lecture 43 - Practical Application: Multi antenna channel estimation

Lecture 44 - Practical Application:Image deblurring

Lecture 45 - Least Norm Signal Estimation

Lecture 46 - Regularization: Least Squares + Least Norm

Lecture 47 - Convex Optimization Problem representation: Canonical form, Epigraph form

Lecture 48 - Linear Program Practical Application: Base Station Co-operation

Lecture 49 - Stochastic Linear Program,Gaussian Uncertainty

Lecture 50 - Practical Application: Multiple Input Multiple Output (MIMO) Beamforming

Lecture 51 - Practical Application: Multiple Input Multiple Output (MIMO) Beamformer Design

Lecture 52 - Practical Application: Co-operative Communication, Overview and various Protocols used

Lecture 53 - Practical Application: Probability of Error Computation for Co-operative Communication

Lecture 54 - Practical Application:Optimal power allocation factor determination for Co-operative Communication

Lecture 55 - Practical Application: Compressive Sensing

Lecture 56 - Practical Application

Lecture 57 - Practical Application- Orthogonal Matching Pursuit (OMP) algorithm for Compressive Sensing

Lecture 58 - Example Problem: Orthogonal Matching Pursuit (OMP) algorithm

Lecture 59 - Practical Application : L1 norm minimization and regularization approach for Compressive Sensing Optimization problem

Lecture 60 - Practical Application of Machine Learning and Artificial Intelligence:Linear Classification, Overview and Motivation

Lecture 61 - Practical Application: Linear Classifier (Support Vector Machine) Design

Lecture 62 - Practical Application: Approximate Classifier Design

Lecture 63 - Concept of Duality

Lecture 64 - Relation between optimal value of Primal and Dual Problems, concepts of Duality gap and Strong Duality

Lecture 65 - Example problem on Strong Duality

Lecture 66 - Karush-Kuhn-Tucker (KKT) conditions

Lecture 67 - Application of KKT condition:Optimal MIMO power allocation (Waterfilling)

Lecture 68 - Optimal MIMO Power allocation (Waterfilling)-II

Lecture 69 - Example problem on Optimal MIMO Power allocation (Waterfilling)

Lecture 70 - Linear objective with box constraints, Linear Programming

Lecture 71 - Example Problems II

Lecture 72 - Examples on Quadratic Optimization

Lecture 73 - Examples on Duality: Dual Norm, Dual of Linear Program (LP)

Lecture 74 - Examples on Duality: Min-Max problem, Analytic Centering

Lecture 75 - Semi Definite Program (SDP) and its application:MIMO symbol vector decoding

Lecture 76 - Application:SDP for MIMO Maximum Likelihood (ML) Detection

Lecture 77 - Introduction to big Data: Online Recommender System (Netflix)

Lecture 78 - Matrix Completion Problem in Big Data: Netflix-I

Lecture 79 - Matrix Completion Problem in Big Data: Netflix-II

NPTEL : NOC:Fiber-Optic Communication Systems and Techniques (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Overview of fiber-optic communication systems

Lecture 2 - Review of Maxwellâ€™s equations

Lecture 3 - Uniform plane waves (UWPs) in free-space

Lecture 4 - Properties of UWPs (propagation constant, polarization, and Poynting vector)

Lecture 5 - Boundary conditions and reflection from a PEC

Lecture 6 - Obliquely incident waves-I (TE and TM waves, Snellâ€™s laws)

Lecture 7 - Obliquely incident waves-II (Reflection and transmission coefficients, Brewster angle)

Lecture 8 - Total internal reflection

Lecture 9 - Ray theory of dielectric slab waveguides

Lecture 10 - Transverse resonance condition for slab waveguides

Lecture 11 - Introduction to optical fibers

Lecture 12 - Ray theory of light propagation in optical fibers

Lecture 13 - Concept of waveguide modes

Lecture 14 - Systematic procedure to obtain modes of a waveguide

Lecture 15 - Systematic analysis of parallel plate metallic waveguide

Lecture 16 - Systematic analysis of dielectric slab waveguides

Lecture 17 - Further discussion on slab waveguides

Lecture 18 - Modal analysis of step index optical fiber

Lecture 19 - Properties of modes of step-index optical fiber - I

Lecture 20 - Properties of modes of step-index optical fiber - II

Lecture 21 - Linearly polarized modes

Lecture 22 - Attenuation and power loss in fibers

Lecture 23 - Introduction to dispersion in fibers

Lecture 24 - Mathematical modelling of dispersion: Transfer function approach

Lecture 25 - Pulse propagation equation and its solution

Lecture 26 - Pre-chirped pulses and Inter and Intra-modal dispersion in optical fibers

Lecture 27 - Beam Propagation Method

Lecture 28 - Polarization Effects on Pulse Propagation

Lecture 29 - Modes in Optical Fibres and Pulse Propagation in Optical Fibres

Lecture 30 - Graded Index Fibers

Lecture 31 - Light Sources, Detectors and Amplifiers

Lecture 32 - Basics of Lasers-I (Structure of Lasers, Process of Photon Emission)

Lecture 33 - Basics of Lasers-II (Einstein's Theory of Radiation)

Lecture 34 - Basics of Lasers-III (Population Inversion and Rate Equation for Lasers)

Lecture 35 - Basic Properties of Semiconductor Laser-I (Energy Gap, Intrinsic and Extrinsic Semiconductors)

Lecture 36 - Basic Properties of Semiconductor Laser-II (Fermi Level)

Lecture 37 - Optical Properties of Semiconductors-I (Direct Bandgap and Indirect Bandgap, Density of States)

Lecture 38 - Optical Properties of Semiconductors-II (Gain, Absorption, Recombination rate) Homojunction Lasers

Lecture 39 - Double Heterostructure Lasers, Introduction to Quantum Well Lasers

Lecture 40 - Semiconductor Optical Amplifier

Lecture 41 - Erbium-doped fiber amplifier

Lecture 42 - Photodetectors

Lecture 43 - Noise in Photodetectors

Lecture 44 - Introduction to WDM components

Lecture 45 - Couplers, Circulators, FRM and Filters

Lecture 46 - Filter, MUX/DEMUX, Diffraction grating (FBG and Long period grating)

Lecture 47 - Optical Modulators-I (Current modulation)

Lecture 48 - Optical Modulators-II (Electro-optic modulators)

Lecture 49 - Review of Communication Concepts-I (Deterministic and Random Signals, Baseband and Passband Signals)

Lecture 50 - Review of Communication Concepts-II (Signal and vectors, Signal energy, Orthonormal basis functions)

Lecture 51 - Intensity modulation/ Direct Detection

Lecture 52 - BER discussion for OOK systems

Lecture 53 - Higher order modulation and Coherent Receiver

Lecture 54 - Coherent receiver for BPSK systems and BER calculation

Lecture 55 - Recovering Polarization

Lecture 56 - DSP algorithms for Chromatic dispersion mitigation

Lecture 57 - DSP algorithms for Carrier phase estimation - I

Lecture 58 - DSP algorithms for Carrier phase estimation - II

Lecture 59 - Nonlinear effects in fiber

Lecture 60 - Four wave mixing, Loss measurement, Dispersion measurement

Lecture 61 - Lab Demonstration (Laser diode characteristics, Loss measurement, Optical Intensity Modulation)

NPTEL : NOC:Electromagnetic Waves in Guided and Wireless Media (Electrical Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Introduction and Types of Transmission Lines

Lecture 2 - Distributed Circuit Model of Uniform Transmission Line

Lecture 3 - Voltage and Current Equation of the Transmission line

Lecture 4 - Sinusoidal Excitation of Transmission Line (Propagation constant, Characteristic Impedance)

Lecture 5 - Properties of Transmission Line (Reflection Coefficient, Input Impedance, Standing Wave Ratio)

Lecture 6 - Power Calculations and Introduction to Smith Chart

Lecture 7 - Smith Chart

Lecture 8 - Additional Applications of Smith Chart

Lecture 9 - Time domain Analysis of Transmission Line - I

Lecture 10 - Time domain Analysis of Transmission Line - II

Lecture 11 - Usage of Lattice Diagrams

Lecture 12 - TDR analysis of Transmission Lines

Lecture 13 - Introduction to Propagation of Electromagnetic Waves

Lecture 14 - Uniform Plane Waves - I

Lecture 15 - Uniform Plane Waves - II

Lecture 16 - Poynting Vector, Average Power, Polarization

Lecture 17 - Uniform Plane Waves in Lossy Medium

Lecture 18 - Normal Incidence of Plane Waves

Lecture 19 - Oblique Incidence of Plane Waves - I

Lecture 20 - Oblique Incidence of Plane Waves - II

Lecture 21 - Total Internal Reflection

Lecture 22 - Slab Waveguides

Lecture 23 - Optical Fibers

Lecture 24 - Parallel Plate Waveguides

Lecture 25 - Rectangular Waveguides

Lecture 26 - Modes of Rectangular Waveguides

Lecture 27 - Waveguides summary and Introduction to Radiation

Lecture 28 - Solution to Electric Scalar Potential and Magnetic Vector Potential Equations

Lecture 29 - Further discussion on Magnetic Vector Potential and Elementary Hertzian Dipole

Lecture 30 - Near field and Far-field Antenna and Properties of Antennas

Lecture 31 - Linear antenna - I

Lecture 32 - Linear antenna - II and Properties of Transmitting and Receiving Antenna

Lecture 33 - Friis Transmission Formula

Lecture 34 - Antenna Array

Lecture 35 - Wireless Channel

Lecture 36 - Further discussion on Wireless Channel Modelling

Lecture 37 - Diffraction - I

Lecture 38 - Diffraction - II

Lecture 39 - Distribution of Laser Beam

Lecture 40 - Interference (Double slit experiment, Fabry Perot Interferometer)

Lecture 41 - Summary

NPTEL : NOC:Basic Electric Circuits (Electrical Engineering)

Co-ordinators : Prof. Ankush Sharma

Lecture 1 - Basic Concepts

Lecture 2 - Sinusoids and Phasors

Lecture 3 - Circuit Elements - Part 1

Lecture 4 - Circuit Elements - Part 2

Lecture 5 - AC Power Analysis

Lecture 6 - RMS Voltage and Current

Lecture 7 - Topology

Lecture 8 - Star-Delta Transformation and Mesh Analysis

Lecture 9 - Mesh Analysis.

Lecture 10 - Nodal Analysis

Lecture 11 - Linearity Property and Superposition Theorem

Lecture 12 - Source Transformation

Lecture 13 - Duality

Lecture 14 - Thevenin's Theorem - 1

Lecture 15 - Thevenin's Theorem - 2

Lecture 16 - Norton's Theorem - 1

Lecture 17 - Norton's Theorem - 2

Lecture 18 - Maximum Power Transfer Theorem - 1

Lecture 19 - Maximum Power Transfer Theorem - 2

Lecture 20 - Reciprocity and Compensation Theorem

Lecture 21 - First Order RC Circuits

Lecture 22 - First Order RL Circuits

Lecture 23 - Singularity Functions

Lecture 24 - Step Response of RC and RL Circuits

Lecture 25 - Second Order Response

Lecture 26 - Step Response of Second Order Circuits-First Order and Second Order Circuits (Continued...)

Lecture 27 - Step Response of Parallel RLC Circuit-First Order and Second Order Circuits (Continued...)

Lecture 28 - Definition of the Laplace Transform

Lecture 29 - Properties of the Laplace Transform

Lecture 30 - Inverse Laplace Transform

Lecture 31 - Laplace Transform of Circuit Elements

Lecture 32 - Transfer Function

Lecture 33 - Convolution Integral

Lecture 34 - Graphical Approach of Convolution Integral

Lecture 35 - Network Stability and Network Synthesis

Lecture 36 - Impedance Parameters

Lecture 37 - Admittance Parameters

Lecture 38 - Hybrid Parameters

Lecture 39 - Transmission Parameters

Lecture 40 - Interconnection of Networks

Lecture 41 - Nodal and Mesh Analysis

Lecture 42 - Superposition Theorem and Source Transformation

Lecture 43 - Thevenin's, Norton's and, Maximum Power Transfer Theorem

Lecture 44 - Magnetically Coupled Circuits

Lecture 45 - Energy in Coupled Circuits and Ideal Transformer

Lecture 46 - Ideal Transformer and Introduction to Three-Phase Circuits

Lecture 47 - Balanced Three-Phase Connections

Lecture 48 - Balanced Wye-Delta and Delta-Delta Connections

Lecture 49 - Balanced Delta-Wye Connection and Power in Balanced Three-Phase System

Lecture 50 - Unbalanced Three-Phase System and Three-Phase Power Measurement

Lecture 51 - Introduction to Graphical Models

Lecture 52 - State Equations

Lecture 53 - State Diagram

Lecture 54 - State Transition Matrix

Lecture 55 - State Variable Method to Circuit Analysis

Lecture 56 - Characteristic Equation, Eigenvalues, and Eigenvectors-State Variable Analysis (Continued...)

Lecture 57 - Modeling of Mechanical Systems

Lecture 58 - Modeling of The Rotational Motion of Mechanical Systems

Lecture 59 - Modeling of Electrical Systems

Lecture 60 - Solving Analogous Systems

NPTEL : NOC:Fundamentals of Electric Drives (Electrical Engineering)

Co-ordinators : Prof. Shyama Prasad Das

Lecture 1 - Introduction to Electric Drives

Lecture 2 - Dynamics of Electric Drives, Four Quadrant Operation, Equivalent Drive Parameters

Lecture 3 - Equivalent Drive Parameters, Friction Components, Nature of Load Torque

Lecture 4 - Steady State Stability, Load Equalization

Lecture 5 - Load Equalization, Characteristics of DC Motor

Lecture 6 - Speed Torque Characteristics of Separately Excited DC Motor and Series DC Motor

Lecture 7 - Field Control of Series Motor, Motoring and Braking of Separately Excited and Series DC motors

Lecture 8 - Speed Control of Separately Excited DC Motor Using Controlled Rectifiers

Lecture 9 - Analysis of Single Phase Full Controlled Converter-fed Separately Excited DC Motor

Lecture 10 - Speed Torque Characteristics of Full Controlled Converter-fed Separately Excited DC Motor, Analysis of Single Phase Half Controlled Converter-fed Separately Excited DC Motor

Lecture 11 - Analysis of Single Phase Half Controlled Converter-fed Separately Excited DC Motor.

Lecture 12 - Three Phase Full Controlled Converter-fed Separately Excited DC Motor, Multi-quadrant Operation of DC Motor

Lecture 13 - Dual Converter-fed DC Motor, Multi-quadrant Operation Using Field Current Reversal

Lecture 14 - DC Chopper-fed Separately Excited DC Motor for Motoring and Braking

Lecture 15 - Two-quadrant DC Chopper, Four-quadrant DC Chopper

Lecture 16 - Dynamic Braking of DC Motor by Chopper Controlled Resistor, Closed-loop Operation of DC Drives, Induction Motor Drives

Lecture 17 - Speed Torque Characteristics of Induction Motor, Operation of Induction Motor from Non-sinusoidal Supply

Lecture 18 - Operation of Induction Motor from Non-sinusoidal Supply

Lecture 19 - Stator Current of Induction Motor with Non-sinusoidal Supply, Operation of Induction Motor with Unbalanced Voltage Supply

Lecture 20 - Single Phasing of Induction Motor, Braking of Induction Motor

Lecture 21 - Dynamic braking of induction motor, AC dynamic braking, DC dynamic braking

Lecture 22 - Analysis of DC dynamic braking of induction motor

Lecture 23 - Self-excited dynamic braking of induction motor, Speed control of induction motor using stator voltage regulator, Variable voltage variable frequency control

Lecture 24 - Variable voltage variable frequency control of induction motor, Open loop V/F control

Lecture 25 - Slip speed control of induction motor, Constant Volt/Hz control with slip speed regulation

Lecture 26 - Closed-loop Volt/Hz control of induction motor with slip speed regulation, Multi-quadrant operation of induction motor drive

Lecture 27 - Current Source Inverter (CSI) fed induction motor drive

Lecture 28 - Closed-loop operation of current source inverter (CSI) fed induction motor drive, Control of slip ring induction motor - Static rotor resistance control

Lecture 29 - Closed-loop operation of slip ring induction motor with static rotor resistance control, Slip power recovery in slip ring induction motor - Static Kramer drive

Lecture 30 - Static Kramer drive and its closed-loop control, Introduction to synchronous motor

Lecture 31 - Various types of synchronous motors, Equivalent circuit and phasor diagram of cylindrical synchronous motor, Speed-torque characteristics of cylindrical synchronous motor

Lecture 32 - Phasor diagram of salient pole synchronous motor, Expression of power and torque for a salient pole synchronous motor, Synchronous reluctance motor, Open-loop V/f control of synchronous motor

Lecture 33 - Open-loop V/f control, Torque-speed characteristics, Self controlled synchronous motor drive employing load commutated thyristor inverter

Lecture 34 - Detailed analysis of commutation of load commutated thyrisor inverter, Derivation of overlap angle and margin angle, Closed-loop speed control scheme for load commutated inverter-fed synchronous motor drive

Lecture 35 - Low cost brushless DC motor (BLDCM), Trapezoidal permanent magnet AC motor

Lecture 36 - Trapezoidal permanent magnet AC motor, Derivation of power and torque, Closed-loop control of trapezoidal BLDC motor, Introduction to switched reluctance motor

Lecture 37 - Construction and operating principle of switched reluctance motor

Lecture 38 - Current/ voltage control for switched reluctance motor, operating modes of switched reluctance motor, Introduction to traction drives

Lecture 39 - Current collector for mainline trains, Nature of traction load, Duty cycle of traction drives

Lecture 40 - Duty cycle of traction drives, Distance between two stops, Calculation of total tractive effort and drive rating

NPTEL : NOC:Fuzzy Sets, Logic and Systems and Applications (Electrical Engineering)

Co-ordinators : Prof. Nishchal K Verma

Lecture 1 - Introduction: Fuzzy Sets, Logic and Systems and Applications

Lecture 2 - Introduction: Real Life Applications of Fuzzy Systems

Lecture 3 - Fuzzy Sets and Fuzzy Logic Toolbox in MATLAB - I

Lecture 4 - Fuzzy Sets and Fuzzy Logic Toolbox in MATLAB - II

Lecture 5 - Membership Functions - I

Lecture 6 - Membership Functions - II

Lecture 7 - Nomenclatures used in Fuzzy Set Theory - I

Lecture 8 - Nomenclatures used in Fuzzy Set Theory - II

Lecture 9 - Nomenclatures used in Fuzzy Set Theory - III

Lecture 10 - Set Theoretic Operations on Fuzzy Sets - I

Lecture 11 - Set Theoretic Operations on Fuzzy Sets - II

Lecture 12 - Properties of Fuzzy Sets - I

Lecture 13 - Properties of Fuzzy Sets - II

Lecture 14 - Properties of Fuzzy Sets - III

Lecture 15 - Properties of Fuzzy Sets - IV

Lecture 16 - Properties of Fuzzy Sets - V

Lecture 17 - Distance between Fuzzy Sets - I

Lecture 18 - Distance between Fuzzy Sets - II

Lecture 19 - Distance between Fuzzy Sets - III

Lecture 20 - Arithmetic Operations on Fuzzy Numbers - I

Lecture 21 - Arithmetic Operations on Fuzzy Numbers - II

Lecture 22 - Arithmetic Operations on Fuzzy Numbers - III

Lecture 23 - Complement of Fuzzy Sets

Lecture 24 - T-norm Operators

Lecture 25 - S-norm Operators

Lecture 26 - Parameterized T-Norm Operators

Lecture 27 - Parameterized S-Norm Operators

Lecture 28 - Fuzzy Relation - I

Lecture 29 - Fuzzy Relation - II

Lecture 30 - Operations on Crisp and Fuzzy Relations

Lecture 31 - Projection of Fuzzy Relation Set

Lecture 32 - Cylindrical Extension of Fuzzy Set

Lecture 33 - Properties of Fuzzy Relation - I

Lecture 34 - Properties of Fuzzy Relation - II

Lecture 35 - Extension Principle

Lecture 36 - Composition of Fuzzy Relations

Lecture 37 - Properties of Composition of Fuzzy Relations

Lecture 38 - Fuzzy Tolerance and Equivalence Relations - I

Lecture 39 - Fuzzy Tolerance and Equivalence Relations - II

Lecture 40 - Fuzzy Tolerance and Equivalence Relations - III

Lecture 41 - Linguistic Hedges

Lecture 42 - Linguistic Hedges and Negation/ Complement and Connectives

Lecture 43 - Concentration and Dilation and Composite Linguistic Term and Some Examples

Lecture 44 - Dilation and Composite Linguistic Term and Some Examples

Lecture 45 - Some Examples on Composite Linguistic Terms

Lecture 46 - Contrast Intensification of Fuzzy Sets

Lecture 47 - Orthogonality of Fuzzy Sets

Lecture 48 - Fuzzy Rules and Fuzzy Reasoning - I

Lecture 49 - Fuzzy Rules and Fuzzy Reasoning - II

Lecture 50 - Fuzzy Inference System

Lecture 51 - Mamdani Fuzzy Model - I

Lecture 52 - Mamdani Fuzzy Model - II

Lecture 53 - Mamdani Fuzzy Model - III

Lecture 54 - Example on Mamdani Fuzzy Model for Single Antecedent with Three Rules

Lecture 55 - Example on Mamdani Fuzzy Model for Two Antecedents with Four Rules

Lecture 56 - Larsen Fuzzy Model - I

Lecture 57 - Larsen Fuzzy Model - II

Lecture 58 - Larsen Fuzzy Model - III

Lecture 59 - Tsukamoto Fuzzy Model

Lecture 60 - TSK Fuzzy Model

NPTEL : NOC:Peer to Peer Networks (Electrical Engineering)

Co-ordinators : Prof. Yatindra N Singh

Lecture 1 - Introduction to Peer to Peer Networks

Lecture 2 - Peer to Peer Network in Telephony:Voice over Internet Telephony (VoIP) and Distributed Hash Table (DHT)

Lecture 3 - Building DHT Networks

Lecture 4 - Logarithmic Partitioning of Node ID Space and Index Entry Authenticity

Lecture 5 - Implementation of Voice over Internet Telephony in P2P Way

Lecture 6 - Leaf Nodes, Core Nodes and Type of Messages in DHT Networks

Lecture 7 - Static and Dynamic Partitioning of Node ID Space: Fixed and Floating Partitioning

Lecture 8 - PASTRY Protocol: The Efficient Use of Internet Infrastructure

Lecture 9 - Understanding the PASTRY Protocol through Example

Lecture 10 - Kademlia: A DHT Routing Protocol

Lecture 11 - Tapestry: An Evolution of Kademlia

Lecture 12 - Understanding the Tapestry Protocol through Example

Lecture 13 - Multi-dimensional Distributed Hash Table: Mapping of Peers into Multidimensional Space

Lecture 14 - Multi-Layer DHT: A Design for Multiple Services

Lecture 15 - Keeping Pairs at Correct Root Nodes

Lecture 16 - Abrupt and Graceful Exit of Root Node: Maintaining Pairs Alive

Lecture 17 - Resilience of Pairs

Lecture 18 - A P2P Distributed File System

Lecture 19 - Storage Space Problem and Incentives to Share Storage

Lecture 20 - P2P Nodes Communications Challenges in Heterogeneous Network Environments

Lecture 21 - P2P Overlaid Multicast: Basic Design

Lecture 22 - P2P Overlaid Multicast: Alternate Design

Lecture 23 - A Design of P2P Email System

Lecture 24 - P2P Mailing List Services: A Basic Design

Lecture 25 - P2P Mailing List Services: An Alternate Design

Lecture 26 - P2P Web: A Basic Design

Lecture 27 - P2P Web Search Engine: A Basic Design

Lecture 28 - P2P Internet: On Being Anonymous

Lecture 29 - P2P in Blockchain

Lecture 30 - P2P Anonymous Communication

Lecture 31 - The Anonymous Communication on the Internet through TOR Network

Lecture 32 - An Introduction To TOR Browser: The Anonymity Preserving Access of the Web Sites

Lecture 33 - Hidden Services on TOR Network

Lecture 34 - MOOC Wrap-Up : Summary of the Course

NPTEL : NOC:Applied Linear Algebra for Signal Processing, Data Analytics and Machine Learning (Electrical Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Vector Properties: Addition, Linear Combination, Inner Product, Orthogonality, Norm

Lecture 2 - Vectors: Unit Norm Vector, Cauchy-Schwarz inequality, Radar Application

Lecture 3 - Inner Product Application: Beamforming in Wireless Communication Systems

Lecture 4 - Matrices, Definition, Addition and Multiplication of Matrices

Lecture 5 - Matrix: Column Space, Linear Independence, Rank of Matrix, Gaussian Elimination

Lecture 6 - Matrix: Determinant, Inverse Computation, Adjoint, Cofactor Concepts

Lecture 7 - Applications of Matrices: Solution of System of Linear equations, MIMO Wireless Technology

Lecture 8 - Applications of Matrices: Electric Circuits, Traffic flows

Lecture 9 - Applications of Matrices: Graph Theory, Social Networks, Dominance Directed Graph, Influential Node

Lecture 10 - Null Space of Matrix: Definition, Rank-Nullity Theorem, Application in Electric Circuits

Lecture 11 - Gram-Schmidt Orthogonalization

Lecture 12 - Gaussian Random Variable: Definition, Mean, Variance, Multivariate Gaussian, Covariance Matrix

Lecture 13 - Linear Transformation of Gaussian Random Vectors

Lecture 14 - Machine Learning Application: Gaussian Classification

Lecture 15 - Eigenvalue: Definition, Characteristic Equation, Eigenvalue Decomposition

Lecture 16 - Special Matrices: Rotation and Unitary Matrices, Application: Alamouti Code

Lecture 17 - Positive Semi-definite (PSD) Matrices: Definition, Properties, Eigenvalue Decomposition

Lecture 18 - Positive Semidefinite Matrix: Example and Illustration of Eigenvalue Decomposition

Lecture 19 - Machine Learning Application: Principle Component Analysis (PCA)

Lecture 20 - Computer Vision Application: Face Recognition, Eigenfaces

Lecture 21 - Least Squares (LS) Solution, Pseudo-Inverse Concept

Lecture 22 - Least Squares (LS) via Principle of Orthogonality, Projection Matrix, Properties

Lecture 23 - Application: Pseudo-Inverse and MIMO Zero Forcing (ZF) Receiver

Lecture 24 - Wireless Application: Multi-Antenna Channel Estimation

Lecture 25 - Machine Learning Application: Linear Regression

Lecture 26 - Computation Mathematics Application: Polynomial Fitting

Lecture 27 - Least Norm Solution

Lecture 28 - Wireless Application: Multi-user Beamforming

Lecture 29 - Singular Value Decomposition (SVD): Definition, Properties, Example

Lecture 30 - SVD Application in MIMO Wireless Technology: Spatial-Multiplexing and High Data Rates

Lecture 31 - SVD for MIMO wireless optimization, water-filling algorithm, optimal power allocation

Lecture 32 - SVD application for Machine Learning: Principal component analysis (PCA)

Lecture 33 - Multiple signal classification (MUSIC) algorithm: system model

Lecture 34 - MUSIC algorithm for Direction of Arrival (DoA) estimation

Lecture 35 - Linear minimum mean square error (LMMSE) principle

Lecture 36 - LMMSE estimate and error covariance matrix

Lecture 37 - LMMSE estimation in linear systems

Lecture 38 - LMMSE application: Wireless channel estimation and example

Lecture 39 - Time-series prediction via auto-regressive (AR) model

Lecture 40 - Recommender system: design and rating prediction

Lecture 41 - Recommender system: Illustration via movie rating prediction example

Lecture 42 - Fast Fourier transform (FFT) and Inverse fast Fourier transform (IFFT)

Lecture 43 - IFFT/ FFT application in Orthogonal Frequency Division Multiplexing (OFDM) wireless technology

Lecture 44 - OFDM system: Circulant matrices and properties

Lecture 45 - OFDM system model: Transmitter and receiver processing

Lecture 46 - Single-carrier frequency division for multiple access (SC-FDMA) technology

Lecture 47 - Linear dynamical systems: definition and solution via matrix exponential

Lecture 48 - Linear dynamical systems: matrix exponential via SVD

Lecture 49 - Machine Learning application: Support Vector Machines (SVM)

Lecture 50 - Support Vector Machines (SVM): Problem formulation via maximum hyperplane separation

Lecture 51 - Sparse regression: problem formulation and relation to Compressive Sensing (CS)

Lecture 52 - Sparse regression: solution via the Orthogonal Matching Pursuit (OMP) algorithm

Lecture 53 - OMP Example for Sparse Regression

Lecture 54 - Machine Learning Application: Clustering

Lecture 55 - K-Means Clustering algorithm

Lecture 56 - Introduction to Stochastic Processes and Markov Chains

Lecture 57 - Discrete Time Markov Chains and Transition Probability Matrix

Lecture 58 - Discrete Time Markov Chain Examples

Lecture 59 - m-STEP Transition Probabilities for Discrete Time Markov Chains

Lecture 60 - Limiting Behavior of Discrete Time Markov Chains

Lecture 61 - Least Squares Revisited: Rank Deficient Matrix

Lecture 62 - Least Squares using SVD

Lecture 63 - Weighted Least Squares

Lecture 64 - Weighted Least Squares Example

Lecture 65 - Woodbury Matrix Identity - Matrix Inversion Lemma

Lecture 66 - Woodbury Matrix Identity - Proof

Lecture 67 - Conditional Gaussian Density - Mean

Lecture 68 - Conditional Gaussian Density - Covariance

Lecture 69 - Scalar Linear Model for Gaussian Estimation

Lecture 70 - MMSE Estimate and Covariance for the Scalar Linear Model

NPTEL : NOC:Economic Operations and Control of Power Systems (Electrical Engineering)

Co-ordinators : Prof. Gururaj Mirle Vishwanath, Prof. Narayana Prasad Padhy

Lecture 1

Lecture 2

Lecture 3

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NPTEL : NOC:Digital Switching (Electrical Engineering)

Co-ordinators : Prof. Yatindra N Singh

Lecture 1

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NPTEL : NOC:Analog VLSI Design (Electrical Engineering)

Co-ordinators : Prof. Imon Mondal

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Lecture 65

NPTEL : Electrical Machines I (Electrical Engineering)

Co-ordinators : Dr. D. Kastha

Lecture 1 - Introduction

Lecture 2 - Operating Principles and Construction of Single Phase Transformers

Lecture 3 - Modeling of Single Phase Transformers

Lecture 4 - Equivalent Circuits of Single Phase Transformers

Lecture 5 - Testing of Single Phase Transformers

Lecture 6 - Efficiency of Single Phase Transformers

Lecture 7 - Voltage Regulation of Single Phase Transformers

Lecture 8 - Parallel Operation of Single Phase Transformers

Lecture 9 - Harmonics and Switching Transients in Single Phase Transformers

Lecture 10 - Introduction to Three Phase Transformer

Lecture 11 - Construction of Three Phase Transformers

Lecture 12 - Three Phase Transformer Connections

Lecture 13 - Three Phase Transformer Phase Groups Part - I

Lecture 14 - Three Phase Transformer Phase Groups Part - II

Lecture 15 - Analysis and Testing of Three Phase Transformers

Lecture 16 - Operation of Three Phase Transformers

Lecture 17 - Auto Transformers

Lecture 18 - Three Winding Transformers

Lecture 19 - Scott Connected Transformers

Lecture 20 - Potential and Current Transformers

Lecture 21 - Operating Principles of DC Machines

Lecture 22 - Constructional Features of DC Machines

Lecture 23 - Generated EMF and Torque in DC Machines

Lecture 24 - Armature Reaction

Lecture 25 - Commutation in DC Machines

Lecture 26 - Separately Excited DC Generators

Lecture 27 - DC Shunt Generators

Lecture 28 - Compound DC Generators

Lecture 29 - Interconnected DC Generators

Lecture 30 - Characteristics of DC Shunt Motors

Lecture 31 - Starting of DC Shunt Motors

Lecture 32 - Speed Control of DC Shunt Motors

Lecture 33 - Braking of DC Shunt Motors

Lecture 34 - Electronic Control of DC Shunt Motors

Lecture 35 - Testing of DC Shunt Motors

Lecture 36 - Characteristics of DC Series Motors

Lecture 37 - Starting and Braking of DC Series Motors

Lecture 38 - Speed Control and of DC Series Motors

Lecture 39 - Testing of DC Series Motors

Lecture 40 - Characteristics of Compound DC Series Motors

NPTEL : Optimal Control (Electrical Engineering)

Co-ordinators : Prof. G.D. Ray

Lecture 1 - Introduction to Optimization Problem: Some Examples

Lecture 2 - Introduction to Optimization Problem: Some Examples (Continued.)

Lecture 3 - Optimality Conditions for Function of Several Variables

Lecture 4 - Optimality Conditions for Function of Several Variables (Continued.)

Lecture 5 - Unconstrained Optimization Problem (Numerical Techniques)

Lecture 6 - Solution of Unconstrained Optimization Problem Using Conjugate Quadient Method and Networks Methods

Lecture 7 - Solution of Unconstrained Optimization Problem Using Conjugate Quadient Method and Networks Methods (Continued.)

Lecture 8 - Solution of Constraint Optimization Problem-Karush-Kuhn Tucker (KKT) Conditions

Lecture 9 - Solution of Constraint Optimization Problem-Karush-Kuhn Tucker (KKT) Conditions (Continued.)

Lecture 10 - Problem and Solution Session

Lecture 11 - Post Optimality Analysis, Convex Function and its Properties

Lecture 12 - Post Optimality Analysis, Convex Function and its Properties (Continued.)

Lecture 13 - Quadratic Optimization Problem Using Linear Programming

Lecture 14 - Matrix form of the Simplex Method

Lecture 15 - Matrix form of the Simplex Method (Continued.)

Lecture 16 - Solution of Linear Programming Using Simplex Method:- Algebraic Approach

Lecture 17 - Solution of Linear Programming Using Simplex Method:- Algebraic Approach (Continued.)

Lecture 18 - Solution of LP Problems with Two Phase Method

Lecture 19 - Solution of LP Problems with Two Phase Method (Continued.)

Lecture 20 - Standard Primal and Dual Problems

Lecture 21 - Relationship Between Primal and Dual Variables

Lecture 22 - Solution of Quadratic Programming Problem Using Simplex Method

Lecture 23 - Interior Point Method for Solving Optimization Problems

Lecture 24 - Interior Point Method for Solving Optimization Problems (Continued.)

Lecture 25 - Solution of Nonlinear Programming Problem Using Exterior Penalty Function Method

Lecture 26 - Solution of Nonlinear Programming Problem Using Exterior Penalty Function Method (Continued.)

Lecture 27 - Solution of Nonlinear Programming Problem Using Interior Penalty Function Method

Lecture 28 - Solution of Nonlinear Programming Problem Using Interior Penalty Function Method (Continued.)

Lecture 29 - Multiobjective Optimization Problem

Lecture 30 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition

Lecture 31 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition (Continued...1)

Lecture 32 - Dynamic Optimization Problem: Basic Concepts and Necessary and Sufficient Condition (Continued...2)

Lecture 33 - Numerical Example and Solution of Optimal Control Problem using Calculus of Variation principle

Lecture 34 - Numerical Example and Solution of Optimal Control Problem using Calculus of Variation principle (Continued.)

Lecture 35 - Hamiltonian Formulation for solution of optimal Control problem and numerical example

Lecture 36 - Hamiltonian Formulation for solution of optimal Control problem and numerical example (Continued.)

Lecture 37 - Performance Indices and Linear Quadratic Regulator Problem

Lecture 38 - Performance Indices and Linear Quadratic Regulator Problem (Continued.)

Lecture 39 - Solution and Stability Analysis of Finite - time LQR Problem: Numerical Example

Lecture 40 - Solution and Infinite - time LQR Problem and Stability Analysis

Lecture 41 - Numerical Example and Methods for Solution of A.R.E.

Lecture 42 - Numerical Example and Methods for Solution of A.R.E. (Continued.)

Lecture 43 - Frequency Domain Interpretation of LQR Controlled System

Lecture 44 - Gain and Phase Margin of LQR Controlled System

Lecture 45 - The Linear Quadratic Gaussian Problem

Lecture 46 - Loop-Transfer Recovery

Lecture 47 - Dynamic Programming for Discrete Time Systems

Lecture 48 - Minimum â€“ Time Control of a Linear Time Invariant System

Lecture 49 - Solution of Minimum â€“ Time Control Problem with an Example

Lecture 50 - Constraint in Control Inputs and State Variables

Lecture 51 - Constraint in Control Inputs and State Variables (Continued...)

Lecture 52 - Norms for Vectors, Matrices, Signals and Linear Systems

Lecture 53 - Signal and System Norms

Lecture 54 - Internal Stability, Sensitivity and Complementary Sensitivity Functions

Lecture 55 - Internal Stability, Sensitivity and Complementary Sensitivity Functions (Continued...)

Lecture 56 - Plant Uncertainty and Standard form for Robust Stability Analysis

Lecture 57 - Plant Uncertainty and Standard form for Robust Stability Analysis (Continued...)

Lecture 58 - Frequency Response of Linear System and Singular Value Decomposition of System

Lecture 59 - Control Problem Statement in H- alpha Framework

Lecture 60 - Control Problem Statement in H - alpha Framework (Continued...)

NPTEL : Chaos, Fractals and Dynamic Systems (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

Lecture 1 - Representations of Dynamical Systems

Lecture 2 - Vector Fields of Nonlinear Systems

Lecture 3 - Limit Cycles

Lecture 4 - The Lorenz Equation - I

Lecture 5 - The Lorenz Equation - II

Lecture 6 - The Rossler Equation and Forced Pendulum

Lecture 7 - The Chua's Circuit

Lecture 8 - Discrete Time Dynamical Systems

Lecture 9 - The Logistic Map and Period doubling

Lecture 10 - Flip and Tangent Bifurcations

Lecture 11 - Intermittency Transcritical and pitchfork

Lecture 12 - Two Dimensional Maps

Lecture 13 - Bifurcations in Two Dimensional Maps

Lecture 14 - Introduction to Fractals

Lecture 15 - Mandelbrot Sets and Julia Sets

Lecture 16 - The Space Where Fractals Live

Lecture 17 - Interactive Function Systems

Lecture 18 - IFS Algorithms

Lecture 19 - Fractal Image Compression

Lecture 20 - Stable and Unstable Manifolds

Lecture 21 - Boundary Crisis and Interior Crisis

Lecture 22 - Statistics of Chaotic Attractors

Lecture 23 - Matrix Times Circle : Ellipse

Lecture 24 - Lyapunov Exponent

Lecture 25 - Frequency Spectra of Orbits

Lecture 26 - Dynamics on a Torus

Lecture 27 - Dynamics on a Torus

Lecture 28 - Analysis of Chaotic Time Series

Lecture 29 - Analysis of Chaotic Time Series

Lecture 30 - Lyapunou Function and Centre Manifold Theory

Lecture 31 - Non-Smooth Bifurcations

Lecture 32 - Non-Smooth Bifurcations

Lecture 33 - Normal from for Piecewise Smooth 2D Maps

Lecture 34 - Bifurcations in Piecewise Linear 2D Maps

Lecture 35 - Bifurcations in Piecewise Linear 2D Maps

Lecture 36 - Multiple Attractor Bifurcation and Dangerous

Lecture 37 - Dynamics of Discontinuous Maps

Lecture 38 - Introduction to Floquet Theory

Lecture 39 - The Monodromy Matrix and the Saltation Matrix

Lecture 40 - Control of Chaos

NPTEL : Digital Signal Processing (Electrical Engineering)

Co-ordinators : Prof. T.K. Basu

Lecture 1 - Discrete Time Signal and System

Lecture 2 - Discrete Time Signal and System (Continued...)

Lecture 3 - Discrete Time Signal and System (Continued...)

Lecture 4 - Frequency Domain Representation of Discrete Signals

Lecture 5 - Z-Transform

Lecture 6 - Z-Transform (Continued...)

Lecture 7 - Solution of Difference Equation

Lecture 8 - Tutorial on Discrete Time Signals & Their Transforms

Lecture 9 - Relation Between Discrete Time and Continuous Signals

Lecture 10 - Discrete Fourier Transform (DFT)

Lecture 11 - Discrete Fourier Transform (DFT) (Continued...)

Lecture 12 - Discrete Fourier Transform (DFT) (Continued...)

Lecture 13 - State Space Representation

Lecture 14 - Filters Introduction

Lecture 15 - FIR Filters

Lecture 16 - FIR Filters (Continued...) Introduction to IIR Filters

Lecture 17 - IIR Filters (Continued...)

Lecture 18 - IIR Filters (Continued...)

Lecture 19 - IIR Filters (Continued...)

Lecture 20 - Tutorial & Introduction to Computer Aided Design of Filters

Lecture 21 - Computer Aided Design of Filters

Lecture 22 - FFT and Computer Aided Design of Filters

Lecture 23 - Introduction to Lattice Filter

Lecture 24 - Lattice Filter (Continued...)

Lecture 25 - Effects of Quantization

Lecture 26 - Effects of Quantization (Continued...)

Lecture 27 - Effects of Quantization (Continued...)

Lecture 28 - Effects of Quantization (Continued...)

Lecture 29 - Random Signals

Lecture 30 - Relationship Between Real and Imaginary Parts of DTFT

Lecture 31 - Relationship Between Real and Imaginary Parts of DTFT

Lecture 32 - Relationship Between Real and Imaginary Parts of DTFT

Lecture 33 - Multi rate Signal Processing

Lecture 34 - Multi rate Signal Processing (Continued...)

Lecture 35 - Polyphase Decomposition

NPTEL : Dynamics of Physical Systems (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

Lecture 1 - Introduction to System Elements

Lecture 2 - Newton's Method and Constraints

Lecture 3 - Derivation of the Lagrangian Equation

Lecture 4 - Using the lagrangian Equation to Obtain Differential Equations (Part-I)

Lecture 5 - Using the lagrangian Equation to Obtain Differential Equations (Part-II)

Lecture 6 - Using the lagrangian Equation to Obtain Differential Equations (Part-III)

Lecture 7 - Using the lagrangian Equation to Obtain Differential Equations (Part-IV)

Lecture 8 - Obtaining First Order Equations

Lecture 9 - Application of the Hamiltonian Method

Lecture 10 - Obtaining Differential Equations Using Kirchoff's Laws

Lecture 11 - The Graph Theory Approach for Electrical Circuits (Part-I)

Lecture 12 - The Graph Theory Approach for Electrical Circuits (Part-II)

Lecture 13 - The Bond Graph Approach - I

Lecture 14 - The Bond Graph Approach - II

Lecture 15 - The Bond Graph Approach - III

Lecture 16 - The Bond Graph Approach - IV

Lecture 17 - The Bond Graph Approach - V

Lecture 18 - The Bond Graph Approach - VI

Lecture 19 - The Bond Graph Approach - VII

Lecture 20 - Numerical Solution of Differential Equations

Lecture 21 - Dynamics in the State Space

Lecture 22 - Vector Field Around Equilibrium Points - I

Lecture 23 - Vector Field Around Equilibrium Points - II

Lecture 24 - Vector Field Around Equilibrium Points - III

Lecture 25 - Vector Field Around Equilibrium Points - IV

Lecture 26 - High Dimensional Linear Systems

Lecture 27 - Linear Systems with External Input - I

Lecture 28 - Linear Systems with External Input - II

Lecture 29 - Linear Systems with External Input - III

Lecture 30 - Dynamics of Nonlinear Systems - I

Lecture 31 - Dynamics of Nonlinear Systems - II

Lecture 32 - Dynamics of Nonlinear Systems - III

Lecture 33 - Discrete-Time Dynamical Systems - I

Lecture 34 - Discrete-Time Dynamical Systems - II

NPTEL : Energy Resources and Technology (Electrical Engineering)

Co-ordinators : Prof. S. Banerjee

Lecture 1 - Thermodynamics: Fundamentals Of Energy - Energy Resources & Technology

Lecture 2 - Quality of Energy

Lecture 3 - Complete Cycle Analysis of Fossil Fuels

Lecture 4 - Energy in Transportation

Lecture 5 - Other Fossil Fuels

Lecture 6 - Energy Economics : Input-Output Analysis

Lecture 7 - Energy Economics : Input-Output Analysis

Lecture 8 - Thermal Power Plants

Lecture 9 - Thermal Power Plants

Lecture 10 - Hydroelectric Power

Lecture 11 - Hydroelectric Power

Lecture 12 - Nuclear Power Generation

Lecture 13 - Nuclear Fusion Reactors

Lecture 14 - Environmental Effects of Conventional Power

Lecture 15 - Solar Thermal Energy Conversion

Lecture 16 - Solar Concentrating Collectors

Lecture 17 - Photovoltaic Power Generation

Lecture 18 - Photovoltaic Power Generation (Continued.)

Lecture 19 - Photovoltaic Power Generation (Continued.)

Lecture 20 - Photovoltaic Power Generation (Continued.)

Lecture 21 - Wind Energy - I

Lecture 22 - Wind Energy - II

Lecture 23 - Wind Energy - III

Lecture 24 - Wind Energy - IV

Lecture 25 - Wind Energy - V

Lecture 26 - Wind Energy - VI

Lecture 27 - Wind Electrical Conversion - I

Lecture 28 - Wind Electrical Conversion - II

Lecture 29 - Wind Electrical Conversion - III

Lecture 30 - Tidal Energy

Lecture 31 - Tidal Energy

Lecture 32 - Tidal Energy

Lecture 33 - Ocean Thermal Energy Conversion

Lecture 34 - Solar Pond and Wave Power

Lecture 35 - Geothermal Energy

Lecture 36 - Solar Distillation and Biomass Energy

Lecture 37 - Energy Storage

Lecture 38 - Magneto hydrodynamic Power Generation

Lecture 39 - Magneto hydrodynamic Power Generation

Lecture 40 - Hydrogen Economy

NPTEL : Estimation of Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. S. Mukhopadhyay

Lecture 1 - Introduction

Lecture 2 - Probability Theory

Lecture 3 - Random Variables

Lecture 4 - Function of Random Variable Joint Density

Lecture 5 - Mean and Variance

Lecture 6 - Random Vectors Random Processes

Lecture 7 - Random Processes and Linear Systems

Lecture 8 - Some Numerical Problems

Lecture 9 - Miscellaneous Topics on Random Process

Lecture 10 - Linear Signal Models

Lecture 11 - Linear Mean Sq.Error Estimation

Lecture 12 - Auto Correlation and Power Spectrum Estimation

Lecture 13 - Z-Transform Revisited Eigen Vectors/Values

Lecture 14 - The Concept of Innovation

Lecture 15 - Last Squares Estimation Optimal IIR Filters

Lecture 16 - Introduction to Adaptive Filters

Lecture 17 - State Estimation

Lecture 18 - Kalman Filter-Model and Derivation

Lecture 19 - Kalman Filter-Derivation (Continued...)

Lecture 20 - Estimator Properties

Lecture 21 - The Time-Invariant Kalman Filter

Lecture 22 - Kalman Filter-Case Study

Lecture 23 - System identification Introductory Concepts

Lecture 24 - Linear Regression-Recursive Least Squares

Lecture 25 - Variants of LSE

Lecture 26 - Least Square Estimation

Lecture 27 - Model Order Selection Residual Tests

Lecture 28 - Practical Issues in Identification

Lecture 29 - Estimation Problems in Instrumentation and Control

Lecture 30 - Conclusion

NPTEL : Illumination Engineering (Electrical Engineering)

Co-ordinators : Prof. N.K. Kishore

Lecture 1 - Introduction to Illumination Engineering

Lecture 2 - Instructional Objectives

Lecture 3 - Eye and Vision - I

Lecture 4 - Eye and Vision - II

Lecture 5 - Laws of Illumination

Lecture 6 - Photometry

Lecture 7 - Incandescent Lamps

Lecture 8 - Discharge Lamps - I

Lecture 9 - Discharge Lamps - II

Lecture 10 - Discharge Lamps - III

Lecture 11 - Illumination Systems - I

Lecture 12 - Illumination Systems - II

Lecture 13 - Glare

Lecture 14 - Color

Lecture 15 - Interior Lighting

Lecture 16 - Sports Lighting

Lecture 17 - Road Lighting

Lecture 18 - Lighting Calculations

Lecture 19 - Lighting Applications

Lecture 20 - Conclusions on Illumination Engineering

NPTEL : Industrial Automation and Control (Electrical Engineering)

Co-ordinators : Prof. S. Sen, Prof. S. Mukhopadhyay

Lecture 1 - Introduction

Lecture 2 - Architecture of Industrial Automation Systems

Lecture 3 - Measurement Systems Characteristics

Lecture 4 - Temperature Measurement

Lecture 5 - Pressure, Force and Torque Sensors

Lecture 6 - Motion Sensing

Lecture 7 - Flow Measurement

Lecture 8 - Signal Conditioning

Lecture 9 - Signal Conditioning (Continued.)

Lecture 10 - Data Acquisition Systems

Lecture 11 - Introduction to Automatic Control

Lecture 12 - P-I-D Control

Lecture 13 - PID Control Tuning

Lecture 14 - Feedforward Control Ratio Control

Lecture 15 - Time Delay Systems and Inverse Response Systems

Lecture 16 - Special Control Structures

Lecture 17 - Concluding Lesson on Process Control

Lecture 18 - Introduction to Sequence Control, PLC, RLL

Lecture 19 - Sequence Control. Scan Cycle,Simple RLL Programs

Lecture 20 - Sequence Control. More RLL Elements, RLL Syntax

Lecture 21 - A Structured Design Approach to Sequence

Lecture 22 - PLC Hardware Environment

Lecture 23 - Introduction To CNC Machines

Lecture 24 - Contour generation and Motion Control

Lecture 25 - Flow Control Valves

Lecture 26 - Hydraulic Control Systems - I

Lecture 27 - Hydraulic Control Systems - II

Lecture 28 - Industrial Hydraulic Circuit

Lecture 29 - Pneumatic Control Systems - I

Lecture 30 - Pneumatic Systems - II

Lecture 31 - Energy Savings with Variable Speed Drives

Lecture 32 - DC Motor Drives

Lecture 33 - DC and BLDC Servo Drives

Lecture 34 - Induction Motor Drives

Lecture 35 - Step Motor Drives BLDC Drives

Lecture 36 - Embedded Systems

Lecture 37 - The Fieldbus Network - I

Lecture 38 - The Fieldbus Network - II

Lecture 39 - Higher Level Automation Systems

Lecture 40 - Course Review and Conclusion

NPTEL : Industrial Instrumentation (Electrical Engineering)

Co-ordinators : Prof. Alok Barua

Lecture 1 - Introduction to Industrial Instrumentation

Lecture 2 - Dynamic Characteristics

Lecture 3 - Dynamic Characteristics (Continued.)

Lecture 4 - Strain gauge

Lecture 5 - Load cell

Lecture 6 - Torque Measurement

Lecture 7 - Thermistor

Lecture 8 - Thermocouples

Lecture 9 - Resistance Temperature Detector

Lecture 10 - LVDT

Lecture 11 - Capacitance Transducers

Lecture 12 - Flowmeter - I

Lecture 13 - Flowmeter - II

Lecture 14 - Flowmeter - III

Lecture 15 - Flowmeter - IV

Lecture 16 - Flowmeter - V

Lecture 17 - Problems on Temperature Sensors

Lecture 18 - Pressure Sensors

Lecture 19 - Low Pressure Measurement

Lecture 20 - pH and Viscosity Measurement

Lecture 21 - Problem and Solutions On Industrial Instrumentation

Lecture 22 - Signal Conditioning Circuits - I

Lecture 23 - Signal Conditioning Circuits - II

Lecture 24 - Piezoelectric Sensors

Lecture 25 - Ultrasonic Sensors

Lecture 26 - Nucleonic Instrumentation

Lecture 27 - Measurement Of Magnetic Field

Lecture 28 - Optoelectronic Sensor - I

Lecture 29 - Optoelectronic Sensor - II

Lecture 30 - Synchro

Lecture 31 - Dissolved Oxygen Sensors - I

Lecture 32 - Dissolved Oxygen Sensors - II

Lecture 33 - Flapper - Nozzle

Lecture 34 - Smart Sensors

Lecture 35 - Chromatography - I

Lecture 36 - Chromatography - II

Lecture 37 - Pollution Measurement

Lecture 38 - Control Valve - I

Lecture 39 - Control Valve - II

Lecture 40 - Signal Conditioning Integrated Circuits

NPTEL : Networks Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. T.K. Basu

Lecture 1 - Introduction to Network Elements and Sources

Lecture 2 - Introduction to Linearity and Nonlinearity

Lecture 3 - Distributed & Lumped Parameters 2-port Networks

Lecture 4 - Two-port Parameters Short Circuit,Open Circuit

Lecture 5 - Tutorial

Lecture 6 - Locus Diagram - Introduction to Signals

Lecture 7 - Signals (Continued.) Laplace Transforms

Lecture 8 - Laplace Transform (Continued.)

Lecture 9 - Tutorial on Laplace Transform

Lecture 10 - Frequency Response Bode Plot

Lecture 11 - Bode Plot (Continued.)

Lecture 12 - Bode Plot (Continued.) - Poles & Zeros

Lecture 13 - Driving Point Immittance Functions - Realisability Conditions

Lecture 14 - Two - Element Synthesis

Lecture 15 - Two - Element Synthesis (Continued.)

Lecture 16 - Tutorial

Lecture 17 - Tutorial

Lecture 18 - Graph Theory

Lecture 19 - Graph Theory (Continued.)

Lecture 20 - Graph Theory (Continued.)

Lecture 21 - Graph Theory (Continued.)

Lecture 22 - Image Impedance, Iterative Impedance

Lecture 23 - Image Impedance, Iterative Impedance

Lecture 24 - Characteristic Impedance and Design of Filters

Lecture 25 - Analysis of Resistive Networks Computer Aided

Lecture 26 - R-L-C Two-Terminal Network

Lecture 27 - Parts of Network Functions

Lecture 28 - Parts of Network Functions (Continued.)

Lecture 29 - Tutorial

Lecture 30 - Tutorial (Continued.)

Lecture 31 - Tutorial

Lecture 32 - Synthesis of 2-port Network

Lecture 33 - Synthesis of 2-port Network (Continued.)

Lecture 34 - Synthesis of 2-port Network (Continued.)

Lecture 35 - Fourier Series

Lecture 36 - Fourier Series (Continued.)

NPTEL : Power System Analysis (Electrical Engineering)

Co-ordinators : Prof. A.K. Sinha

Lecture 1 - Introduction to Power system analysis

Lecture 2 - Introduction to Single Line Diagram

Lecture 3 - Transmission Line Parameters

Lecture 4 - Inductance Calculation (Three Phase)

Lecture 5 - Transmission Line Capacitance

Lecture 6 - Transmission Line Capacitance (Continued..)

Lecture 7 - Transmission Line Modeling

Lecture 8 - Transmission Line Modeling Long Line

Lecture 9 - Transmission Line Steady State Operation

Lecture 10 - Transmission Line Steady State Control Voltage

Lecture 11 - Transmission System A Review

Lecture 12 - Transformer Model

Lecture 13 - Synchronous Machine Model

Lecture 14 - Synchronous Machine Model

Lecture 15 - Load Model

Lecture 16 - Power Flow - I

Lecture 17 - Power Flow - II

Lecture 18 - Power Flow - III

Lecture 19 - Power Flow - IV

Lecture 20 - Power Flow - V

Lecture 21 - Power Flow - VI

Lecture 22 - Power Flow - VII

Lecture 23 - Review of Power System Component Models

Lecture 24 - Review of Power Flow Study

Lecture 25 - Short Circuit Analysis

Lecture 26 - Symmetrical Component Analysis

Lecture 27 - Sequence Networks

Lecture 28 - Unbalanced Fault Analysis

Lecture 29 - Unbalanced Fault Analysis

Lecture 30 - Fault Analysis for Large power Systems

Lecture 31 - Bus Impedance Matrix

Lecture 32 - Asymmetrical Fault Analysis Using Z - Bus

Lecture 33 - Power System Stability - I

Lecture 34 - Power System Stability - II

Lecture 35 - Power System Stability - III

Lecture 36 - Power System Stability - IV

Lecture 37 - Power System Stability - V

Lecture 38 - Power System Stability - VI

Lecture 39 - Power System Stability - VII

Lecture 40 - Power System Stability - VIII

NPTEL : NOC:Industrial Automation and Control (Electrical Engineering)

Co-ordinators : Prof. S. Mukhopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Architecture of Industrial Automation Systems

Lecture 4 - Architecture of Industrial Automation Systems (Continued...)

Lecture 5 - Measurement Systems Characteristics

Lecture 6 - Measurement Systems Characteristics (Continued...)

Lecture 7 - Data Acquisition Systems

Lecture 8 - Data Acquisition Systems (Continued...)

Lecture 9 - Introduction to Automatic Control

Lecture 10 - Introduction to Automatic Control (Continued...)

Lecture 11 - P-I-D Control

Lecture 12 - P-I-D Control (Continued...)

Lecture 13 - PID Controller Tuning

Lecture 14 - PID Controller Tuning (Continued...)

Lecture 15 - Feedforward Control Ratio Control

Lecture 16 - Feedforward Control Ratio Control (Continued...)

Lecture 17 - Time Delay Systems and Inverse Response Systems

Lecture 18 - Time Delay Systems and Inverse Response Systems (Continued...)

Lecture 19 - Special Control Structures

Lecture 20 - Special Control Structures (Continued...)

Lecture 21 - Concluding Lesson on Process Control (Self-study)

Lecture 22 - Introduction to Sequence Control, PLC, RLL

Lecture 23 - Introduction to Sequence Control, PLC, RLL (Continued...)

Lecture 24 - Sequence Control, Scan Cycle, Simple RLL Programs

Lecture 25 - Sequence Control, Scan Cycle, Simple RLL Programs (Continued...)

Lecture 26 - Sequence Control, More RLL Elements, RLL Syntax

Lecture 27 - Sequence Control, More RLL Elements, RLL Syntax (Continued...)

Lecture 28 - A Structured Design Approach to Sequence Control

Lecture 29 - A Structured Design Approach to Sequence Control (Continued...)

Lecture 30 - PLC Hardware Environment

Lecture 31 - PLC Hardware Environment (Continued...)

Lecture 32 - Flow Control Valves

Lecture 33 - Flow Control Valves (Continued...)

Lecture 34 - Hydraulic Control Systems - I

Lecture 35 - Hydraulic Control Systems - I (Continued...)

Lecture 36 - Hydraulic Control Systems - II

Lecture 37 - Hydraulic Control Systems - II (Continued...)

Lecture 38 - Industrial Hydraulic Circuit

Lecture 39 - Industrial Hydraulic Circuit (Continued...)

Lecture 40 - Pneumatic Control Systems - I

Lecture 41 - Pneumatic Control Systems - I (Continued...)

Lecture 42 - Pneumatic Systems - II

Lecture 43 - Pneumatic Systems - II (Continued...)

Lecture 44 - Energy Savings with Variable Speed Drives

Lecture 45 - Energy Savings with Variable Speed Drives (Continued...)

Lecture 46 - Introduction To CNC Machines

Lecture 47 - Introduction To CNC Machines

Lecture 48 - The Fieldbus Network - I

Lecture 49 - The Fieldbus Network - I (Continued...)

Lecture 50 - Higher Level Automation Systems

Lecture 51 - Higher Level Automation Systems (Continued...)

Lecture 52 - Course Review and Conclusion (Self Study)

NPTEL : NOC:Medical Image Analysis (Electrical Engineering)

Co-ordinators : Prof. Debdoot Sheet

Lecture 1 - Introduction to Medical Image Analysis

Lecture 2 - X Ray and CT Imaging

Lecture 3 - Magnetic Resonance Imaging

Lecture 4 - Ultrasound Imaging

Lecture 5 - Optical Microscopy and Molecular Imaging

Lecture 6 - Texture in Medical Images

Lecture 7 - Region Growing and Clustering

Lecture 8 - Random Walks for Segmentation

Lecture 9 - Active Contours for Segmentation

Lecture 10 - Systematic Evaluation and Validation

Lecture 11 - Decision Trees for Segmentation and Classification

Lecture 12 - Random Forests for Segmentation and Classification

Lecture 13 - Neural Networks for Segmentation and Classification

Lecture 14 - Deep Learning for Medical Image Analysis

Lecture 15 - Deep Learning for Medical Image Analysis (Continued...)

Lecture 16 - Retinal Vessel Segmentation

Lecture 17 - Vessel Segmentation in Computed Tomography Scan of Lungs

Lecture 18

Lecture 19 - Tissue Characterization in Ultrasound

Lecture 20

NPTEL : NOC:Biomedical Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Sudipta Mukhopadhyay

Lecture 1 - Motivation

Lecture 2 - Preliminaries

Lecture 3 - Biomedical Signal Origin and Dynamics

Lecture 4 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 5 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 6 - Biomedical Signal Origin and Dynamics (Continued...)

Lecture 7 - Artifact Removal

Lecture 8 - Artifact Removal (Continued...)

Lecture 9 - Artifact Removal (Continued...)

Lecture 10 - Artifact Removal (Continued...)

Lecture 11 - Artifact Removal (Continued...)

Lecture 12 - Artifact Removal (Continued...)

Lecture 13 - Artifact Removal (Continued...)

Lecture 14 - Artifact Removal (Continued...)

Lecture 15 - Artifact Removal (Continued...)

Lecture 16 - Artifact Removal (Continued...)

Lecture 17 - Artifact Removal (Continued...)

Lecture 18 - Event Detection

Lecture 19 - Event Detection (Continued...)

Lecture 20 - Event Detection (Continued...)

Lecture 21 - Event Detection (Continued...)

Lecture 22 - Event Detection (Continued...)

Lecture 23 - Event Detection (Continued...)

Lecture 24 - Event Detection (Continued...)

Lecture 25 - Homomorphic Processing

Lecture 26 - Homomorphic Processing (Continued...)

Lecture 27 - Waveform Analysis

Lecture 28 - Waveform Analysis (Continued...)

Lecture 29 - Waveform Analysis

Lecture 30 - Waveform Analysis (Continued...)

Lecture 31 - Waveform Analysis (Continued...)

Lecture 32 - Waveform Analysis (Continued...)

Lecture 33 - Waveform Analysis (Continued...)

Lecture 34 - Frequency Domain Characterisation

Lecture 35 - Frequency Domain Characterisation (Continued...)

Lecture 36 - Frequency Domain Characterisation (Continued...)

Lecture 37 - Frequency Domain Characterisation (Continued...)

Lecture 38 - Frequency Domain Characterisation (Continued...)

Lecture 39 - Frequency Domain Characterisation (Continued...)

Lecture 40 - Modelling of Biomedical Systems

Lecture 41 - Modelling of Biomedical Systems (Continued...)

Lecture 42 - Modelling of Biomedical Systems (Continued...)

Lecture 43 - Modelling of Biomedical Systems (Continued...)

Lecture 44 - Modelling of Biomedical Systems (Continued...)

Lecture 45 - Modelling of Biomedical Systems (Continued...)

Lecture 46 - Modelling of Biomedical Systems (Continued...)

Lecture 47 - Tutorial - I

Lecture 48 - Tutorial - I (Continued...)

Lecture 49 - Tutorial - I (Continued...)

Lecture 50 - Tutorial - II

Lecture 51 - Tutorial - II (Continued...)

Lecture 52 - Tutorial - II (Continued...)

Lecture 53 - Tutorial - III

Lecture 54 - Tutorial - III (Continued...)

Lecture 55 - Tutorial - III (Continued...)

Lecture 56 - Tutorial - III (Continued...)

Lecture 57 - Tutorial - IV

Lecture 58 - Tutorial - IV (Continued...)

Lecture 59 - Tutorial - IV (Continued...)

Lecture 60 - Tutorial - IV (Continued...)

Lecture 61 - Tutorial - IV (Continued...)

Lecture 62 - Tutorial - IV (Continued...)

Lecture 63 - Tutorial - V

Lecture 64 - Tutorial - V (Continued...)

Lecture 65 - Tutorial - V (Continued...)

Lecture 66 - Tutorial - V (Continued...)

Lecture 67 - Tutorial - V (Continued...)

Lecture 68 - Live Session

NPTEL : NOC:Microprocessors and Microcontrollers (Electrical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Basic Computer Organization

Lecture 5 - Basic computer organization

Lecture 6 - Basic Computer Organization

Lecture 7 - 8085 Microprocessors

Lecture 8 - 8085 Microprocessors (Continued...)

Lecture 9 - 8085 Microprocessors (Continued...)

Lecture 10 - 8085 Microprocessors (Continued...)

Lecture 11 - 8085 Microprocessors (Continued...)

Lecture 12 - 8085 Microprocessors (Continued...)

Lecture 13 - 8085 Microprocessors (Continued...)

Lecture 14 - 8085 Microprocessors (Continued...)

Lecture 15 - 8085 Microprocessors (Continued...)

Lecture 16 - 8085 Microprocessors (Continued...)

Lecture 17 - 8085 Microprocessors (Continued...)

Lecture 18 - 8085 Microprocessors (Continued...)

Lecture 19 - 8085 Microprocessors (Continued...)

Lecture 20 - 8085 Microprocessors (Continued...)

Lecture 21 - 8085 Microprocessors (Continued...)

Lecture 22 - 8085 Microprocessors (Continued...)

Lecture 23 - 8051 Microcontroller

Lecture 24 - 8051 Microcontroller (Continued...)

Lecture 25 - 8051Microcontroller (Continued...)

Lecture 26 - 8051 Microcontroller (Continued...)

Lecture 27 - 8051 Microcontroller (Continued...)

Lecture 28 - 8051 Microcontroller (Continued...)

Lecture 29 - 8051 Microcontroller (Continued...)

Lecture 30 - 8051 Microcontroller (Continued...)

Lecture 31 - 8051 Microcontroller (Continued...)

Lecture 32 - 8051 Microcontroller (Continued...)

Lecture 33 - 8051 Microcontroller (Continued...)

Lecture 34 - 8051 Microcontroller (Continued...)

Lecture 35 - 8051 Microcontroller (Continued...)

Lecture 36 - 8051 Programming Examples

Lecture 37 - 8051 Programming Examples (Continued...)

Lecture 38 - 8051 Programming Examples (Continued...)

Lecture 39 - 8051 Programming Examples (Continued...)

Lecture 40 - 8051 Programming Examples (Continued...)

Lecture 41 - ARM

Lecture 42 - ARM (Continued...)

Lecture 43 - ARM (Continued...)

Lecture 44 - ARM (Continued...)

Lecture 45 - ARM (Continued...)

Lecture 46 - ARM (Continued...)

Lecture 47 - ARM (Continued...)

Lecture 48 - ARM (Continued...)

Lecture 49 - PIC

Lecture 50 - PIC, AVR

Lecture 51 - AVR (Continued...)

Lecture 52 - AVR (Continued...)

Lecture 53 - Interfacing

Lecture 54 - Interfacing (Continued...)

Lecture 55 - Interfacing (Continued...)

Lecture 56 - Interfacing (Continued...)

Lecture 57 - Interfacing (Continued...)

Lecture 58 - Interfacing (Continued...)

Lecture 59 - 8086

Lecture 60 - 8086 (Continued...)

Lecture 61 - 8086 (Continued...)

Lecture 62 - 8086 (Continued...)

Lecture 63 - 8086 (Continued...)

Lecture 64 - 8087

NPTEL : NOC:Deep Learning For Visual Computing (Electrical Engineering)

Co-ordinators : Prof. Debdoot Sheet

Lecture 1 - Introduction to Visual Computing

Lecture 2 - Feature Extraction for Visual Computing

Lecture 3 - Feature Extraction with Python

Lecture 4 - Neural Networks for Visual Computing

Lecture 5 - Classification with Perceptron Model

Lecture 6 - Introduction to Deep Learning with Neural Networks

Lecture 7 - Introduction to Deep Learning with Neural Networks

Lecture 8 - Multilayer Perceptron and Deep Neural Networks

Lecture 9 - Multilayer Perceptron and Deep Neural Networks

Lecture 10 - Classification with Multilayer Perceptron

Lecture 11 - Autoencoder for Representation Learning and MLP Initialization

Lecture 12 - MNIST handwritten digits classification using autoencoders

Lecture 13 - Fashion MNIST classification using autoencoders

Lecture 14 - ALL-IDB Classification using autoencoders

Lecture 15 - Retinal Vessel Detection using autoencoders

Lecture 16 - Stacked Autoencoders

Lecture 17 - MNIST and Fashion MNIST with Stacked Autoencoders

Lecture 18 - Denoising and Sparse Autoencoders

Lecture 19 - Sparse Autoencoders for MNIST classification

Lecture 20 - Denoising Autoencoders for MNIST classification

Lecture 21 - Cost Function

Lecture 22 - Classification cost functions

Lecture 23 - Optimization Techniques and Learning Rules

Lecture 24 - Gradient Descent Learning Rule

Lecture 25 - SGD and ADAM Learning Rules

Lecture 26 - Convolutional Neural Network Building Blocks

Lecture 27 - Simple CNN Model: LeNet

Lecture 28 - LeNet Definition

Lecture 29 - Training a LeNet for MNIST Classification

Lecture 30 - Modifying a LeNet for CIFAR

Lecture 31 - Convolutional Autoencoder and Deep CNN

Lecture 32 - Convolutional Autoencoder for Representation Learning

Lecture 33 - AlexNet

Lecture 34 - VGGNet

Lecture 35 - Revisiting AlexNet and VGGNet for Computational Complexity

Lecture 36 - GoogLeNet - Going very deep with convolutions

Lecture 37 - GoogLeNet

Lecture 38 - ResNet - Residual Connections within Very Deep Networks and DenseNet - Densely connected networks

Lecture 39 - ResNet

Lecture 40 - DenseNet

Lecture 41 - Space and Computational Complexity in DNN

Lecture 42 - Assessing the space and computational complexity of very deep CNNs

Lecture 43 - Domain Adaptation and Transfer Learning in Deep Neural Networks

Lecture 44 - Transfer Learning a GoogLeNet

Lecture 45 - Transfer Learning a ResNet

Lecture 46 - Activation pooling for object localization

Lecture 47 - Region Proposal Networks (rCNN and Faster rCNN)

Lecture 48 - GAP + rCNN

Lecture 49 - Semantic Segmentation with CNN

Lecture 50 - UNet and SegNet for Semantic Segmentation

Lecture 51 - Autoencoders and Latent Spaces

Lecture 52 - Principle of Generative Modeling

Lecture 53 - Adversarial Autoencoders

Lecture 54 - Adversarial Autoencoder for Synthetic Sample Generation

Lecture 55 - Adversarial Autoencoder for Classification

Lecture 56 - Understanding Video Analysis

Lecture 57 - Recurrent Neural Networks and Long Short-Term Memory

Lecture 58 - Spatio-Temporal Deep Learning for Video Analysis

Lecture 59 - Activity recognition using 3D-CNN

Lecture 60 - Activity recognition using CNN-LSTM

NPTEL : NOC:Power System Engineering (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11 - Cables (Continued...)

Lecture 12 - Transient over voltages and Insulation coordination

Lecture 13 - Transient over voltages and Insulation coordination (Continued...)

Lecture 14 - Transient over voltages and Insulation coordination (Continued...)

Lecture 15 - Transient over voltages and Insulation coordination (Continued...)

Lecture 16 - Transient over voltages and Insulation coordination (Continued...)

Lecture 17 - Transient over voltages and Insulation coordination (Continued...)

Lecture 18 - Transient over voltages and Insulation coordination (Continued...)

Lecture 19 - Transient over voltages and Insulation coordination (Continued...)

Lecture 20 - Corona

Lecture 21 - Corona (Continued...)

Lecture 22 - Corona (Continued...)

Lecture 23 - Corona (Continued...), Sag and Tension Analysis

Lecture 24 - Sag and Tension Analysis (Continued...)

Lecture 25 - Sag and Tension Analysis (Continued...)

Lecture 26 - Sag and Tension Analysis (Continued...)

Lecture 27 - Sag and Tension Analysis (Continued...)

Lecture 28 - Sag and Tension Analysis (Continued...)

Lecture 29 - Load flow of radial distribution networks

Lecture 30 - Load flow of radial distribution networks (Continued...)

Lecture 31 - Load flow of radial distribution networks (Continued...)

Lecture 32 - Load flow of radial distribution networks (Continued...)

Lecture 33 - Load flow of radial distribution networks (Continued...)

Lecture 34 - Load flow of radial distribution networks (Continued...)

Lecture 35 - Load flow of radial distribution networks (Continued...)

Lecture 36 - Load flow of radial distribution networks (Continued...)

Lecture 37 - Load flow of radial distribution networks (Continued...), Voltage stability of distribution network

Lecture 38 - Voltage stability of distribution network, Approximate method

Lecture 39 - Application of capacitors in distribution system

Lecture 40 - Application of capacitors in distribution system (Continued...)

Lecture 41 - Application of capacitors in distribution system (Continued...)

Lecture 42 - Application of capacitors in distribution system (Continued...)

Lecture 43 - Application of capacitors in distribution system (Continued...)

Lecture 44 - Application of capacitors in distribution system (Continued...), Load frequency control

Lecture 45 - Load frequency control (Continued...)

Lecture 46 - Load frequency control (Continued...)

Lecture 47 - Load frequency control (Continued...)

Lecture 48 - Load frequency control (Continued...)

Lecture 49 - Load frequency control (Continued...)

Lecture 50 - Load frequency control (Continued...)

Lecture 51 - Load frequency control (Continued...)

Lecture 52 - Load frequency control (Continued...)

Lecture 53 - Load frequency control (Continued...)

Lecture 54 - Load frequency control (Continued...)

Lecture 55 - Load frequency control (Continued...)

Lecture 56 - Load frequency control (Continued...)

Lecture 57 - Automatic generation control

Lecture 58 - Automatic generation control (Continued...)

Lecture 59 - Automatic generation control (Continued...), Unit commitment

Lecture 60 - Unit commitment (Continued...)

Lecture 61 - Live Session

NPTEL : NOC:Fundamentals of Electrical Engineering (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

Lecture 1 - Basic Concepts, Examples

Lecture 2 - Basic Concepts, Examples (Continued...)

Lecture 3 - Basic Concepts, Examples (Continued...)

Lecture 4 - Basic Concepts, Examples (Continued...)

Lecture 5 - Basic Laws

Lecture 6 - Basic Laws (Continued...)

Lecture 7 - Basic Laws (Continued...)

Lecture 8 - Basic Laws (Continued...)

Lecture 9 - Basic Laws (Continued...)

Lecture 10 - Basic Laws (Continued...)

Lecture 11 - Methods of Circuit Analysis

Lecture 12 - Methods of Circuit Analysis (Continued...)

Lecture 13 - Methods of Circuit Analysis (Continued...)

Lecture 14 - Methods of Circuit Analysis (Continued...)

Lecture 15 - Methods of Circuit Analysis (Continued...)

Lecture 16 - Methods of Circuit Analysis (Continued...)

Lecture 17 - Mesh analysis with current sources, Examples

Lecture 18 - Methods of Circuit Analysis (Continued...) and Circuit Theorems

Lecture 19 - Circuit Theorems (Continued...)

Lecture 20 - Circuit Theorems (Continued...)

Lecture 21 - Circuit Theorems (Continued...)

Lecture 22 - Circuit Theorems (Continued...)

Lecture 23 - Circuit Theorems (Continued...)

Lecture 24 - Circuit Theorems (Continued...)

Lecture 25 - Circuit Theorems (Continued...) and Capacitors and Inductors

Lecture 26 - Capacitors and Inductors (Continued...)

Lecture 27 - Capacitors and Inductors (Continued...)

Lecture 28 - Capacitors and Inductors (Continued...)

Lecture 29 - First Order Circuits

Lecture 30 - First Order Circuits (Continued...)

Lecture 31 - First Order Circuits (Continued...)

Lecture 32 - First Order Circuits (Continued...)

Lecture 33 - First Order Circuits (Continued...)

Lecture 34 - First Order Circuits (Continued...)

Lecture 35 - First Order Circuits (Continued...)

Lecture 36 - First Order Circuits (Continued...)

Lecture 37 - Single phase AC circuits

Lecture 38 - Single phase AC circuits (Continued...)

Lecture 39 - Single phase AC circuits (Continued...)

Lecture 40 - Single phase AC circuits (Continued...)

Lecture 41 - Single phase AC circuits (Continued...)

Lecture 42 - Single phase AC circuits (Continued...)

Lecture 43 - Single phase AC circuits (Continued...)

Lecture 44 - Resonance and Maximum Power Transfer Theorem

Lecture 45 - Resonance and Maximum Power Transfer Theorem (Continued...)

Lecture 46 - Resonance and Maximum Power Transfer Theorem (Continued...)

Lecture 47 - Three phase circuits

Lecture 48 - Three phase circuits (Continued...)

Lecture 49 - Three phase circuits (Continued...)

Lecture 50 - Three phase circuits (Continued...)

Lecture 51 - Magnetic Circuits

Lecture 52 - Magnetic Circuits (Continued...)

Lecture 53 - Magnetic Circuits (Continued...)

Lecture 54 - Single Phase Transformer

Lecture 55 - Single Phase Transformer (Continued...)

Lecture 56 - Single Phase Transformer (Continued...)

Lecture 57 - Single Phase Transformer (Continued...)

Lecture 58 - Three phase Induction Motors

Lecture 59 - Three phase Induction Motors (Continued...)

Lecture 60 - Three phase Induction Motors (Continued...)

Lecture 61 - Three phase Induction Motors (Continued...)

Lecture 62 - DC Motors

Lecture 63 - DC Motors (Continued...)

Lecture 64 - DC Motors (Continued...)

NPTEL : NOC:Digital Circuits (Electrical Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Number System

Lecture 4 - Number System (Continued...)

Lecture 5 - Number System (Continued...)

Lecture 6 - Number System (Continued...)

Lecture 7 - Number System (Continued...)

Lecture 8 - Boolean Algebra

Lecture 9 - Boolean Algebra (Continued...)

Lecture 10 - Boolean Algebra (Continued...)

Lecture 11 - Boolean Algebra (Continued...)

Lecture 12 - Boolean Algebra (Continued...)

Lecture 13 - Boolean Algebra (Continued...)

Lecture 14 - Logic Gates

Lecture 15 - Logic Gates (Continued...)

Lecture 16 - Logic Gates (Continued...)

Lecture 17 - Logic Gates (Continued...)

Lecture 18 - Logic Gates (Continued...)

Lecture 19 - Logic Gates (Continued...)

Lecture 20 - Arithmetic Circuits

Lecture 21 - Arithmetic Circuits (Continued...)

Lecture 22 - Arithmetic Circuits (Continued...)

Lecture 23 - Decoders, Multiplexers, PLA

Lecture 24 - Decoders, Multiplexers, PLA (Continued...)

Lecture 25 - Decoders, Multiplexers, PLA (Continued...)

Lecture 26 - Decoders, Multiplexers, PLA (Continued...)

Lecture 27 - Decoders, Multiplexers, PLA (Continued...)

Lecture 28 - Sequential Circuits

Lecture 29 - Sequential Circuits (Continued...)

Lecture 30 - Sequential Circuits (Continued...)

Lecture 31 - Sequential Circuits (Continued...)

Lecture 32 - Sequential Circuits (Continued...)

Lecture 33 - Sequential Circuits (Continued...)

Lecture 34 - Sequential Circuits (Continued...)

Lecture 35 - Finite State Machine

Lecture 36 - Finite State Machine (Continued...)

Lecture 37 - Data Converters

Lecture 38 - Data Converters (Continued...)

Lecture 39 - Data Converters (Continued...)

Lecture 40 - Data Converters (Continued...)

Lecture 41 - Memory

Lecture 42 - Memory (Continued...)

Lecture 43 - Memory (Continued...)

Lecture 44 - FPGA

Lecture 45 - FPGA (Continued...)

Lecture 46 - VHDL

Lecture 47 - VHDL(Continued...)

Lecture 48 - 8085 Microprocessor

Lecture 49 - 8085 Microprocessor (Continued...)

Lecture 50 - 8085 Microprocessor (Continued...)

Lecture 51 - 8085 Microprocessor (Continued...)

Lecture 52 - 8085 Microprocessor (Continued...)

Lecture 53 - 8085 Microprocessor (Continued...)

Lecture 54 - 8085 Microprocessor (Continued...)

Lecture 55 - 8085 Microprocessor (Continued...)

Lecture 56 - 8085 Microprocessor (Continued...)

Lecture 57 - 8085 Microprocessor (Continued...)

Lecture 58 - 8085 Microprocessor (Continued...)

Lecture 59 - 8085 Microprocessor (Continued...)

Lecture 60 - 8085 Microprocessor (Continued...)

Lecture 61 - 8085 Microprocessor (Continued...)

Lecture 62 - 8085 Microprocessor (Continued...)

Lecture 63 - 8086 Microprocessor

Lecture 64 - 8086 Microprocessor (Continued...)

Lecture 65 - 8086 Microprocessor (Continued...)

NPTEL : NOC:Analysis and Design Principles of Microwave Antennas (Electrical Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

Lecture 1 - Concept of Scalar and Vector Potentials

Lecture 2 - Radiation From a Current Element (Hertzian Dipole)

Lecture 3 - Specific Properties of the Radiated Fields from a Current Element

Lecture 4 - General Properties of Radiated Fields from an Antenna

Lecture 5 - Farfield and Radiation Pattern of an Antenna

Lecture 6 - Directivity and Gain of an Antenna

Lecture 7 - Idea of Efficiency, Beamwidth, Polarisation and Bandwidth

Lecture 8 - Polarization of Antenna

Lecture 9 - Impedance of Antenna

Lecture 10 - Effective Aperture of an Antenna

Lecture 11 - Friss Transmission Equation and Antenna Temperature

Lecture 12 - Dipole And Monopole Antena

Lecture 13 - Dipole And Monopole Antena (Continued...)

Lecture 14 - BALUN

Lecture 15 - Loop Antenna

Lecture 16 - Folded Dipole Antenna

Lecture 17 - Introduction to Antenna Array

Lecture 18 - Antenna Array Theory

Lecture 19 - Broadside Uniform Linear Array

Lecture 20 - Endfire Linear Uniform Array

Lecture 21 - Parasitic Array and Log Periodic Antenna

Lecture 22 - Analysis Procedures of Aperture Antennas

Lecture 23 - Analysis Procedures of Aperture Antenna (Continued...)

Lecture 24 - Horn Antenna

Lecture 25 - Horn Antenna (Continued...)

Lecture 26 - Reflector Antennas

Lecture 27 - Paraboloid Reflector Antenna (Continued...)

Lecture 28 - Paraboloid Reflector Antenna (Continued...)

Lecture 29 - Dual Reflector Antenna

Lecture 30 - Generalised Analysis of Antenna

Lecture 31 - Solution of Wave Equation for Electric and Magnetic Current Densities

Lecture 32 - Farfield Evaluation of Spherical Wave Radiation by Generalised Antenna

Lecture 33 - Slot Antenna

Lecture 34 - Open Ended Waveguide Antenna and Microstrip Antenna

Lecture 35 - Numerical Evaluation of Wire Antenna Currents

Lecture 36 - Solution of Intregral Equation by Moment Method

Lecture 37 - Array Pattern Synthesis

Lecture 38 - Array Pattern Synthesis (Continued...)

Lecture 39 - Ultra Wideband Antennas

Lecture 40 - Antenna Measurements

NPTEL : NOC:Architectural Design of Digital Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Indranil Hatai

Lecture 1 - Introduction to VLSI Design Flow

Lecture 2 - Introduction to VLSI Design Flow

Lecture 3 - Introduction to VLSI Design Flow

Lecture 4 - Algorithm to Efficient Architecture Mapping

Lecture 5 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 6 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 7 - Tutorial on Algorithm to Efficient Architecture Mapping

Lecture 8 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 9 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 10 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 11 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 12 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 13 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 14 - Algorithm to Efficient Architecture Mapping (Continued...)

Lecture 15 - Efficient Adder Architecture

Lecture 16 - Efficient Adder Architecture (Continued...)

Lecture 17 - Efficient Adder Architecture (Continued...)

Lecture 18 - Efficient Adder Architecture

Lecture 19 - Efficient Adder Architecture

Lecture 20 - Efficient Adder Architecture

Lecture 21 - Efficient Adder Architecture

Lecture 22 - Efficient Adder Architecture

Lecture 23 - Efficient Adder Architecture

Lecture 24 - Efficient Adder Architecture

Lecture 25 - Pipelining and Parallel Processing

Lecture 26 - Pipelining and Parallel Processing

Lecture 27 - Multiplier Architecture

Lecture 28 - Multiplier Architecture

Lecture 29 - Multiplier Architecture

Lecture 30 - Multiplier Architecture

Lecture 31 - Multiplier Architecture

Lecture 32 - Multiplier Architecture

Lecture 33 - Multiplier Architecture

Lecture 34 - Multiplier Architecture

Lecture 35 - Squaring Circuit Design

Lecture 36 - Reconfigurable Constant Multiplier Design

Lecture 37 - Reconfigurable Constant Multiplier Design

Lecture 38 - Reconfigurable Constant Multiplier Design

Lecture 39 - Fixed Point Number Representation

Lecture 40 - Fixed Point Number Representation

Lecture 41 - CORDIC Architecture

Lecture 42 - CORDIC Architecture

Lecture 43 - CORDIC Architecture

Lecture 44 - CORDIC Architecture

Lecture 45 - Timing Analysis

Lecture 46 - Timing Analysis

Lecture 47 - Timing Analysis

Lecture 48 - Logic Hazard

Lecture 49 - FFT Architecture

Lecture 50 - FFT Architecture (Continued...)

Lecture 51 - Timing analysis Basics

Lecture 52 - Timing analysis Basics (Continued...)

Lecture 53 - Timing analysis Basics (Continued...)

Lecture 54 - Timing Issuesin Digital IC Design

Lecture 55 - Timing Issuesin Digital IC Design (Continued...)

Lecture 56 - Timing Issuesin Digital IC Design (Continued...)

Lecture 57 - Timing Issuesin Digital IC Design (Continued...)

Lecture 58 - Architectural Design of Digital Integrated Circuits

Lecture 59 - Design Tips for Basic Circuits Design (Continued...)

Lecture 60 - Design Tips for Basic Circuits Design (Continued...)

Lecture 61 - Design Tips for Basic Circuits Design (Continued...)

Lecture 62 - Low Power Digital Design

Lecture 63 - Low Power Digital Design (Continued...)

Lecture 64 - Low Power Digital Design

Lecture 65 - Low Power Digital Design (Continued...)

Lecture 66 - Hardware for Machine Learning: Design Considerations Design Tips

Lecture 67 - Hardware for Machine Learning: Design Considerations Design Tips (Continued...)

NPTEL : NOC:Electrical Machines-II (Electrical Engineering)

Co-ordinators : Prof.Tapas Kumar Bhattacharya

Lecture 1 - Inductance, Self and Mutual

Lecture 2 - Relationship of Inductances in Transformer

Lecture 3 - Equivalent Circuit from Circuit KVL Equations

Lecture 4 - Co-efficient of Coupling , Energy Stored in Coupled Coils

Lecture 5 - A Single Conductor Generator and Motor

Lecture 6 - Analysis of Single Conductor Generator and Motor

Lecture 7 - Analysis of Single Conductor Generator and Motor (Continued...)

Lecture 8 - Flux Density Distribution in Space and Nature emf

Lecture 9 - Flux Density Distribution in Space and Nature emf (Continued...)

Lecture 10 - From Linear to Rotating Machine

Lecture 11 - From Linear to Rotating Machine (Continued...)

Lecture 12 - Basic Underlying Principle of Operation of Rotating Machine

Lecture 13 - Basic Underlying Principle of Operation of Rotating Machine (Continued...)

Lecture 14 - Flux Density Distribution along the Air Gap

Lecture 15 - Flux Density Distribution along the Air Gap (Continued...)

Lecture 16 - Induced Voltage in a Coil in a Rotating Machine

Lecture 17 - Induced Voltage in a Coil in a Rotating Machine (Continued...)

Lecture 18 - Induced Voltage in a Coil in a Rotating Machine (Continued...)

Lecture 19 - Induced Voltage due to Fundamental and Harmonic Components of Flux Density Distribution

Lecture 20 - Distributed Coils Connected in Series Resultant Voltage

Lecture 21 - Distribution Factor

Lecture 22 - Pitch Factor and Winding Factor

Lecture 23 - How to decide about Short Pitch Angle ÃÂµ

Lecture 24 - Double Layer 3-phase Winding - An Introduction

Lecture 25 - Winding Table for 3-phase Distributed Winding

Lecture 26 - Winding Table for 3-phase Distributed Winding with Examples

Lecture 27 - Winding Table for 3-phase Distributed Winding with Examples (Continued...)

Lecture 28 - 120 degree Phase Spread Winding with Examples

Lecture 29 - Winding Table of 120 degree Phase Spread Coils and Group Connection

Lecture 30 - Introduction to Rotating Magnetic Field

Lecture 31 - Rotating Magnetic Field (Continued...), Mechanical and Electrical Speed

Lecture 32 - Speed and Direction of Rotating Field

Lecture 33 - Synchronous Speed and How to Calculate Induced Voltage in a Coil

Lecture 34 - Introduction to Induction Motor

Lecture 35 - Introduction to Induction Motor (Continued...)

Lecture 36 - General Expression of Torque in Terms of Stator and Rotor Fields

Lecture 37 - Torque Angle and Torque Expression

Lecture 38 - How to Fix Up Positions of Net Field, Rotor Field and Stator Field

Lecture 39 - Slip: Its Importance and Range for Motor Operation

Lecture 40 - Equivalent Circuit of 3-Phase Induction Motor

Lecture 41 - Equivalent Circuit of 3-Phase Induction Motor (Continued...)

Lecture 42 - Equivalent Circuit of 3-Phase Induction Motor (Continued...)

Lecture 43 - Expression for Electromagnetic Torque in terms of Equivalent Circuit Parameters

Lecture 44 - Maximum Electromagnetic Torque and Slip at Which it Occurs

Lecture 45 - Typical Torque Slip Characteristic and Operating Point

Lecture 46 - Change in Torque-slip Characteristic as Supply Voltage and Rotor Resistance are Varied

Lecture 47 - Types of Induction Motor - Slip Ring Type

Lecture 48 - Introduction to Cage Induction Motor

Lecture 49 - Cage Motor Can Operate for Different Stator Poles

Lecture 50 - Core Loss in Induction Motor and Simplified Equivalent Circuit

Lecture 51 - Torque Expression from Simplified Equivalent Circuit and Introduction to Circle Diagram

Lecture 52 - Circle Diagram (Continued...)

Lecture 53 - Exact Power Flow Diagram and Circle Diagram

Lecture 54 - Circle Diagram (Continued...)

Lecture 55 - Circle Diagram: Slip Line

Lecture 56 - Circle Diagram from Test Data

Lecture 57 - Starting of 3 Phase Induction Motor - Introduction

Lecture 58 - DOL and Reactor Starting

Lecture 59 - DOL and Auto Transformer Starting

Lecture 60 - Introduction to Speed Control

Lecture 61 - Idea of VVVF Speed Control of Induction Motor

Lecture 62 - Speed Contro Using Two Motors

Lecture 63 - Electrical Braking of 3 Phase Induction Motor

Lecture 64 - Braking (Continued...)

Lecture 65 - Introduction to Single Phase Induction Motor - Sequence Currents

Lecture 66 - Development of Equivalent Circuit

Lecture 67 - Development of Equivalent Circuit (Continued...)

Lecture 68 - Torque-slip Ch. of 1 ph. I-M Running on Single Winding

Lecture 69 - Introduction to Starting of 1ph. Induction Motor

Lecture 70 - Expression for Starting Torque and Need for Phase Splitting

Lecture 71 - Resistor Split 1 ph. Induction Motor

Lecture 72 - Capacitor Split 1 ph Induction Motor

Lecture 73 - Starting of 1 ph. Induction Motor (Continued...)

Lecture 74 - Synchronous Machine Construction

Lecture 75 - Synchronous Generator - Introduction

Lecture 76 - Synchronisation

Lecture 77 - Expression for Induced Voltage and O.C. Phasor Diagram

Lecture 78 - Loaded Synchronous Generator - Resultant Field

Lecture 79 - Armature Reaction and Synchronous Reactance. Basic Phasor Diagram

Lecture 80 - General Mode of Operation - Rotro Field, Stator Field and Resultant Field

Lecture 81 - Complete Phasor Diagram and Expression for Complex Power

Lecture 82 - Synchronous Motor Operation, Phasor Diagram and Power Expression

Lecture 83 - Effect of Variation of Field Current in Generator

Lecture 84 - Effect of Variation Field Current in Synchronous Motor, Introduction to Salient Pole Machine

Lecture 85 - Analysis of Salient Pole Synchronous Machine

Lecture 86 - Phasor Diagram of Salient Pole Synchronous Machine for Generator and Motor Mode

Lecture 87 - Expression for Load Angle and Expression for Power

Lecture 88 - Phasor Diagrams of Salient Pole Synchronous Generator under Various Conditions

Lecture 89 - Phasor Diagrams of Salient Pole Synchronous Motor under Various Conditions

Lecture 90 - O.C and S.C Test on Synchronous Generator

NPTEL : NOC:Digital Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. Goutam Saha

Lecture 1 - Introduction

Lecture 2 - Transistor as a switch

Lecture 3 - Performance Issues and Introduction to TTL

Lecture 4 - Transistor Transistor Logic (TTL)

Lecture 5 - CMOS Logic

Lecture 6 - Basic Gates and their representations

Lecture 7 - Fundamentals of Boolean Algebra

Lecture 8 - Boolean Function to Truth Table and Implementaion Issues

Lecture 9 - Truth Table to Boolean Function and Implementaion Issues

Lecture 10 - Karnugh Map and Digital Circuit Realization

Lecture 11 - Karnaugh Map to Entered Variable Map

Lecture 12 - Quine - McClusky (QM) Algorithm

Lecture 13 - Cost Criteria and Minimization of Multiple Output Functions

Lecture 14 - Static 1 Hazard

Lecture 15 - Static 0 Hazard and Dynamic Hazard

Lecture 16 - Multiplexer: Part I

Lecture 17 - Multiplexer: Part II

Lecture 18 - Demultiplexer / Decoder

Lecture 19 - Decoder with BCD Input and Encoder

Lecture 20 - Parity Generator and Checker

Lecture 21 - Number System

Lecture 22 - Negative Number and 2s Complement Arithmetic

Lecture 23 - Arithmetic Building Blocks - I

Lecture 24 - Arithmetic Building Blocks - II

Lecture 25 - Overflow Detection and BCD Arithmetic

Lecture 26 - Magnitude Comparator

Lecture 27 - Arithmetic Logic Unit (ALU)

Lecture 28 - Unweighted Code

Lecture 29 - Error Detection and Correction Code

Lecture 30 - Multiplication and Division

Lecture 31 - SR Latch and Introduction to Clocked Flip-Flop

Lecture 32 - Edge-Triggered Flip-Flop

Lecture 33 - Representations of Flip-Flops

Lecture 34 - Analysis of Sequential Logic Circuit

Lecture 35 - Conversion of Flip-Flops and Flip-Flop Timing Parameters

Lecture 36 - Register and Shift Register: PIPO and SISO

Lecture 37 - Shift Register: SIPO, PISO and Universal Shift Register

Lecture 38 - Application of Shift Register

Lecture 39 - Linear Feedback Shift Register

Lecture 40 - Serial Addition, Multiplication and Division

Lecture 41 - Asynchronous Counter

Lecture 42 - Decoding Logic and Synchronous Counter

Lecture 43 - Cascading: Mod 2, 3, 5 to Mod 6, 10, 1000 Counter

Lecture 44 - Counter Design with Asynchronous Reset and Preset

Lecture 45 - Counter Design as Synthesis Problem and Few Other Uses of Counter

Lecture 46 - Synthesis of Sequential Logic Circuit: Moore Model and Mealy Model

Lecture 47 - Moore Model and Mealy Model: Realization of Digital Logic Circuit

Lecture 48 - Algorithmic State Machine (ASM) Chart and Synthesis of Sequential Logic Circuit

Lecture 49 - Circuit Realization from ASM Chart and State Minimization

Lecture 50 - State Minimization by Implication Table and Partitioning Method

Lecture 51 - Digital to Analog Conversion - I

Lecture 52 - Digital to Analog Conversion - II

Lecture 53 - Analog to Digital Conversion - I

Lecture 54 - Analog to Digital Conversion - II

Lecture 55 - Certain Performance Issue of ADC and DAC

Lecture 56 - Introduction to Memory

Lecture 57 - Static Random Access Memory (SRAM)

Lecture 58 - Dynamic RAM (DRAM) and Memory Expansion

Lecture 59 - Read Only Memory (ROM)

Lecture 60 - PAL, PLA, CPLD, FPGA

NPTEL : NOC:Power System Dynamics, Control and Monitoring (Electrical Engineering)

Co-ordinators : Prof. Debapriya Das

Lecture 1 - Power System stability

Lecture 2 - Power System stability (Continued...)

Lecture 3 - Power System stability (Continued...)

Lecture 4 - Power System stability (Continued...)

Lecture 5 - Power System stability (Continued...)

Lecture 6 - Power System Stability (Continued...)

Lecture 7 - Power System Stability (Continued...)

Lecture 8 - Power System Stability (Continued...)

Lecture 9 - Power System Stability (Continued...)

Lecture 10 - Power System Stability (Continued...)

Lecture 11 - Power System Stability (Continued...)

Lecture 12 - Power System Stability (Continued...)

Lecture 13 - Power System Stability (Continued...)

Lecture 14 - Power System Stability (Continued...)

Lecture 15 - Power System Stability (Continued...)

Lecture 16 - Power System Stability (Continued...)

Lecture 17 - Power System Stability (Continued...)

Lecture 18 - Power System Stability (Continued...)

Lecture 19 - Power System Stability (Continued...)

Lecture 20 - Power System Stability (Continued...)

Lecture 21 - Power System stability (Continued...)

Lecture 22 - Power System stability, Eigen properties of the state matrix

Lecture 23 - Power System stability, Eigen properties of the state matrix (Continued...)

Lecture 24 - Power System stability, Eigen properties of the state matrix (Continued...)

Lecture 25 - Power System stability, Eigen properties of the state matrix (Continued...)

Lecture 26 - Power System stability, Eigen properties of the state matrix (Continued...)

Lecture 27 - Power System stability, Eigen properties of the state matrix, Transient stability

Lecture 28 - Transient stability

Lecture 29 - Transient stability (Continued...)

Lecture 30 - Transient stability (Continued...)

Lecture 31 - Transient stability

Lecture 32 - Transient stability, Automatic generation control conventional scenario

Lecture 33 - Automatic generation control conventional scenario

Lecture 34 - Automatic generation control conventional scenario

Lecture 35 - Automatic generation control conventional scenario

Lecture 36 - Automatic generation control conventional scenario

Lecture 37 - Automatic generation control conventional scenario

Lecture 38 - Automatic generation control conventional scenario

Lecture 39 - Automatic generation control conventional scenario

Lecture 40 - Automatic generation control conventional scenario

Lecture 41 - AGC in deregulated system

Lecture 42 - AGC in deregulated system (Continued...)

Lecture 43 - AGC in deregulated system (Continued...)

Lecture 44 - AGC in deregulated system (Continued...)

Lecture 45 - AGC in deregulated system (Continued...)

Lecture 46 - AGC in deregulated system (Continued...)

Lecture 47 - AGC in deregulated system (Continued...)

Lecture 48 - AGC in deregulated system (Continued...)

Lecture 49 - AGC in deregulated system, Reactive power and voltage control

Lecture 50 - Reactive power and voltage control

Lecture 51 - Reactive power and voltage control, State extimation in power system

Lecture 52 - State estimation in power system

Lecture 53 - State estimation in power system (Continued...)

Lecture 54 - State estimation in power system (Continued...)

Lecture 55 - State estimation in power system (Continued...)

Lecture 56 - State estimation in power system (Continued...)

Lecture 57 - Hydraulic turbine modelling

Lecture 58 - Hydraulic turbine modelling (Continued...)

Lecture 59 - Subsynchronous oscillation

Lecture 60 - Subsynchronous oscillation, Windup and non windup limits

NPTEL : NOC:Evolution of Air Interface towards 5G (Electrical Engineering)

Co-ordinators : Prof. Suvra Sekhar Das

Lecture 1 - Evolution of wireless Communication

Lecture 2 - Evolution of wireless Communication Standards From 2G to 5G

Lecture 3 - Evolution of wireless Communication Standards From 2G to 5G (Continued...)

Lecture 4 - Evolution of wireless Communication Standards From 2G to 5G (Continued...)

Lecture 5 - Evolution of wireless Communication Standards From 2G to 5G (Continued...)

Lecture 6 - Requirements and operating scenarios of 5G

Lecture 7 - Requirements and operating scenarios of 5G (Continued....)

Lecture 8 - 5G scenarios

Lecture 9 - Ultra reliable low latency communication

Lecture 10 - Designing 5G new radio

Lecture 11 - Fundamental Framework for waveform analysis

Lecture 12 - Fundamental Framework for waveform analysis (Continued...)

Lecture 13 - Waveform Design Aspects of 2G

Lecture 14 - Waveforms in 3G

Lecture 15 - Waveforms in 3G (Continued...)

Lecture 16 - Waveform in 4G and 5G (OFDM)

Lecture 17 - Waveform in 4G and 5G (OFDM) (Continued...)

Lecture 18 - Waveform in 4G and 5G (OFDM) (Continued...)

Lecture 19 - Waveform in 4G and 5G (OFDMA)

Lecture 20 - Waveform in 4G and 5G (OFDMA, SCFDMA, SCFDE)

Lecture 21 - Waveform in 4G and 5G (SCFDMA Continued...)

Lecture 22 - Waveform in 5G

Lecture 23 - Waveform in 5G Numerology

Lecture 24 - Frame Structure in 5G NR

Lecture 25 - Numerology in 5G and adaptive subcarrier bandwidth

Lecture 26 - Numerology in 5G (Continued...)

Lecture 27 - Waveforms beyond 5G

Lecture 28 - Waveforms beyond 5G (Continued...)

Lecture 29 - Waveforms beyond 5G (Continued...)

Lecture 30 - Waveforms beyond 5G (Continued...)

Lecture 31 - Waveform beyond 5G (Precoded GFDM)

Lecture 32 - Comparison of waveforms

Lecture 33 - Channel models for performance evaluation - Part I

Lecture 34 - Channel models for performance evaluation - Part II

Lecture 35 - Channel models for performance evaluation - Part III

Lecture 36 - MIMO Signal Processing (Receive Diversity)

Lecture 37 - MIMO Signal Processing

Lecture 38 - MIMO Signal Processing (Capacity)

Lecture 39 - MIMO Signal Processing (Capacity and Massive MIMO)

Lecture 40 - Hybrid beamforming (mmWave)

NPTEL : NOC:Electrical Measurement and Electronic Instruments (Electrical Engineering)

Co-ordinators : Prof. Avishek Chatterjee

Lecture 1 - PMMC Instruments

Lecture 2 - Electrodynamic Instrument

Lecture 3 - Demonstration of PMMC and Electrodynamic Instruments

Lecture 4 - Features of PMMC and Electrodynamic Instruments

Lecture 5 - Moving Iron Instruments

Lecture 6 - Demonstration of Moving Iron Instrument

Lecture 7 - Electrostatic Instrument

Lecture 8 - Derivation of Deflecting Torque in Electrodynamic, Electrostatic and Moving Iron Instrument

Lecture 9 - Damping and Eddy Current Damping

Lecture 10 - Dynamics of the Moving Coil and Damping

Lecture 11 - Dynamics of the Moving Coil and Damping (Continued...)

Lecture 12 - Ballistic Galvanometer

Lecture 13 - Ammeter - I

Lecture 14 - Ammeter - II

Lecture 15 - Voltmeter

Lecture 16 - Ohmmeters - I

Lecture 17 - Ohmmeters - II

Lecture 18 - Rectifier based Voltmeters and Ammeter - I

Lecture 19 - Rectifier based Voltmetesr and Ammeter - II

Lecture 20 - Resistance measurement with a Voltmeter and an Ammeter

Lecture 21 - Four-Terminal Resistance

Lecture 22 - Problems: Four Terminal Resistance

Lecture 23 - Error Calculation

Lecture 24 - Sensitivity, Accuracy, and Resolution of Wheatstone Bridge

Lecture 25 - Kelvin Double Bridge

Lecture 26 - High Resistance Measurement

Lecture 27 - Wattmeter Connection and Compensated Wattmeter

Lecture 28 - Single Phase Energy Meter

Lecture 29 - Demonstration: 1. Eddy Current Braking 2.Creation of Magnetic Field Without Moving Objects

Lecture 30 - Single Phase Energy Meter (Continued...)

Lecture 31 - Connection of Energy Meter, Wattmeter, and Three Phase Supply

Lecture 32 - DC Potentiometer

Lecture 33 - AC Potentiometer

Lecture 34 - Polar potentiometer and phase shifter

Lecture 35 - Polar potentiometer

Lecture 36 - Co-ordinate potentiometer

Lecture 37 - Kelvin-Varley potential divider

Lecture 38 - Impedance measurement

Lecture 39 - AC bridges - I

Lecture 40 - AC bridges - II

Lecture 41 - AC bridges - III

Lecture 42 - Current transformer and potential transformer

Lecture 43 - Review of transformer and magnetic circuit

Lecture 44 - Errrors in Instrument ransformer

Lecture 45 - Flux density measurement with Ballistic Galvanometer

Lecture 46 - Flux density measurement with Ballistic Galvanometer (Continued...)

Lecture 47 - Background: From Flip Flop to Counters - I

Lecture 48 - Background: From Flip Flop to Counters - II

Lecture 49 - Background: Operational Amplifiers - I

Lecture 50 - Background: Operational Amplifiers - II

Lecture 51 - Background: Operational Amplifiers - III

Lecture 52 - Background: Operational Amplifiers - IV

Lecture 53 - Inverting amplifier versus Schmitt Trigger

Lecture 54 - Non-inverting amplifier versus Schmitt Trigger

Lecture 55 - Difference amplifier - I

Lecture 56 - Difference amplifier - II

Lecture 57 - Difference amplifier - III

Lecture 58 - Digital frequency meter

Lecture 59 - Digital frequency meter and Schmitt Trigger

Lecture 60 - Schmitt Trigger

Lecture 61 - Schmitt Trigger

Lecture 62 - Digital frequency meter

Lecture 63 - Linear ramp type digital voltmeter

Lecture 64 - Dual slope digital voltmeter - I

Lecture 65 - Dual slope digital voltmeter - II

Lecture 66 - Dual slope digital voltmeter and Integrator circuit

Lecture 67 - Digital ramp type voltmeter

Lecture 68 - Digital ramp type voltmeter and Successive approximation type voltmeter

Lecture 69 - ADC and DAC - I

Lecture 70 - ADC and DAC - II

Lecture 71 - Why we need electronic Instruments

Lecture 72 - Instruments with op-amp based amplifiers - I

Lecture 73 - Instruments with op-amp based amplifiers - II

Lecture 74 - Instruments with op-amp based amplifiers - III

Lecture 75 - Instrumentation Amplifier

Lecture 76 - Function generator

Lecture 77 - 555-Timer circuit

Lecture 78 - Astable and monostable oscillator circuits

Lecture 79 - Pulse generator

Lecture 80 - Oscilloscope - I

Lecture 81 - Oscilloscope - II

Lecture 82 - Emitter follower voltmeter

Lecture 83 - Linear ohmmeter

Lecture 84 - Ramp generator

NPTEL : NOC:Principles and Techniques of Modern Radar Systems (Electrical Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

Lecture 1 - Historical Development and Application

Lecture 2 - Radar Bands and System Modeling

Lecture 3 - Radar Equation

Lecture 4 - Some Basic Concepts of Pulsed Radar

Lecture 5 - Some Basic Concepts of Pulsed Radar (Continued...)

Lecture 6 - Some Basic Concepts of Pulsed Radar (Continued...)

Lecture 7 - Some Basic Concepts of Pulsed Radar (Continued...)

Lecture 8 - Tutorial Problems on Basic Concepts of Radar - Part I

Lecture 9 - Tutorial Problems on Basic Concepts of Radar - Part II

Lecture 10 - CW Radar

Lecture 11 - CW Radar Mathematical Model and Applications

Lecture 12 - FM-CW Radar

Lecture 13 - Double Frequency CW Radar

Lecture 14 - Pulsed Radar

Lecture 15 - MTI Filter

Lecture 16 - Clutter and Single DLC

Lecture 17 - Double DLC and Recursive MTI Filter

Lecture 18 - Multiple prf MTI Radar

Lecture 19 - Multiple prf MTI Radar and Clutter Attenuation

Lecture 20 - MTI Improvement Factor

Lecture 21 - Tutorial Problems on CW and Pulsed Radar - Part I

Lecture 22 - Tutorial Problems on CW and Pulsed Radar - Part II

Lecture 23 - Pulsed Doppler Radar

Lecture 24 - Pulsed Doppler Radar (Continued...) and Search Radar

Lecture 25 - Tracking Radar

Lecture 26 - Tracking Radar (Continued...)

Lecture 27 - Tracking Radar (Continued...)

Lecture 28 - Tracking Radar (Continued...)

Lecture 29 - Tracking Radar (Continued...)

Lecture 30 - Tracking Radar (Continued...)

Lecture 31 - Tracking Radar (Continued...)

Lecture 32 - Tutorial Problems on Search and Tracking Radar

Lecture 33 - Detection in Radar Receiver

Lecture 34 - Detection in Radar Receiver (Continued...)

Lecture 35 - Detection in Radar Receiver (Continued...)

Lecture 36 - Detection in Radar Receiver (Continued...)

Lecture 37 - Detection in Radar Receiver (Continued...)

Lecture 38 - Detection in Radar Receiver (Continued...)

Lecture 39 - Detection in Radar Receiver (Continued...)

Lecture 40 - Detection in Radar Receiver (Continued...)

Lecture 41 - Detection in Radar Receiver (Continued...)

Lecture 42 - Detection in Radar Receiver (Continued...)

Lecture 43 - Detection in Radar Receiver (Continued...)

Lecture 44 - Detection in Radar Receiver (Continued...)

Lecture 45 - Detection in Radar Receiver (Continued...)

Lecture 46 - Detection in Radar Receiver (Continued...)

Lecture 47 - Tutorial Problems on Detection in Radar Receiver

Lecture 48 - SAR Processing

Lecture 49 - SAR Processing (Continued...)

Lecture 50 - SAR Processing (Continued...)

Lecture 51 - SAR Processor

Lecture 52 - Tutorial

Lecture 53 - Statistical Detection Theory: Introduction

Lecture 54 - Statistical Detection Theory (Continued...)

Lecture 55 - Statistical Detection Theory (Continued...)

Lecture 56 - Statistical Detection Theory (Continued...)

Lecture 57 - Statistical Detection Theory (Continued...)

Lecture 58 - Tutorial

Lecture 59 - Ground Penetrating Radar

Lecture 60 - GPR Measurements and Microwave Tomography

NPTEL : NOC:Electrical Machines-I (Electrical Engineering)

Co-ordinators : Prof.Tapas Kumar Bhattacharya

Lecture 1 - Magnetic Circuit and Transformer

Lecture 2 - Magnetising Current from B-H Curve

Lecture 3 - Ideal Transformer, Dot Convention and Phasor Diagram

Lecture 4 - Operation of Ideal Operation with Load Connected

Lecture 5 - Equivalent Circuit of Ideal Transformer

Lecture 6 - Rating of Single Phase Transformer: Rated Current and Rated Voltage with Example

Lecture 7 - Transformer with Multiple Coils

Lecture 8 - Modelling of Practical Transformer - I

Lecture 9 - Modelling of Practical Transformer - II

Lecture 10 - Modelling of Practical Transformer - III

Lecture 11 - Core Loss - Eddy Current Loss

Lecture 12 - Factors on Eddy Current Loss Depends

Lecture 13 - Hysteresis Loss

Lecture 14 - Exact Equivalent Circuit

Lecture 15 - Approximate Equivalent Circuit

Lecture 16 - Determination of Equivalent Circuit Parameters - No Load Test

Lecture 17 - Short Circuit Test

Lecture 18 - Choosing Sides to Carry Out O.C / S.C Test

Lecture 19 - Efficiency of Transformer - Losses

Lecture 20 - Efficiency (Continued...)

Lecture 21 - Condition for Maximum Efficiency When Load Power Factor Constant

Lecture 22 - Family of Efficiency Curve at Various Power Factor and Energy Efficiency

Lecture 23 - Load Description and Energy Efficiency

Lecture 24 - Regulation: its Expression

Lecture 25 - Regulation: its Expression (Continued...)

Lecture 26 - Auto Transformer - Introduction

Lecture 27 - AutoTransformer versus Two Winding Transformer

Lecture 28 - AutoTransformer versus Two Winding Transformer (Continued...)

Lecture 29 - Numerical Problems on Ideal Auto Transformer

Lecture 30 - Two Winding Transformer Connected as Auto Transformer

Lecture 31 - Practical Auto Transformer

Lecture 32 - Equivalent Circuit of an Auto Transformer

Lecture 33 - Polarity Test and Sumpner Test

Lecture 34 - 3 Phase Transformer Using 3 Single Phase Transformer

Lecture 35 - Various Connections of 3-Phase Transformer - I

Lecture 36 - Various Connections of 3-Phase Transformer - II

Lecture 37 - Vector Group of 3-Phase Transformer

Lecture 38 - Vector Group (Continued...)

Lecture 39 - Open Delta Connection

Lecture 40 - 3-Phase Cone Type and Shell Type Transformer

Lecture 41 - Zig Zag Connection

Lecture 42 - Effect 3rd Harmonic Exciting Current and Flux

Lecture 43 - Choosing Transformer Connection

Lecture 44 - Choosing Transformer Connection (Continued...)

Lecture 45 - Phase Conversion using Transformer: Scott Connection

Lecture 46 - Scott Connection (Continued...)

Lecture 47 - 3 Phase to 6 Phase Conversion O.C / S.C Test on 3 Phase Transformer

Lecture 48 - Parallel Operation of Transformers - I

Lecture 49 - Parallel Operation of Transformers - II

Lecture 50 - Parallel Operation of Transformers - III

Lecture 51 - Specific Magnetic and Electric Loadings

Lecture 52 - ooling of Transformer and Fillings of Transformer

Lecture 53 - Output Equation of 3- Phase Transformer

Lecture 54 - Introduction to D.C Machine

Lecture 55 - Single Conductor D.C Generator / Motor Operation

Lecture 56 - Homopolar D.C Generator

Lecture 57 - Homopolar D.C Motor

Lecture 58 - Introduction to Rotating D.C Machines

Lecture 59 - Armature Winding of D.C Machine - I

Lecture 60 - Armature Winding of D.C Machine - II

Lecture 61 - Armature Winding of D.C Machine - III

Lecture 62 - Generated Voltage Across the Armature

Lecture 63 - Electromagnetic Troque in D.C Machine

Lecture 64 - Generator and Motor Operation - Basics

Lecture 65 - O.C.C and Load Characteristic of Separately Excited Generators

Lecture 66 - Voltage Build Up in Shunt Generator

Lecture 67 - Load Characteristic of Shunt Generator

Lecture 68 - Qualitative Discussion on Armature Reaction

Lecture 69 - Ill Effects of Armature Reaction

Lecture 70 - Compensating and Interpoles

Lecture 71 - Armature Reaction (Continued...)

Lecture 72 - Field Flux Density, Armature Flux Density and Resultant Field Distribution

Lecture 73 - Field Patterns for Both Motor and Generators

Lecture 74 - Demagnetising and Cross Magnetising mmf for Brush Shifted Machine

Lecture 75 - Calculation of Compensating, Interpole and Series Field Turns

Lecture 76 - Estimating Armature and Field Resistance from its Rating

Lecture 77 - Power Flow Diagram, Rotational Loss

Lecture 78 - Shunt Motor: Basic Equation

Lecture 79 - Starting of D.C Motor - 3-Point Starter

Lecture 80 - Speed Control of Shunt Motor - I

Lecture 81 - Speed Control of Shunt Motor - II

Lecture 82 - Speed Control of Shunt Motor - III

Lecture 83 - Field Control (Continued...)

Lecture 84 - D.C Motor Braking

Lecture 85 - Introduction to Series Motor

Lecture 86 - Series Motor Characteristics

Lecture 87 - Series Motor Speed Control

Lecture 88 - Universal Motor

Lecture 89 - Swinburne Test

Lecture 90 - Hopkinson Test

Lecture 91 - Efficiency Calculation

Lecture 92 - Field Test on D.C Series Motor

Lecture 93 - Simplex Wave winding

Lecture 94 - Wave Winding (Continued...)

NPTEL : NOC:VLSI Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Mrityunjay Chakraborty

Lecture 1 - Graphical Representation of Signals

Lecture 2 - Signal Flow Graph

Lecture 3 - Data Flow Graph, Critical Path

Lecture 4 - Dependence Graph, Basics of Retiming

Lecture 5 - Retiming Theorem

Lecture 6 - Forward Path and Loop Retiming

Lecture 7 - Loop Bound and Iteration Bound

Lecture 8 - Cutset Retiming

Lecture 9 - Retiming IIR Filters

Lecture 10 - Adaptive Filter Basics (LMS Algorithm)

Lecture 11 - Retiming LMS

Lecture 12 - Retiming Delayed LMS

Lecture 13 - Parallel Processing in DSP by Unfolding

Lecture 14 - Basic Unfolding Relation

Lecture 15 - Retiming for Unfolding

Lecture 16 - Loop Unfolding

Lecture 17 - Iteration bound for Loops

Lecture 18 - Bitserial, Digit serial and Word serial Structures

Lecture 19 - Unfolding a Switch

Lecture 20 - Unfolding Bit Serial Systems

Lecture 21 - Folding of DFG

Lecture 22 - Folding Examples - IIR Filter

Lecture 23 - Retiming for Folding

Lecture 24 - Introduction to Delay Optimization by Folding

Lecture 25 - Life Time Analysis of Storage Variables

Lecture 26 - Foward Backward Data Allocation

Lecture 27 - Life Time Analysis of Storage Variables in a Digital Filter

Lecture 28 - Delay Folded Realization of a Digital Filter

Lecture 29 - Polyphase Decomposition of Sequences

Lecture 30 - Hardware Efficient 2 - Parallel FIR Filters

Lecture 31 - Hardware Efficient 3 - Parallel FIR Filters

Lecture 32 - Introduction to First Level Architectures

Lecture 33 - 2's Complement Number Systems

Lecture 34 - Multiplication of Two Binary Numbers

Lecture 35 - Carry Ripple and Carry Save Array

Lecture 36 - Bit Serial Multipliers

Lecture 37 - Bit Serial Digital Filters

Lecture 38 - Baugh Wooley Multiplier

Lecture 39 - Distributed Arithmetic

NPTEL : NOC:Analog Electronic Circuits (Electrical Engineering)

Co-ordinators : Prof. Pradip Mandal

Lecture 1 - Introduction to the course

Lecture 2 - Introduction to the constituent topics of the course and the Layout

Lecture 3 - Revisit to pre-requisite topics

Lecture 4 - Revisit to pre-requisite topics (Continued...)

Lecture 5 - Analysis of Simple Non-Linear Circuit

Lecture 6 - Analysis of Simple Non-linear Circuit (Continued...)

Lecture 7 - Revisiting BJT Characteristic

Lecture 8 - Revisiting BJT Characteristics (Continued...)

Lecture 9 - Revisiting BJT Characteristics (Continued...)

Lecture 10 - Revisiting MOSFET

Lecture 11 - Revisiting MOSFET (Continued...)

Lecture 12 - Revisiting MOSFET (Continued...)

Lecture 13 - Revisiting MOSFET (Continued...)

Lecture 14 - Analysis of simple non-linear circuit containing a BJT

Lecture 15 - Analysis of simple non-linear circuit containing a BJT (Continued...)

Lecture 16 - Analysis of simple non-linear circuit containing a MOSFET

Lecture 17 - Analysis of simple non-linear circuit containing a MOSFET (Continued...)

Lecture 18 - Linearization of non-linear circuit containing BJT

Lecture 19 - Linearization of non-linear circuit containing BJT (Continued...)

Lecture 20 - Linearization of non-linear circuit containing MOSFET

Lecture 21 - Linearization of non-linear circuit containing MOSFET (Continued...)

Lecture 22 - Linear models of Amplifiers - Part A

Lecture 23 - Linear models of Amplifiers - Part B

Lecture 24 - Common Emitter Amplifier - Part A

Lecture 25 - Common Emitter Amplifier - Part B

Lecture 26 - Common Emitter Amplifier (Continued...) - Part A

Lecture 27 - Common Emitter Amplifier (Continued...) - Part B

Lecture 28 - Common Emitter Amplifier (Continued...) - Numerical examples - Part A

Lecture 29 - Common Emitter Amplifier (Continued...) - Numerical examples - Part B

Lecture 30 - Common Emitter Amplifier (Continued...) - Design guidelines - Part A

Lecture 31 - Common Emitter Amplifier (Continued...) - Design guidelines - Part B

Lecture 32 - Common Source Amplifier - Part A

Lecture 33 - Common Source Amplifier - Part B

Lecture 34 - Common Source Amplifier (Continued...) Numerical examples and design guidelines - Part B

Lecture 35 - Frequency Response of CE and CS Amplifiers - Part A

Lecture 36 - Frequency Response of CE and CS Amplifiers - Part B

Lecture 37 - Frequency Response of CE and CS Amplifiers - Part C

Lecture 38 - Frequency Response of CE and CS Amplifiers (Continued...) - Part A

Lecture 39 - Frequency Response of CE And CS Amplifiers (Continued...) - Part B

Lecture 40 - Frequency Response of CE/CS Amplifiers Considering High Frequency Models of BJT and MOSFET - Part A

Lecture 41 - Frequency Response of CE/CS Amplifiers Considering High Frequency Models of BJT and MOSFET - Part B

Lecture 42 - Frequency Response of CE/CS Amplifiers Considering High Frequency Models of BJT And MOSFET - Part C

Lecture 43 - Limitation of CE and CS Amplifiers in Cascading

Lecture 44 - Common Collector and Common Drain Amplifiers

Lecture 45 - Common Collector and Common Drain Amplifiers (Continued...): Analysis - Part A

Lecture 46 - Common Collector and Common Drain Amplifiers (Continued...): Analysis - Part B

Lecture 47 - Common Collector and Common Drain Amplifiers (Continued...): Numerical Examples - Part A

Lecture 48 - Common Collector and Common Drain Amplifiers (Continued...): Numerical Examples - Part B

Lecture 49 - Common Base and Common Gate Amplifiers : Analysis - Part A

Lecture 50 - Common Base and Common Gate Amplifiers : Analysis - Part B

Lecture 51 - Common Base and Common Gate Amplifiers (Continued...) : Numerical Examples - Part A

Lecture 52 - Common Base and Common Gate Amplifiers (Continued...) : Numerical Examples - Part B

Lecture 53 - Common Base and Common Gate Amplifiers (Continued...) : Numerical Examples - Part C

Lecture 54 - Common Base and Common Gate Amplifiers (Continued...) : Numerical Examples - Part D

Lecture 55 - Multi-Transistor Amplifiers: Operation and Analysis - Part A

Lecture 56 - Multi-Transistor Amplifiers: Operation and Analysis - Part B

Lecture 57 - Multi-Transistor Amplifiers: Operation and Analysis - Part C

Lecture 58 - Multi-Transistor Amplifiers (Continued...): Numerical Examples - Part A

Lecture 59 - Multi-Transistor Amplifiers (Continued...): Numerical Examples - Part B

Lecture 60 - Multi-Transistor Amplifiers (Continued...): Numerical Examples - Part C

Lecture 61 - Multi-Transistor Amplifiers: Cascode Amplifier - Part A

Lecture 62 - Multi-Transistor Amplifiers: Cascode Amplifier - Part B

Lecture 63 - Multi-Transistor Amplifiers: Cascode Amplifier (Continued...) - Numerical Examples - Part A

Lecture 64 - Multi-Transistor Amplifiers: Cascode Amplifier (Continued...) - Numerical Examples - Part B

Lecture 65 - Multi-Transistor Amplifiers: Cascode Amplifier (Continued...) - Numerical Examples - Part C

Lecture 66 - Multi-Transistor Amplifiers: Amplifier With Active Load - Part A

Lecture 67 - Multi-Transistor Amplifiers: Amplifier With Active Load - Part B

Lecture 68 - Multi-Transistor Amplifiers: Amplifier With Active Load (Continued...) - Numerical Examples - Part A

Lecture 69 - Multi-Transistor Amplifiers: Amplifier With Active Load (Continued...) - Numerical Examples - Part B

Lecture 70 - Single-ended Vs Differential Signaling and Basic Model of a Differential Amplifier

Lecture 71 - Single-ended Vs Differential Signaling and Basic Model of a Differential Amplifier (Continued...)

Lecture 72 - Single-ended Vs Differential Signaling and Basic Model of a Differential Amplifier (Continued...)

Lecture 73 - Single-ended Vs Differential Signaling and Basic Model of a Differential Amplifier (Continued...)

Lecture 74 - Single-ended Vs Differential Signaling and Basic Model of a Differential Amplifier (Continued...)

Lecture 75 - Differential Amplifier : Basic Structure and Principle of Operation

Lecture 76 - Differential Amplifier : Basic Structure and Principle of Operation (Continued...)

Lecture 77 - Differential Amplifier : Analysis and Numerical Examples

Lecture 78 - Differential Amplifier : Analysis and Numerical Examples (Continued...)

Lecture 79 - Differential Amplifier : Analysis and Numerical Examples (Continued...)

Lecture 80 - Differential Amplifier : Analysis and Numerical Examples (Continued...)

Lecture 81 - Current mirror circuits - Part A

Lecture 82 - Current mirror circuits - Part B

Lecture 83 - Usage of current mirror - Part A

Lecture 84 - Usage of current mirror - Part B

Lecture 85 - Usage of current mirror - Part C

Lecture 86 - Numerical examples on current mirror and its applications - Part A

Lecture 87 - Numerical examples on current mirror and its applications - Part B

Lecture 88 - Numerical examples on current mirror and its applications - Part C

Lecture 89 - Numerical examples on current mirror and its applications - Part D

Lecture 90 - Feedback system - Part A

Lecture 91 - Feedback system - Part B

Lecture 92 - Feedback system - Part C

Lecture 93 - Feedback system - Part D

Lecture 94 - Feedback system - Part E

Lecture 95 - Effect of feedback on frequency response - Part A

Lecture 96 - Effect of feedback on frequency response - Part B

Lecture 97 - Applications of feedback in amplifier circuits - Part A

Lecture 98 - Applications of feedback in amplifier circuits - Part B

Lecture 99 - Applications of feedback in amplifier circuits - Part C

NPTEL : NOC:Network Analysis (Electrical Engineering)

Co-ordinators : Prof. T.K. Bhattacharya

Lecture 1 - Introduction: KVL, KCL and Power Balance

Lecture 2 - Voltage and Current Sources

Lecture 3 - Simple Networks with Voltage and Current Sources

Lecture 4 - Mesh Analysis - I

Lecture 5 - Mesh Analysis - II

Lecture 6 - Nodal Analysis - I

Lecture 7 - Nodal Analysis - II

Lecture 8 - Nodal Analysis - III

Lecture 9 - Inductor - I

Lecture 10 - Initial Condition for Inductor

Lecture 11 - Energy Stored in Inductor with Example

Lecture 12 - R-L Series Circuit Analysis

Lecture 13 - Retrieving Energy or Discharging of Inductor Energy

Lecture 14 - Capacitor: Relationship of Voltage and Current and Initial Condition

Lecture 15 - Charging of a Capacitor - Voltage, Current and Energy During Charging

Lecture 16 - Discharge of a Charged Capacitor

Lecture 17 - Linearity of R,L,C - Inductor with Initial Current and Capacitor with Initial Voltage

Lecture 18 - General Method for Solving Linear Differential Equation - I

Lecture 19 - General Method for Solving Linear Differential Equation - II

Lecture 20 - General Method for Solving Linear Differential Equation - III

Lecture 21 - Problem Solving: Application

Lecture 22 - R-L Circuit with Sinusoidal Excitation

Lecture 23 - R-C Circuit with Sinusoidal Exponential

Lecture 24 - Solution Due to Exponential Forcing Function

Lecture 25 - Mesh and Nodal Analysis with Time Varying Source

Lecture 26 - Circuit Analysis with Phasor - I

Lecture 27 - Circuit Analysis with Phasor - II

Lecture 28 - Circuit Analysis with Phasor - III

Lecture 29 - Concept of Active and Reactive Power in A.C Circuit - I

Lecture 30 - Concept of Active and Reactive Power in A.C Circuit - II

Lecture 31 - Expression for Complex Power in A.C Circuit

Lecture 32 - Numerical Example

Lecture 33 - Mesh and Nodal Analysis in A.C Circuit, Introduction to Impulse Function

Lecture 34 - Odd and Even Functions, Relation between Unit Step and Impulse Function

Lecture 35 - Solution of Differential Equation with Impulse Excitation

Lecture 36 - Numerical Example when Excitation is Impulse

Lecture 37 - Self and Mutual Inductances - I

Lecture 38 - Dot Convention in Mutually Coupled Coils

Lecture 39 - Mutually Coupled Coils in Series and Parallel

Lecture 40 - Energy Stored in Mutually Coupled Coils

Lecture 41 - Steady State Response with Sinusoidal Excitation when the Coils are Mutually Coupled

Lecture 42 - Basics of Signals in Brief

Lecture 43 - Laplace Transform - I

Lecture 44 - Laplace Transform - II

Lecture 45 - Laplace Transform Applied to Circuit Analysis - I

Lecture 46 - Laplace Transform Applied to Circuit Analysis - II

Lecture 47 - Numerical Examples - I

Lecture 48 - Numerical Examples - II

Lecture 49 - General Second Order Circuit Analysis with L.T - I

Lecture 50 - General Second Order Circuit Analysis with L.T - II

Lecture 51 - Network Theorem - I

Lecture 52 - Network Theorem - II

Lecture 53 - Norton's Theorem

Lecture 54 - Thevenin Theorem

Lecture 55 - Star-Delta and Delta-Star Transformation

Lecture 56 - Telligen's Theorem

Lecture 57 - Reciprocity Theorem

Lecture 58 - Maximum Power Transfer Theorem

Lecture 59 - Graph Theory Applied to Network Analysis - I

Lecture 60 - Graph Theory Applied to Network Analysis - II

Lecture 61 - Graph Theory Applied to Network Analysis - III

Lecture 62 - Graph Theory Applied to Network Analysis - IV

Lecture 63 - Graph Theory Applied to Network Analysis - V

Lecture 64 - Mesh Analysis with Graph Theory

Lecture 65 - Nodal Analysis with Graph Theory

Lecture 66 - Cut-Set Analysis with Graph Theory

Lecture 67 - Numerical Examples of Network Analysis with Graph Theory

Lecture 68 - Circuit Analysis with Dependent Sources - I

Lecture 69 - Circuit Analysis with Dependent Sources - II

Lecture 70 - Circuit Analysis with Dependent Sources - III

Lecture 71 - Two Port Network - I

Lecture 72 - Two Port Network - II

Lecture 73 - Two Port Network - III

Lecture 74 - Two Port Network - IV

Lecture 75 - Two Port Network - V

Lecture 76 - Two Port Network - VI

Lecture 77 - Two Port Network - VII

Lecture 78 - Gyrator

Lecture 79 - Ideal Op - Amp

Lecture 80 - Examples of Ideal Op-Amp Circuits - I

Lecture 81 - Examples of Ideal Op-Amp Circuits - II

Lecture 82 - General Impedance Transfer Circuit and Concluding Remarks

NPTEL : NOC:Power System Protection (Electrical Engineering)

Co-ordinators : Prof. Ashok Kumar Pradhan

Lecture 1 - Faults in Power System

Lecture 2 - Elements and Features of Protection Scheme

Lecture 3 - Fault Analysis Review - Sequence Components

Lecture 4 - Fault Analysis Review - Sequence Components (Continued...)

Lecture 5 - Numerical Relaying Concept

Lecture 6 - Discrete Fourier Transform

Lecture 7 - Recursive and Half Cycle DFT and Cosine Filter

Lecture 8 - Least Square Technique

Lecture 9 - Frequency Response of Phasor Estimation techniques

Lecture 10 - In the Presence of Decaying DC

Lecture 11 - Overcurrent Relay Characteristics

Lecture 12 - Overcurrent Relay Coordination

Lecture 13 - Relay Coordination with Fuse

Lecture 14 - Introduction to Directional Relaying

Lecture 15 - Positive Sequence Directional Relay

Lecture 16 - Negative and Zero Sequence Directional Relay

Lecture 17 - Superimposed Component Based Directional Relaying

Lecture 18 - Introduction to Distance Relay

Lecture 19 - Fault Classification

Lecture 20 - Apparent Impedance Calculation

Lecture 21 - Distance Relay Implementation

Lecture 22 - Application to Double Circuit Line

Lecture 23 - Multi-terminal Lines

Lecture 24 - Protection of series compensated lines - Part I

Lecture 25 - Protection of series compensated lines - Part II

Lecture 26 - Effect of Fault Resistance

Lecture 27 - Load Encroachment

Lecture 28 - Power Swing

Lecture 29 - Power Swing Detection Techniques - Part I

Lecture 30 - Power Swing Detection Techniques - Part II

Lecture 31 - Adaptive Distance Relaying

Lecture 32 - Communication Assisted Relaying Scheme

Lecture 33 - Current Transformer - Part I

Lecture 34 - Current Transformer - Part II

Lecture 35 - Capacitor Voltage Transformer

Lecture 36 - Fiber Optic Sensors

Lecture 37 - Introduction to Transformer Protection

Lecture 38 - Differential Relay

Lecture 39 - Steps in Differential Relay Processing

Lecture 40 - Inrush Detection

Lecture 41 - CT Saturation, Negative Sequence Differential and Restricted Earth Fault Relay

Lecture 42 - Line Differential - Part I

Lecture 43 - Line Differential - Part II

Lecture 44 - Busbar Protection

Lecture 45 - Fault Characteristics of Renewable Sources

Lecture 46 - Protection Challenges of Distribution Systems with Renewables

Lecture 47 - Protection challenges of transmission systems with renewables

Lecture 48 - Traveling Wave Basics

Lecture 49 - Protection using Travelling Waves

Lecture 50 - Fault Location using Travelling Wave

Lecture 51 - Wide Area Measurement Basics

Lecture 52 - Wide Area Measurement for Protection

NPTEL : NOC:Signal Processing for mm Wave communication for 5G and beyond (Electrical Engineering)

Co-ordinators : Prof. Amit Kumar Dutta

Lecture 1 - Tx- Rx Structure

Lecture 2 - Rx -Structure

Lecture 3 - Fundamental of Ray-Tracing model

Lecture 4 - General channel model - Part I

Lecture 5 - General channel model - Part I (Continued...)

Lecture 6 - General channel model - Part I (Continued...)

Lecture 7 - General channel model - Part II

Lecture 8 - Wireless channel-A ray tracing model - Part II

Lecture 9 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 10 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 11 - Wireless channel-A ray tracing model - Part II (Continued...)

Lecture 12 - RMS Delay spread and Doppler Effect on channel

Lecture 13 - Time Varing Model

Lecture 14 - Doppler Impact on coherence BW

Lecture 15 - Introduction to time series

Lecture 16 - AR,ARMA,MA process

Lecture 17 - Doppler with AR process model

Lecture 18 - Coherence time and parameter summery

Lecture 19 - Basic ISI channel

Lecture 20 - Channel estimation and Equalizer

Lecture 21 - precoder and MIMO

Lecture 22 - precoder and MIMO (Continued...)

Lecture 23 - Basics of mmwave spectrum

Lecture 24 - Angle of arrival and angle of departure

Lecture 25 - 3D concepts, AoA,AoD

Lecture 26 - mmWave channel model with RX beaming

Lecture 27 - mmWave channel model with RX beaming (Continued...)

Lecture 28 - mmWave channel model with RX beaming (Continued...)

Lecture 29 - mmWave channel model with RX beaming (Continued...)

Lecture 30 - mmwave channel model (Continued...)

Lecture 31 - mmWave channel model (Continued...) -Tx side multiple antenna

Lecture 32 - Basics of Beamforming

Lecture 33 - Single Antenna beamforming

Lecture 34 - Concept of antenna many fold vector

Lecture 35 - 3D Concept of antenna many fold vector

Lecture 36 - Different Geometry of antennafrom electrical point of view

Lecture 37 - Basics of Beamforming pattern - Part I

Lecture 38 - Basics of Beamforming pattern - Part II

Lecture 39 - SISO Beamforming

Lecture 40 - MIMO Beamforming

Lecture 41 - Structural implementation of MIMO Beamforming

Lecture 42 - Different Level of Beamforming

Lecture 43 - MIMO Beamforming in Transmitter side

Lecture 44 - MIMO Beamforming in Receiver side - Part I

Lecture 45 - MIMO Beamforming in Receiver side - Part II

Lecture 46 - Mathematical description of MIMO Beamforming (Continued...)

Lecture 47 - Equalizer based detector

Lecture 48 - Parameter to be designed in MIMO Beamforming

Lecture 49 - OFDM Data Model

Lecture 50 - OFDM Data model (Continued...)

Lecture 51 - General OFDM

Lecture 52 - OFDM spectrum and CFO

Lecture 53 - MIMO OFDM structure

Lecture 54 - MIMO OFDM decode and beamforming

Lecture 55 - Design parameter estimation - Part 1

Lecture 56 - Design parameter estimation - Part 2

Lecture 57 - Design parameter estimation - Part 3

Lecture 58 - Design parameter estimation - Part 4

Lecture 59 - Design parameter estimation - Part 5

Lecture 60 - MU System

Lecture 61 - CFO and other impairment and their effects

Lecture 62 - Multi User Hybrid beam and impairment and analysis - Part 3

Lecture 63 - Multi User Hybrid beam and Impairment and analysis - Part 4

Lecture 64 - Multi User Hybrid beam and Impairment and analysis - Part 5

NPTEL : NOC:Control and Tuning Methods in Switched Mode Power Converters (Electrical Engineering)

Co-ordinators : Prof. Santanu Kapat

Lecture 1 - DC Power Conversion Systems - Introduction

Lecture 2 - Overview of voltage regulators

Lecture 3 - Switched mode power converter (SMPC)

Lecture 4 - Model Development for MATLAB Simulation

Lecture 5 - Demonstration of MATLAB Simulation

Lecture 6 - Demonstration of MATLAB Simulation (Continued...)

Lecture 7 - Power Stage Design of Basic SMPCs: Summary

Lecture 8 - Fixed Frequency Modulation Techniques

Lecture 9 - Variable Frequency Modulation Techniques

Lecture 10 - Modulation in Discontinuous Conduction Mode (DCM)

Lecture 11 - Synchronizing Simulation and Script files in MATLAB

Lecture 12 - Interactive MATLAB Simulation and Case Studies

Lecture 13 - Converterâ€™s Objectives and Control Implications

Lecture 14 - Feedforward Control in SMPC

Lecture 15 - Single and Multi Loop Feedback Control Methods

Lecture 16 - Feedback Control of Cascaded SMPCs

Lecture 17 - Combined feedback and feedforward control

Lecture 18 - State feedback control

Lecture 19 - Variable Frequency Control - Understanding Opportunities and Challenges

Lecture 20 - Constant On-time Control Methods

Lecture 21 - Constant Off-time Control Methods

Lecture 22 - Hysteresis Control Methods in SMPCs

Lecture 23 - Stability and Performance Comparison using MATLAB Simulation

Lecture 24 - Light Load Control Methods and Interactive MATLAB Simulation

Lecture 25 - Overview of Modeling Techniques

Lecture 26 - State space averaging and model validation

Lecture 27 - Circuit Averaging Techniques and Equivalent Circuit

Lecture 28 - DC Analysis using Equivalent Circuit Model

Lecture 29 - Derivation of Small-Signal Transfer Functions

Lecture 30 - Small-Signal Model Validation using MATLAB and Time Domain Correlation

Lecture 31 - Small-signal Modeling with Closed Current Loop

Lecture 32 - Impedance Analysis and Stability

Lecture 33 - Loop Gain Analysis and Understanding Model Limits using MATLAB

Lecture 34 - PID Control Design and Tuning under VMC with MATLAB Case Studies

Lecture 35 - Shaping Output Impedance of a Buck Converter under VMC

Lecture 36 - Design of VMC Boost Converter and MATLAB Design Case Studies

Lecture 37 - Accurate Small-signal Modelling under CMC and Verification using MATLAB

Lecture 38 - Design CMC in a Buck Converter and MATLAB based Model Validation

Lecture 39 - Design of CMC Boost Converter - Output and State Feedback Approaches

Lecture 40 - Loop Interactions in CMC and Design of Average CMC

Lecture 41 - Dynamics of SMPCs and Overview of Model-based Nonlinear Control

Lecture 42 - Dynamics of LTIs and Vector Field with MATLAB Demonstration

Lecture 43 - Geometric Perspectives of Eigenvalues and Eigenvectors in SMPCs

Lecture 44 - Small-signal and Large-signal Model based Nonlinear Control

Lecture 45 - Introduction to Sliding Mode Control in SMPCs

Lecture 46 - Sliding Mode Control Design in a Buck Converter

Lecture 47 - Boundary Control Techniques and Selection of Switching Surfaces

Lecture 48 - Time Optimal Control and Identifying Physical Limits in SMPCs

Lecture 49 - Linking Switching Boundary and PID Controller Structure in SMPCs

Lecture 50 - Large-Signal Controller Tuning in Buck Converter: Objectives and Derivations

Lecture 51 - Large-Signal Controller Tuning in Boost and Buck-Boost Converters

Lecture 52 - Large-Signal Controller Tuning in Fixed- and Variable-Frequency Control

Lecture 53 - Critical Performance Limits in Dynamic Voltage Scaling and Possible Solutions

Lecture 54 - Nonlinear Control vs. Large-Signal Tuning: Comparative Study using MATLAB

Lecture 55 - Small-Signal vs. Large-Signal Tuning: Comparison using MATLAB Simulation

Lecture 56 - Performance Improvement and Size Reduction using Large-Signal based Control

Lecture 57 - Digital Control in High Frequency SMPCs - Introduction and Motivations

Lecture 58 - Overview of Fixed and Variable Frequency Digital Control Architectures

Lecture 59 - Challenges and Opportunities in Digitally Controlled High Frequency SMPCs

Lecture 60 - Course Summary, Key Takeaways, Few Emerging Applications and Future Scopes

NPTEL : NOC:Advanced Microwave Guided-Structures and Analysis (Electrical Engineering)

Co-ordinators : Prof. Bratin Ghosh

Lecture 1 - Scattering Matrix Concepts

Lecture 2 - Scattering Matrix Concepts (Continued...)

Lecture 3 - Scattering Matrix Concepts (Continued...)

Lecture 4 - Scattering Matrix Concepts (Continued...)

Lecture 5 - Scattering Matrix Concepts Tutorials

Lecture 6 - Scattering Matrix Concepts Tutorials (Continued...)

Lecture 7 - Scattering Matrix Concepts Tutorials (Continued...)

Lecture 8 - Instantaneous form of Maxwellâ€™s equations

Lecture 9 - Instantaneous form of Maxwellâ€™s equations (Continued....)

Lecture 10 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 11 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 12 - Instantaneous form of Maxwellâ€™s equations (Continued...)

Lecture 13 - Instantaneous form of Maxwellâ€™s equations Tutorials

Lecture 14 - Instantaneous form of Maxwellâ€™s equations Tutorials (Continued...)

Lecture 15 - Harmonic form of Maxwellâ€™s equations

Lecture 16 - Harmonic form of Maxwellâ€™s equations (Continued...)

Lecture 17 - Harmonic form of Maxwellâ€™s equations (Continued...)

Lecture 18 - Harmonic form of Maxwellâ€™s equations Tutorials

Lecture 19 - Wave Equation and Solution

Lecture 20 - Relation between wavenumbers

Lecture 21 - Radiation from an electric current source (Continued...)

Lecture 22 - Radiation from an electric current source (Continued...)

Lecture 23 - Radiation from an electric current source (Continued...)

Lecture 24 - Wave Equation and Solution Tutorials

Lecture 25 - Radiation from an electric current source Tutorials

Lecture 26 - Radiation from a magnetic current source

Lecture 27 - Radiation from a magnetic current source (Continued...)

Lecture 28 - Radiation from a magnetic current source (Continued...)

Lecture 29 - Application of the magnetic current source (Continued...)

Lecture 30 - Radiation from a magnetic current source Tutorials

Lecture 31 - Radiation from a magnetic current source Tutorials (Continued....)

Lecture 32 - Rectangular waveguide - I

Lecture 33 - Rectangular waveguide - I Tutorials

Lecture 34 - Rectangular waveguide - II

Lecture 35 - Rectangular waveguide - II (Continued...)

Lecture 36 - Rectangular waveguide - II Tutorials

Lecture 37 - Rectangular waveguide - II Tutorials (Continued...)

Lecture 38 - Rectangular cavity resonator

Lecture 39 - Rectangular cavity resonator Tutorials

Lecture 40 - Rectangular cavity resonator Tutorials (Continued...)

Lecture 41 - The Reciprocity Theorem, Computation of Amplitudes of Forward and Backward (Continued...)

Lecture 42 - The Reciprocity Theorem, Computation of Amplitudes of Forward and Backward (Continued...)

Lecture 43 - The Reciprocity Theorem, Computation of Amplitudes Tutorials

Lecture 44 - The Reciprocity Theorem, Computation of Amplitudes Tutorials (Continued...)

Lecture 45 - Analysis of Guided Structures

Lecture 46 - Analysis of Guided Structures (Continued...)

Lecture 47 - Analysis of Guided Structures (Continued...)

Lecture 48 - Analysis of Guided Structures (Continued...)

Lecture 49 - Analysis of Guided Structures (Continued...)

Lecture 50 - Analysis of Guided Structures (Continued...)

Lecture 51 - Analysis of Guided Structures (Continued...)

Lecture 52 - Analysis of Guided Structures (Continued...)

Lecture 53 - Analysis of Guided Structures (Continued...)

Lecture 54 - Analysis of Guided Structures (Continued...)

Lecture 55 - Analysis of Guided Structures (Continued...)

Lecture 56 - Analysis of Guided Structures (Continued...)

Lecture 57 - Analysis of Guided Structures Tutorials

Lecture 58 - Analysis of Guided Structures Tutorials (Continued...)

Lecture 59 - Cylindrical Wave Functions

Lecture 60 - Cylindrical Wave Functions (Continued...)

Lecture 61 - Cylindrical Wave Functions (Continued...)

Lecture 62 - Circular Waveguide

Lecture 63 - Circular Cavity

Lecture 64 - Cylindrical Wave Functions Tutorials

Lecture 65 - Cylindrical Wave Functions Tutorials (Continued...)

Lecture 66 - Application to the Coupling Problem : Aperture-Coupled, Probe-Coupled and Waveguide

Lecture 67 - Application to the Coupling Problem : Aperture-Coupled, Probe-Coupled and Waveguide (Continued...)

Lecture 68 - Application to the Coupling Problem : Aperture-Coupled, Probe-Coupled and Waveguide (Continued...)

Lecture 69 - Application to the Coupling Problem : Aperture-Coupled, Probe-Coupled and Waveguide (Continued...)

NPTEL : NOC:Cognition and its Computation (Electrical Engineering)

Co-ordinators : Prof. Rajlakshmi Guha, Prof. Sharba Bandyopadhyay

Lecture 1 - Introduction

Lecture 2 - Historical Origin of Cognition Studies

Lecture 3 - The Cognitive Revolution

Lecture 4 - Anatomical Structures of the Brain

Lecture 5 - Frontal Lobes and Cognition

Lecture 6 - Neuropsychological Testing

Lecture 7 - Eye Tracking and Cognition

Lecture 8 - EEG, fMRI, MEG

Lecture 9 - Single neuron level measurements

Lecture 10 - Single Neuron Imaging and Manipulation of Neural Activity

Lecture 11 - Introduction to Computation

Lecture 12 - Currency of Computation in Neurobiology - Action Potential

Lecture 13 - Synapse and Synaptic Transmission

Lecture 14 - Synaptic Plasticity

Lecture 15 - Short Term Plasticity and STDP

Lecture 16 - Coding by neurons

Lecture 17 - Sensory Circuits: Visual - I

Lecture 18 - Sensory Circuits: Visual - II

Lecture 19 - Sensory Circuits: Auditory - I

Lecture 20 - Sensory Circuits: Auditory - II

Lecture 21 - Sensory Circuits: Somatosensory

Lecture 22 - Sensory Circuits: Olfactory and Gustatory

Lecture 23 - Motor circuits - Sensory-motor

Lecture 24 - Reward Circuits

Lecture 25 - Executive Circuits

Lecture 26 - Types of Attention, Theories Broadbent Triessman

Lecture 27 - Alerting Orientation and Executive Network

Lecture 28 - Disorders of Attention

Lecture 29 - Basics of Perception - Object, Depth and Movement

Lecture 30 - Constancy and Illusions

Lecture 31 - Neurobiology of attention, Working Memory

Lecture 32 - Cholinergic System, Bottom up and Top down

Lecture 33 - Object Recognition

Lecture 34 - Visual Search and Pattern Recognition

Lecture 35 - Auditory Scene Analysis, McGurk Effect

Lecture 36 - Learning Processes

Lecture 37 - Learning Processes (Continued...)

Lecture 38 - Memory

Lecture 39 - Learning Disorders

Lecture 40 - Memory Failure - Forgetting

Lecture 41 - Learning in biological neural networks

Lecture 42 - Examples

Lecture 43 - Different types of Plasticity

Lecture 44 - Developmental Plasticity/Learning/Critical Period

Lecture 45 - Examples of Disorders in Plasticity

Lecture 46 - Introduction to speech and language (Development)

Lecture 47 - Components of Speech, Speech Production

Lecture 48 - Speech Perception

Lecture 49 - Lessons from Animal Communication

Lecture 50 - Language and Thought - Speech Language Disorders

Lecture 51 - Theories of Emotion

Lecture 52 - Neurophysiology of emotions - Limbic System

Lecture 53 - Problem Solving

Lecture 54 - Decision Making

Lecture 55 - Frontal cortex in decision making

Lecture 56 - Topics in current research - I

Lecture 57 - Topics in current research - II

Lecture 58 - Topics in current research - III

Lecture 59 - Topics in current research - IV

Lecture 60 - Topics in current research - V

NPTEL : NOC:Digital Control in Switched Mode Power Converters and FPGA-based Prototyping (Electrical Engineering)

Co-ordinators : Prof. Santanu Kapat

Lecture 1 - Digital Control in Switched Mode Power Converters - Course Introduction

Lecture 2 - Digital Control of SMPCs - Course Instructions, Guidelines and Resources

Lecture 3 - Examples of Some Commercial Digital Control Solutions

Lecture 4 - Overview of Digital Control Implementation Platforms

Lecture 5 - Introducing Basic Digitization in Power Electronic Converters

Lecture 6 - Recap of Feedback and Feedforward Control Methods in SMPCs

Lecture 7 - Recap of Fixed and Variable Frequency Modulation Techniques

Lecture 8 - Levels of Digitization in Single-loop Feedback Control in SMPCs

Lecture 9 - Levels of Digitization in Multi-loop Feedback Control in SMPCs

Lecture 10 - SMPC Topologies and Power Stage Design for Hardware Demonstrations

Lecture 11 - Basics of Sampling under Fixed and Variable Frequency Modulation

Lecture 12 - Voltage Mode Digital Pulse Width Modulators and Sampling Methods

Lecture 13 - Overview of Digital Pulse Width Modulator Architectures

Lecture 14 - Sampling Methods under Fixed Frequency Current Mode Control

Lecture 15 - Overview of Fixed Frequency Current Mode Control Architectures

Lecture 16 - Sampling Methods under Constant On/Off - Time Digital Modulation

Lecture 17 - Constant On/Off- Time Mixed-Signal Current Mode Control Architectures

Lecture 18 - Sampling Methods under Digital Hysteresis Control Methods

Lecture 19 - Overview of Digital Hysteresis Control Architectures

Lecture 20 - Summary of Digital Current Mode Control Architectures

Lecture 21 - Recap of Voltage and Current Mode Control Implementation using MATLAB

Lecture 22 - MATLAB Model Development for Basic Digital Control Blocks

Lecture 23 - MATLAB Model Development for Fixed Frequency Digital Control

Lecture 24 - MATLAB Models for Digital Controllers using Difference Equations

Lecture 25 - MATLAB Model Development for Digital Voltage Mode Control

Lecture 26 - MATLAB Model Development for Mixed-Signal Current Mode Control

Lecture 27 - MATLAB Model Development for Fully Digital Current Mode Control

Lecture 28 - MATLAB Model Development for Constant-On Time Control

Lecture 29 - MATLAB Model Development for Constant-Off Time Control

Lecture 30 - MATLAB Model Development for Digital Current Hysteresis Control

Lecture 31 - Continuous-Time Small-Signal Modeling under Digital Control

Lecture 32 - Discrete Time Modeling with Closed Current Loop

Lecture 33 - State-Space Modeling and Steps For Deriving Discrete-Time Models

Lecture 34 - Derivation of Discrete-Time Large-Signal Models

Lecture 35 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part I

Lecture 36 - Validation of Discrete-Time Large-Signal Models using MATLAB - Part II

Lecture 37 - Derivation of Discrete-Time Small-Signal Models - I

Lecture 38 - Derivation of Discrete-Time Small-Signal Models - II

Lecture 39 - Discrete-Time Transfer Functions and Closed Loop Block Diagrams

Lecture 40 - Model Accuracy with MATLAB Case Studies - Comparative Study

Lecture 41 - Continuous-Time to Discrete-Time Conversion Methods - A Summary

Lecture 42 - Recap of Frequency Domain Design of Analog VMC and CMC

Lecture 43 - Design under Digital Voltage Mode Control - Frequency Domain Approaches

Lecture 44 - Design under Digital Current Mode Control - Frequency Domain Approaches

Lecture 45 - Design Case Study and MATLAB Simulation of Digital Voltage Mode Control

Lecture 46 - Design Case Study and MATLAB Simulation of Digital Current Mode Control

Lecture 47 - Time Optimal Control of a Buck Converter and Identifying Performance Limits

Lecture 48 - Trajectory based CMC Design for Proximate Time Optimal Recovery

Lecture 49 - Trajectory based Digital CMC Tuning and MATLAB Case Studies

Lecture 50 - Digital Pulse Skipping Control and MATLAB Simulation Case Studies

Lecture 51 - Selection of ADC and DAC in Digitally Controlled SMPCs

Lecture 52 - High Frequency Current Sensing Techniques in Digitally Controlled SMPCs

Lecture 53 - Current Sensing Techniques in Digitally Controlled High Power Converters

Lecture 54 - Signal Conditioning Circuits and PCB Design for Mixed-Signal Implementation

Lecture 55 - Reference Power Stage Design and Schematic for Buck and Boost Converters - I

Lecture 56 - Reference Power Stage Design and Schematic for Buck and Boost Converters - II

Lecture 57 - Step-by-Step Guidelines for Digital Control Implementation using FPGA

Lecture 58 - Test and Measurement of a Buck Converter using Digital Storage Oscilloscope

Lecture 59 - Functionalities in Mixed Signal Oscilloscope for Validating Digital Control

Lecture 60 - Power Spectrum Analysis of SMPCs using Mixed-Signal Oscilloscope

Lecture 61 - Introduction to Verilog Hardware Description Language (HDL)

Lecture 62 - Guidelines for Verilog HDL Programming - Some Key Rules

Lecture 63 - Structural and Dataflow Modeling in Verilog HDL for Combinational Logics

Lecture 64 - Behavioral Modeling in Verilog HDL for Sequential Digital Circuits

Lecture 65 - Simulation of Verilog-HDL based Design using Xilinx Webpack - I

Lecture 66 - Simulation of Verilog-HDL based Design using Xilinx Webpack - II

Lecture 67 - Fixed Point Implementation in Embedded Control System

Lecture 68 - Fixed Point Arithmetic and Concept of Q Format

Lecture 69 - Counter-based DPWM with Deadtime and Verilog HDL Programming

Lecture 70 - Simulating Counter-based DPWM with Deadtime using Xilinx ISE Simulator

Lecture 71 - Top Down Design Methodology in Digital Voltage Mode Control - I

Lecture 72 - Top Down Design Methodology in Digital Voltage Mode Control - II

Lecture 73 - Digital PID Control Implementation using Verilog HDL Programming

Lecture 74 - Digital PID Controller - Hardware Implementation and Experimental Results

Lecture 75 - Top Down Design Methodology in Mixed-Signal Current Mode Control

Lecture 76 - Top Down Design Method and Verilog HDL Programming of Mixed-Signal CMC

Lecture 77 - Verilog HDL based Digital PI Control Implementation of Mixed-Signal CMC

Lecture 78 - Hardware Implementation of Mixed-Signal CMC and Experimental Results

Lecture 79 - Voltage based Digital Pulse Skip Modulation and Top Down Design Method

Lecture 80 - Implementing Digital Pulse Skip Modulation and Experimental Results

Lecture 81 - STM32 Overview and STM32G4x ecosystem

Lecture 82 - Getting started with STM32CubeMX - Part I

Lecture 83 - Getting started with STM32CubeMX - Part II

Lecture 84 - Practical implementation of LLC converters - Part I

Lecture 85 - Practical implementation of LLC converters - Part II

Lecture 86 - Texas Instruments C2000 Real-time Microcontroller Devices

Lecture 87 - Getting Started with C2000 - Software and Hardware Development

Lecture 88 - Texas Instruments C2000 key peripheral differentiations

Lecture 89 - Texas Instruments TIDM-02008 Reference Design Overview

Lecture 90 - Texas Instruments TIDM-02008 Reference Design Software Overview

Lecture 91 - Steps for FPGA Implementation of Digital Voltage Mode Control

Lecture 92 - Steps for FPGA Implementation of Mixed-Signal Current Mode Control

Lecture 93 - Instability in Digital CMC and Ramp Compensation with Experimental Results

Lecture 94 - Benefits of Constant Off-Time and On-Time Digital CMC Techniques

Lecture 95 - Top Down Design Methodology of Constant On/Off-Time Control

Lecture 96 - Verilog HDL Implementation of Voltage based Constant On-Time Control

Lecture 97 - FPGA Implementation of Constant On/Off-Time Mixed-Signal CMC

Lecture 98 - Stability Comparison of Fixed and Variable Freq. Digital CMC with Experimental Results

Lecture 99 - Assessment of Digital Control Techniques for Light Load DC-DC Converters

Lecture 100 - Adaptive On-Time Digital Control in DCM with Verilog HDL Implementation

Lecture 101 - MATLAB Simulation of a Practical Digital VMC Buck Converter in CCM

Lecture 102 - Data Acquisition and Steps for Validating Simulation and Experimental Results

Lecture 103 - Loop Shaping and Design of Digital Voltage Mode Control in a Buck Converter

Lecture 104 - Digital VMC Design for Shaping Output Impedance in a Buck Converter

Lecture 105 - Hardware Case Studies and Transient Performance in Digital VMC Buck Converter

Lecture 106 - Design and Simulation Case Studies in a Mixed-Signal CMC Buck Converter

Lecture 107 - Hardware Case Studies and Transient Performance in a Digital CMC Buck Converter

Lecture 108 - Analysis of Output Impedance in Digital CMC with Load Current Feedforward

Lecture 109 - Load Current Feedforward in Digital CMC Buck Converter: Experimental Results

Lecture 110 - Need for Multi-Mode Digital Control and Design Requirements in SMPCs

Lecture 111 - Implementing Bi-frequency Spread Spectrum in Digital VMC using Verilog HDL

Lecture 112 - Performance of Bi-frequency Spread Spectrum DPWM and Experimental Results

Lecture 113 - Top Down Design Methodology of PWM/PSM Multi-Mode Digital Control

Lecture 114 - Verilog HDL based FPGA Prototyping of PWM/PSM Multi-Mode Digital Control

Lecture 115 - FPGA Prototyping of Peak Current based PWM/PFM Multi-Mode Digital Control - I

Lecture 116 - FPGA Prototyping of Peak Current based PWM/PFM Multi-Mode Digital Control - II

Lecture 117 - Industry-Driven Architectures for Digital Control IC in High Frequency SMPC

Lecture 118 - Industry-Driven Architectures for Digital Control System Solutions in SMPCs

Lecture 119 - Exploration of Architectures, Modeling, Design, and Control - Course Summary

Lecture 120 - Key Takeaways and Course Usefulness for Skilled Manpower Development

NPTEL : NOC:VLSI Interconnects (Electrical Engineering)

Co-ordinators : Prof. Sarang Pendharker

Lecture 1 - Introduction to VLSI interconnects

Lecture 2 - The distributed RC interconnect model

Lecture 3 - The Elmore delay

Lecture 4 - Elmore delay in interconnects

Lecture 5 - Elmore delay in branched RC interconnects

Lecture 6 - Equivalent circuit for RC interconnects

Lecture 7 - Scaling effects in interconnects

Lecture 8 - Delay mitigation in RC interconnects

Lecture 9 - RC interconnect simulation

Lecture 10 - Inductive effects in interconnects

Lecture 11 - Distributed RLC interconnect model

Lecture 12 - Transmission line equations

Lecture 13 - When to consider the inductive effects?

Lecture 14 - The transfer function of an RLC interconnect

Lecture 15 - Time domain response of a lumped RLC circuit

Lecture 16 - Equivalent Elmore model for RLC interconnects

Lecture 17 - Two-pole model of RLC interconnects from ABCD parameters

Lecture 18 - RLC interconnect simulation

Lecture 19 - Origin of the skin effect

Lecture 20 - Effective resistance at high frequencies

Lecture 21 - Equivalent circuit to simulate skin effect

Lecture 22 - Power dissipation due to interconnects

Lecture 23 - Optimum interconnect width for minimizing total power dissipation

Lecture 24 - Heating effects and thermal modeling

Lecture 25 - Compact thermal modeling with equivalent electrical circuits

Lecture 26 - Electromigration in interconnects

Lecture 27 - Mitigation of electromigration

Lecture 28 - Capacitive coupling in interconnects

Lecture 29 - Cross-talk and timing jitters in two identical interconnects

Lecture 30 - Coupling effects and mitigation techniques

Lecture 31 - Matrix formulation of coupled interconnects

Lecture 32 - Coupled RLC interconnects

Lecture 33 - Decoupling of interconnects by diagonalization of matrix

Lecture 34 - Analysis of coupled interconnects: Examples - 1

Lecture 35 - Analysis of coupled interconnects: Examples - 2

Lecture 36 - Simulation of RC coupled interconnects

Lecture 37 - Extraction of capacitance - Part 1

Lecture 38 - Extraction of capacitance - Part 2

Lecture 39 - Extraction of inductance - Part 1

Lecture 40 - Extraction of inductance - Part 2

Lecture 41 - Estimation of interconnect parameters from S-parameters

NPTEL : NOC:Semiconductor Device Modeling and Simulation (Electrical Engineering)

Co-ordinators : Prof. Vivek Dixit

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Crystal Concept

Lecture 4 - Crystal Concept

Lecture 5 - Crystal Concept

Lecture 6 - Reciprocal Space

Lecture 7 - Problem Session - 1

Lecture 8 - Doping In Semiconductors

Lecture 9 - Bandstructure

Lecture 10 - Effective Mass

Lecture 11 - Density of States

Lecture 12 - Mobility

Lecture 13 - Problem Session - 2

Lecture 14 - Semiconductor statistics

Lecture 15 - Semiconductor statistics (Continued...)

Lecture 16 - P-N Junction

Lecture 17 - P-N Junction (Continued...)

Lecture 18 - P-N Junction (Continued...)

Lecture 19 - Problem Session - 3

Lecture 20 - BJT

Lecture 21 - Bipolar Junction Transistor

Lecture 22 - Bipolar Junction Transistor (Continued...)

Lecture 23 - Bipolar Junction Transistor (Continued...)

Lecture 24 - Problem Session - 4

Lecture 25 - Metal- Semiconductor Interface

Lecture 26 - Schottky junction

Lecture 27 - Field Effect Transistor

Lecture 28 - MOS Capacitor

Lecture 29 - MOS-CV

Lecture 30 - REAL MOS (Continued...)

Lecture 31 - MOSFET

Lecture 32 - MOSFET (Continued...)

Lecture 33 - Problem Session - 5

Lecture 34 - Semiclassical Transport

Lecture 35 - Semiclassical Transport (Continued...)

Lecture 36 - Semiclassical Transport (Continued...)

Lecture 37 - Semiclassical Transport (Continued...)

Lecture 38 - Semiclassical Transport (Continued...)

Lecture 39 - Problem Session - 6

Lecture 40 - Drift-diffusion model

Lecture 41 - Drift-diffusion model (Continued...)

Lecture 42 - Drift-diffusion model (Continued...)

Lecture 43 - Drift-diffusion model (Continued...)

Lecture 44 - Generation-Recombination

Lecture 45 - Generation-Recombination (Continued...)

Lecture 46 - Solving DD Equations (Continued...)

Lecture 47 - Solving DD Equations (Continued...)

Lecture 48 - Problem Session - 7

Lecture 49 - Hydrodynamic Model

Lecture 50 - Hydrodynamic Model (Continued...)

Lecture 51 - Hydrodynamic Model (Continued...)

Lecture 52 - Monte Carlo simuations

Lecture 53 - Problem Session - 8

Lecture 54 - Quantum Mechanics

Lecture 55 - Solving Schrodinger Equation

Lecture 56 - Quantum Correction Models

Lecture 57 - Quantum Transport

Lecture 58 - Transfer Matrix Approach

Lecture 59 - TCAD Tools

Lecture 60 - ATLAS SILVACO

Lecture 61 - Simulating Junctions

Lecture 62 - Models and Simulation Concepts

Lecture 63 - Mixed-mode Simulation

NPTEL : NOC:RF and Microwave Networks (Electrical Engineering)

Co-ordinators : Prof. Bratin Ghosh

Lecture 1 - The network concept

Lecture 2 - One-port network

Lecture 3 - One-port network, Two-port network

Lecture 4 - Two-port network, Signal flow graph

Lecture 5 - Tutorial - 1

Lecture 6 - General analysis of cylindrical waveguides

Lecture 7 - TE to z mode analysis of cylindrical waveguides

Lecture 8 - TE to z mode analysis of cylindrical waveguides (Continued...), TM to z mode analysis

Lecture 9 - Normalization of mode vectors, Characteristics of eigen values and eigen functions

Lecture 10 - Wave impedance for TE and TM to z modes, Transmission line analogy for mode voltage

Lecture 11 - Transmission line equivalence for TE and TM modes, Power calculation using

Lecture 12 - Tutorial - 2

Lecture 13 - Modal expansion in cylindrical waveguides, Concept of mode orthogonality

Lecture 14 - Concept of mode orthogonality (continued), Determination of arbitrary mode

Lecture 15 - Power orthogonality in cylindrical waveguides

Lecture 16 - Tutorial - 3

Lecture 17 - Modal expansion of fields in rectangular waveguides

Lecture 18 - Modal expansion of fields in rectangular waveguides (Continued), Capacitive rectangular

Lecture 19 - Capacitive rectangular waveguide junction (Continued...)

Lecture 20 - Inductive rectangular waveguide junction (Continued...)

Lecture 21 - Inductive rectangular waveguide junction (Continued...), Construction of solutions

Lecture 22 - Cylindrical waveguide junctions (Continued...)

Lecture 23 - Cylindrical waveguide junctions (Continued...)

Lecture 24 - Cylindrical waveguide junctions (Continued...), Example of capacitive rectangular

Lecture 25 - Cylindrical waveguide junctions (Continued...), Example of capacitive rectangular

Lecture 26 - Example of inductive waveguide junction (Continued...), Alternative equivalent circuit

Lecture 27 - Tutorial - 4

Lecture 28 - Obstacles in waveguides

Lecture 29 - Obstacles in waveguides (Continued...)

Lecture 30 - Obstacles in waveguides (Continued...)

Lecture 31 - Small obstacles in waveguides

Lecture 32 - Small obstacles in waveguides (Continued...)

Lecture 33 - Small obstacles in waveguides, Reciprocity

Lecture 34 - Reciprocity

Lecture 35 - Reciprocity (Continued...)

Lecture 36 - Tutorial - 5

Lecture 37 - Posts in rectangular waveguide

Lecture 38 - Posts in rectangular waveguide (Continued...)

Lecture 39 - Posts in rectangular waveguide (Continued...)

Lecture 40 - Posts in rectangular waveguide (Continued...)

Lecture 41 - Diaphragms in waveguide

Lecture 42 - Diaphragms in waveguide (Continued...)

Lecture 43 - Diaphragms in waveguide (Continued...)

Lecture 44 - Diaphragms in waveguide (Continued...)

Lecture 45 - Tutorial - 6

Lecture 46 - Currents in Waveguides

Lecture 47 - Currents in Waveguides (Continued...)

Lecture 48 - Coaxial to waveguide junction with matched termination

Lecture 49 - Coaxial to waveguide feeds with arbitrary termination

Lecture 50 - Coaxial to waveguide feeds with arbitrary termination (Continued...)

Lecture 51 - Coaxial to waveguide feeds with arbitrary termination (Continued...)

Lecture 52 - Coaxial to waveguide feeds with arbitrary termination (Continued...)

Lecture 53 - Tutorial - 7

Lecture 54 - Apertures in the ground plane

Lecture 55 - Apertures in the ground plane (Continued...)

Lecture 56 - Apertures in the ground plane (Continued...)

Lecture 57 - Apertures in the ground plane (Continued...), Plane current sheets

Lecture 58 - Plane current sheets (Continued...)

Lecture 59 - Tutorial - 8

Lecture 60 - Excitation of Apertures

Lecture 61 - Tutorial - 9

Lecture 62 - Modal expansion in cavities

Lecture 63 - Probes in cavities

Lecture 64 - Tutorial - 10

Lecture 65 - Aperture coupling to cavities

Lecture 66 - Aperture coupling to cavities (Continued...)

Lecture 67 - Wave interaction with cylindrical structures

Lecture 68 - Wave interaction with cylindrical structures (Continued...)

Lecture 69 - Wave interaction with cylindrical structures (Continued...)

Lecture 70 - Wave interaction with cylindrical structures (Continued...)

Lecture 71 - Wave interaction with cylindrical structures (Continued...)

Lecture 72 - Wave interaction with cylindrical structures (Continued...)

Lecture 73 - Wave interaction with cylindrical structures (Continued...)

Lecture 74 - Wave interaction with cylindrical structures (Continued...)

Lecture 75 - Tutorial - 12

NPTEL : NOC:Introduction to Adaptive Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Mrityunjoy Chakraborty

Lecture 1 - Introduction to Adaptive Filters

Lecture 2 - Probability and Random Variables

Lecture 3 - General Set of Random Variables

Lecture 4 - Statistical Impedance, Covariance Matrices

Lecture 5 - Multivariate Gaussian Density

Lecture 6 - Complex Random Variables

Lecture 7 - Introduction to Hermitian Matrices

Lecture 8 - Eigenvalues and eigenvectors of Hermitian Matrices

Lecture 9 - Spectral Decomposition of Hermitian Matrices

Lecture 10 - Positive Definite and Semidefinite Matrices

Lecture 11 - Introduction to Discrete Time Random Processes

Lecture 12 - Power Spectral Density (PSD)

Lecture 13 - PSD and Linear Time Invariant Systems

Lecture 14 - Optimal FIR Filter

Lecture 15 - Optimal FIR Filter (Continued...)

Lecture 16 - LMS Algorithm

Lecture 17 - Convergence Proof of LMS Algorithm

Lecture 18 - Convergence Proof of LMS Algorithm (Continued...)

Lecture 19 - Application of Adaptive Filter

Lecture 20 - Application of Adaptive Filter (Continued...)

Lecture 21 - Application of Adaptive Filter (Continued...)

Lecture 22 - Applications of Adaptive Filter

Lecture 23 - Applications of Adaptive Filter

Lecture 24 - Second Order Analysis of LMS Algorithm

Lecture 25 - Second Order Analysis of LMS Algorithm (Continued...)

Lecture 26 - Second Order Analysis of LMS Algorithm (Continued...)

Lecture 27 - Second Order Analysis of LMS Algorithm (Continued...)

Lecture 28 - NLMS Algorithm

Lecture 29 - NLMS Algorithm

Lecture 30 - Affine Projection Algorithm (APA)

Lecture 31 - Affine Projection Algorithm (APA)

Lecture 32 - Introduction to RLS Algorithm

Lecture 33 - Introduction to RLS Algorithm (Continued...)

Lecture 34 - Introduction to RLS Algorithm (Continued...)

Lecture 35 - Formulation of the RLS Algorithm

Lecture 36 - Introduction to RLS Algorithm

Lecture 37 - Introduction to RLS Algorithm

Lecture 38 - Formulation of the RLS Algorithm

Lecture 39 - Derivation of the RLS transversal adaptive filter

Lecture 40 - Derivation of the RLS transversal adaptive filter

Lecture 41 - Derivation of the RLS transversal adaptive filter

NPTEL : NOC:Nanobiophotonics: Touching Our Daily Life (Electrical Engineering)

Co-ordinators : Dr. Basudev Lahiri

Lecture 1 - What is Nano Bio Photonics?

Lecture 2 - Why is Nano Bio Photonics?

Lecture 3 - Why do this?

Lecture 4 - Why Photonics?

Lecture 5 - Why Biology?

Lecture 6 - Nature of Light

Lecture 7 - Light-Matter Interactions

Lecture 8 - Introduction to Fluorescence

Lecture 9 - The Cell

Lecture 10 - The Central Dogma

Lecture 11 - Facts of Matter

Lecture 12 - Introduction to Nanotechnology

Lecture 13 - Nanotechnology: The art of small

Lecture 14 - Synthesis of Nanomaterials : Top-Down Approach

Lecture 15 - Applications of Nanomaterials in Photonics

Lecture 16 - Interaction of Light with Cells

Lecture 17 - Light-matter interactions in molecules (Basic of Spectroscopy)

Lecture 18 - Imaging for Biological Matters

Lecture 19 - Fluorophores and Fluorescence Microscopy Techniques

Lecture 20 - Primary Examples

Lecture 21 - Basics of Flow Cytometry - Part 1

Lecture 22 - Basics of Flow Cytometry - Part 2

Lecture 23 - Data manipulation and presentation

Lecture 24 - Application of Flow cytometry in Biology

Lecture 25 - Raman Assisted Flow cytometry

Lecture 26 - Genetic Code

Lecture 27 - Biosensing Background

Lecture 28 - Basics of Microarray Technology

Lecture 29 - DNA Microarray Technology

Lecture 30 - Protein Microarray Technology

Lecture 31 - Laser Principles and Operation

Lecture 32 - Nonlinear Optical Processes

Lecture 33 - In Vivo Photoexcitation

Lecture 34 - Light/Laser Activated Therapy

Lecture 35 - Laser Tissue Contouring

Lecture 36 - Metamaterials

Lecture 37 - Metamaterials as Biosensors

Lecture 38 - Biosensing with Optical Nano-Antennas

Lecture 39 - Nanoscale Chemical Imaging

Lecture 40 - Optical Tweezers

Lecture 41 - Introduction to Optogenetics

Lecture 42 - Controlling the Brain with Light

Lecture 43 - The Nervous System

Lecture 44 - The Neural Circuits

Lecture 45 - Optical Neuroimaging and Tomography

Lecture 46 - Functional Near-Infrared Spectroscopy (fNIRS) of the Brain

Lecture 47 - Neuro imaging with Light-Sheet Microscopy

Lecture 48 - Brain imaging with Two Photon Microscopy

Lecture 49 - Brain imaging with functional optoacoustic Imaging

Lecture 50 - Tomographic technique for Brain imaging

Lecture 51 - Optogenetic Modulation of Neural Circuits

Lecture 52 - Nanoparticles for Optical Modulation of Neuronal Behavior

Lecture 53 - Optical Stimulation of Neural Circuits in Freely Moving Animals

Lecture 54 - Higher Harmonic Generation Imaging for Neuropathology

Lecture 55 - Multi-Photon Nanosurgery

Lecture 56 - Bioinspired materials for photonics

Lecture 57 - Bioderived Materials

Lecture 58 - Bioinspired Materials

Lecture 59 - Biotemplates

Lecture 60 - Summary and Revisiting Few Topics

NPTEL : NOC:EMI-EMC and Signal Integrity: Principles, Techniques and Applications (Electrical Engineering)

Co-ordinators : Prof. Amitabha Bhattacharya

Lecture 1 - Introduction to Electromagnetic Environment

Lecture 2 - Introduction to Electromagnetic Compatibility

Lecture 3 - EMC Standards

Lecture 4 - EMC Units and Signal Spectrum

Lecture 5 - Single Sided Spectrum

Lecture 6 - Response of Linear Systems to Periodic Input Signals

Lecture 7 - Important Computational Techniques

Lecture 8 - Fourier Coefficient for Piecewise Linear Periodic Waveforms

Lecture 9 - Fourier Coefficient for Piecewise Linear Periodic Waveforms (Continued...)

Lecture 10 - Trapezoidal Clock

Lecture 11 - Spectral Bounds for Trapezoidal Clock

Lecture 12 - Spectral estimation of trapezoidal clock

Lecture 13 - Effect of Rise/Fall Time on Spectral Bound of a Clock

Lecture 14 - Effect of Ringing on Spectral Bounds

Lecture 15 - Spectral Bounds for Linear System Output

Lecture 16 - Resolution Bandwidth of a Spectrum Analyser

Lecture 17 - Detector of Spectrum Analyser

Lecture 18 - Radiated Emission Model Subproblem - I

Lecture 19 - Farfield Characteristics of Current Element: Some Discussion

Lecture 20 - Farfield of Dipole Antena

Lecture 21 - Farfield models of wire antenna and current models

Lecture 22 - Differential mode current emission model

Lecture 23 - Differential mode current emission model (Continued...)

Lecture 24 - Common Mode Current Emission Model

Lecture 25 - Current Measurement

Lecture 26 - Radiated Susceptibility Models

Lecture 27 - Determination of Per Unit Length Inductance (Continued...)

Lecture 28 - Per Unit Length Parameters of Various Two Wire Lines

Lecture 29 - Radiated Susceptibility Model

Lecture 30 - Radiated Susceptibility Model (Continued...)

Lecture 31 - Radiated Susceptibility Model (Continued...)

Lecture 32 - Crosstalk

Lecture 33 - Development of Multi Conductor Transmission Line Equation

Lecture 34 - Per Unit Length Parameter of a Three Conductor System

Lecture 35 - Parameters of Three Conductor Systems (Continued...)

Lecture 36 - Parameters of Three Conductor Systems (Continued...)

Lecture 37 - Development of crosstalk model infrequency domain

Lecture 38 - Determination of Terminal Currents of a three conductor system

Lecture 39 - Derivation of Chain Parameter Matrix

Lecture 40 - Determination of Crosstalk in a Lossless Line Immersed in Homogeneous Medium

Lecture 41 - Determination of Crosstalk (Continued...)

Lecture 42 - Determination of Crosstalk (Continued...)

Lecture 43 - Determination of Crosstalk (Continued...)

Lecture 44 - Inductive and Capacitive coupling

Lecture 45 - Time Domain Crosstalk

Lecture 46 - Time Domain Crosstalk (Continued...)

Lecture 47 - Inclusion of Losses in Transient Crosstalk

Lecture 48 - Conducted emission and susceptibility

Lecture 49 - Shielding

Lecture 50 - Shielding Effectiveness for Farfield Source

Lecture 51 - Shielding Effectiveness Due to Farfield Source (Continued...)

Lecture 52 - SE Due to Farfield Sources (Continued...) and Free Space Impedance Ar Nearfield

Lecture 53 - Shielding for Nearfield Source

Lecture 54 - EMC System Aspect for Shielding

Lecture 55 - Grounding

Lecture 56 - Grounding (Continued...)

Lecture 57 - Bonds and Joints

Lecture 58 - EMC Case Studies

Lecture 59 - Electrostatic Discharge (ESD)

NPTEL : NOC:Embedded Sensing, Actuation and Interfacing Systems (Electrical Engineering)

Co-ordinators : Prof. Banibrata Mukherjee

Lecture 1 - Introduction

Lecture 2 - Real-life Examples Illustration

Lecture 3 - Sensor Structure and Characteristics

Lecture 4 - Sensor and Actuator Characteristics and Numerical Problem

Lecture 5 - Temperature Sensors and its Signal Conditioning Circuits

Lecture 6 - Motion Sensors and its Interfacing Aspects

Lecture 7 - Gyroscope and Strain Gauge

Lecture 8 - Strain Gauge and Optical Sensor

Lecture 9 - Optical Encoder, Gas Sensor and Chemical Sensor

Lecture 10 - Magnetic Sensor and Actuator

Lecture 11 - Electrical Actuator

Lecture 12 - Electrical Actuator: Stepper Motor and Heater

Lecture 13 - Smart Material Actuator

Lecture 14 - Metamaterial and Other Actuators

Lecture 15 - Op-amp based circuits and amplifier

Lecture 16 - Various Op-amp Configurations

Lecture 17 - Instrumentation Amplifier and Filter

Lecture 18 - Passive and Active Filters

Lecture 19 - Universal Filter and Data Converter

Lecture 20 - ADC and DAC

Lecture 21 - Sampling Issue and Communication Protocol

Lecture 22 - Bridge Circuits and their Linearity Improvement

Lecture 23 - Linearization and error reduction schemes

Lecture 24 - Principle of Direct Interfacing Scheme

Lecture 25 - Various Aspects of Direct Interfacing

Lecture 26 - Direct Interfacing for Differential and Bridge Type Resistive Sensor

Lecture 27 - Measurement Uncertainties and Interface of Sensor Array

Lecture 28 - Various Configurations of Capacitive Sensors

Lecture 29 - Analog Interface Circuit and Direct Interfacing Scheme

Lecture 30 - Direct Interfacing Scheme for Differential Capacitive Sensor

Lecture 31 - Lossy Capacitive Sensor and its Interfacing Aspect

Lecture 32 - Advanced Interfacing Circuits for Lossy Capacitive Sensor

Lecture 33 - Autobalance Active Bridge Interfacing Circuit

Lecture 34 - Background of Miniaturization

Lecture 35 - Micromachining Technology for MEMS Devices

Lecture 36 - Bulk and Surface Micromachining and Fabrication Steps

Lecture 37 - MEMS Fabrication Process - Part 1

Lecture 38 - MEMS Fabrication Process - Part 2

Lecture 39 - MEMS Fabrication Process - Part 3

Lecture 40 - MEMS Fabrication Process - Part 4

Lecture 41 - MEMS-IC Integration Aspects and Miniaturized Sensor

Lecture 42 - MEMS Pressure Sensor and Interfacing Electronics

Lecture 43 - MEMS Accelerometer

Lecture 44 - MEMS Capacitive Accelerometer and Interfacing Electronics

Lecture 45 - Interfacing Electronics Details for MEMS Accelerometer

Lecture 46 - MEMS Gyroscope and Flow sensor

Lecture 47 - MEMS Actuator

Lecture 48 - MEMS Electrostatic Actuator Analysis

Lecture 49 - Background of Renewable Energy Harvesting

Lecture 50 - Various Transduction Mechanisms for Energy Harvester

Lecture 51 - Vibration Energy Harvester and its Interfacing Aspects

Lecture 52 - Interfacing Power Management Circuit for Vibration Energy Harvester

Lecture 53 - Demonstration of Energy Harvester Set-up and Self-powered Embedded System

Lecture 54 - Background of Embedded Sensors and Actuators in Automotives

Lecture 55 - Applications in Safety System of Automotive

Lecture 56 - Applications in Safety System and Engine Control System

Lecture 57 - Application in Cardiovascular Measurements

Lecture 58 - Applications in Remote Healthcare and Smart Medical Devices

Lecture 59 - Electronic Nose and its Applications in Disease Detection

Lecture 60 - Virtual Sensing, Research Scopes, Summary and Key Takeaways of the Course

NPTEL : NOC:A Basic Course on Electric and Magnetic Circuits (Electrical Engineering)

Co-ordinators : Prof. Ashok Kumar Pradhan

Lecture 1 - Electric systems

Lecture 2 - Resistive circuit connections

Lecture 3 - Nodal analysis

Lecture 4 - Mesh Analysis / Loop Analysis

Lecture 5 - Mixed sources - Meshand Nodal analysis

Lecture 6 - Superposition Theorem

Lecture 7 - Thevenin's Theorem and its applications

Lecture 8 - Norton's theorem and Maximum power transfer theorem

Lecture 9 - Review problems on DC circuits

Lecture 10 - Average and RMS values Phasor representation of sinusoids Reactance

Lecture 11 - Series AC circuits, R-L, R-C, R-L-C

Lecture 12 - KVL and KCL Series and parallel combination of impedance Star - delta transformations

Lecture 13 - Power Curves for AC circuits

Lecture 14 - Real and Reactive Power

Lecture 15 - Loop current method, nodal analysis and theorems

Lecture 16 - Theorem-examples, maximum power transfer theorem

Lecture 17 - Resonance

Lecture 18 - Power Factor Improvement

Lecture 19 - Review problems on AC circuits

Lecture 20 - Capacitor - properties series - parallel combinations

Lecture 21 - Inductor - properties series - parallel combinations

Lecture 22 - Source free RC and RL circuits

Lecture 23 - Step response of RC and RL circuits

Lecture 24 - Review Problems on RL and RC transients

Lecture 25 - Basics on three phase systems

Lecture 26 - Line and phase currents and voltages in star connected systems

Lecture 27 - Line and phase voltages and currents in delta connected systems

Lecture 28 - Three phase power

Lecture 29 - Three phase power and Power factor

Lecture 30 - Measurement of 3 - phase power

Lecture 31 - Magnetic flux, flux density, magnetic field strength

Lecture 32 - Reluctance Equivalent magnetic circuit Solving Magnetic Circuits

Lecture 33 - Solving Magnetic Circuits

Lecture 34 - Hysteresis loop Hysteresis and Eddy Current loss

Lecture 35 - Self and Mutual inductances Dot Convention

Lecture 36 - Solving Magnetic Coupled Circuits

Lecture 37 - Magnetic Circuit applications

Lecture 38 - Transformer Basics, The emf equation

Lecture 39 - Ideal transformer, Impedance referred to primary

Lecture 40 - Practical transformer, Transformer equivalent circuit diagram

Lecture 41 - Voltage Drop and Voltage Regulation Calculation

Lecture 42 - Efficiency of Transformer

Lecture 43 - Transformer Tests, Transformer Applications

NPTEL : Modelling and Analysis of Electric Machines (Electrical Engineering)

Co-ordinators : Dr. Krishna Vasudevan

Lecture 1 - Introduction

Lecture 2 - Magnetic Fields

Lecture 3 - Magnetic Circuit

Lecture 4 - Singly Excited Linear Motion System

Lecture 5 - Linear and Cylindrical Motion Systems

Lecture 6 - Systems with Multiple Excitations

Lecture 7 - Non-linear Magnetic Systems

Lecture 8 - Inductances in Constant Air gap Machines

Lecture 9 - Inductance in Salient Pole Machine - I

Lecture 10 - Inductance in Salient Pole Machine - II

Lecture 11 - Inductance in Salient Pole Machine - III

Lecture 12 - Inductance in Salient Pole Machine - IV

Lecture 13 - Inductance in Salient Pole Machine - V

Lecture 14 - Inductances of Distributed Winding - I

Lecture 15 - Inductances of Distributed Winding - II

Lecture 16 - Inductances of Distributed Winding - III

Lecture 17 - Dynamic Equations of Induction Machines

Lecture 18 - Dynamic Equations of Salient Pole Synchronous Machine

Lecture 19 - Three-to-Two Phase Transformation

Lecture 20 - Induction Machine in Two-Phase Reference Frame

Lecture 21 - The Pseudo-Stationary Reference Frame

Lecture 22 - Induction Machine in Pseudo-Stationary Reference Frame

Lecture 23 - The Primitive Machine Equations

Lecture 24 - Dynamic Equations of DC Machines

Lecture 25 - Small Signal Model of DC Machine

Lecture 26 - Small Signal Behaviour of DC Machine

Lecture 27 - The Arbitrary Reference Frame

Lecture 28 - Induction Machine Equations in Arbitrary, Synchronous Reference Frames and Small Signal Modelling

Lecture 29 - Introduction to Field Oriented Control of Induction Machines

Lecture 30 - Space Vector Formulation of Induction Machine Equations

Lecture 31 - Modelling of Salient Pole Synchronous Machines - I

Lecture 32 - Modelling of Salient Pole Synchronous Machines - II

Lecture 33 - Modelling of Salient Pole Synchronous Machines - III

Lecture 34 - Steady State Models - Induction Machine

Lecture 35 - Steady State Models - Salient Pole Synchronous Machine

Lecture 36 - Solution of Dynamic Equations of Induction Machine - I

Lecture 37 - Solution of Dynamic Equations of Induction Machine - II

Lecture 38 - Reactances of Salient Pole Synchronous Machines - I

Lecture 39 - Reactances of Salient Pole Synchronous Machines - II

Lecture 40 - Reactances of Salient Pole Synchronous Machines - III

Lecture 41 - Suddent Short Circuit of Three Phase Alternator - Analytical Solution

Lecture 42 - Suddent Short Circuit of Three Phase Alternator - Numerical Simulation

Lecture 43 - Course Recapitulation and Assignments

NPTEL : Analog ICs (Electrical Engineering)

Co-ordinators : Prof. K. Radhakrishna Rao

Lecture 1 - Basic Building Blocks In Analog ICs

Lecture 2 - Current Mirrors

Lecture 3 - Translinear Networks

Lecture 4 - Differential Amplifier

Lecture 5 - Differential Amplifier Characteristics

Lecture 6 - Video Amplifier and RF/IF Amplifiers

Lecture 7 - Cascade Amplifier

Lecture 8 - IC Negative Feedback Wide Band Amplifiers

Lecture 9 - IC Negative Feedback Amplifiers

Lecture 10 - Voltage Sources And References

Lecture 11 - IC Voltage Regulator

Lecture 12 - Characteristics and Parameters Of Voltage

Lecture 13 - Protection Circuitry For Voltage Regulator

Lecture 14 - Switched Mode Regulator And Operational

Lecture 15 - IC Operational Voltage Amplifier

Lecture 16 - General Purpose Operational Amplifier-747

Lecture 17 - Transconductance Operational Amplifier

Lecture 18 - Audio Power Amplifier and Norton's Amplifier

Lecture 19 - Analog Multipliers

Lecture 20 - Analog Multipliers

Lecture 21 - Voltage Controlled Oscillator

Lecture 22 - Voltage Controlled Oscillator

Lecture 23 - Self Tuned Filter

Lecture 24 - Phase Locked Loop24 Phase Locked Loop

Lecture 25 - Phase Locked Loop

Lecture 26 - Phase Locked Loop

Lecture 27 - Phase Locked Loop

Lecture 28 - Current Mode ICs

NPTEL : Digital Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Amitava Dasgupta

Lecture 1 - Semiconductors

Lecture 2 - Modelling of PN Junction Diodes

Lecture 3 - Modelling of BJTs

Lecture 4 - Diode and BJT Model Parameter Extraction

Lecture 5 - BJT Inverters DC and Switching Characteristics

Lecture 6 - Schottky Transistor

Lecture 7 - Specifications of Logic Circuits

Lecture 8 - Qualitative discussion on TTL Circuits

Lecture 9 - Standard TTL Circuits

Lecture 10 - Schottky (74s..) and Low power Schottky (74ls)

Lecture 11 - Advanced TTL Circuits

Lecture 12 - I2 L Technology

Lecture 13 - Edge triggered D-F/F

Lecture 14 - I2 L - Condition for Proper Operation

Lecture 15 - I2 L - Propagation delay Self aligned

Lecture 16 - Schottky Transistor Logic

Lecture 17 - Stacked I2 L

Lecture 18 - ECL Basic Operation

Lecture 19 - Quantitative analysis of ECL 10k Series gates

Lecture 20 - ECL 100k series; Stacked ECL gates; D-F/F

Lecture 21 - Emitter Function Logic;Low Power ECL

Lecture 22 - Polyemitter Bipolar Transistor In ECL;Propagation

Lecture 23 - Heterojunction Bipolar Transistor Based ECL;ECL

Lecture 24 - nMOS Logic Circuits

Lecture 25 - nMOS Logic Circuits(contd); CMOS :Introduction

Lecture 26 - CMOS Inverter

Lecture 27 - CMOS NAND,NOR and Other Gates: Clocked CMOS

Lecture 28 - Dynamic CMOS ;Transmission Gates;Realization Of MUX,decoder, D-F/F

Lecture 29 - BiCMOS Gates

Lecture 30 - BiCMOS Driver;BiCMOS 32-bit Adder

Lecture 31 - Digital Integrated Circuits

Lecture 32 - Digital Integrated Circuits

Lecture 33 - CMOS SRAM

Lecture 34 - BiCMOS SRAM

Lecture 35 - DRAM-CMOS and BiCMOS

Lecture 36 - ROM-EPROM,EEPROM and Flash EPROM

Lecture 37 - GaAs MESFET Characteristics and Equivalent Circuits

Lecture 38 - Direct Coupled FET Logic; Superbuffer FET Logic

Lecture 39 - Buffered FET Logic; Schottky Diode FET Logic

Lecture 40 - Transmission Line Effects

NPTEL : Electromagnetic Fields (Electrical Engineering)

Co-ordinators : Prof. Harishankar Ramachandran

Lecture 1 - Introduction To Vector

Lecture 2 - Introduction To Vector (Continued...)

Lecture 3 - Coulomb's Law

Lecture 4 - Electric Field

Lecture 5 - Electro Static Potential

Lecture 6 - The Gradient

Lecture 7 - Gauss's Law

Lecture 8 - Poisson's Equation

Lecture 9 - Energy In The Field

Lecture 10 - Sample Problems In Electrostatics

Lecture 11 - Fields In Materials

Lecture 12 - Fields In Material Bodies

Lecture 13 - Displacement Vectors

Lecture 14 - Capacitors

Lecture 15 - Method Of Images

Lecture 16 - Poisson's Equation 2 Dimensions

Lecture 17 - Field Near Sharp Edges And Points

Lecture 18 - Magnetic Field 1

Lecture 19 - Magnetic Field 2

Lecture 20 - Stokes Theorems

Lecture 21 - The curl

Lecture 22 - Field due to current loop

Lecture 23 - Ampere's law

Lecture 24 - Examples of Ampere's law

Lecture 25 - Inductance

Lecture 26 - Mutual Inductance

Lecture 27 - Faraday's law

Lecture 28 - Magnetic Energy

Lecture 29 - Magnetic Energy (Continued...)

Lecture 30 - Magnetic Energy (Continued...)

Lecture 31 - Generalised Ampere's Law

Lecture 32 - The Wave Equation

Lecture 33 - The Wave Equation

Lecture 34 - Poynting Theorem

Lecture 35 - Skin Effect

Lecture 36 - Skin Effect (Continued...)

Lecture 37 - Radiation And Circuits

Lecture 38 - Phasor Form Of Poynting Theorem

Lecture 39 - Reflection At Dielectric Boundaries

Lecture 40 - Reflection At Dielectric Boundaries (Continued...)

Lecture 41 - Transmission Lines

Lecture 42 - Transmission Lines (Continued...) and Conclusion

NPTEL : Networks and Systems (Electrical Engineering)

Co-ordinators : Prof. V.G.K. Murti

Lecture 1 - Introductory Concepts - 1

Lecture 2 - Introductory Concepts - 2

Lecture 3 - Introductory Concepts - 3

Lecture 4 - Introductory Concepts - 4

Lecture 5 - Introductory Concepts - 5

Lecture 6 - Introductory Concepts - 6

Lecture 7 - Fourier Series - 1

Lecture 8 - Fourier Series - 2

Lecture 9 - Fourier Series - 3

Lecture 10 - Fourier Series - 4

Lecture 11 - Fourier Series - 5

Lecture 12 - Fourier Series - 6

Lecture 13 - Fourier Transforms - 1

Lecture 14 - Fourier Transforms - 2

Lecture 15 - Fourier Transforms - 3

Lecture 16 - Fourier Transforms - 4

Lecture 17 - Fourier Transforms - 5

Lecture 18 - Fourier Transforms - 6

Lecture 19 - Fourier Transforms - 7

Lecture 20 - Laplace Transforms - 1

Lecture 21 - Laplace Transforms - 2

Lecture 22 - Laplace Transforms - 3

Lecture 23 - Laplace Transforms - 4

Lecture 24 - Laplace Transforms - 5

Lecture 25 - Laplace Transforms - 6

Lecture 26 - Application of Laplace Transforms - 1

Lecture 27 - Application of Laplace Transforms - 2

Lecture 28 - Application of Laplace Transforms - 3

Lecture 29 - Application of Laplace Transforms - 4

Lecture 30 - Network Functions - 1

Lecture 31 - Network Functions - 2

Lecture 32 - Network Functions - 3

Lecture 33 - Network Functions - 4

Lecture 34 - Network Theorems - 1

Lecture 35 - Network Theorems - 2

Lecture 36 - Network Theorems - 3

Lecture 37 - Network Theorems - 4

Lecture 38 - Discrete - Time Systems - 1

Lecture 39 - Discrete - Time Systems - 2

Lecture 40 - Discrete - Time Systems - 3

Lecture 41 - Discrete - Time Systems - 4

Lecture 42 - Discrete - Time Systems - 5

Lecture 43 - Discrete - Time Systems - 6

Lecture 44 - Discrete - Time Systems - 7

Lecture 45 - State-Variable Methods - 1

Lecture 46 - State-Variable Methods - 2

Lecture 47 - State Variable Methods - 3

Lecture 48 - State Variable Methods - 4

Lecture 49 - State Variable Methods - 5

Lecture 50 - State Variable Methods - 6

NPTEL : Probability Foundation for Electrical Engineers (Electrical Engineering)

Co-ordinators : Dr. Krishna Jagannathan

Lecture 1 - Introduction

Lecture 2 - Cardinality

Lecture 3 - Countability

Lecture 4 - Uncountable sets - 1

Lecture 5 - Uncountable sets - 2

Lecture 6 - Probability spaces - Introduction

Lecture 7 - Probability spaces - Algebra

Lecture 8 - Probability spaces - Ïf-algebra

Lecture 9 - Probability spaces - Measurable space

Lecture 10 - Properties of probability measures

Lecture 11 - Continuity of probability measure

Lecture 12 - Discrete probability space - finite and countably infinite sample space

Lecture 13 - Discrete probability space - Uncountable sample space

Lecture 14 - Generated Ïf-algebra, Borel Sets

Lecture 15 - Borel sets

Lecture 16 - Uniform probability measure on Borel sets-Lebesgue measure

Lecture 17 - CarathÃ©odoryâ€™s extension theorem

Lecture 18 - Lebesgue measure (Continued...)

Lecture 19 - Infinite coin toss model

Lecture 20 - Infinite coin toss model (Continued...)

Lecture 21 - Conditional probability

Lecture 22 - Properties of conditional probability

Lecture 23 - Independence of events

Lecture 24 - Independence of Ïf-algebras

Lecture 25 - Borel-Cantelli Lemma - 1

Lecture 26 - Borel-Cantelli Lemma - 2

Lecture 27 - Random Variables

Lecture 28 - Random Variables (Continued...)

Lecture 29 - Cumulative Distribution Function

Lecture 30 - Properties of CDF

Lecture 31 - Types of Random Variables

Lecture 32 - Examples of Random Variables

Lecture 33 - Continuous Random Variables - 1

Lecture 34 - Examples of Continuous Random Variables - 1

Lecture 35 - Continuous Random Variables - 2, Examples of Continuous RandomVariables - 2

Lecture 36 - Singular Random Variables

Lecture 37 - Several Random Variables - 1

Lecture 38 - Several Random Variables - 2

Lecture 39 - Independent Random Variables - 1

Lecture 40 - Independent Random Variables - 2

Lecture 41 - Conditional PMF, Jointly Continuous Random Variables - 1

Lecture 42 - Jointly Continuous Random Variables - 2

Lecture 43 - Jointly Continuous Random Variables - 3

Lecture 44 - Conditional CDF

Lecture 45 - Transformation of Random Variables - 1

Lecture 46 - Transformation of Random Variables - 2; Independent Random Variables

Lecture 47 - Sums of Discrete Random Variables

Lecture 48 - Sums of Jointly Continuous Random Variables

Lecture 49 - Sums of Random Number of Random Variables

Lecture 50 - General Transformations of Random Variables

Lecture 51 - Jacobian Formula

Lecture 52 - Examples Illustrating the use of Jacobian Formula

Lecture 53 - Introduction Integral and Expectation

Lecture 54 - Definition of the Abstract Integral

Lecture 55 - Simple Functions

Lecture 56 - Computing Expectation using Simple Functions, Properties of Integrals

Lecture 57 - Properties of Integrals (Continued....)

Lecture 58 - Inclusion Exclusion Formula using Indicator RVs and Expectation

Lecture 59 - Monotone Convergence Theorem - 1

Lecture 60 - Monotone Convergence Theorem - 2

Lecture 61 - Expectation of a Discrete Random Variable

Lecture 62 - Examples of Expectation of Discrete Random Variables

Lecture 63 - Expectation of Function of Random Variable

Lecture 64 - Some Examples of Computing Expectation

Lecture 65 - Fatouâ€™s Lemma

Lecture 66 - Dominated Convergence Theorem

Lecture 67 - Variance

Lecture 68 - Covariance

Lecture 69 - Covariance Correlation Coefficient - 1

Lecture 70 - Covariance Correlation Coefficient - 2

Lecture 71 - Conditional Expectation

Lecture 72 - Properties of Conditional Expectation

Lecture 73 - MMSE Estimator

Lecture 74 - Transforms

Lecture 75 - Moment Generating Function - 1

Lecture 76 - Moment Generating Function - 2

Lecture 77 - Characteristic Function - 1

Lecture 78 - Characteristic Function - 2

Lecture 79 - Characteristic Function - 3

Lecture 80 - Characteristic Function - 4

Lecture 81 - Concentration Inequalities - 1

Lecture 82 - Concentration Inequalities - 2

Lecture 83 - Convergence of Random Variables - 1

Lecture 84 - Convergence of Random Variables - 2

Lecture 85 - Convergence of Random Variables - 3

Lecture 86 - Convergence of Random Variables - 4

Lecture 87 - Convergence of Random Variables - 5

Lecture 88 - Convergence of Random Variables - 6

Lecture 89 - Convergence Of Characteristic Functions

Lecture 90 - Limit Theorems

Lecture 91 - The Law of Large Numbers - 1

Lecture 92 - The Law of Large Numbers - 2

Lecture 93 - The Central Limit Theorem - 1

Lecture 94 - The Central Limit Theorem - 2

Lecture 95 - A Brief Overview of Multivariate Gaussians - 1

Lecture 96 - A Brief Overview of Multivariate Gaussians - 2

NPTEL : NOC:Analog Circuits (Electrical Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 1 - Introduction to the course

Lecture 2 - Obtaining power gain

Lecture 3 - Obtaining power gain using a linear two port?

Lecture 4 - One port (two terminal) nonlinear element

Lecture 5 - Nonlinear circuit analysis

Lecture 6 - Small signal incremental analysis - graphical view

Lecture 7 - Small signal incremental analysis

Lecture 8 - Incremental equivalent circuit

Lecture 9 - Large signal characteristics of a diode

Lecture 10 - Analysis of diode circuits

Lecture 11 - Small signal model of a diode

Lecture 12 - Two port nonlinearity

Lecture 13 - Small signal equivalent of a two port network

Lecture 14 - Small signal equivalent circuit of a two port network

Lecture 15 - Gain of a two port network

Lecture 16 - Constraints on small signal parameters to maximize the gain

Lecture 17 - Constraints on large signal characteristics to maximize the gain

Lecture 18 - Implications of constraints in terms of the circuit equivalent

Lecture 19 - MOS transistor-description

Lecture 20 - MOS transistor large signal characteristics

Lecture 21 - MOS transistor large signal characteristics - graphical view

Lecture 22 - MOS transistor small signal characteristics

Lecture 23 - Linear (Triode) region of the MOS transistor

Lecture 24 - Small signal amplifier using the MOS transistor

Lecture 25 - Basic amplifier structure

Lecture 26 - Problems with the basic structure

Lecture 27 - Adding bias and signal-ac coupling

Lecture 28 - Common source amplifier with biasing

Lecture 29 - Common source amplifier: Small signal equivalent circuit

Lecture 30 - Common source amplifier analysis: Effect of biasing components

Lecture 31 - Constraint on the input coupling capacitor

Lecture 32 - Constraint on the output coupling capacitor

Lecture 33 - Dependence of ID on VDS

Lecture 34 - Small signal output conductance of a MOS transistor

Lecture 35 - Effect of gds on a common source amplifier; Inherent gain limit of a transistor

Lecture 36 - Variation gm with transistor parameters

Lecture 37 - Variation of gm with constant VGS and constant drain current bias

Lecture 38 - Negative feedback control for constant drain current bias

Lecture 39 - Types of feedback for constant drain current bias

Lecture 40 - Sense at the drain and feedback to the gate-Drain feedback

Lecture 41 - Intuitive explanation of low sensitivity with drain feedback

Lecture 42 - Common source amplifier with drain feedback bias

Lecture 43 - Constraint on the gate bias resistor

Lecture 44 - Constraint on the input coupling capacitor

Lecture 45 - Constraint on the output coupling capacitor

Lecture 46 - Input and output resistances of the common source amplifier with constant VGS bias

Lecture 47 - Current mirror

Lecture 48 - Common souce amplifier with current mirror bias

Lecture 49 - Constraint on coupling capacitors and bias resistance

Lecture 50 - Diode connected transistor

Lecture 51 - Source feedback biasing

Lecture 52 - Common source amplifier with source feedback bias

Lecture 53 - Constraints on capacitor values

Lecture 54 - Sensing at the drain and feeding back to the source

Lecture 55 - Sensing at the source and feeding back to the gate

Lecture 56 - Ensuring that transistor is in saturation

Lecture 57 - Using a resistor instead of current source for biasing

Lecture 58 - Controlled sources using a MOS transistor-Introduction

Lecture 59 - Voltage controlled voltage source

Lecture 60 - VCVS using a MOS transistor

Lecture 61 - VCVS using a MOS transistor - Small signal picture

Lecture 62 - VCVS using a MOS transistor - Complete circuit

Lecture 63 - Source follower: Effect of output conductance; Constraints on coupling capacitors

Lecture 64 - VCCS using a MOS transistor

Lecture 65 - VCCS using a MOS transistor: Small signal picture

Lecture 66 - VCCS using a MOS transistor: Complete circuit

Lecture 67 - VCCS using a MOS transistor: AC coupling the output

Lecture 68 - Source degenrated CS amplifier

Lecture 69 - CCCS using a MOS transistor

Lecture 70 - CCCS using a MOS transistor: Small signal picture

Lecture 71 - CCCS using a MOS transistor: Complete circuit

Lecture 72 - CCVS using a MOS transistor

Lecture 73 - CCVS using a MOS transistor: Gain

Lecture 74 - CCVS using a MOS transistor: Input and output resistances

Lecture 75 - CCVS using a MOS transistor: Complete circuit

Lecture 76 - VCVS using an opamp

Lecture 77 - CCVS using an opamp

Lecture 78 - Negative feedback and virtual short in an opamp

Lecture 79 - Negative feedback and virtual short in a transistor

Lecture 80 - Constraints on controlled sources using opamps and transistors

Lecture 81 - Quick tour of amplifying devices

Lecture 82 - Signal swing limits in amplifiers

Lecture 83 - Swing limit due to transistor entering triode region

Lecture 84 - Swing limit due to transistor entering cutoff region

Lecture 85 - Swing limit calculation example

Lecture 86 - Swing limits-more calculations

Lecture 87 - pMOS transistor

Lecture 88 - Small signal model of the pMOS transistor

Lecture 89 - Common source amplifier using the pMOS transistor

Lecture 90 - Swing limits of the pMOS common source amplifier

Lecture 91 - Biasing a pMOS transistor at a constant current; pMOS current mirror

Lecture 92 - Converting nMOS transistor circuits to pMOS

Lecture 93 - Bias current generation

Lecture 94 - Examples of more than one transistor in feedback

Lecture 95 - Gain limitation in a common source amplifier with resistive load

Lecture 96 - nMOS active load for pMOS common source amplifier

Lecture 97 - CMOS inverter

Lecture 98 - Large signal characteristics of pMOS CS amplifier with nMOS active load

Lecture 99 - Large signal characteristics of nMOS CS amplifier with pMOS active load

Lecture 100 - Large signal characteristics of a CMOS inverter

Lecture 101 - Active load amplifiers as digital gates

Lecture 102 - Sensitivity of output bias to input bias in a CMOS inverter

Lecture 103 - Self biasing a CMOS inverter

Lecture 104 - An application of self biased inverters

Lecture 105 - Current consumption of a self-biased inverter; Current biasing

Lecture 106 - Amplifying a difference signal; Differential pair

Lecture 107 - Differential pair-small signal basics

Lecture 108 - Biasing a differential pair

Lecture 109 - Differential pair with differential excitation

Lecture 110 - Differential pair with a current mirror load

Lecture 111 - Differential pair with a current mirror load - operating point

Lecture 112 - Differential pair with a current mirror load - Norton equivalent current

Lecture 113 - Differential pair with a current mirror load - Norton equivalent resistance

Lecture 114 - Common mode gain

Lecture 115 - Single stage opamp

Lecture 116 - Single stage opamp: Input common mode swing limits

Lecture 117 - Single stage opamp: Output swing limits

Lecture 118 - Which transistor type to use for the second stage?

Lecture 119 - Small signal gain

Lecture 120 - DC negative feedback biasing of all stages

Lecture 121 - DC negative feedback biasing of all stages (Continued...)

Lecture 122 - Small signal model

Lecture 123 - Swing limits

Lecture 124 - Systematic offset; How to eliminate it

Lecture 125 - Bipolar junction transistor(BJT): Large signal model

Lecture 126 - BJT model for calculating operating points

Lecture 127 - BJT small signal model

Lecture 128 - Biasing a BJT

Lecture 129 - Biasing a BJT, (Continued...)

Lecture 130 - Amplifiers using BJTs

Lecture 131 - PNP transistor

NPTEL : NOC:Introduction to Non Linear Dynamics (Electrical Engineering)

Co-ordinators : Prof. Gaurav Raina

Lecture 1 - A brief introduction to modelling

Lecture 2 - Dynamics and Nonlinear systems: getting started

Lecture 3 - 1-Dimensional Flows, Flows on the Line, Lecture 1

Lecture 4 - 1-Dimensional Flows, Flows on the Line, Lecture 2

Lecture 5 - 1-Dimensional Flows, Flows on the Line, Lecture 3

Lecture 6 - 1-Dimensional Flows, Flows on the Line, Lecture 4

Lecture 7 - 1-Dimensional Flows, Flows on the Line, Lecture 5

Lecture 8 - 1-Dimensional Flows, Flows on the Line, Lecture 6

Lecture 9 - 1-Dimensional Flows, Bifurcations, Lecture 1

Lecture 10 - 1-Dimensional Flows, Bifurcations, Lecture 2

Lecture 11 - 1-Dimensional Flows, Bifurcations, Lecture 3

Lecture 12 - 1-Dimensional Flows, Bifurcations, Lecture 4

Lecture 13 - 1-Dimensional Flows, Bifurcations, Lecture 5

Lecture 14 - 1-Dimensional Flows, Bifurcations, Lecture 6

Lecture 15 - 1-Dimensional Flows, Flows on the Circle, Lecture 1

Lecture 16 - 1-Dimensional Flows, Flows on the Circle, Lecture 2

Lecture 17 - 2-Dimensional Flows, Linear Systems, Lecture 1

Lecture 18 - 2-Dimensional Flows, Linear Systems, Lecture 2

Lecture 19 - 2-Dimensional Flows, Linear Systems, Lecture 3

Lecture 20 - 2-Dimensional Flows, Linear Systems, Lecture 4

Lecture 21 - 2-Dimensional Flows, Phase Plane, Lecture 1

Lecture 22 - 2-Dimensional Flows, Phase Plane, Lecture 2

Lecture 23 - 2-Dimensional Flows, Phase Plane, Lecture 3

Lecture 24 - 2-Dimensional Flows, Limit Cycles, Lecture 1

Lecture 25 - 2-Dimensional Flows, Limit Cycles, Lecture 2

Lecture 26 - 2-Dimensional Flows, Limit Cycles, Lecture 3

Lecture 27 - 2-Dimensional Flows, Bifurcations, Lecture 1

Lecture 28 - 2-Dimensional Flows, Bifurcations, Lecture 2

Lecture 29 - 2-Dimensional Flows, Bifurcations, Lecture 3

NPTEL : NOC:Control Engineering (Electrical Engineering)

Co-ordinators : Prof. Ramkrishna.P

Lecture 1 - Introduction to Systems and Control

Lecture 2 - Modelling of Systems

Lecture 3 - Elements of Modelling

Lecture 4 - Examples of Modelling

Lecture 5 - Solving Problems in Modelling of Systems

Lecture 6 - Laplace Transforms

Lecture 7 - Inverse Laplace Transforms

Lecture 8 - Transfer Function of Modelling Block Diagram Representation

Lecture 9 - Solving Problems on Laplace Transforms and Transfer Functions

Lecture 10 - Block Diagram Reduction, Signal Flow Graphs

Lecture 11 - Solving Problems on Block Diagram Reduction, Signal Flow Graphs

Lecture 12 - Time Response Analyzsis of systems

Lecture 13 - Time Response specifications

Lecture 14 - Solving Problems on Time Response Analyzsis ans specifications

Lecture 15 - Stability

Lecture 16 - Routh Hurwitz Criterion

Lecture 17 - Routh Hurwitz Criterion T 1

Lecture 18 - Closed loop System and Stability

Lecture 19 - Root Locus Technique

Lecture 20 - Root Locus Plots

Lecture 21 - Root Locus Plots (Continued...)

Lecture 22 - Root Locus Plots (Continued...)

Lecture 23 - Root Locus Plots (Continued...)

Lecture 24 - Introduction to Frequency Response

Lecture 25 - Frequency Response Plots

Lecture 26 - Relative Stability

Lecture 27 - Bode plots

Lecture 28 - Basics of Control design Proportional, Integral and Derivative Actions

Lecture 29 - Basics of Control design Proportional, Integral and Derivative Actions

Lecture 30 - Problems on PID Controllers

Lecture 31 - Basics of Control design Proportional, Integral and Derivative Actions

Lecture 32 - Control design in time domain and discusses the lead compensator

Lecture 33 - Improvement of the Transient Response using lead compensation

Lecture 34 - Design of control using lag compensators

Lecture 35 - The design of Lead-Lag compensators using root locus

Lecture 36 - Introduction design of control in frequency domain

Lecture 37 - Design of Lead Compensator using Bode Plots

Lecture 38 - Design of Lag Compensators using Bode Plots

Lecture 39 - Design of Lead-Lag Compensators using Bode plots

Lecture 40 - Experimental Determination of Transfer Function

Lecture 41 - Effect of Zeros on System Response

Lecture 42 - Navigation - Stories and Some Basics

Lecture 43 - Navigation - Dead Reckoning and Reference Frames

Lecture 44 - Inertial Sensors and Their Characteristics

Lecture 45 - Filter Design to Attentuate Inertial Sensor Noise

Lecture 46 - Complementary Filter

Lecture 47 - Complementary Filter - 1

Lecture 48 - Introduction to State Space Systems

Lecture 49 - Linearization of State Space Dynamics

Lecture 50 - Linearization of State Space Dynamics - 1

Lecture 51 - Controllability and Observability

Lecture 52 - State Space Canonical Forms

Lecture 53 - State Space Solution and Matrix Exponential

Lecture 54 - Controllability and Pole Placement

Lecture 55 - Controllable Decomposition and Observability

NPTEL : NOC:Analog IC Design (Electrical Engineering)

Co-ordinators : Prof. S. Aniruddhan

Lecture 1 - Introduction to MOSFETs

Lecture 2 - Simple MOSFET Circuits

Lecture 3 - MOSFET Current Mirrors

Lecture 4 - Cascode Amplifiers

Lecture 5 - MOSFET in Integrated Circuits

Lecture 6 - MOSFET Capacitances

Lecture 7 - Noise

Lecture 8 - Noise of Simple Circuits

Lecture 9 - Systematic Mismatch

Lecture 10 - Random Mismatch

Lecture 11 - Differential Amplifiers

Lecture 12 - Negative Feedback

Lecture 13 - Stability of Negative Feedback Systems

Lecture 14 - Dominant Pole Compensation

Lecture 15 - Active Load

Lecture 16 - One Stage OpAmps - 1

Lecture 17 - One Stage OpAmps - 2

Lecture 18 - One Stage OpAmps - 3

Lecture 19 - Differential Amplifiers Offset

Lecture 20 - One Stage OpAmps - Noise and Offset

Lecture 21 - One Stage OpAmps - Slew Rate

Lecture 22 - One Stage OpAmps - Datasheet

Lecture 23 - One Stage OpAmps - Example 1

Lecture 24 - One Stage OpAmps - Example 2

Lecture 25 - Telescopic OpAmp - 1

Lecture 26 - Telescopic OpAmp - 2

Lecture 27 - Telescopic OpAmp - 3

Lecture 28 - Telescopic OpAmp - 4

Lecture 29 - Telescopic OpAmp - 5

Lecture 30 - Telescopic OpAmp - Datasheet

Lecture 31 - Telescopic OpAmp - Design Example

Lecture 32 - Folded-Cascode OpAmp - 1

Lecture 33 - Folded-Cascode OpAmp - 2

Lecture 34 - Folded-Cascode OpAmp - 3

Lecture 35 - Folded-Cascode OpAmp - 4

Lecture 36 - Folded-Cascode OpAmp - 5

Lecture 37 - Negative feedback amplifier

Lecture 38 - Step response, sinusoidal steady state response

Lecture 39 - Loop gain and unity loop gain frequency; Opamp

Lecture 40 - Opamp realization using controlled sources; Delay in the loop

Lecture 41 - Negative feedback amplifier with ideal delay-small delays

Lecture 42 - Negative feedback amplifier with ideal delay-large delays

Lecture 43 - Negative feedback amplifier with parasitic poles and zeros

Lecture 44 - Negative feedback amplifier with parasitic poles and zeros; Nyquist criterion

Lecture 45 - Nyquist criterion; Phase margin

Lecture 46 - Phase margin

Lecture 47 - Single stage opamp realization

Lecture 48 - Two stage miller compensated opamp

Lecture 49 - Two stage miller compensated opamp.

Lecture 50 - Two and three stage miller compensated opamps; Feedforward compensated opamp

Lecture 51 - Two Stage Opamp

Lecture 52 - Two Stage Opamp ; Three Stage and Triple Cascade Opamps

Lecture 53 - Common Mode Rejection Ratio ; Example

Lecture 54 - Fully differential single stage opamp

Lecture 55 - Common mode feedback

Lecture 56 - Fully differential single stage opamp-2

Lecture 57 - Fully differential two stage opamp; Fully differential versus pseudo-differential

NPTEL : NOC:Probability Foundations for Electrical Engineers (Electrical Engineering)

Co-ordinators : Prof. R.Aravind, Dr. Andrew Thangaraj

Lecture 1 - Experiments, Outcomes and Events

Lecture 2 - Examples: Experiments and sample spaces

Lecture 3 - Operations on Events

Lecture 4 - Examples: Sample spaces and events

Lecture 5 - Sigma Fields and Probability

Lecture 6 - Discrete Sample Spaces

Lecture 7 - Union and Partition

Lecture 8 - Examples: Probability Calculation for Equally likely Outcomes

Lecture 9 - Definition and Basic Properties

Lecture 10 - Bayes' Rule for Partitions

Lecture 11 - Examples: Conditional probability

Lecture 12 - Example of Detection

Lecture 13 - Example: Coloured Cards from a Box

Lecture 14 - Independence of Events

Lecture 15 - Examples: Independence

Lecture 16 - Combining Independent Experiments

Lecture 17 - Conditional Independence

Lecture 18 - Examples and Computations with Conditional Independence

Lecture 19 - Binomial and Geometric Models

Lecture 20 - Examples: Binomial and Geometric Model

Lecture 21 - Definition and Discrete Setting

Lecture 22 - RandomVariables and Events

Lecture 23 - Examples: Discrete random variables

Lecture 24 - Important distributions

Lecture 25 - Examples: Discrete PMFs

Lecture 26 - Real-life modeling example

Lecture 27 - More Distributions

Lecture 28 - Conditional PMFs, Conditioning on an event, Indicator random variables

Lecture 29 - Example: Conditioning on an event, Indicator random variables

Lecture 30 - Multiple random variables and joint distribution

Lecture 31 - Example: Two random variables

Lecture 32 - Marginal PMF

Lecture 33 - Trinomial joint PMF

Lecture 34 - Events and Conditioning with Two Random Variables

Lecture 35 - Example: compute marginal and conditional PMFs, probability of events

Lecture 36 - Independent random variables

Lecture 37 - More on independence

Lecture 38 - Example: IID Repetitions

Lecture 39 - Addition of Random Variables

Lecture 40 - Sum, Difference and Max of Two Random Variables

Lecture 41 - More Computations: Min of Two Random Variables

Lecture 42 - Example: X+Y, X-Y, min(X,Y), max(X,Y)

Lecture 43 - Real line as sample space

Lecture 44 - Probability density function (pdf)

Lecture 45 - Cumulative distribution function (CDF)

Lecture 46 - Continuous random variables

Lecture 47 - pdf and CDF of continuous random variables

Lecture 48 - Spinning pointer example

Lecture 49 - Important continuous distributions

Lecture 50 - More continuous distributions

Lecture 51 - Two-dimensional real sample space

Lecture 52 - Joint pdf and joint CDF

Lecture 53 - More on assigning probability to regions of x-y plain

Lecture 54 - Darts example and marginal pdfs

Lecture 55 - Independence to two continuous random variables

Lecture 56 - Examples: two independent continuous random variables

Lecture 57 - Prob[X > Y]: computation of probability of a non-rectangular region

Lecture 58 - Transformations of random variables

Lecture 59 - CDF method

Lecture 60 - pdf method

Lecture 61 - Examples

Lecture 62 - One-to-one transformations

Lecture 63 - Expected Value or Mean of a Random Variable

Lecture 64 - Properties of Expectation

Lecture 65 - Expectation Computations for Important Distributions

Lecture 66 - Variance

Lecture 67 - Examples of Variance

Lecture 68 - Expectations with Two Random Variables

Lecture 69 - Correlation and Covariance

Lecture 70 - Examples: Continuous Distributions

Lecture 71 - Examples: Symmetry

Lecture 72 - Examples: Discrete Distributions

Lecture 73 - Live Session

NPTEL : NOC:Introduction to Photonics (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

Lecture 1 - Introduction to Photonics

Lecture 2 - Diffraction and Interference

Lecture 3 - Tutorial on Ray Optics and Wave Optics

Lecture 4 - Lab Demonstration : Diffractions and Interference

Lecture 5 - Interferometers

Lecture 6 - Coherence

Lecture 7 - Spatial and Temporal Coherence

Lecture 8 - Tutorial on Wave Optics

Lecture 9 - Lab Demonstration: Michelson Interferometer

Lecture 10 - Electromagnetic Optics

Lecture 11 - Fiber Optics

Lecture 12 - Photon Properties

Lecture 13 - Lab Demonstration: Fiber modes, NA and MFD

Lecture 14 - Photon Optics

Lecture 15 - Tutorial on Photon optics

Lecture 16 - Photon interaction - 1

Lecture 17 - Photon interaction - 2

Lecture 18 - Lab Demonstration: Interaction of light with matter

Lecture 19 - Optical Amplification

Lecture 20 - Three Level systems

Lecture 21 - Four Level Systems

Lecture 22 - EDFA Introduction

Lecture 23 - EDFA Tutorial

Lecture 24 - Lasers Part - 1

Lecture 25 - Lab Demonstration: EDFA Characterization

Lecture 26 - Lasers part- 2

Lecture 27 - Lasers part- 3

Lecture 28 - Lasers part- 4

Lecture 29 - Lab Demonstration: Fiber Laser

Lecture 30 - Semiconductor light Source and detector - Band structure

Lecture 31 - Semiconductor light Source and detector - Light emission

Lecture 32 - Semiconductor light Source and detector LED Characteristics

Lecture 33 - Lab Demonstration: Semiconductor Sources

Lecture 34 - Semiconductor light Source and detector Laser Characteristics

Lecture 35 - Semiconductor Detectors - 1

Lecture 36 - Semiconductor Detectors - 2

Lecture 37 - Semiconductor Detectors - 3

Lecture 38 - Lab Demonstration: Semiconductor Detectors

Lecture 39 - Semiconductor Detectors - 4

Lecture 40 - Light manipulation-Mallus' Law

Lecture 41 - Light manipulation-Birefringence

Lecture 42 - Light manipulation-Faraday Rotation

Lecture 43 - Lab Demonstration: Manipulation of Light Intensity and Polarization

Lecture 44 - Non-linear optics-Pockels effect

Lecture 45 - Non-linear optics-Kerr Effect

Lecture 46 - Lab Demonstration: Manipulation of Light Electro Optic Modulator (EOM)

Lecture 47 - Non-linear optics-stimulated Brillouin scattering

Lecture 48 - Non-linear optics-stimulated Raman scattering

NPTEL : NOC:Multirate DSP (Electrical Engineering)

Co-ordinators : Prof. David Kovil Pillai

Lecture 1 - Introduction to Multirate DSP - Part 1

Lecture 2 - Introduction to Multirate DSP - Part 2

Lecture 3 - Sampling and Nyquist criterion - Part 1

Lecture 4 - Sampling and Nyquist criterion - Part 2

Lecture 5 - Signal Reconstruction - Part 1

Lecture 6 - Signal Reconstruction - Part 2

Lecture 7 - Reconstruction filter - Part 1

Lecture 8 - Reconstruction filter - Part 2

Lecture 9 - Discrete time processing of continuous time signal - Part 1

Lecture 10 - Discrete time processing of continuous time signal - Part 2

Lecture 11 - DT processing of CT signal example

Lecture 12 - Time scaling- upsampler and downsampler - Part 1

Lecture 13 - Time scaling- upsampler and downsampler - Part 2

Lecture 14 - Upsampler and downsampler- continued - Part 1

Lecture 15 - Upsampler and downsampler- continued - Part 2

Lecture 16 - Decimator properties

Lecture 17 - Properties of Upsampler and Downsampler

Lecture 18 - Fractional sampling rate change - Part 1

Lecture 19 - Fractional sampling rate change - Part 2

Lecture 20 - Multiplexer/ demultiplexer interpretation

Lecture 21 - Noble identities and polyphase decomposition - Part 1

Lecture 22 - Noble identities and polyphase decomposition - Part 2

Lecture 23 - Polyphase decomposition continued - Part 1

Lecture 24 - Polyphase decomposition continued - Part 2

Lecture 25 - Introduction to Multirate Filter Banks

Lecture 26 - Applications of Multirate - Part 1

Lecture 27 - Applications of Multirate - Part 2

Lecture 28 - Spectral Analysis of Filter Bank - Part 1

Lecture 29 - Spectral Analysis of Filter Bank - Part 2

Lecture 30 - DFT and High Resolution Spectral Analysis - Part 1

Lecture 31 - DFT and High Resolution Spectral Analysis - Part 2

Lecture 32 - Transmultiplexer and Maximally Decimated Filterbanks - Part 1

Lecture 33 - Transmultiplexer and Maximally Decimated Filterbanks - Part 2

Lecture 34 - Maximally Decimated Filterbanks 2 - Part 1

Lecture 35 - Maximally Decimated Filterbanks 2 - Part 2

Lecture 36 - Study of Two-channel filter bank

Lecture 37 - Introduction to Quadrature Mirror Filters (QMF)

Lecture 38 - 2-channel QMF Filter Bank Design

Lecture 39 - Study of All-pass filters

Lecture 40 - Study of All-pass lattice

Lecture 41 - All-pass decomposition, the study of Mth band and Nyquist filters

Lecture 42 - Study of two-channel filter bank with perfect reconstruction

Lecture 43 - First part name : Perfect Reconstruction Final Overview. Second part name : Introduction to OFDM- Motivation - Part 1

Lecture 44 - First part name : Perfect Reconstruction Final Overview. Second part name : Introduction to OFDM- Motivation - Part 2

Lecture 45 - Capacity of wireless channels - CSIR - Part 1

Lecture 46 - Capacity of wireless channels - CSIT - Part 2

Lecture 47 - Capacity of wireless channels - Formulation of capacity calculation - Part 3

Lecture 48 - Capacity of wireless channels - Formulation of capacity calculation (Continued...) - Part 1

Lecture 49 - Capacity of wireless channels - Formulation of capacity calculation (Continued...) - Part 2

Lecture 50 - Capacity of wireless channels - Time-invariant Frequency selective channel - Part 3

Lecture 51 - Capacity of wireless channels - Time varying Frequency selective channels - Part 1

Lecture 52 - Multi-rate DSP framework for Multi-carrier Modulation - Part 2

Lecture 53 - MCM with overlapping spectra - Part 1

Lecture 54 - Recap of multirate DSP concepts for building OFDM - Part 2

Lecture 55 - Introduction to Redundancy and it's implementation in multi-rate framework - Part 3

Lecture 56 - M-channel multicarrier Transceiver - Part 1

Lecture 57 - M-channel multicarrier Transceiver - Part 2

Lecture 58 - M-channel multicarrier Transceiver - Part 3

Lecture 59 - Pseudo -circulant structure - Part 1

Lecture 60 - Pseudo -circulant structure - Part 2

Lecture 61 - MCM impairments and CP - Part 1

Lecture 62 - MCM impairments and CP - Part 2

Lecture 63 - Orthogonal Frequency Division Multiplexing - Part 1

Lecture 64 - Orthogonal Frequency Division Multiplexing - Part 2

Lecture 65 - Review of OFDM with CP

Lecture 66 - Review of Lec 1-28

Lecture 67 - OFDM applications - Quantization - Part 1

Lecture 68 - OFDM applications - Quantization - Part 2

Lecture 69 - Some more applications of MDSP

NPTEL : NOC:LDPC and Polar Codes in 5G Standard (Electrical Engineering)

Co-ordinators : Dr. Andrew Thangaraj

Lecture 1 - Additive White Gaussian Noise (AWGN) Channel and BPSK

Lecture 2 - Bit Error Rate (BER) and Signal to Noise Ratio (SNR)

Lecture 3 - Error Correction Coding in a Digital Communication System

Lecture 4 - Complementary Error Function

Lecture 5 - Simulation of Uncoded BPSK and BER v/s Eb/N0 plot Generation in MATLAB/Octave

Lecture 6 - n = 3 Repetition Code

Lecture 7 - Implementation of n = 3 Repetition Code in MATLAB

Lecture 8 - (7,4) Hamming Code

Lecture 9 - A Brief Introduction to Linear Block Codes

Lecture 10 - Simulation of (7,4) Hamming Code in MATLAB

Lecture 11 - Low Density Parity Check Codes: definition, properties and introduction to protograph construction

Lecture 12 - LDPC Codes in 5G: protograph, base matrix, expansion

Lecture 13 - Encoding LDPC codes in 5G

Lecture 14 - MATLAB programs for encoding LDPC codes

Lecture 15 - Log-Likelihood Ratio and Soft Input and Soft Output (SISO) Decoder for the Repetition Code

Lecture 16 - Soft Input and Soft Output (SISO) Decoder for the Single Parity Check (SPC) Code

Lecture 17 - Illustration of SISO decoder for (3,2) SPC code and min-sum approximation

Lecture 18 - SISO decoder for a general (n,n-1) SPC code

Lecture 19 - Soft-Input Soft-Output Iterative Message Passing Decoder for LDPC Codes

Lecture 20 - A Toy Example Illustration of the SISO MInsum Iterative Message Passing Decoder

Lecture 21 - Modifications to the Decoder: Layered Decoding and Offset

Lecture 22 - Implementation of SISO Layered Minsum Iterative Message Passing Decoder in MATLAB

Lecture 23 - Debugging and Improvements to the MATLAB Implementation

Lecture 24 - Rate Matching in LDPC Codes using Puncturing and Shortening

Lecture 25 - Implementation of Fixed Point Quantization and Offset Minsum in the Decoder

Lecture 26 - Introduction to Polar Codes: Polar Transform

Lecture 27 - Channel Polarization, Definition of (N,K) Polar Code and Encoding

Lecture 28 - MATLAB Implementation for Encoding Polar Codes

Lecture 29 - Successive Cancellation (SC) Decoder for Polar Codes: Illustration of its Building Blocks with N=2,4

Lecture 30 - Successive Cancellation (SC) Decoder for a General (N,K) Polar Code

Lecture 31 - MATLAB Implementation of Successive Cancellation Decoder - Part 1

Lecture 32 - MATLAB Implementation of Successive Cancellation Decoder - Part 2

Lecture 33 - Successive Cancellation List Decoding

Lecture 34 - Fixed Point Quantization for SC Decoder and LDPC Decoder

Lecture 35 - MATLAB Implementation of Successive Cancellation List Decoding

Lecture 36 - Rate Matching for LDPC codes

Lecture 37 - Performance Comparison of LDPC codes and Polar Codes in 5G

NPTEL : NOC:Electromagnetic Compatibility, EMC (Electrical Engineering)

Co-ordinators : Prof. Daniel Mansson, Prof. Rajeev Thottappillil

Lecture 1 - Introduction to EMC - Definitions

Lecture 2 - Introduction to EMC - Sources, units etc

Lecture 3 - Electromagnetic principles - Faraday's and Ampere's equations

Lecture 4 - Electromagnetic principles - Gauss's equation, boundary conditions

Lecture 5 - Electromagnetic principles - Uniform plane wave

Lecture 6 - Electromagnetic principles - Transmission lines

Lecture 7 - Electromagnetic principles - Dipoles

Lecture 8 - High-frequency behaviour of components - Conductors

Lecture 9 - High-frequency behaviour of components - Capacitors, inductors, resistors

Lecture 10 - High-frequency behaviour of components - Mechanical switches and transformers

Lecture 11 - Crosstalk or near-field coupling - Capacitive coupling, inductive coupling, common-impedance coupling

Lecture 12 - Crosstalk or near-field coupling - Crosstalk combinations

Lecture 13 - Crosstalk or near-field coupling - Coupling to shielded cables

Lecture 14 - Electromagnetic coupling in the far-field

Lecture 15 - Field Coupling - Exercises

Lecture 16 - Solutions to EMC problems - Lay out and control of interfaces

Lecture 17 - Solutions to EMC problems - Grounding or earthing

Lecture 18 - Solutions to EMC problems - Electromagnetic Shielding

Lecture 19 - Solutions to EMC problems - Electromagnetic Shielding (Continued...)

Lecture 20 - Solutions to EMC problems - Shielded cables

Lecture 21 - Solutions to EMC problems - Filters and Surge protectors

Lecture 22 - Lightning Protection - Introduction

Lecture 23 - Lightning protection - Currents, charges and fields

Lecture 24 - Lightning Protection - Buildings

Lecture 25 - Lightning Protection - Towers, Lightning safety

Lecture 26 - EMC Requirements and Standard, Testing and Difficulties - 1

Lecture 27 - EMC Requirements and Standard, Testing and Difficulties - 2

Lecture 28 - Intentional Electromagnetic Interference or IEMI - 1

Lecture 29 - Intentional Electromagnetic Interference or IEMI - 2

NPTEL : NOC:Mapping Signal Processing Algorithms to Architectures (Electrical Engineering)

Co-ordinators : Prof. Nitin Chandrachoodan

Lecture 1 - Introduction: Objectives and Pre-requisites

Lecture 2 - Review of digital logic

Lecture 3 - Timing and Power in digital circuits

Lecture 4 - Implementation Costs and Metrics

Lecture 5 - Example: Audio processing

Lecture 6 - Example: AlexNet

Lecture 7 - Architecture cost components

Lecture 8 - Examples of Architectures

Lecture 9 - Multi-objective Optimization

Lecture 10 - Number representation

Lecture 11 - Scientific notation and Floating point

Lecture 12 - Basic FIR filter

Lecture 13 - Serial FIR filter architectures

Lecture 14 - Simple programmable architecture

Lecture 15 - Block diagrams and SFGs

Lecture 16 - Dataflow Graphs

Lecture 17 - Iteration period

Lecture 18 - FIR filter iteration period

Lecture 19 - IIR filter iteration period

Lecture 20 - Computation Model

Lecture 21 - Constraint analysis for IPB computation

Lecture 22 - Motivational examples for IPB

Lecture 23 - General IPB computation

Lecture 24 - Sample period calculation

Lecture 25 - Parallel architecture

Lecture 26 - Odd-even register reuse

Lecture 27 - Power consumption

Lecture 28 - Pipelining

Lecture 29 - Time-invariant systems

Lecture 30 - Valid pipelining examples

Lecture 31 - Feedforward cutsets

Lecture 32 - Balanced pipeline

Lecture 33 - Retiming basic concept

Lecture 34 - Retiming basic concept

Lecture 35 - Example and uses of retiming

Lecture 36 - Resource sharing: adder example

Lecture 37 - Changing iteration period

Lecture 38 - Hardware assumptions and constraint analysis

Lecture 39 - Mathematical formulation

Lecture 40 - Examples with formulation

Lecture 41 - Example: Biquad filter

Lecture 42 - Hardware architecture

Lecture 43 - Review biquad folding sets

Lecture 44 - Complete biquad hardware

Lecture 45 - DEMO: FFT in Vivado HLS

Lecture 46 - DEMO: FFT synthesis

Lecture 47 - Obtaining a folding schedule

Lecture 48 - ASAP schedule

Lecture 49 - Utilization Efficiency

Lecture 50 - ALAP schedule

Lecture 51 - Iteration period bound and scheduling

Lecture 52 - Retiming for scheduling

Lecture 53 - Blocked schedules

Lecture 54 - Overlapped schedules

Lecture 55 - Improved blocked schedule

Lecture 56 - Allocation, Binding and Scheduling

Lecture 57 - DEMO: Analyze FFT implementation

Lecture 58 - DEMO: FFT interface

Lecture 59 - Scheduling: problem formulation

Lecture 60 - Example: differential equation solver

Lecture 61 - Heuristic approaches to scheduling

Lecture 62 - Mathematical formulation

Lecture 63 - ILP formulation

Lecture 64 - List scheduling

Lecture 65 - Hardware model

Lecture 66 - Force Directed Scheduling

Lecture 67 - DEMO: HLS on FFT

Lecture 68 - DEMO: FFT Simulation and Optimization

Lecture 69 - DEMO: CPU interfacing

Lecture 70 - Software Compilation

Lecture 71 - Optimization Examples

Lecture 72 - Loop optimizations - 1

Lecture 73 - Loop optimizations - 2

Lecture 74 - Loop optimizations - 3

Lecture 75 - Software pipelining - 1

Lecture 76 - Software pipelining - 2

Lecture 77 - FFT Optimization

Lecture 78 - Demo: Vivado setup

Lecture 79 - Background: CPUs and FPGAs

Lecture 80 - Demo: Vivado HLS FFT IP Export

Lecture 81 - Demo: Vivado ILA and VIO on hardware

Lecture 82 - Demo: FFT on FPGA board

Lecture 83 - Demo: Simulating SoC and SDK

Lecture 84 - Background: Understanding ELF files

Lecture 85 - On-chip communication basics

Lecture 86 - Many-to-Many communication

Lecture 87 - AXI bus handshaking

Lecture 88 - AXI bus (Continued...)

Lecture 89 - Demo: Microblaze processor on FPGA

Lecture 90 - Demo: Performance counter AXI peripheral

Lecture 91 - Demo: HW accelerator for FPGA

Lecture 92 - DMA and arbitration

Lecture 93 - Network-on-chip basics

Lecture 94 - NoC - Topologies and metrics

Lecture 95 - NoC - Routing

Lecture 96 - NoC - Switching and flow control

Lecture 97 - Systolic Arrays - Background

Lecture 98 - Systolic Arrays - Examples

Lecture 99 - CORDIC algorithm

Lecture 100 - Parallel implementation of FIR filters

Lecture 101 - Unfolding Transformation

Lecture 102 - Lookahead Transformation

Lecture 103 - Introduction to GPUs and Matrix multiplication

NPTEL : NOC:Linear System Theory (Electrical Engineering)

Co-ordinators : Prof. Ramakrishna Pasumarthi

Lecture 1 - Introduction to Linear Systems

Lecture 2 - System Models

Lecture 3 - System Models - Part 1

Lecture 4 - System Models - Part 2

Lecture 5 - General Representation

Lecture 6 - Sets, Functions and Fields

Lecture 7 - Linear Algebra - Vector Spaces and Metric Spaces

Lecture 8 - Linear Algebra - Span, Basis and Subspaces

Lecture 9 - Linear Algebra - Linear Maps and Matrices

Lecture 10 - Linear Algebra - Fundamental Subspaces and Rank-Nullity

Lecture 11 - Tutorial 1 on Linear Algebra

Lecture 12 - Linear Algebra - Change of Basis and Similarity Transformation

Lecture 13 - Linear Algebra - Invariant Subspaces, Eigen Values and Eigen Vectors

Lecture 14 - Linear Algebra - Diagonalization and Jordan Forms

Lecture 15 - Linear Algebra - Eigen Decomposition and Singular Value Decomposition

Lecture 16 - Tutorial 2 on Linear Algebra

Lecture 17 - Solutions to LTI Systems

Lecture 18 - State Transition Matrix for LTI systems

Lecture 19 - Forced Reponse of Continuous and Discrete LTI system

Lecture 20 - State Transition Matrix and Solutions to LTV systems

Lecture 21 - Equilibrium Points

Lecture 22 - Limit Cycles and Linearisation

Lecture 23 - Stability Analysis and Types of Stability

Lecture 24 - Lyapunov Stability

Lecture 25 - Stability of Discrete Time Systems

Lecture 27 - Controllability and Reachability

Lecture 28 - Controllability Matrix and Controllable Systems

Lecture 29 - Controllability Tests

Lecture 30 - Controllability of Discrete Time Systems

Lecture 31 - Controllable Decomposition

Lecture 32 - Stabilizability

Lecture 33 - Observability

Lecture 34 - Gramians and Duality

Lecture 35 - Observability for Discrete Time Systems and Observability Tests

Lecture 36 - Observable Decompositon and Detectability

Lecture 37 - Kalman Decomposition and Minimal Realisation

Lecture 38 - Canonical Forms and State Feedback Control

Lecture 39 - Control Design using Pole Placement

Lecture 40 - Tutorial for Modules 9 and 10

Lecture 41 - State Estimation and Output Feedback

Lecture 42 - Design of Observer and Observer based Controller

Lecture 43 - Optimal Control and Linear Quadratic Regulator (LQR)

Lecture 44 - Feedback Invariant and Algebraic Ricatti Equation

Lecture 45 - Tutorial for Module 11

Lecture 46 - Linear Matrix Inequalities

Lecture 47 - Properties of LMIs and Delay LMIs

NPTEL : NOC:Digital Signal Processing (Electrical Engineering)

Co-ordinators : C. S. Ramalingam

Lecture 1 - Signal Definition and Classification

Lecture 2 - Affine Transform

Lecture 3 - Recap of Affine Transform

Lecture 4 - Even and Odd Parts of a Signal

Lecture 5 - The Unit Step Sequence

Lecture 6 - The Unit Impulse

Lecture 7 - The Unit Impulse (Continued...)

Lecture 8 - Exponential Signals and Sinusoids

Lecture 9 - Sinusoids (Continued...)

Lecture 10 - When are two sinusoids independent?

Lecture 11 - Another Difference Between CT and DT Sinusoids

Lecture 12 - System definition and properties (linearity)

Lecture 13 - Time-invariance, memory, causality, and stability

Lecture 14 - LTI systems, impulse response, and convolution

Lecture 15 - Properties of convolution, system interconnections

Lecture 16 - Java applet demo of convolution

Lecture 17 - Systems governed by LCCDE

Lecture 18 - FIR and IIR systems

Lecture 19 - Karplus-Strong algorithm

Lecture 20 - Z-transform definition and RoC

Lecture 21 - Z-transform (Continued...)

Lecture 22 - Poles and zeros

Lecture 23 - Recursive implementation of FIR filters

Lecture 24 - Convergence criterion

Lecture 25 - Properties of the RoC

Lecture 26 - DTFT definition and absolute summability

Lecture 27 - Linearity

Lecture 28 - Delay

Lecture 29 - Exponential multiplication

Lecture 30 - Complex conjugation

Lecture 31 - Time reversal

Lecture 32 - Differentiation in the Z-domain

Lecture 33 - Convolution in the time domain

Lecture 34 - Relationship between x[n] and X(1)

Lecture 35 - Initial Value Theorem

Lecture 36 - Final Value Theorem

Lecture 37 - Multiplication in the time domain

Lecture 38 - Parseval's Theorem

Lecture 39 - Partial Fractions Method

Lecture 40 - Power series method

Lecture 41 - Contour Integral Method

Lecture 42 - Contour Integral Method (Continued...)

Lecture 43 - Inverse DTFT

Lecture 44 - DTFT of Sequences that are not absolutely summable

Lecture 45 - Response to cos(?_0 n+?)

Lecture 46 - Causality and Stability

Lecture 47 - Response to suddenly applied inputs

Lecture 48 - Introduction to frequency response

Lecture 49 - Magnitude response and its geometric interpretation

Lecture 50 - Magnitude Response (Continued...)

Lecture 51 - Response of a single complex zero/pole

Lecture 52 - Resonator and Improved Resonator

Lecture 53 - Notch filter

Lecture 54 - Moving Average Filter

Lecture 55 - Comb filter

Lecture 56 - Phase response of a single complex zero

Lecture 57 - Effect of crossing a unit circle zero, wrapped and unwrapped phase, resonator phase response

Lecture 58 - Allpass Filter

Lecture 59 - Group delay and its physical interpretation

Lecture 60 - Zero-phase filtering, effect on nonlinear phase on waveshape

Lecture 61 - Zero-Phase Filtering, Linear Phase - 1

Lecture 62 - Linear Phase - 2

Lecture 63 - Linear Phase - 3

Lecture 64 - Linear Phase - 3

Lecture 65 - Linear Phase - 3

Lecture 66 - Linear Phase - 4, Sampling - 1

Lecture 67 - Linear Phase - 4, Sampling - 1

Lecture 68 - Linear Phase - 4, Sampling - 1

Lecture 69 - Sampling - 2

Lecture 70 - Sampling - 3

Lecture 71 - Sampling - 4

Lecture 72 - Sampling - 4

Lecture 73 - Sampling - 4

Lecture 74 - The Discrete Fourier Transform - 1

Lecture 75 - The Discrete Fourier Transform - 1

Lecture 76 - The Discrete Fourier Transform - 2

Lecture 77 - The Discrete Fourier Transform - 3

Lecture 78 - The Discrete Fourier Transform - 3

Lecture 79 - The Discrete Fourier Transform - 3

Lecture 80 - The Discrete Fourier Transform - 4

Lecture 81 - The Discrete Fourier Transform - 4

Lecture 82 - The Discrete Fourier Transform - 4

NPTEL : NOC:Computational Electromagnetics (Electrical Engineering)

Co-ordinators : Prof. Uday Khankhoje

Lecture 1 - Chain rule of differentiation

Lecture 2 - Gradient, Divergence, and Curl operators

Lecture 3 - Common theorems in vector calculus

Lecture 4 - Corollaries of these theorems

Lecture 5 - Mathematical History

Lecture 6 - Different regimes of Maxwell's equations

Lecture 7 - Different ways of solving them

Lecture 8 - Maxwell's Equations

Lecture 9 - Boundary Conditions

Lecture 10 - Uniqueness Theorem

Lecture 11 - Equivalence Theorem

Lecture 12 - Simple Numerical Integration

Lecture 13 - Interpolating a Function

Lecture 14 - Gauss Quadrature

Lecture 15 - Line Charge Problem

Lecture 16 - Solving the Integral Equation

Lecture 17 - Basis Functions

Lecture 18 - Helmholtz Equation

Lecture 19 - Solving Helmholtz Equation

Lecture 20 - Huygen's principle and the Extinction theorem

Lecture 21 - Formulating the integral equations

Lecture 22 - Conclusions of surface integral equations

Lecture 23 - Motivations for Green's functions

Lecture 24 - A one-dimensional example

Lecture 25 - 1-D example: alternate representation

Lecture 26 - 2-D wave example : finding solution

Lecture 27 - 2-D wave example : boundary conds

Lecture 28 - 2-D example : Evaluating Constants - Part 1

Lecture 29 - 2-D example : Evaluating Constants - Part 2

Lecture 30 - 3-D example

Lecture 31 - Motivation for MoM

Lecture 32 - Linear Vector Spaces

Lecture 33 - Formulating Method of Moments

Lecture 34 - Surface Integral Equations: Recap

Lecture 35 - Surface Integral Equations: Evaluating the Integrals - Part 1

Lecture 36 - Surface Integral Equations: Evaluating the Integrals - Part 2

Lecture 37 - Surface Integral Equations: Conclusion

Lecture 38 - Volume Integral Equations:Setting Up

Lecture 39 - Volume Integral Equations:Solving - Part 1

Lecture 40 - Volume Integral Equations:Solving - Part 2

Lecture 41 - Volume Integral Equations:Summary

Lecture 42 - Surface integral equations for PEC

Lecture 43 - Surface v/s volume integral equations

Lecture 44 - Definition of radar cross-section

Lecture 45 - Computational Considerations

Lecture 46 - History and Overview of the FEM

Lecture 47 - Basic framework of FEM

Lecture 48 - 1D Basis Functions

Lecture 49 - 2D Basis Functions

Lecture 50 - Weak form of 1D-FEM - Part 1

Lecture 51 - Weak form of 1D-FEM - Part 2

Lecture 52 - Generating System of Equations for 1D FEM

Lecture 53 - 1D wave equation: Formulation

Lecture 54 - 1D Wave Equation: Boundary Conditions

Lecture 55 - 1D Wave Equation: Basis and testing functions

Lecture 56 - 1D Wave Equation: Matrix assembly

Lecture 57 - 2D FEM Shape Functions

Lecture 58 - Converting to Weak Form (2D FEM)

Lecture 59 - Radiation Boundary Condition

Lecture 60 - Total field formulation

Lecture 61 - Scattered field formulation

Lecture 62 - Comparing total and scattered field formulation

Lecture 63 - Matrix assembly - Part 1

Lecture 64 - Matrix assembly - Part 2

Lecture 65 - Computing Far Field

Lecture 66 - Numerical Aspects of 2D FEM

Lecture 67 - Summary of FEM Procedure

Lecture 68 - Introduction to FDTD

Lecture 69 - 2D FDTD Formulation : Stencil

Lecture 70 - 2D FDTD Formulation : Time Stepping

Lecture 71 - 2D FDTD Formulation : Divergence Conditions

Lecture 72 - Stability Criteria - Part 1

Lecture 73 - Stability Criteria - Part 2

Lecture 74 - Stability Criteria - Higher Dimensions

Lecture 75 - Accuracy Considerations - 1D

Lecture 76 - Accuracy Considerations - Higher Dimensions

Lecture 77 - Dealing with non-dispersive dielectric media

Lecture 78 - Dealing with dispersive dielectric media

Lecture 79 - Debye Model - Part 1

Lecture 80 - Debye Model - Part 2

Lecture 81 - Absorbing Boundary Conditions - 1D

Lecture 82 - Absorbing Boundary Conditions - 2D

Lecture 83 - Implementing ABC in FDTD

Lecture 84 - Failure of ABC

Lecture 85 - Perfectly Matched Layers (PML) - Introduction

Lecture 86 - Implementing PML using Coordinate Stretching

Lecture 87 - PML - Phase Matching

Lecture 88 - PML - Tangential Boundary Conditions

Lecture 89 - Perfectly Matched Interface

Lecture 90 - PML theory - Summary

Lecture 91 - Implementing PML into FDTD - Part 1

Lecture 92 - Implementing PML into FDTD - Part 2

Lecture 93 - Sources in FDTD - Currents

Lecture 94 - Sources in FDTD - Part 2

Lecture 95 - Summary of FDTD

Lecture 96 - MEEP : FDTD in action

Lecture 97 - Inverse Problems - Introduction

Lecture 98 - Inverse Problems - Mathematical Formulation

Lecture 99 - Inverse Problems - Challenges

Lecture 100 - Inverse Problems - Non-Linearity

Lecture 101 - Inverse Problems - Summary

Lecture 102 - Antennas - Potential formulation

Lecture 103 - Antennas - Hertz Dipole - Part 1

Lecture 104 - Antennas - Hertz Dipole - Part 2

Lecture 105 - Antennas - Radiation Patterns

Lecture 106 - Antennas - Motivation for CEM

Lecture 107 - Antennas - Pocklingtonâ€™s Integral Equation - Part 1

Lecture 108 - Antennas - Pocklingtonâ€™s Integral Equation - Part 2

Lecture 109 - Antennas - Source Modeling

Lecture 110 - Antennas - Circuit Model

Lecture 111 - Antennas - MoM details

Lecture 112 - Antennas - Mutual Coupling - Part 1

Lecture 113 - Antennas - Mutual Coupling - Part 2

Lecture 114 - Hybrid Methods - Motivation

Lecture 115 - Finite Element-Boundary Integral - Part 1

Lecture 116 - Finite Element-Boundary Integral - Part 2

Lecture 117 - Finite Element-Boundary Integral - Part 3

NPTEL : NOC:Transmission Lines and Electromagnetic Waves (Electrical Engineering)

Co-ordinators : Dr. Ananth Krishnan

Lecture 1 - Transmission lines

Lecture 2 - LosslessTransmission lines: Wave Equations

Lecture 3 - Introduction to finite difference method

Lecture 4 - Octave simulation of wave equation

Lecture 5 - Octave simulation of Telegrapher's equation

Lecture 6 - Reflections and reflection coefficient

Lecture 7 - AC signals in loss-less transmission lines

Lecture 8 - Transmission lines with losses

Lecture 9 - Octave simulation of Transmission lines with losses

Lecture 10 - Voltage reflection coefficient and standing wave ratio

Lecture 11 - Graphical representation of reflection coefficient

Lecture 12 - Impedance matching using Smith chart

Lecture 13 - Demonstration of Impedance matching using VNA

Lecture 14 - Transmission Line Limitations and Maxwell's Equation

Lecture 15 - Maxwell's Curl Equation

Lecture 16 - Octave simulation of an Electromagnetic Wave Equation

Lecture 17 - Polarisation of an Electromagnetic Wave

Lecture 18 - Octave Simulation of different types of Polarisation

Lecture 19 - Electromagnetic Waves in a conductive Medium

Lecture 20 - Plane Waves

Lecture 21 - Plane Waves at normal incidence

Lecture 22 - Plane waves at Oblique Incidence - I

Lecture 23 - Plane waves at Oblique Incidence - II

Lecture 24 - Plane waves at Oblique Incidence - III

Lecture 25 - Octave simulation of perpendicular polarisation

Lecture 26 - Octave simulation of perpendicular polarisation (Continued...)

Lecture 27 - Dielectric-ideal conductor interface

Lecture 28 - Parallel plate waveguide

Lecture 29 - Rectangular Waveguide

Lecture 30 - Octave simulation of modes of a Rectangular Waveguide

Lecture 31 - Phase Velocity and Group velocity

Lecture 32 - Octave simulation of Field pattern of a parellel plate waveguide

Lecture 33 - Cavity resonatorand Real life applications of waveguides and cavity

NPTEL : NOC:Digital IC Design (Electrical Engineering)

Co-ordinators : Prof. Janakiraman

Lecture 1 - Introduction - Digital IC Design

Lecture 2 - PN Junction

Lecture 3 - MOS Capacitor Threshold Voltage

Lecture 4 - MOS Transistor Current Expression

Lecture 5 - Body Effect and I-V Plots

Lecture 6 - Short Channel Transistors - Channel Length Modulation

Lecture 7 - Velocity Saturation and Level-1 SPICE Model

Lecture 8 - Drain Induced Barrier Lowering

Lecture 9 - Sub-Threshold Leakage

Lecture 10 - Substrate and Gate Leakage

Lecture 11 - The PMOS Transistor

Lecture 12 - Transistor Capacitance - 1

Lecture 13 - Transistor Capacitance - 2

Lecture 14 - CMOS Inverter Construction

Lecture 15 - Voltage Transfer Characteristics

Lecture 16 - Load Line Analysis

Lecture 17 - Trip Point for Short Channel Device Inverter

Lecture 18 - Trip Point for Long Channel Device Inverter

Lecture 19 - Noise Margin Analysis - 1

Lecture 20 - Noise Margin Analysis - 2

Lecture 21 - Noise Margin Analysis - 3

Lecture 22 - Noise Margin Analysis-Long Channel Device Inverter - 1

Lecture 23 - Noise Margin Analysis-Long Channel Device Inverter - 2

Lecture 24 - Pass Transistors

Lecture 25 - NMOS Transistor ON Resistance and Fall Delay

Lecture 26 - Elmore Delay Model

Lecture 27 - Inverter: Transient Response

Lecture 28 - Inverter: Dynamic Power

Lecture 29 - Inverter: Short Circuit Power

Lecture 30 - Inverter: Leakage Power and Transistor Stacks

Lecture 31 - Stacking Effect and Sleep Transistors

Lecture 32 - Ring Oscillators and Process Variations

Lecture 33 - Implementing Any Boolean Logic Function

Lecture 34 - Implementing Any Boolean Logic Function: Examples. Gate sizing

Lecture 35 - Gate Sizing

Lecture 36 - Logic Gate Capacitance

Lecture 37 - Gate Delay

Lecture 38 - Parasitic Delay

Lecture 39 - Gate Delay with a Load Capacitance

Lecture 40 - Logical Effort

Lecture 41 - Gate Delay

Lecture 42 - Path Delay Calculation and Optimization Formulation

Lecture 43 - Path Delay Optimization: Intuition

Lecture 44 - Path Delay Optimization: Example

Lecture 45 - Buffer Insertion

Lecture 46 - Input Ordering and Asymmetric Gates

Lecture 47 - Skewed Gates

Lecture 48 - Special Functions

Lecture 49 - Pseudo NMOS Logic

Lecture 50 - Pseudo NMOS Inverter

Lecture 51 - Pseudo NMOS Logical Effort and CVSL

Lecture 52 - Dynamic Circuits and Input Monotonicity

Lecture 53 - Domino Logic and Weak Keepers

Lecture 54 - Transmission Gate Logic

Lecture 55 - Gate Sizing for Large Circuits

Lecture 56 - Ripple Adder Introduction

Lecture 57 - Full Adder Circuit Implementation

Lecture 58 - Full Adder Optimization

Lecture 59 - Carry Skip Adder

Lecture 60 - Carry Select Adder

Lecture 61 - Linear and Square Root Carry Select Adder

Lecture 62 - Two's Complement Arithmetic

Lecture 63 - Two's Complement Sign Extension

Lecture 64 - Array Multiplier

Lecture 65 - Array Multiplier - Timing Analysis

Lecture 66 - Carry Save Multiplier

Lecture 67 - Carry Save Multiplier - Signed Multiplication

Lecture 68 - Introduction to Pipelining

Lecture 69 - Time Borrowing

Lecture 70 - Master Slave Flip Flop

Lecture 71 - Flop Timing Parameters

Lecture 72 - Alternate Circuit Implementations

Lecture 73 - Clock Overlap

Lecture 74 - C2MOS Flop

Lecture 75 - Flop Characterization

Lecture 76 - Max and Min Delay of Flop Based Systems

Lecture 77 - Flop Min Delay Constraint

Lecture 78 - Latch - Max and Min Delay Constraints

Lecture 79 - Latch - Timing Analysis with Skew

Lecture 80 - Time Borrowing

NPTEL : NOC:Power Management Integrated Circuits (Electrical Engineering)

Co-ordinators : Prof. Qadeer Ahmad Khan

Lecture 1 - Introduction to PMIC - Part 1

Lecture 2 - Introduction to PMIC - Part 2

Lecture 3 - Linear versus Switching Regulators

Lecture 4 - Performance Parameters of Regulators

Lecture 5 - Local vs Remote Feedback, Point of Load Regulators

Lecture 6 - Kelvin Sensing, Droop Compensation

Lecture 7 - Current Regulator Applications, Introduction to Bandgap Voltage References, PTAT and CTAT voltage

Lecture 8 - Adding PTAT and CTAT Voltages

Lecture 9 - Bandgap Voltage Reference Circuit, Brokaw Bandgap Circuit

Lecture 10 - Sub-1-volt Bandgap Circuit

Lecture 11 - Generating Multiple Reference Voltages; Applications of Linear Regulators

Lecture 12 - Designing a Linear Regulator, Negative and Positive Feedback

Lecture 13 - First-Order Systems, Phase Margin

Lecture 14 - Closed-Loop Response of Second-Order Systems

Lecture 15 - Relationship between Damping Factor and Phase Margin, Frequency Compensation, MOS Parasitic Capacitances

Lecture 16 - Finding the Poles of the Error Amplifier - Part 1

Lecture 17 - Finding the Poles of the Error Amplifier - Part 2

Lecture 18 - Dominant Pole Frequency Compensation

Lecture 19 - Dominant Pole Compensation at No-Load

Lecture 20 - Dominant Pole Compensation using Miller Effect, RHP zero due to Miller Capacitor

Lecture 21 - Intuitive Method of Finding the Poles, Pole Splitting after Miller Compensation

Lecture 22 - Effect of RHP zero on Stability, Mitigating the Effect of RHP zero, LDO with NMOS Pass Element

Lecture 23 - Output Impedance of PMOS LDO

Lecture 24 - Line Regulation and PSRR of PMOS LDO

Lecture 25 - PSRR of PMOS versus PSRR of NMOS LDO

Lecture 26 - Sources of Error in Linear and Switching Regulators

Lecture 27 - Offset in Amplifiers; Real Life Analogy; Static Offset Cancellation

Lecture 28 - Dynamic Offset Cancellation Techniques (Chopping, Auto-zeroing)

Lecture 29 - Digital LDO, Technique to Avoid Limit Cycle Oscillations in Digital LDO

Lecture 30 - Hybrid LDO, Short-Circuit Protection

Lecture 31 - Hiccup Mode and Foldback Current Limit

Lecture 32 - Introduction to Switching Regulators

Lecture 33 - volt-second Balance, Non-Idealities in the Power Stage of a Buck Converter

Lecture 34 - Transformer Model of a Buck Converter, Conduction Efficiency, Efficiency of an LDO versus Efficiency of a Switching Regulator

Lecture 35 - Synchronous versus Non-Synchronous Switching Regulators, PWM Control Techniques

Lecture 36 - Losses in Switching Regulators (Conduction Loss, Gate-Driver Switching Loss)

Lecture 37 - Dead-Time Switching Loss in DC-DC Converters

Lecture 38 - Hard Switching Loss in DC DC Converters

Lecture 39 - Magnetic Loss in DC-DC Converters, Relative Significance of Losses as a Function of the Load Current

Lecture 40 - Output Voltage Ripple of a Buck Converter

Lecture 41 - Choosing the Inductor and Capacitor for a Buck Converter

Lecture 42 - CCM Vs DCM Operation in DC DC Converters

Lecture 43 - CCM DCM Boundary Condition, Voltage Conversion Ratio in DCM

Lecture 44 - Concept of Pulse Frequency Modulation PFM

Lecture 45 - Classification of Pulse Width Modulators

Lecture 46 - DC - DC Converter Control Techniques, Stability Analysis of Voltage Mode Buck Converter - Part 1

Lecture 47 - Stability Analysis of Voltage Mode Buck Converter - Part 2

Lecture 48 - Stability Analysis of Voltage Mode Buck Converter - Part 3

Lecture 49 - Dominant Pole Compensation (Type-I with Gm-C Architecture)

Lecture 50 - Dominant Pole Compensation (Type-I with Op Amp-RC Architecture)

Lecture 51 - Introduction to Type-II Compensation

Lecture 52 - Type-II Compensator using Gm-C Architecture - Part 1

Lecture 53 - Type-II Compensator using Gm-C Architecture - Part 2

Lecture 54 - Type-II Compensator using Gm-C Architecture - Part 3

Lecture 55 - Type-II Compensator using Op Amp-RC Architecture

Lecture 56 - Introduction to Type-III Compensator

Lecture 57 - Type-III Compensator using Op Amp-RC Architecture

Lecture 58 - Simulation of DC-DC Converter with Type-III Compensator

Lecture 59 - Type-III Compensator using Gm-C Architecture

Lecture 60 - Feed-Forward Line Compensation, Loop Gain Compensation by Modulating Gm

Lecture 61 - Designing a Buck Converter, Power Loss Budgeting

Lecture 62 - Sizing Power MOSFETs

Lecture 63 - Estimating Switching Losses and Choosing the Switching Frequency

Lecture 64 - Choosing Inductance and Capacitance Values

Lecture 65 - Choosing 'C' Depending on Factors that Limit the Load Transient Response

Lecture 66 - Inductor and Capacitor Characteristics, Reducing the Effect of Capacitor ESL

Lecture 67 - Gate Buffer and Non-Overlap Clock Generator in Gate-Driver Circuit

Lecture 68 - Pulse-Width Modulator- Trailing Edge, Leading Edge and Dual Edge; Triangle Wave Generator

Lecture 69 - Average Ramp Voltage of Single-Edge PW Modulator,Design Considerations of EA

Lecture 70 - Delays Associated with PW Modulator, PFM and PSM Operation, DCM Operation using NMOS

Lecture 71 - Designing a Zero-Cross Comparator, Inverter-Based Auto-Zeroed Comparator, Simulation Demo

Lecture 72 - Current Mode Control- Peak, Valley, Emulated; VMC versus CMC; Sub-Harmonic Oscillation

Lecture 73 - Ramp-Adaptive Slope Compensation to Avoid Current Loop Instability

Lecture 74 - Non-Linear Control of DC-DC Converters, Phase-Shift between i_L and v_C

Lecture 75 - Stabilising a Voltage-Mode Hysteretic Converter using R_esr, Relation between F_sw and the Hysteresis Window

Lecture 76 - Hysteretic Converter - Simulation Demo

Lecture 77 - Current-Mode Hysteretic Converter, Using R-C as Ripple Generator

Lecture 78 - Controlling the Switching Frequency of a Hysteretic Converter, Delay in the Hysteretic Comparator

Lecture 79 - Frequency and Voltage Regulation Loops in a Fixed-Frequency Hysteretic Converter

Lecture 80 - Resetting the Capacitor Voltage in a Hysteretic Converter, Constant ON-Time Control

Lecture 81 - Introduction to Boost Converter, RHP Zero in a Boost Converter

Lecture 82 - Introduction to Buck-Boost Converter

Lecture 83 - Tri-Mode Buck-Boost Converter (Buck, Buck-Boost and Boost)

Lecture 84 - Boundary Conditions for Mode Transition in a Tri-Mode Buck-Boost Converter

Lecture 85 - Generating Buck and Boost Duty Cycles in a Tri-Mode Buck-Boost Converter

Lecture 86 - Introduction to Switched-Capacitor DC-DC Converters,Switched-Capacitor DC-DC Converter with V_o = 2*V_DD

Lecture 87 - Applications of Switched-Capacitor DC-DC Converters in Open-Loop, Regulating the Output using Feedback Control

Lecture 88 - H-Bridge Switched-Capacitor DC-DC Converter,SC DC-DC converter with Multiple Gain Settings

Lecture 89 - Current Sensing Techniques in DC-DC Converters

Lecture 90 - Analog Layout Techniques - Part 1

Lecture 91 - Analog Layout Techniques - Part 2

Lecture 92 - Digital Control of DC-DC Converters, ADC Architectures

Lecture 93 - Digital Pulse-Width Modulator Architectures, Adaptive Compensation

Lecture 94 - Limitations of Analog and Digital Controllers, Time-Based Controller for Buck Converter

Lecture 95 - Time-Based Controller for Buck Converter and for LDO, Issues with Time-Based Control

Lecture 96 - Multi-Phase DC-DC Converters

Lecture 97 - Dynamic Voltage and Frequency Scaling, Single Inductor Multiple Output (SIMO) DC-DC Converter

Lecture 98 - LCD/AMOLED Display Drivers - Part 1

Lecture 99 - LCD/AMOLED Display Drivers - Part 2

Lecture 100 - LCD/AMOLED Display Drivers - Part 3

Lecture 101 - LED Drivers for Camera Flash

Lecture 102 - Li-Ion Battery and its Charging Phases

Lecture 103 - Battery Charger IC

NPTEL : NOC:DC Power Transmission Systems (Electrical Engineering)

Co-ordinators : Prof. Krishna S

Lecture 1 - Course contents

Lecture 2 - Introduction

Lecture 3 - Historical developments

Lecture 4 - Power semiconductor devices

Lecture 5 - General converter configuration

Lecture 6 - Choice of converter configuration: Valve utilization factor

Lecture 7 - Choice of converter configuration: Transformer utilization factor

Lecture 8 - Converter configuration for pulse number equal to 6

Lecture 9 - Analysis of 6 pulse LCC neglecting inductance

Lecture 10 - Analysis of 6 pulse LCC neglecting inductance: Jumps in voltage across a valve

Lecture 11 - Analysis of 6 pulse LCC neglecting inductance: Average DC side voltage

Lecture 12 - Fourier series - Part 1

Lecture 13 - Fourier series - Part 2

Lecture 14 - Analysis of 6 pulse LCC neglecting inductance: DC side voltage harmonics

Lecture 15 - Analysis of 6 pulse LCC neglecting inductance: Fundamental and harmonic components of AC side current

Lecture 16 - Definitions: Delay angle, angle of advance, commutation margin angle

Lecture 17 - Commutation margin angle in a 6 pulse LCC neglecting inductance - Part 1

Lecture 18 - Commutation margin angle in a 6 pulse LCC neglecting inductance - Part 2

Lecture 19 - Instantaneous power on AC and DC sides in a 6 pulse LCC neglecting inductance

Lecture 20 - Average power on AC and DC sides in a 6 pulse LCC neglecting inductance

Lecture 21 - 6 pulse LCC with inductance

Lecture 22 - 2 and 3 valve conduction mode of 6 pulse LCC

Lecture 23 - 2 and 3 valve conduction mode of 6 pulse LCC: DC side voltage harmonics

Lecture 24 - 2 and 3 valve conduction mode of 6 pulse LCC: DC side voltage and voltage across a valve

Lecture 25 - 2 and 3 valve conduction mode of 6 pulse LCC: Fundamental and harmonic components of AC side current

Lecture 26 - Extinction angle

Lecture 27 - Extinction angle: Commutation margin angle for normal inverter operation of 6 pulse LCC

Lecture 28 - 3 and 4 valve conduction mode of 6 pulse LCC

Lecture 29 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 1

Lecture 30 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 2

Lecture 31 - Analysis of 3 and 4 valve conduction mode of 6 pulse LCC - Part 3

Lecture 32 - 3 valve conduction mode of 6 pulse LCC

Lecture 33 - Commutation margin angle

Lecture 34 - Normalization

Lecture 35 - Characteristics of 6 pulse LCC - Part 1

Lecture 36 - Characteristics of 6 pulse LCC - Part 2

Lecture 37 - Steady state analysis of a general LCC - Part 1

Lecture 38 - Steady state analysis of a general LCC - Part 2

Lecture 39 - Steady state analysis of a general LCC - Application to 6 pulse LCC

Lecture 40 - 6 pulse LCC with resistance included on the AC side

Lecture 41 - 6 pulse LCC with resistance, inductance and voltage source on the DC side - Part 1

Lecture 42 - 6 pulse LCC with resistance, inductance and voltage source on the DC side - Part 2

Lecture 43 - Power factor

Lecture 44 - Capacitor commutated converter - Part 1

Lecture 45 - Capacitor commutated converter - Part 2

Lecture 46 - 12 pulse LCC - Part 1

Lecture 47 - 12 pulse LCC - Part 2

Lecture 48 - Modes of operation of 12 pulse LCC

Lecture 49 - Purposes of transformer

Lecture 50 - Applications of DC transmission

Lecture 51 - Types of DC link: Monopolar

Lecture 52 - Types of DC link: Bipolar and homopolar

Lecture 53 - DC link control

Lecture 54 - DC link control: Control variables

Lecture 55 - Considerations that influence selection of control

Lecture 56 - Converter control characteristics

Lecture 57 - MTDC systens: Applications

Lecture 58 - Types of MTDC systems

Lecture 59 - Non-characteristic harmonics

Lecture 60 - Effect of firing angle errors

Lecture 61 - Problems with harmonics

Lecture 62 - Single tuned filter

Lecture 63 - Design of single tuned filter - Part 1

Lecture 64 - Design of single tuned filter - Part 2

Lecture 65 - Double tuned and damped filters

Lecture 66 - Reactive power requirement

Lecture 67 - Comparison of AC and DC transmission

NPTEL : NOC:Optical Engineering (Electrical Engineering)

Co-ordinators : Prof. Shanti Bhattacharya

Lecture 1 - Introduction to Optical Engineering

Lecture 2 - Geometric Optics Basics

Lecture 3 - Refraction at a single surface

Lecture 4 - Lab 1 Introduction to OSLO

Lecture 5 - Stops and Rays

Lecture 6 - Aperture stop - Part 1

Lecture 7 - Aperture stop - Part 2

Lecture 8 - Lab 2 OSLO

Lecture 9 - Imaging equation for thick lens using ABCD matrix

Lecture 10 - Ray Tracing Matrix - Part 1

Lecture 11 - Ray Tracing Matrix - Part 2

Lecture 12 - Principal Planes

Lecture 13 - Lab 3 OSLO

Lecture 14 - Tracing rays through optical pupils - Part 1

Lecture 15 - Tracing rays through optical pupils - Part 2

Lecture 16 - Aberrations

Lecture 17 - Monochromatic Aberrations - Part 1

Lecture 18 - Monochromatic Aberrations - Part 2

Lecture 19 - Lab 4 - OSLO

Lecture 20 - Chromatic Aberrations and Aberration correction

Lecture 21 - Aberration correction

Lecture 22 - Revisiting Ray intercept curves

Lecture 23 - Lab 5 - OSLO

Lecture 24 - Interesting Geometric phenomena and applications

Lecture 25 - Gaussian beams introduction

Lecture 26 - Gaussian beams

Lecture 27 - Lab 6 - OSLO

Lecture 28 - ransformation of a Gaussian beam

Lecture 29 - Transformation of a Gaussian beam due to a lens and a mirror

Lecture 30 - Application of Gaussian beam equations

Lecture 31 - Interferometry basics

Lecture 32 - Interferometry basics - Part 1

Lecture 33 - Introduction to Python

Lecture 34 - Python - Part 2

Lecture 35 - Introduction to Matlab

Lecture 36 - Interferometry basics - Part 2

Lecture 37 - Python - Part 3

Lecture 38 - Matlab tutorial on interference

Lecture 39 - Applications of interference - Part 1

Lecture 40 - Holography

Lecture 41 - Applications of interference

Lecture 42 - Applications of Optical Engineering

Lecture 43 - Diffractive Optics

Lecture 44 - Diffraction Grating

NPTEL : NOC:Nonlinear System Analysis (Electrical Engineering)

Co-ordinators : Dr. Arun D. Mahindrakar, Prof. Ramkrishna Pasumarthy

Lecture 1 - Examples of Nonlinear Physical Systems

Lecture 2 - Math Preliminaries - Part 1

Lecture 3 - Math Preliminaries - Part 2

Lecture 4 - Math Preliminaries - Part 3

Lecture 5 - Lipschitz Continuity and Contraction Mapping Theorem - Part 1

Lecture 6 - Lipschitz Continuity and Contraction Mapping Theorem - Part 2

Lecture 7 - Lipschitz Continuity and Contraction Mapping Theorem - Part 3

Lecture 8 - Existence and Uniqueness Theorem of ODE - Part 1

Lecture 9 - Existence and Uniqueness Theorem of ODE - Part 2

Lecture 10 - Existence and Uniqueness Theorem of ODE - Part 3

Lecture 11 - Existence and Uniqueness Theorem of ODE - Part 4

Lecture 12 - Equilibrium Points

Lecture 13 - Phase Portrait - Part 1

Lecture 14 - Phase Portrait - Part 2

Lecture 15 - Phase Portrait - Part 3

Lecture 16 - Phase portrait of Nonlinear Systems: Examples

Lecture 17 - Limit Cycles

Lecture 18 - Limit Cycles - Examples - Part 1

Lecture 19 - Limit Cycles - Examples - Part 2

Lecture 20 - Introduction to Bifurcation Theory - 1

Lecture 21 - Introduction to Bifurcation Theory - 2

Lecture 22 - Necessary and Sufficient Conditions for Local Bifurcation

Lecture 23 - Problems on Bifurcation Theory.

Lecture 24 - Stability Notions: Lyapunov and LaSalle's theorem - Part 1

Lecture 25 - Stability Notions: Lyapunov and LaSalle's theorem - Part 2

Lecture 26 - Stability Notions: Lyapunov and LaSalle's theorem - Part 3

Lecture 27 - Stability Notions: Lyapunov and LaSalle's theorem - Part 4

Lecture 28 - Stability Analysis and types of stability

Lecture 29 - Lypaunov Stability

Lecture 30 - Supplementary lecture: Comparison Lemma and Lyapunov Stability

Lecture 31 - Center Manifold Theorem

Lecture 32 - Interconnection between non linearity and a linear system - Sector Nonlinearities And Aizermannâ€™s conjecture

Lecture 33 - Counter example for Aizermannâ€™s conjecture

Lecture 34 - Passivity inspiration - passive circuits - dissipation equality

Lecture 35 - Dissipative Equality for circuit (Continued...)

Lecture 36 - PR condition for passivity of SISO system

Lecture 37 - Examples of PR transfer functions

Lecture 38 - Relation between storage function and Lyapunov function - PR Lemma

Lecture 39 - Proof of PR Lemma

Lecture 40 - Proof (Continued...) using spectral factorization theorem

Lecture 41 - PR definition for MIMO case

Lecture 42 - PSD Storage function in PR Lemma and how to make it PD (strictly PR)

Lecture 43 - KYP Theorem

Lecture 44 - Passivity preservation under interconnection

Lecture 45 - Aizermannâ€™s conjecture under passivity assumption is true

Lecture 46 - Sector Nonlinearities and need for generlaizing KYP Lemma

Lecture 47 - Need for Loop transformations

Lecture 48 - Loop Transformations - Part 1

Lecture 49 - Loop Transformations - Part 2

Lecture 50 - Circle criterion for PR

Lecture 51 - Examples based on circle criterion and stability under circle transformations

NPTEL : NOC:Signals and Systems (Electrical Engineering)

Co-ordinators : Prof. Kushal K. Shah

Lecture 1 - Real and Complex Number

Lecture 2 - Sinusoid and Phasor

Lecture 3 - Limits and Continuity

Lecture 4 - Differentiation and Integration

Lecture 5 - Lâ€™Hospitalâ€™s Rule

Lecture 6 - LTI System Examples; Impedance

Lecture 7 - Dirac Delta function; Impulse

Lecture 8 - Continuous and Discrete Time Systems

Lecture 9 - Even Signal; Odd Signal

Lecture 10 - Orthogonality of Signals

Lecture 11 - Shifting and Scaling in Continuous Time - I

Lecture 12 - Shifting and Scaling in Continuous Time - II

Lecture 13 - Shifting and Scaling in Discrete Time

Lecture 14 - Signal and Noise

Lecture 15 - Signals in the Physical World

Lecture 16 - Signals and Sensory Perception

Lecture 17 - Frequency Domain Representation

Lecture 18 - Definition of Fourier Transform

Lecture 19 - Fourier Transform : Examples I

Lecture 20 - Dirichlet Conditions

Lecture 21 - Inverse Fourier Transform

Lecture 22 - Fourier Transform : Examples II

Lecture 23 - Frequency-Time Uncertainty Relation

Lecture 24 - Fourier Transform : Linearity, Time Shifting and Time Scaling

Lecture 25 - Fourier Transform : Derivative Property

Lecture 26 - Fourier Transform : Multiplication and Convolution Property

Lecture 27 - Fourier Transform : Integral Property

Lecture 28 - Fourier Transform : Example III

Lecture 29 - Fourier Transform : Example IV

Lecture 30 - Fourier Transform of Noise

Lecture 31 - Types of Noise

Lecture 32 - Overview of Systems and General Properties

Lecture 33 - Linearity and Time Invariance

Lecture 34 - LTI System Examples

Lecture 35 - Frequency Response of RLC circuits - I

Lecture 36 - Frequency Response of RLC circuits - II

Lecture 37 - LCCDE Representation of Continuous-Time LTI Systems

Lecture 38 - Frequency Domain Representation of LCCDE Systems

Lecture 39 - Time Domain Representation of LTI Systems

Lecture 40 - Continuous-Time Convolution Integral

Lecture 41 - Continuous-Time Convolution : Example I

Lecture 42 - Continuous-Time Convolution : Example II

Lecture 43 - Continuous-Time Convolution : Example III

Lecture 44 - LTI Systems : Commutative, Distributive and Associative

Lecture 45 - LTI Systems : Memorylessness and Invertibility

Lecture 46 - LTI Systems : Causality and Stability

Lecture 47 - Fourier Transform in Complex Frequency Domain

Lecture 48 - Laplace Transform : Poles and Zeros

Lecture 49 - Laplace Transform : Region of Convergence [ROC]

Lecture 50 - Laplace Transform : Examples I

Lecture 51 - Laplace Transform : Examples II

Lecture 52 - Laplace Analysis of LTI Systems

Lecture 53 - Laplace Analysis of RLC Circuits - I

Lecture 54 - Laplace Transform : Linearity, Shifting and Scaling

Lecture 55 - Laplace Transform : Derivative and Integral

Lecture 56 - Laplace Transform : Causality and Stability

Lecture 57 - Laplace Analysis of LTI Systems : Example I

Lecture 58 - Laplace Analysis of LTI Systems : Example II

Lecture 59 - Laplace Analysis of First Order RLC Circuits

Lecture 60 - Laplace Analysis of Second Order RLC Circuits

Lecture 61 - Fourier Transform of Periodic Signals

Lecture 62 - Fourier Series Representation in Continuous-Time

Lecture 63 - Fourier Series Properties - I

Lecture 64 - Fourier Series Properties - II

Lecture 65 - LTI System Response for Periodic Input Signal

Lecture 66 - Fourier Series in Continuous-Time : Examples I

Lecture 67 - Fourier Series in Continuous-Time : Examples II

Lecture 68 - Discrete-Time Convolution Sum

Lecture 69 - Discrete-Time Convolution Sum Examples and Properties

Lecture 70 - LCCDE Representation of Discrete-Time LTI Systems

Lecture 71 - Impulse Train Sampling

Lecture 72 - Reconstruction of Continuous-Time Signal

Lecture 73 - Nyquist Sampling Theorem and Aliasing

Lecture 74 - Fourier Transform of Sampled Signals

Lecture 75 - DTFT : Examples I

Lecture 76 - DTFT Properties I: Periodicity, Linearity, Time/Frequency shifting, and Conjugation

Lecture 77 - DTFT Properties II: Differencing and Accumulation in Time Domain, Differentiation in Frequency Domain

Lecture 78 - DTFT Properties III: Time Reversal, Time Expansion, Convolution and Parsevaalâ€™s Relation

Lecture 79 - DTFT : Examples II

Lecture 80 - DTFT in Complex Frequency Domain

Lecture 81 - Z-Transform : Properties of ROC

Lecture 82 - Z-Transform Properties I: Linearity, Time-Shifting, Time-Expansion, Time-Reversal, and Z-Scaling

Lecture 83 - Z-Transform Properties II: Conjugation and Convolution

Lecture 84 - Z-Transform Properties III: Causality and Stability

Lecture 85 - Z-Transform : Examples I

Lecture 86 - Z-Transform : Examples II

Lecture 87 - Block Diagram Representation

NPTEL : NOC:Linear Dynamical Systems (Electrical Engineering)

Co-ordinators : Prof. Tushar Jain

Lecture 1 - Response and state-space solution of Linear systems

Lecture 2 - Solution of LTV systems

Lecture 3 - Solution of LTI systems

Lecture 4 - Equivalent State Equations

Lecture 5 - Realization of LTI and LTV Systems

Lecture 6 - Tutorial - 1

Lecture 7 - Introduction to Stability Analysis

Lecture 8 - Lyapunov Stability - Part I

Lecture 9 - Lyapunov Stability - Part II

Lecture 10 - Proof of lyapunov stability theorem

Lecture 11 - BIBO vs Lyapunov Stability

Lecture 12 - BIBO vs Lyapunov Stability

Lecture 13 - Tutorial - 2

Lecture 14 - Introduction to Controllability

Lecture 15 - Reachability and Controllability Gramians

Lecture 16 - Controllability Matrix

Lecture 17 - Discrete-time Reachability and Controllability Gramians

Lecture 18 - Tests for controllability - I

Lecture 19 - Tests for controllability - II

Lecture 20 - Tutorial - 3

Lecture 21 - Tests for controllability - III

Lecture 22 - Tests for controllability - IV

Lecture 23 - Controllable Decomposition - I

Lecture 24 - Stabilizable Systems

Lecture 25 - Tests for Stabilizability

Lecture 26 - Tutorial - 4

Lecture 27 - State Feeback - I

Lecture 28 - State Feeback - II

Lecture 29 - Lyapunov Method of State Feedback Design

Lecture 30 - Regulation and Tracking

Lecture 31 - Tutorial - 5

Lecture 32 - Robust Tracking and Disturbance Rejection

Lecture 33 - State Feedback design for Multi-input systems

Lecture 34 - Linear Quadratic Regulator

Lecture 35 - Tutorial - 6

Lecture 36 - Output feedback and observability

Lecture 37 - Duality and Observability tests

Lecture 38 - Decompostions and Detectability

Lecture 39 - Minimal Realisations

Lecture 40 - Observer Design and Output Feedback

Lecture 41 - Observer Design and Output Feedback

Lecture 42 - UIO

Lecture 43 - Tutorial - 7 and 8 (combined)

NPTEL : NOC:A brief Introduction of Micro-Sensors (Electrical Engineering)

Co-ordinators : Prof. Santanu Talukder

Lecture 1 - Introduction to Microscale Sensors or MEMS

Lecture 2 - Scaling effect

Lecture 3 - Some Simple Mechanics

Lecture 4 - Basic Mechanics - Part 1

Lecture 5 - Basic Mechanics - Part 2

Lecture 6 - Basic Mechanics - Part 3

Lecture 7 - Electrostatics

Lecture 8 - Electrostatic force

Lecture 9 - Coupled electromechanics

Lecture 10 - Stiction

Lecture 11 - Si crystal structure

Lecture 12 - Si etching

Lecture 13 - KOH etching

Lecture 14 - TMAH etching

Lecture 15 - Deposition and Lithography

Lecture 16 - Lithography

Lecture 17 - Pressure sensor types, membrane, Piezoelectric sensing, capacitive sensing

Lecture 18 - Pressure Sensor - II

Lecture 19 - Pressure Sensor - III

Lecture 20 - Accelerometer - I

Lecture 21 - Accelerometer - II

Lecture 22 - Assignment 1

Lecture 23 - Assignment 2

NPTEL : NOC:Fiber Optic Communication Technology (Electrical Engineering)

Co-ordinators : Prof. Deepa Venkitesh

Lecture 1 - Introduction to FOCT: Prerequisites, Course Content and Learning Outcomes

Lecture 2 - Communication through the ages

Lecture 3 - Communication: Basics - 1

Lecture 4 - Communication: Basics - 2

Lecture 5 - Digital Communication for Optical Communication

Lecture 6 - Digital modulation: Basics - 2

Lecture 7 - Digital modulation: Basics - 3

Lecture 8 - Optical communication system

Lecture 9 - Assignment Discussion - Week 1

Lecture 10 - Optical Sources

Lecture 11 - Semiconductor gain media- structure, spectrum

Lecture 12 - Optical sources: LED

Lecture 13 - External Quantum Efficiency

Lecture 14 - Modulation Bandwidth of LED

Lecture 15 - Optical and Electrical Bandwidth of LED

Lecture 16 - Emission Pattern of LED

Lecture 17 - Optical Sources: Laser Diodes over LEDs

Lecture 18 - Laser Diodes: Resonator Concepts 1a

Lecture 19 - Laser Diodes: Resonator Concepts 1b

Lecture 20 - Laser Diodes: Resonator Concepts 1c

Lecture 21 - Assignment Discussion - Week 2

Lecture 22 - Laser Diodes: Gain Coefficient

Lecture 23 - Laser Diodes: Photon life time

Lecture 24 - Laser rate equation: Steady State solution1

Lecture 25 - Laser rate equation: LI Chara

Lecture 26 - Laser power derivation

Lecture 27 - Modulation Response of Laser - 1

Lecture 28 - Modulation Response of Laser - 2

Lecture 29 - Modulation Response of Laser - 3

Lecture 30 - Setbacks of direct modulation of laser: Modulation Chirp

Lecture 31 - Setbacks of direct modulation of laser: Transcient Chirp

Lecture 32 - Assignment Discussion - Week 3

Lecture 33 - Recap of direction modulation consequences

Lecture 34 - Noise in Lasers

Lecture 35 - Relative Intensity Noise

Lecture 36 - Laser Phase Noise - 1

Lecture 37 - Laser Phase Noise - 2

Lecture 38 - Effect of Laser Phase Noise: A case study

Lecture 39 - Electro-optic phase modulation

Lecture 40 - Electro-optic intensity modulator

Lecture 41 - Biasing of MZM: BPSK Generation

Lecture 42 - Biasing of MZM: QPSK and 16 QAM Generation

Lecture 43 - Line coding schemes and their bandwidth requirements

Lecture 44 - Assignment Discussion - Week 4

Lecture 45 - Introduction to optical Fiber

Lecture 46 - Attenuation in optical fibers

Lecture 47 - Fiber Modes

Lecture 48 - Modes of a step index fiber - 1

Lecture 49 - Modes of a step index fiber - 2

Lecture 50 - Modes of a step index fiber - 3

Lecture 51 - Modes of a step index fiber - 4

Lecture 52 - Modes of a step index fiber - 5

Lecture 53 - Modes and Cut-off conditions

Lecture 54 - Universal b-V curves

Lecture 55 - Modal Profiles in step index fiber

Lecture 56 - Mode Field Diameter

Lecture 57 - Dispersion- Intermodal dispersion derivation

Lecture 58 - Dispersion-Bit rate distance Product

Lecture 59 - Phase Velocity and Group Velocity - 1

Lecture 60 - Phase Velocity and Group Velocity - 2

Lecture 61 - Material dispersion

Lecture 62 - Waveguide dispersion

Lecture 63 - Total Dispersion in optical fiber

Lecture 64 - Polarization mode dispersion

Lecture 65 - Photodetectors concepts

Lecture 66 - p-n and p-i-n Photodetectors

Lecture 67 - Avalance Photodetector

Lecture 68 - Direct detection receiver and sources of noise

Lecture 69 - Quantifying noises in direct detection receivers

Lecture 70 - SNR and Operation Regimes

Lecture 71 - Noise Equivalent power and SNR in APDs

Lecture 72 - Coherent Receivers

Lecture 73 - SNR analysis of coherent receivers

Lecture 74 - Performance Evaluation - 1

Lecture 75 - Performance Evaluation - 2

Lecture 76 - Performance Metrics: BER,Q, and Receiver Sensitivity

Lecture 77 - Performance Metrics:Q and SNR

Lecture 78 - Quantum limit of photodetection

Lecture 79 - Optical Amplifier

Lecture 80 - Erbium doped fiber amplifier - 1

Lecture 81 - Erbium doped fiber amplifier - 2

Lecture 82 - Erbium doped fiber amplifier - 3

Lecture 83 - Erbium doped fiber amplifier - 4

Lecture 84 - Link Design - Rise Time Budget

Lecture 85 - Link Design - Case Study

Lecture 86 - Link Design - Passive Optical Network and long haul link

Lecture 87 - Dispersion - Recap

Lecture 88 - Dispersion Compensation - Pulse Propagation with disperison

Lecture 89 - Pulse propagation - 2

Lecture 90 - Dispersion Compensation - Dispersion Transfer Function

Lecture 91 - Dispersion Compensation - Case Study

Lecture 92 - Dispersion COmpensation - WDM and DSP

Lecture 93 - Nonlinear Effects- Nonlinear refractive Index

Lecture 94 - Self Phase Modulation

Lecture 95 - Cross Phase Modulation

Lecture 96 - Scattering Processes in optical fibers

Lecture 97 - Stimulated Brillouin Scattering

Lecture 98 - Stimulated Raman Scattering

Lecture 99 - Components - Directional Couplers

Lecture 100 - Components - VOA, Polariser, Polarisation Controllers

Lecture 101 - Components - Isolator

Lecture 102 - Components - Circulator, Definitions

Lecture 103 - Components - Wavelength filters

Lecture 104 - Components - Arrayed Waveguide Gratings, WSS

Lecture 105 - Balanced Detection

Lecture 106 - Polarisation Diverse Coherent Receiver

Lecture 107 - Phase and Polarisation Diverse Coherent Reciever

Lecture 108 - Overview of impairments in coherent optical communication

Lecture 109 - Transceiver impairments - Generation and Compensation

Lecture 110 - Channel Impairments - Generation and Compensation

Lecture 111 - Demo video

Lecture 112 - Introduction to Optical Networks

Lecture 113 - Layers of Optical Network

Lecture 114 - SDH/SONET Layering, Frame Structure

Lecture 115 - Physical Networks Topologies

Lecture 116 - Topology specific Link Design

Lecture 117 - Network Protection

Lecture 118 - Access Networks- PON

Lecture 119 - Optical Interconnects, Data Centers

Lecture 120 - Optical communication for Wireless Fronthauling

NPTEL : NOC:Image Signal Processing (Electrical Engineering)

Co-ordinators : Prof. A. N. Rajagopalan

Lecture 1 - Course Introduction

Lecture 2 - Applications of Image processing

Lecture 3 - Applications of Image processing (Continued...)

Lecture 4 - Basics of Images

Lecture 5 - Shot Noise

Lecture 6 - Geometric Transformations

Lecture 7 - Geometric Transformations (Continued...)

Lecture 8 - Bilinear Interpolation

Lecture 9 - Geometric Transformations (Continued...)

Lecture 10 - Projective Transformation

Lecture 11 - Homography

Lecture 12 - Homography - Special cases

Lecture 13 - Computing Homography

Lecture 14 - RANSAC

Lecture 15 - Rotational Homography

Lecture 16 - Research Challenges

Lecture 17 - Real Aperture Camera

Lecture 18 - Real aperture camera - Introduction

Lecture 19 - Cricle of confusion

Lecture 20 - Depth of field, Linearity

Lecture 21 - Space-Invariance

Lecture 22 - 2D Convolution

Lecture 23 - 2D Convolution

Lecture 24 - Blur Models

Lecture 25 - Space-variant Blurring

Lecture 26 - Shape from X - Introduction

Lecture 27 - 2-View Stereo

Lecture 28 - Introduction to Shape from Focus

Lecture 29 - SFF Principle

Lecture 30 - Shape from focus - Gaussian fitting

Lecture 31 - Shape from focus - Focus operators

Lecture 32 - Shape from Focus - Examples

Lecture 33 - Shape from Focus - Tensor Voting

Lecture 34 - DFD Principle

Lecture 35 - Motion Blur

Lecture 36 - Image Transforms - Introduction

Lecture 37 - Image Transforms - Motivation

Lecture 38 - 1D Unitary Transforms - Introduction

Lecture 39 - Extending 1D Unitary Transform to 2D - Motivation

Lecture 40 - Extending 1D Unitary Transform to 2D - Example

Lecture 41 - Alternative Forms of 2D

Lecture 42 - Kronecker Product

Lecture 43 - Kronecker Product - (Example Revisited)

Lecture 44 - Extending 1D Unitary Transform to 2D - Summary

Lecture 45 - 1D DFT to 2D DFT

Lecture 46 - 2D DFT Visualization

Lecture 47 - 2D DFT - Computation

Lecture 48 - 1D DCT - Definition, Motivation

Lecture 49 - Relation to DFT

Lecture 50 - 2D DCT and Walsh-Haddamard Transform

Lecture 51 - Data Dependent Transforms, Karhunen Loeve Transform

Lecture 52 - Karhunen-Loeve Transform (KLT) - Concept

Lecture 53 - Karhunen-Loeve Transform (KLT) - Applications

Lecture 54 - Karhunen-Loeve Transform (KLT) - Applications

Lecture 55 - Singular Value Decomposition (SVD)

Lecture 56 - Applications of SVD

Lecture 57 - Change detection

Lecture 58 - Image Thresholding

Lecture 59 - Adaptive Local thresholding - Motivation

Lecture 60 - Chow-Kaneko Local thresholding

Lecture 61 - K-Means Method

Lecture 62 - ISODATA Method

Lecture 63 - Theory of Histogram Equalization and Modification

Lecture 64 - Histogram Equalization example

Lecture 65 - Image sequence and Single image filtering in Gaussian noise

Lecture 66 - Non-local Means Method

Lecture 67 - Non-local Means Filtering (Examples)

Lecture 68 - Impulse Noise Generator

Lecture 69 - Impulse noise filtering

Lecture 70 - Transform Domain Filtering

Lecture 71 - Illumination Handling

Lecture 72 - Applications of Restoration, and Image Deblurring

Lecture 73 - Haddamard's conditions and Least squares solution

Lecture 74 - Min-norm solution and Norm of Linear operator

Lecture 75 - Numerical stability analysis

Lecture 76 - Image Deblurring

Lecture 77 - Tikhonov-Miller Regularization

Lecture 78 - Conditional Mean as an Estimator

Lecture 79 - Linear Estimator

Lecture 80 - Wiener Filter

Lecture 81 - Fourier Wiener Filter

Lecture 82 - 1D Superresolution

Lecture 83 - Superresolution Examples

NPTEL : NOC:Fundamentals of Electric Vehicles: Technology and Economics (Electrical Engineering)

Co-ordinators : Prof. Ashok Jhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha, Prof. L Kannan

Lecture 1 - Overview of Electric Vehicles in India

Lecture 2 - Can India Drive its EV program Innovatively and Differently and scale? - Part 1

Lecture 3 - Can India Drive its EV program Innovatively and Differently and scale? - Part 2

Lecture 4 - A bit about batteries

Lecture 5 - Charging and Swapping Infrastructure

Lecture 6 - Where will we get Lithium for batteries?

Lecture 7 - EV Subsystems

Lecture 8 - Forces acting when a vehicle move

Lecture 9 - Aerodynamic drag, Rolling Resistance and Uphill Resistance

Lecture 10 - Power and Torque to accelerate

Lecture 11 - Putting it all together - 1

Lecture 12 - Putting it all together - 2

Lecture 13 - Concept of Drive Cycle - 1

Lecture 14 - Concept of Drive Cycle - 2

Lecture 15 - Drive Cycles and Energy used per km - Part 1

Lecture 16 - Drive Cycles and Energy used per km - Part 2

Lecture 17 - EV Subsystem: Design of EV Drive Train - Part 1

Lecture 18 - EV Subsystem: Design of EV Drive Train - Part 2

Lecture 19 - Introduction to Battery Parameters - Part 1

Lecture 20 - Introduction to Battery Parameters - Part 2

Lecture 21 - Why Lithium Ion Battery? - Part 1

Lecture 22 - Why Lithium Ion Battery? - Part 2

Lecture 23 - Batteries in Future

Lecture 24 - Li-Ion Battery Cells

Lecture 25 - SoH and SoC estimation and Self Discharge - Part 1

Lecture 26 - SoH and SoC estimation and Self Discharge - Part 2

Lecture 27 - Battery Pack Development - Part 1

Lecture 28 - Battery Pack Development - Part 2

Lecture 29 - Computation of Effective cost of battery - Part 1

Lecture 30 - Computation of Effective cost of battery - Part 2

Lecture 31 - Charging Batteries

Lecture 32 - Fundamentals of Battery Pack Design

Lecture 33 - Mechanical Design - Part 1

Lecture 34 - Mechanical Design - Part 2

Lecture 35 - Mechanical Design - Part 3

Lecture 36 - Mechanical Design - Part 4

Lecture 37 - Thermal Design - Part 1

Lecture 38 - Thermal Design - Part 2

Lecture 39 - Thermal Design - Part 3

Lecture 40 - Thermal Design - Part 4

Lecture 41 - Electrical Design - Part 1

Lecture 42 - Electrical Design - Part 2

Lecture 43 - Electrical Design - Part 3

Lecture 44 - BMS Design of Electic Vehicle - Part 1

Lecture 45 - BMS Design of Electic Vehicle - Part 2

Lecture 46 - BMS Design of Electic Vehicle - Part 3

Lecture 47 - EV Motors and Controllers - Understanding Flow - Part 1

Lecture 48 - EV Motors and Controllers - Understanding Flow - Part 2

Lecture 49 - Power and Efficiency

Lecture 50 - Torque Production - Part 1

Lecture 51 - Torque Production - Part 2

Lecture 52 - Torque Production - Part 3

Lecture 53 - Speed and Back EMF

Lecture 54 - The d-q Equivalent circuit - Part 1

Lecture 55 - The d-q Equivalent circuit - Part 2

Lecture 56 - Field-oriented Control

Lecture 57 - Three phase AC - Part 1

Lecture 58 - Three phase AC - Part 2

Lecture 59 - Thermal Design - Part 1

Lecture 60 - Thermal Design - Part 2

Lecture 61 - Engineering Considerations - Part 1

Lecture 62 - Engineering Considerations - Part 2

Lecture 63 - Future Frontiers

Lecture 64 - EV Chargers: Introduction

Lecture 65 - EV Chargers: Slow or Fast - Part 1

Lecture 66 - EV Chargers: Slow or Fast - Part 2

Lecture 67 - Battery Swapping

Lecture 68 - Standardization and On board Chargers

Lecture 69 - Public Chargers - Part 1

Lecture 70 - Public Chargers - Part 2

Lecture 71 - Bulk Chargers/Swap Stations - Part 1

Lecture 72 - Bulk Chargers/Swap Stations - Part 2

Lecture 73 - Economics of Public Chargers in context

Lecture 74 - Analytics - Part 1

Lecture 75 - Analytics - Part 2

Lecture 76 - Course Summary

NPTEL : NOC:Applied Linear Algebra (Electrical Engineering)

Co-ordinators : Prof. Andrew Thangaraj

Lecture 1 - Introduction to the Course

Lecture 2 - Vector Spaces: Introduction

Lecture 3 - Linear Combinations and Span

Lecture 4 - Subspaces, Linear Dependence and Independence

Lecture 5 - Basis and Dimension

Lecture 6 - Sums, Direct Sums and Gaussian Elimination

Lecture 7 - Linear Maps and Matrices

Lecture 8 - Null space, Range, Fundamental theorem of linear maps

Lecture 9 - Column space, null space and rank of a matrix

Lecture 10 - Algebraic operations on linear maps

Lecture 11 - Invertible maps, Isomorphism, Operators

Lecture 12 - Solving Linear Equations

Lecture 13 - Elementary Row Operations

Lecture 14 - Translates of a subspace, Quotient Spaces

Lecture 15 - Row space and rank of a matrix

Lecture 16 - Determinants

Lecture 17 - Coordinates and linear maps under a change of basis

Lecture 18 - Simplifying matrices of linear maps by choice of basis

Lecture 19 - Polynomials and Roots

Lecture 20 - Invariant subspaces, Eigenvalues, Eigenvectors

Lecture 21 - More on Eigenvalues, Eigenvectors, Diagonalization

Lecture 22 - Eigenvalues, Eigenvectors and Upper Triangularization

Lecture 23 - Properties of Eigenvalues

Lecture 24 - Linear state space equations and system stability

Lecture 25 - Discrete-time Linear Systems and Discrete Fourier Transforms

Lecture 26 - Sequences and counting paths in graphs

Lecture 27 - PageRank Algorithm

Lecture 28 - Dot product and length in Cn, Inner product and norm in V over F

Lecture 29 - Orthonormal basis and Gram-Schmidt orthogonalisation

Lecture 30 - Linear Functionals, Orthogonal Complements

Lecture 31 - Orthogonal Projection

Lecture 32 - Projection and distance from a subspace

Lecture 33 - Linear equations, Least squares solutions and Linear regression

Lecture 34 - Minimum Mean Squared Error Estimation

Lecture 35 - Adjoint of a linear map

Lecture 36 - Properties of Adjoint of a Linear Map

Lecture 37 - Adjoint of an Operator and Operator-Adjoint Product

Lecture 38 - Self-adjoint Operator

Lecture 39 - Normal Operators

Lecture 40 - Complex Spectral Theorem

Lecture 41 - Real Spectral Theorem

Lecture 42 - Positive Operators

Lecture 43 - Quadratic Forms, Matrix Norms and Optimization

Lecture 44 - Isometries

Lecture 45 - Classification of Operators

Lecture 46 - Singular Values and Vectors of a Linear Map

Lecture 47 - Singular Value Decomposition

Lecture 48 - Polar decomposition and some applications of SVD

NPTEL : NOC:Basic Electrical Circuits (Electrical Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 1 - Preliminaries

Lecture 2 - Current

Lecture 3 - Voltage

Lecture 4 - Electrical elements and circuits

Lecture 5 - Kirchhoff's current law (KCL)

Lecture 6 - Kirchhoff's voltage law (KVL)

Lecture 7 - Voltage source

Lecture 8 - Current source

Lecture 9 - Resistor

Lecture 10 - Capacitor

Lecture 11 - Inductor

Lecture 12 - Mutual inductor

Lecture 13 - Linearity of elements

Lecture 14 - Series connection-Voltage sources in series

Lecture 15 - Series connection of R, L, C, current source

Lecture 16 - Elements in parallel

Lecture 17 - Current source in series with an element; Voltage source in parallel with an element

Lecture 18 - Extreme cases: Open and short circuits

Lecture 19 - Summary

Lecture 20 - Voltage controlled voltage source (VCVS)

Lecture 21 - Voltage controlled current source (VCCS)

Lecture 22 - Current controlled voltage source (CCVS)

Lecture 23 - Current controlled current source (CCCS)

Lecture 24 - Realizing a resistance using a VCCS or CCCS

Lecture 25 - Scaling an element's value using controlled sources

Lecture 26 - Example calculation

Lecture 27 - Power and energy absorbed by electrical elements

Lecture 28 - Power and energy in a resistor

Lecture 29 - Power and energy in a capacitor

Lecture 30 - Power and energy in an inductor

Lecture 31 - Power and energy in a voltage source

Lecture 32 - Power and energy in a current source

Lecture 33 - Goals of circuit analysis

Lecture 34 - Number of independent KCL equations

Lecture 35 - Number of independent KVL equations and branch relationships

Lecture 36 - Analysis of circuits with a single independent source

Lecture 37 - Analysis of circuits with multiple independent sources using superposition

Lecture 38 - Superposition: Example

Lecture 39 - What is nodal analysis

Lecture 40 - Setting up nodal analysis equations

Lecture 41 - Structure of the conductance matrix

Lecture 42 - How do elements circuit appear in the nodal analysis formulation

Lecture 43 - Completely solving the circuit starting from nodal analysis

Lecture 44 - Nodal analysis example

Lecture 45 - Matrix inversion basics

Lecture 46 - Nodal analysis with independent voltage sources

Lecture 47 - Supernode for nodal analysis with independent voltage sources

Lecture 48 - Nodal analysis with VCCS

Lecture 49 - Nodal analysis with VCVS

Lecture 50 - Nodal analysis with CCVS

Lecture 51 - Nodal analysis with CCCS

Lecture 52 - Nodal analysis summary

Lecture 53 - Planar circuits

Lecture 54 - Mesh currents and their relationship to branch currents

Lecture 55 - Mesh analysis

Lecture 56 - Mesh analysis with independent current sources-Supermesh

Lecture 57 - Mesh analysis with current controlled voltage sources

Lecture 58 - Mesh analysis with current controlled current sources

Lecture 59 - Mesh analysis using voltage controlled sources

Lecture 60 - Nodal analysis versus Mesh analysis

Lecture 61 - Superposition theorem

Lecture 62 - Pushing a voltage source through a node

Lecture 63 - Splitting a current source

Lecture 64 - Substitution theorem: Current source

Lecture 65 - Substitution theorem: Voltage source

Lecture 66 - Substituting a voltage or current source with a resistor

Lecture 67 - Extensions to Superposition and Substitution theorem

Lecture 68 - Thevenin's theorem

Lecture 69 - Worked out example: Thevenin's theorem

Lecture 70 - Norton's theorem

Lecture 71 - Worked out example: Norton's theorem

Lecture 72 - Maximum power transfer theorem

Lecture 73 - Preliminaries

Lecture 74 - Two port parameters

Lecture 75 - y parameters

Lecture 76 - y parameters: Examples

Lecture 77 - z parameters

Lecture 78 - z parameters: Examples

Lecture 79 - h parameters

Lecture 80 - h parameters: Examples

Lecture 81 - g parameters

Lecture 82 - g parameters: Examples

Lecture 83 - Calculations with a two-port element

Lecture 84 - Calculations with a two-port element

Lecture 85 - Degenerate cases

Lecture 86 - Relationships between different two-port parameters

Lecture 87 - Equivalent circuit representation of two-ports

Lecture 88 - Reciprocity

Lecture 89 - Proof of reciprocity of resistive two-ports

Lecture 90 - Proof for 4-terminal two-ports

Lecture 91 - Reciprocity in terms of different two-port parameters

Lecture 92 - Reciprocity in circuits containing controlled sources

Lecture 93 - Examples

Lecture 94 - Feedback amplifier using an opamp

Lecture 95 - Ideal opamp

Lecture 96 - Negative feedback around the opamp

Lecture 97 - Finding opamp sign for negative feedback

Lecture 98 - Example: Determining opamp sign for negative feedback

Lecture 99 - Analysis of circuits with opamps

Lecture 100 - More on opamps: Example circuits and additional topics

Lecture 101 - Inverting amplifier

Lecture 102 - Summing amplifier

Lecture 103 - Instrumentation amplifier

Lecture 104 - Negative resistance

Lecture 105 - Finding opamp signs for negative feedback-circuits with multiple opamps

Lecture 106 - Opamp supply voltages and saturation

Lecture 107 - KCL with an opamp and supply currents

Lecture 108 - Circuits with storage elements (capacitors and inductors)

Lecture 109 - First order circuit with zero input-natural response

Lecture 110 - First order RC circuit with zero input-Example

Lecture 111 - First order circuit with a constant input

Lecture 112 - General form of the first order circuit response

Lecture 113 - First order RC circuit with a constant input-Example

Lecture 114 - First order circuit with piecewise constant input

Lecture 115 - First order circuit with piecewise constant input-Example

Lecture 116 - First order circuit-Response of arbitrary circuit variables

Lecture 117 - Summary: Computing first order circuit response

Lecture 118 - Does a capacitor block DC?

Lecture 119 - Finding the order of a circuit

Lecture 120 - First order RC circuits with discontinuous capacitor voltages

Lecture 121 - Summary: Computing first order circuit response with discontinuities

Lecture 122 - First order RL circuits

Lecture 123 - First order RL circuit with discontinuous inductor current-Example

Lecture 124 - First order RC circuit with an exponential input

Lecture 125 - First order RC response to its own natural response

Lecture 126 - First order RC response to a sinusoidal input

Lecture 127 - First order RC response to a sinusoidal input-via the complex exponential

Lecture 128 - Summary: Linear circuit response to sinusoidal input via the complex exponential

Lecture 129 - Three methods of calculating the sinusoidal steady state response

Lecture 130 - Calculating the total response including initial conditions

Lecture 131 - Why are sinusoids used in measurement?

Lecture 132 - Second order system natural response

Lecture 133 - Second order system as a cascade of two first order systems

Lecture 134 - Second order system natural response-critically damped and underdamped

Lecture 135 - Generalized form of a second order system

Lecture 136 - Numerical example

Lecture 137 - Series and parallel RLC circuits

Lecture 138 - Forced response of a second order system

Lecture 139 - Steady state response calculation and Phasors

Lecture 140 - Phasors (Continued...)

Lecture 141 - Magnitude and Phase plots

Lecture 142 - Magnitude and phase plotes of a second order system

Lecture 143 - Maximum power transfer and Conjugate matching

NPTEL : NOC:Optical Fiber Sensors (Electrical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

Lecture 1 - Introduction to optical sensors

Lecture 2 - Different types of optical sensors

Lecture 3 - Overview of distributed sensors

Lecture 4 - Optical sensors system

Lecture 5 - Optical sources

Lecture 6 - Optical receivers - 1

Lecture 7 - Optical receivers - 2

Lecture 8 - Optical receivers - 3

Lecture 9 - Optical receiver design

Lecture 10 - Noise Analysis

Lecture 11 - Sensor Performance characteristics

Lecture 12 - Noise Mitigation Techniques

Lecture 13 - Lock in detection

Lecture 14 - Amplitude modulated sensors - 1

Lecture 15 - Gas absoprtion spectroscopy

Lecture 16 - Amplitude modulated sensors - 2

Lecture 17 - Amplitude modulated sensors - 3

Lecture 18 - Amplitude modulated sensors - 4

Lecture 19 - Problem Discussion

Lecture 20 - Pulse-oximeter

Lecture 21 - Phase modulated sensors - 1

Lecture 22 - Phase modulated sensors - 2

Lecture 23 - Phase modulated Sensors - 3

Lecture 24 - Phase modulated sensors - 4

Lecture 25 - Phase modulated sensors - 5

Lecture 26 - Phase modulated sensors - 6

Lecture 27 - Phase modulated sensors - 7

Lecture 28 - Phase modulated sensors - 8

Lecture 29 - Phase modulated sensors - 9

Lecture 30 - Phase modulated sensors - 10

Lecture 31 - Phase modulated Sensors - 11

Lecture 32 - Wavelength modulated sensors - 1

Lecture 33 - Wavelength modulated sensors - 2

Lecture 34 - Wavelength modulated sensors - 3

Lecture 35 - Wavelength modulated sensors - 4

Lecture 36 - Wavelength modulated sensors - 5

Lecture 37 - Wavelength modulated sensors - 6

Lecture 38 - Wavelength modulated sensors - 7

Lecture 39 - Wavelength modulated sensors - 8

Lecture 40 - Polarization modulated sensors - 1

Lecture 41 - Polarization modulated sensors - 2

Lecture 42 - Polarization modulated sensors - 3

NPTEL : NOC:Introduction to Time - Varying Electrical Networks (Electrical Engineering)

Co-ordinators : Prof. Shanthi Pavan

Lecture 1 - Course Introduction and Motivation

Lecture 2 - Kirchoff's Current and Voltage Laws, and the Incidence Matrix

Lecture 3 - Power Conservation and Tellegen's Theorem

Lecture 4 - Intuition behind Tellegen's Theorem

Lecture 5 - Tellegen's Theorem and reciprocity in linear resistive networks

Lecture 6 - Why is reciprocity useful in practice?

Lecture 7 - Inter-reciprocity in linear time-invariant networks

Lecture 8 - Inter-reciprocity in linear time-invariant networks (Continued...)

Lecture 9 - Inter-reciprocity in networks with ideal operational amplifiers

Lecture 10 - Review of Modified Nodal Analysis (MNA) of linear networks

Lecture 11 - MNA stamps of controlled sources - the VCCS and VCVS

Lecture 12 - MNA stamps of controlled sources - the CCCS and CCVS

Lecture 13 - Inter-reciprocity in linear networks - using the MNA stamp approach

Lecture 14 - The Adjoint Network

Lecture 15 - MNA stamp of an ideal opamp

Lecture 16 - Properties of circuits with multiple ideal opamps

Lecture 17 - Introduction to noise in electrical networks

Lecture 18 - Noise processed by a linear time-invariant system

Lecture 19 - kT/C noise in a sample-and-hold circuit

Lecture 20 - Noise in RLC networks

Lecture 21 - Total integrated noise in RLC Networks

Lecture 22 - Bode's Noise Theorem - Frequency domain

Lecture 23 - Input referred noise in electrical networks - Part 1

Lecture 24 - Input referred noise in electrical networks - Part 2

Lecture 25 - Input referred noise and the noise factor

Lecture 26 - Noise Factor Examples

Lecture 27 - Motivation to learn about time-varying circuits and systems - Part 1

Lecture 28 - Motivation to learn about time-varying circuits and systems - Part 2

Lecture 29 - Convolution integral for LTV systems

Lecture 30 - Frequency response of an LTV system

Lecture 31 - LTV system example : Time-varying RC filter

Lecture 32 - Linear Periodically Time-Varying Systems (LPTV)

Lecture 33 - Response of an LPTV system to a complex exponential input

Lecture 34 - Harmonic Transfer Functions

Lecture 35 - Zadeh expansion of an LPTV system

Lecture 36 - MNA analysis of LPTV networks

Lecture 37 - MNA stamp of a periodically time varying conductance

Lecture 38 - MNA stamp of a capacitor and a voltage source in an LPTV network

Lecture 39 - Analysis of an example LPTV network - Part 1

Lecture 40 - Analysis of an example LPTV network - Part 2

Lecture 41 - LPTV network analysis, RC filter, time-varying

Lecture 42 - Impedance and admittance in LTI and LPTV networks

Lecture 43 - Thevenin and Norton's Theorems for LPTV networks

Lecture 44 - The N-path principle

Lecture 45 - N-path example

Lecture 46 - Time-domain intuition of the N-path principle

Lecture 47 - N-path example: Time-Interleaved ADCs

Lecture 48 - Dc-dc converter as an LPTV system

Lecture 49 - N-path principle: Multiphase dc-dc converter

Lecture 50 - The N-path filter

Lecture 51 - Computing H_0(j2\pi f_s) for a 4-path filter

Lecture 52 - Input impedance of the 4-path filter at f_s

Lecture 53 - Computing H_0(j2\pi 2 f_s) for a 4-path filter

Lecture 54 - Determining H_0 for input frequency deviations from f_s

Lecture 55 - Reciprocity and Inter-reciprocity in LPTV networks : Part 1

Lecture 56 - Reciprocity and Inter-reciprocity in LPTV networks : Part 2, the transfer-function theorem

Lecture 57 - Why is the transfer-function theorem important?

Lecture 58 - The frequency-reversal theorem for inter-reciprocal (adjoint) LPTV networks : introduction

Lecture 59 - The frequency-reversal theorem for inter-reciprocal (adjoint) LPTV networks : derivation

Lecture 60 - Why is the frequency-reversal theorem important?

Lecture 61 - Inter-reciprocity in signal-flow graphs

Lecture 62 - Applications of inter-reciprocity: analysis of chopped amplifiers

Lecture 63 - Applications of inter-reciprocity: analysis of chopped amplifiers (Continued...)

Lecture 64 - Applications of inter-reciprocity: chopping with square-wave modulation

Lecture 65 - Applications of inter-reciprocity: the switched-RC network

Lecture 66 - Time-domain implications of inter-reciprocity and the adjoint network

Lecture 67 - Time-domain implications of inter-reciprocity and the adjoint network : Example calculation

Lecture 68 - LPTV networks with sampled outputs: Switched capacitor circuits

Lecture 69 - LPTV networks with sampled outputs: A continuous-time delta-sigma data converter

Lecture 70 - LPTV networks with sampled outputs: The equivalent LTI filter

Lecture 71 - Finding the equivalent LTI filter of a sampled LPTV system : example

Lecture 72 - Equivalent LTI filter for a switched-RC network

Lecture 73 - Finding the equivalent LTI filter of a sampled LPTV system : example of a continuous-time delta-sigma modulator

Lecture 74 - Finding the equivalent LTI filter of a sampled LPTV system with offset sampling

Lecture 75 - LPTV networks driven by modulated inputs

Lecture 76 - Introduction to noise in LPTV Networks

Lecture 77 - Noise in LPTV networks with sampled outputs

Lecture 78 - Total integrated noise in networks with R,L,C and periodically operated switches

NPTEL : NOC:Digital System Design (Electrical Engineering)

Co-ordinators : Prof. Neeraj Goel

Lecture 1 - Introduction

Lecture 2 - Analog vs Digital

Lecture 3 - Binary number system - 1

Lecture 4 - Binary number system - 2

Lecture 5 - Negative number representation - 1

Lecture 6 - Negative number representation - 2

Lecture 7 - Other number systems

Lecture 8 - Floating point numbers - 1

Lecture 9 - Floating point numbers - 2

Lecture 10 - Floating point numbers - 3

Lecture 11 - Floating point numbers - 4

Lecture 12 - Floating point numbers - 5

Lecture 13 - Boolean functions

Lecture 14 - Boolean Algebra

Lecture 15 - SOP and POS Representation

Lecture 16 - Algebraic simplifications

Lecture 17 - Canonical form

Lecture 18 - Boolean minimization using K-Maps

Lecture 19 - More Logic gates

Lecture 20 - Hardware description language:Verilog

Lecture 21 - Verilog simulation demo

Lecture 22 - K-maps

Lecture 23 - QM-method

Lecture 24 - Area delay model

Lecture 25 - Multi-level logic

Lecture 26 - Multiplexer

Lecture 27 - Four state logic

Lecture 28 - Decoders - 1

Lecture 29 - Decoders - 2

Lecture 30 - Encoders

Lecture 31 - Programmable hardware

Lecture 32 - Ripple carry adder

Lecture 33 - Carry look ahead adder

Lecture 34 - Modeling BUS in Verilog

Lecture 35 - Fast adder:Carry select adder

Lecture 36 - Multiple operand adder

Lecture 37 - Multiplication

Lecture 38 - Iterative circuits - 1

Lecture 39 - Iterative circuits - 2

Lecture 40 - Introduction to sequential circuits

Lecture 41 - Latches

Lecture 42 - D-Flip-flops

Lecture 43 - More Flip-flops

Lecture 44 - Counters

Lecture 45 - Verilog-Behavior model - 1

Lecture 46 - Verilog-Behavior model - 2

Lecture 47 - Registers - 1

Lecture 48 - Registers - 2

Lecture 49 - Memory

Lecture 50 - Sequential circuit analysis

Lecture 51 - Derivation state graph

Lecture 52 - Sequence detector: Example 1

Lecture 53 - Sequence detector: Example 2

Lecture 54 - State machine reduction

Lecture 55 - State encoding

Lecture 56 - Multi-cycle adder design

Lecture 57 - Pipelined adder design

Lecture 58 - Multiplication design

Lecture 59 - Division hardware design

Lecture 60 - Interacting state machines

Lecture 61 - Register Transfer Level design

Lecture 62 - GCD computer at RTL Level

Lecture 63 - RTL Design - Bubble sort

Lecture 64 - RTL Design - Traffic light controller

Lecture 65 - FPGA

Lecture 66 - Xilinx CLB

Lecture 67 - FPGA - Design flow

Lecture 68 - FPGA design demo

Lecture 69 - Introduction to ASIC design flow - Part 1

Lecture 70 - Introduction to ASIC design flow - Part 2

Lecture 71 - Future directions

NPTEL : NOC:Stochastic Modeling and the Theory of Queues (Electrical Engineering)

Co-ordinators : Prof. Krishna Jagannathan

Lecture 1 - Review of Probability Theory: Random Variable

Lecture 2 - Sequence of Random Variables

Lecture 3 - Laws of Large Numbers and Central Limit Theorem

Lecture 4 - What is a stochastic process?

Lecture 5 - Counting Process

Lecture 6 - Poisson Process - Introduction

Lecture 7 - Poisson Process - Memorylessness

Lecture 8 - Poisson Process - Increment properties

Lecture 9 - Distribution of arrival epoch Sn and N(t) for a Poisson Process

Lecture 10 - Alternate definitions of a Poisson Process

Lecture 11 - Merging of Poisson Processes - Part 1

Lecture 12 - Merging of Poisson Processes - Part 2

Lecture 13 - Splitting of Poisson Process - Part 1

Lecture 14 - Splitting of Poisson Process - Part 2

Lecture 15 - Example: Poisson Splitting

Lecture 16 - Conditional arrival density and order statistics - Part 1

Lecture 17 - Conditional arrival density and order statistics - Part 2

Lecture 18 - Non Homogeneous Poisson Process

Lecture 19 - Introduction to Queueing (with examples)

Lecture 20 - Examples: Non homogeneous Poisson process

Lecture 21 - Examples: Competing Poisson processes

Lecture 22 - Introduction to Renewal Processes

Lecture 23 - Strong law for renewal processes

Lecture 24 - Strong law for renewal processes - Proof

Lecture 25 - Residual life, age and duration (Time average) - Part 1

Lecture 26 - Residual life, age and duration (Time average) - Part 2

Lecture 27 - Renewal Reward Theorem (Time average) - Part 1

Lecture 28 - Renewal Reward Theorem (Time average) - Part 2

Lecture 29 - Stopping time

Lecture 30 - Wald's Equality

Lecture 31 - Wald's Equality (Continued...)

Lecture 32 - Elementary Renewal Theorem

Lecture 33 - The Renewal Equation

Lecture 34 - The Renewal Equation (Continued...)

Lecture 35 - G/G/1 Queue and Little's theorem

Lecture 36 - Little's theorem

Lecture 37 - M/G/1 Queue

Lecture 38 - M/G/1 Queue and PK Formula

Lecture 39 - M/G/1 Queue and PK Formula (Continued...)

Lecture 40 - Ensemble rewards - Age and Duration

Lecture 41 - Ensemble rewards - Age and Duration (Continued...)

Lecture 42 - Key Renewal Theorem and Ensemble rewards

Lecture 43 - Introduction to finite state Discrete Time Markov Chains

Lecture 44 - Class and Types of Classes in a DTMC

Lecture 45 - Periodicity in a DTMC

Lecture 46 - Matrix Representation of a DTMC

Lecture 47 - The long term behaviour of a DTMC

Lecture 48 - Stationary Distribution and Long term behaviour of a DTMC - Part 1

Lecture 49 - Stationary Distribution and Long term behaviour of a DTMC - Part 2

Lecture 50 - Stationary Distribution and Long term behaviour of a DTMC - Part 3

Lecture 51 - Spectral Properties of Stochastic Matrices - Part 1

Lecture 52 - Spectral Properties of Stochastic Matrices - Part 2

Lecture 53 - The Short-term Behaviour of a DTMC

Lecture 54 - Introduction to Countable-state DTMC

Lecture 55 - Introduction to Countable-state DTMC (Continued...)

Lecture 56 - The Strong Markov Property

Lecture 57 - Renewal Theory applied to DTMC's

Lecture 58 - Stationary Distribution of a Countable State Space DTMC and Renewal Theory

Lecture 59 - Stationary Distribution of a Countable State Space DTMC and Renewal Theory (Continued...)

Lecture 60 - Stationary Distribution and The Steady State Behaviour of a Countable-state DTMC - Part 1

Lecture 61 - Stationary Distribution and The Steady State Behaviour of a Countable-state DTMC - Part 2

Lecture 62 - Convergence to Steady State of a Coutable-state DTMC (Stochastic Coupling)

Lecture 63 - The Birth-Death Markov Chains

Lecture 64 - The Reversibility Markov Chains

Lecture 65 - The Reversibility Markov Chains (Continued...)

Lecture 66 - Time Sampled M/M/1 Queue and The Burke's Theorem

Lecture 67 - Introduction to Continuous Time Markov Chains

Lecture 68 - Introduction to CTMC (Continued...)

Lecture 69 - The Steady State Behaviour of CTMC - Part 1

Lecture 70 - The Steady State Behaviour of CTMC - Part 2

Lecture 71 - The Steady State Behaviour of CTMC - Part 3

Lecture 72 - The Steady State Behaviour of CTMC - Part 4

Lecture 73 - The chapman-kolmogrov equations for CTMC's

Lecture 74 - The Birth-Death Continuous time Markov Chains

Lecture 75 - The Reversibility of Continuous time Markov Chains

Lecture 76 - Burke's Theorem and the Tandem Queues - Part 1

Lecture 77 - Burke's Theorem and the Tandem Queues - Part 2

Lecture 78 - The Jackson Networks - Part 1

Lecture 79 - The Jackson Networks - Part 2

Lecture 80 - Semi Markov Processes - Part 1

Lecture 81 - Semi Markov Processes - Part 2

NPTEL : NOC:Integrated Photonics Devices and Circuits (Electrical Engineering)

Co-ordinators : Prof. Bijoy Krishna Das

Lecture 1 - Course Background and Learning Outcome

Lecture 2 - Moore's Law and Interconnect Bottleneck

Lecture 3 - Progress in Optical Interconnect Technology and Beyond

Lecture 4 - Evolution of Silicon Photonics Platform

Lecture 5 - Fundamentals of Lightwaves: EM Waves: Maxwell Equations and Plane Wave Solutions

Lecture 6 - Fundamentals of Lightwaves: EM Waves: Wave Propagation in Lossy Dielectric Medium

Lecture 7 - Fundamentals of Lightwaves: EM Waves in Metals and Semiconductors

Lecture 8 - Fundamentals of Lightwaves: EM Waves: Plasma Dispersion

Lecture 9 - Fundamentals of Lightwaves: EM Waves Principle of Optical Waveguiding

Lecture 10 - Fundamentals of Lightwaves: 1-D Optical Waveguide: Ray Optics Model

Lecture 11 - Optical Waveguides: Theory and Design: TIR Based Eigen Mode Solutions for Slab Waveguides

Lecture 12 - Optical Waveguides: Theory and Design: TIR Based Design Solutions for Slab Waveguides

Lecture 13 - Optical Waveguides: Theory and Design: Guided ModeSolutions for Slab Waveguides

Lecture 14 - Optical Waveguides: Theory and Design: Guided ModeSolutions for Slab Waveguides cont

Lecture 15 - Optical Waveguides: Theory and Design: Guided Mode Dispersionand Power in Slab Waveguides

Lecture 16 - Optical Waveguides: Theory and Design: Optical Waveguide with 2D confinement

Lecture 17 - Optical Waveguides: Theory and Design: Dispersion and Polarization of Guided Modes

Lecture 18 - Optical Waveguides: Theory and Design: Orthogonalityof Guided Modes

Lecture 19 - Optical Waveguides: Theory and Design: Coupled Mode Theoryof Guided Modes

Lecture 20 - Optical Waveguides: Theory and Design: Coupled Mode Theory (Continued...)

Lecture 21 - Optical Waveguides: Theory and Design: Coupled Mode Theory (Continued...)

Lecture 22 - Integrated Optical Components: Y-Junction Power Splitter/Combiner and Mach-Zehnder Interferometer

Lecture 23 - Integrated Optical Components: Directional Coupler: Coupled Waveguides

Lecture 24 - Integrated Optical Components: Directional Coupler: Coupled Waveguides (Continued...)

Lecture 25 - Integrated Optical Components: Directional Coupler: Design and Modelling

Lecture 26 - Integrated Optical Components: DC based MZI and Microring Resonator (MRR)

Lecture 27 - Integrated Optical Components: Microring Resonator (MRR): Passive Characteristics

Lecture 28 - Integrated Optical Components: Distributed Bragg Reflector (DBR)

Lecture 29 - Integrated Optical Components: Distributed Bragg Reflector (DBR): Device Design - Part 1

Lecture 30 - Integrated Optical Components: Distributed Bragg Reflector (DBR): Device Design - Part 2

Lecture 31 - Tunable Devices and Reconfigurable Circuits: Phase Error Interference

Lecture 32 - Tunable Devices and Reconfigurable Circuits: Post Fabrication Phase Error Corrections

Lecture 33 - Tunable Devices and Reconfigurable Circuits: Thermo-Optic Switching and Tuning

Lecture 34 - Tunable Devices and Reconfigurable Circuits: Programmable Silicon Photonics

Lecture 35 - Electro-Optic Modulators for Integrated Photonics: Basic Design and Working Principle

Lecture 36 - Electro-Optic Modulators for Integrated Photonics: Various Physical Mechanisms

Lecture 37 - Electro-Optic Modulators for Integrated Photonics: FCCE Based Silicon Photonics Modulator

Lecture 38 - Light Sources and Photodetectors for Integrated Photonics: Integrated Photonic light Sources - Part 1

Lecture 39 - Light Sources and Photodetectors for Integrated Photonics: Integrated Photonic light Sources - Part 2

Lecture 40 - Light Sources and Photodetectors for Integrated Photonics: Photodetectors for Silicon Photonics

NPTEL : NOC:Introduction to Semiconductor Devices (Electrical Engineering)

Co-ordinators : Prof. Naresh Kumar Emani

Lecture 1 - Types of Semiconductors

Lecture 2 - Classical Vs Quantum Mechanics

Lecture 3 - Electrons in infinite and finite 1D potential well

Lecture 4 - 3D potential well model of atom and Bohr's model

Lecture 5 - Covalent bonds and inter-atomic interactions in Silicon

Lecture 6 - Energy band formation

Lecture 7 - Electron hole pair generation

Lecture 8 - Direct and Indirect bandgap semiconductors

Lecture 9 - Energy levels in infinite and finite potential wells (short demo)

Lecture 10 - Effective mass in Semiconductors

Lecture 11 - Intrinsic carrier density

Lecture 12 - Doping and extrinsic semiconductors

Lecture 13 - Fermi level in extrinsic semiconductors

Lecture 14 - Temperature dependence of Fermi level

Lecture 15 - Temperature dependence of Fermi level

Lecture 16 - Charge neutrality relationship

Lecture 17 - Drift current and energy band representation of kinetic energy of carriers

Lecture 18 - Semiconductor bands in a electric field

Lecture 19 - Diffusion current

Lecture 20 - Non-uniform doping

Lecture 21 - Equilibrium Vs Nonequilibrium carrier response

Lecture 22 - Minority carrier diffusion equation (MCDE) - Example problems

Lecture 23 - Quasi Fermi level in nonequilibrium conditions

Lecture 24 - Quasi Fermi level and minority carrier diffusion length

Lecture 25 - Semiconductor device fabrication

Lecture 26 - PN Junctions - An introduction

Lecture 27 - PN Junction electrostatics

Lecture 28 - Energy band diagram of PN junction

Lecture 29 - Depletion width and peak electric field

Lecture 30 - PN junction electrostatics - examples

Lecture 31 - Demo of PN Junction Lab on Nanohub

Lecture 32 - Forward and reverse biased PN junctions

Lecture 33 - Minority carrier injection in PN junctions

Lecture 34 - Current in forward biased PN junction

Lecture 35 - Current in reverse biased PN junction

Lecture 36 - Depletion capacitance in PN junction

Lecture 37 - Non-idealities in PN junction diode

Lecture 38 - Nanohub Demo - PN Junction with applied bias

Lecture 39 - Schottky barrier in metal-semiconductor junction

Lecture 40 - Current flow across a Schottky barrier

Lecture 41 - Ohmic vs rectifying contacts

Lecture 42 - An Ideal MOS Capacitor

Lecture 43 - Operating regimes of a MOSCAP

Lecture 44 - Simplified band diagrams of accumulation and depletion in MOSCAP

Lecture 45 - Inversion in a MOSCAP

Lecture 46 - NMOSCAP in accumulation mode

Lecture 47 - NMOSCAP in depletion mode

Lecture 48 - NMOSCAP in inversion mode

Lecture 49 - Exact solution vs delta-depletion approximation

Lecture 50 - Threshold voltage in a MOSCAP

Lecture 51 - Nanohub Demo - MOSCAP tool

Lecture 52 - Non-ideal MOS Capacitor

Lecture 53 - MOSCAP Capacitance-Voltage (CV) Characteristics

Lecture 54 - Example problems with MOSCAPs

Lecture 55 - Impact of doping, oxide thickness and temperature on CV

Lecture 56 - Nanohub Demo - MOS CV

Lecture 57 - Introduction to MOSFET

Lecture 58 - Operating modes of a MOSFET

Lecture 59 - IV Characteristics of a long channel MOSFET

Lecture 60 - Example problems with MOSFETs

Lecture 61 - MOSFET device metrics

Lecture 62 - CMOS Technology

Lecture 63 - MOSFET Scaling and technology nodes

Lecture 64 - Limits of scaling

Lecture 65 - Current characteristics of a short channel MOSFET

Lecture 66 - Threshold voltage characteristics of short channel MOSFET

Lecture 67 - MOSFETs in the 21st century

Lecture 68 - Optical absorption and bandgap

Lecture 69 - Introduction to solar cells

Lecture 70 - Efficiency of a solar cell

Lecture 71 - Types of photodetectors

Lecture 72 - PIN and avalanche Photodectectors

Lecture 73 - Photodetector metrics

Lecture 74 - Radiative absoption and emission processes

Lecture 75 - Materials for optoelectronic devices

Lecture 76 - Operation of a light emitting diode (LED)

Lecture 77 - LED emission spectrum

Lecture 78 - Stimulated emission and lasing

NPTEL : NOC:Electric Vehicles and Renewable Energy (Electrical Engineering)

Co-ordinators : Prof. Ashok Jhunjhunwala, Prof. Prabhjot Kaur, Prof. Kaushal Kumar Jha, Prof. L Kannan

Lecture 1 - Electric Vehicle Introduction

Lecture 2 - The drive Torque, Power, Speed and Energy

Lecture 3 - Energy Source

Lecture 4 - Vehicle Auxillary, Petrol pumps and Charging stations

Lecture 5 - Introduction to Electric Vehicles in India

Lecture 6 - Can India Drive its EV program Innovatively and Differently and scale

Lecture 7 - Battery Cost reduction strategy

Lecture 8 - A bit about Batteries, Charging and Swapping Infrastructure

Lecture 9 - Where will we get Lithium for batteries and EV Subsystems

Lecture 10 - Forces acting when a vehicle move

Lecture 11 - Aerodynamic drag, Rolling Resistance and Uphill Resistance

Lecture 12 - Power and torque to accelerate

Lecture 13 - Putting it all together - 1

Lecture 14 - Putting it all together - 2

Lecture 15 - Concept of drive cycle - 1

Lecture 16 - Concept of drive cycle - 2

Lecture 17 - Drive Cycles and Energy used per km - Part 1

Lecture 18 - Drive Cycles and Energy used per km - Part 2

Lecture 19 - EV Subsystem: Design of EV Drive Train - Part 1

Lecture 20 - EV Subsystem: Design of EV Drive Train - Part 2

Lecture 21 - Introduction to Battery Parameters - Part 1

Lecture 22 - Introduction to Battery Parameters - Part 2

Lecture 23 - Why Lithium Ion Battery? - Part 1

Lecture 24 - Why Lithium Ion Battery? - Part 2

Lecture 25 - Batteries in Future

Lecture 26 - Li-Ion Battery Cells

Lecture 27 - SoH and SoC estimation and Self Discharge - Part 1

Lecture 28 - SoH and SoC estimation and Self Discharge - Part 2

Lecture 29 - Battery Pack Development - Part 1

Lecture 30 - Battery Pack Development - Part 2

Lecture 31 - Computation of Effective cost of battery - Part 1

Lecture 32 - Computation of Effective cost of battery - Part 2

Lecture 33 - Charging Batteries

Lecture 34 - Fundamentals of Battery Pack Design

Lecture 35 - Electrical Design of Battery Pack - Part 1

Lecture 36 - Electrical Design of Battery Pack - Part 2

Lecture 37 - Electrical Design of Battery Pack - Part 3

Lecture 38 - Mechanical Design of Battery Pack - Part 1

Lecture 39 - Mechanical Design of Battery Pack - Part 2

Lecture 40 - Mechanical Design of Battery Pack - Part 3

Lecture 41 - Mechanical Design of Battery Pack - Part 4

Lecture 42 - Thermal Design of Battery Pack - Part 1

Lecture 43 - Thermal Design of Battery Pack - Part 2

Lecture 44 - Thermal Design of Battery Pack - Part 3

Lecture 45 - Thermal Design of Battery Pack - Part 4

Lecture 46 - BMS Design and Embedded System - Part 1

Lecture 47 - BMS Design and Embedded System - Part 2

Lecture 48 - BMS Design and Embedded System - Part 3

Lecture 49 - BMS Design and Embedded System - Part 4

Lecture 50 - BMS Design and Embedded System - Part 5

Lecture 51 - Cell Testing and Characterization - Part 1

Lecture 52 - Cell Testing and Characterization - Part 2

Lecture 53 - EV Motors and Controllers - Vehicle Dynamics - Part 1

Lecture 54 - EV Motors and Controllers - Vehicle Dynamics - Part 2

Lecture 55 - EV Motors and Controllers - Understanding Flow - Part 1

Lecture 56 - EV Motors and Controllers - Understanding Flow - Part 2

Lecture 57 - Power and Efficiency

Lecture 58 - Torque Production - Part 1

Lecture 59 - Torque Production - Part 2

Lecture 60 - Torque Production - Part 3

Lecture 61 - Speed and Back EMF

Lecture 62 - The d-q Equivalent circuit - Part 1

Lecture 63 - The d-q Equivalent circuit - Part 2

Lecture 64 - Field-oriented Control

Lecture 65 - Three phase AC - Part 1

Lecture 66 - Three phase AC - Part 2

Lecture 67 - Thermal Design - Part 1

Lecture 68 - Thermal Design - Part 2

Lecture 69 - Thermal Design - Part 3

Lecture 70 - Engineering Considerations - Part 1

Lecture 71 - Engineering Considerations - Part 2

Lecture 72 - Engineering Considerations - Part 3 and Future Frontiers

Lecture 73 - EV Charger Introduction

Lecture 74 - Charger Paramaters and Types

Lecture 75 - Slow Fast chargers and Swapping

Lecture 76 - Swapping

Lecture 77 - Standardization and on board chargers

Lecture 78 - Public chargers

Lecture 79 - Public charger economics in Indian Context

Lecture 80 - Bulk Chargers, Swapping stations and data analytics

Lecture 81 - Introduction to Energy Scenario in India - Part 1

Lecture 82 - Introduction to Energy Scenario in India - Part 2

Lecture 83 - A novel Approach towards 100% RE in India - Part 1

Lecture 84 - A novel Approach towards 100% RE in India - Part 2

Lecture 85 - Going Beyond solar, wind, Li Ion and chilled water storage

Lecture 86 - Solar Photovoltaic

Lecture 87 - Solar Cell and its Characteristics

Lecture 88 - Solar Cells to Modules

Lecture 89 - Wind Energy

Lecture 90 - The War of Currents

Lecture 91 - The Birth of Solar - DC

Lecture 92 - Storage Options for Energy - Part 1

Lecture 93 - Storage Options for Energy - Part 2

Lecture 94 - Storage Options for Energy - Part 3

Lecture 95 - Storage Options for Energy - Part 4

Lecture 96 - The EV Ecosystem - Part 1

Lecture 97 - The EV Ecosystem - Part 2

NPTEL : Phase-locked loops (Electrical Engineering)

Co-ordinators : Dr. Saurabh Saxena

Lecture 1 - Course Introduction and Motivation - Part I

Lecture 2 - Course Introduction and Motivation - Part II

Lecture 3 - Basic Operation of a Phase Locked Loop

Lecture 4 - Simple Implementation of a Phase Locked Loop

Lecture 5 - Input Output Characteristics of Basic PLL Blocks

Lecture 6 - Time Domain Analysis of a Simple PLL

Lecture 7 - Time Domain Versus Small Signal Analysis of a Simple PLL

Lecture 8 - Type and Order of PLL

Lecture 9 - Small Signal Analysis of Type-I/II/III PLLs for Phase Step, Frequency Step and Frequency Ramp

Lecture 10 - Frequency Acquisition Range for PLLs

Lecture 11 - Frequency Acquisition in Type-I PLLs

Lecture 12 - Frequency Acquisition Limits in Type-I PLLs

Lecture 13 - Frequency Acquisition in Type II PLLs

Lecture 14 - Frequency Acquisition Ranges in Type II PLLs with Ideal and Non Ideal Integrator

Lecture 15 - Frequency Domain Insight in Frequency Acquisition for Type II PLLs

Lecture 16 - Introduction to Clock Multipliers

Lecture 17 - Analog Phase Error Detectors - Part I

Lecture 18 - Analog Phase Error Detectors - Part II

Lecture 19 - Digital Phase Error Detectors - Part I

Lecture 20 - Digital Phase Error Detectors - Part II

Lecture 21 - Range Extension for Phase Error Detectors

Lecture 22 - Phase Frequency Detector

Lecture 23 - Digital Frequency Detector

Lecture 24 - Charge Pump PLL

Lecture 25 - Small Signal and Stability Analysis of Type II Order 2 Charge Pump PLL

Lecture 26 - Problems in Charge Pump PLL - Dead Zone in PFD

Lecture 27 - Problems in Charge Pump PLL - Reference Spur

Lecture 28 - Design Procedure for Type-II Order 3 Charge Pump PLL

Lecture 29 - Design Procedure for Charge Pump Clock Multiplier

Lecture 30 - Sources of Non-Linearities in CP-PLL - Part I

Lecture 31 - Sources of Non-Linearities in CP-PLL - Part II

Lecture 32 - Noise Analysis in CP-PLL - Part I

Lecture 33 - Noise Analysis in CP PLL - Part II

Lecture 34 - Noise Analysis in CP-PLL - Part III

Lecture 35 - Noise Simulations for CP-PLL Blocks

Lecture 36 - Introduction to Oscillators

Lecture 37 - Low Swing Ring Oscillator - Part I

Lecture 38 - Low-Swing Ring Oscillator - Part II

Lecture 39 - Large-Swing Ring Oscillator - Part I

Lecture 40 - Large-Swing Ring Oscillator - Part II

Lecture 41 - Large-Swing Ring Oscillator - Part III

Lecture 42 - Large-Swing Ring Oscillator - Part IV

Lecture 43 - Large-Swing Ring Oscillator - Part V

Lecture 44 - Supply Regulated VCO - Part I

Lecture 45 - Supply Regulated VCO - Part II

Lecture 46 - Supply Regulated VCO - Part III

Lecture 47 - Phase Noise in Ring Oscillators

Lecture 48 - Circuit level Design of PFD - Part I

Lecture 49 - Circuit level Design of PFD - Part II

Lecture 50 - Circuit level Design of PFD - Part III

Lecture 51 - Circuit level Design of Charge Pump - Part I

Lecture 52 - Circuit-level Design of Charge Pump - Part II

Lecture 53 - Circuit-level Design of Charge Pump - Part III

Lecture 54 - Circuit-level Design of Charge Pump - Part IV

Lecture 55 - Circuit-level Design of Charge Pump - Part V

Lecture 56 - Circuit-level Design of Charge Pump - Part VI

Lecture 57 - Circuit-level Design of Clock Frequency Divider

Lecture 58 - Techniques for Wide Frequency Range Clock Multiplier

Lecture 59 - Introduction to Digital PLL

Lecture 60 - Design of Time-to-Digital Converter

Lecture 61 - Small Signal Analysis of Digital PLL

Lecture 62 - Noise Analysis in Digital PLL

Lecture 63 - Analog/Digital Hybrid PLL - Part I

Lecture 64 - Analog/Digital Hybrid PLL - Part II

Lecture 65 - Course Summary

NPTEL : NOC:Fundamentals of Nano and Quantum Photonics (Electrical Engineering)

Co-ordinators : Prof. Naresh Kumar Emani

Lecture 1 - Review of Maxwell's Equations

Lecture 2 - Wave Equation

Lecture 3 - Dispersion Relation

Lecture 4 - Propagating and Evanescent Waves

Lecture 5 - Diffraction Limit and Spatial Frequencies

Lecture 6 - Plane Waves

Lecture 7 - Optical Response of Materials

Lecture 8 - Lorentz Model

Lecture 9 - Properties of Lorentz Oscillator Model

Lecture 10 - Drude-Lorentz Model for Metals

Lecture 11 - Kramers-Kronig Relation

Lecture 12 - Engineering Optical Response of Materials

Lecture 13 - Low dimensional systems

Lecture 14 - Absorption in Semiconductors

Lecture 15 - Optical gain in semiconductors

Lecture 16 - Absorption in low-dimensional semiconductors

Lecture 17 - Selection rules for optical processes

Lecture 18 - Scattering of EM radiation

Lecture 19 - LSPR: Quasi-static approximation

Lecture 20 - Size dependence of Plasmon Resonance

Lecture 21 - Tuning Plasmonic Resonances

Lecture 22 - Surface Plasmon Polariton(SPP)

Lecture 23 - Understanding SPP Dispersion Diagram

Lecture 24 - Exciting Surface Plasmon Polaritons

Lecture 25 - Analytical Calculation of Scattering Coefficients - IPython code overview

Lecture 26 - EM Waves in Multilayer Stack - T Matrix formulation

Lecture 27 - Photonic Bandgap in 1D

Lecture 28 - EM Waves in 1D Photonic Crystal

Lecture 29 - Diffracton Grating

Lecture 30 - Applications of Photonic Crystals

Lecture 31 - PhC in 1D - T-matrix examples

Lecture 32 - Introduction to Metamaterials

Lecture 33 - Metamaterials at GHz and THz frequecies

Lecture 34 - Negative index materials at optical frequencies

Lecture 35 - Plasmonic Metasurfaces

Lecture 36 - Dielectric Metasurfaces

Lecture 37 - Tunable and Active Metamaterials

Lecture 38 - Radiative Absorption and Emission

Lecture 39 - Miniaturization of Integrated Photonic Devices

Lecture 40 - Recent trends in nanoscale lasers

Lecture 41 - Non-Hermitian Systems

Lecture 42 - Resonant light-atom interactions

Lecture 43 - Experimental observation of Rabi oscillations

Lecture 44 - Atom-Cavity Interaction - Weak and strong coupling regimes

Lecture 45 - Experimental observation of weak and strong coupling

Lecture 46 - Fabrication of nanophotonic structures - 1

Lecture 47 - Fabrication of nanophotonic structures - 2

Lecture 48 - Measuring light quanta

Lecture 49 - Photon Statistics

Lecture 50 - Photodetection and shot noise limit

Lecture 51 - Second order correlation function

Lecture 52 - Hanbury Brown-Twiss Experiment with Photons

Lecture 53 - EM Waves as harmonic oscillator

Lecture 54 - Vacuum fluctuations

Lecture 55 - Coherent and squeezed states

Lecture 56 - Squeezed and photon number states

Lecture 57 - Application of squeezed states

Lecture 58 - Preliminaries for quantum theory of light

Lecture 59 - Quantum theory of light

Lecture 60 - Operator solution of quantum harmonic oscillator

Lecture 61 - Photon number states

Lecture 62 - Field quadratures and operators

Lecture 63 - Uncertainty relations for quantum light

Lecture 64 - Applications of quantum light - Quantum Key Distribution

NPTEL : NOC:Analog Electronic Circuits (IITM) (Electrical Engineering)

Co-ordinators : Prof. Shanthi Pavan

Lecture 1 - Introduction Linear and Nonlinear Network

Lecture 2 - Small Signal Analysis of Nonlinear Networks

Lecture 3 - Small Signal Analysis

Lecture 4 - Incremental Model for Common Two Terminal Element Passive Two Terminal Elements

Lecture 5 - Linear and Nonlinear Two Ports and the Incremental Y Matrix

Lecture 6 - Graphical Representation of the Y Matrix

Lecture 7 - Nonlinear Two Ports With Incremental Gain

Lecture 8 - IV Charateristic of a Nonlinear 2 port with Incremental Gain

Lecture 9 - The MOSFET and its Characterisitics

Lecture 10 - Deriving the Common V Source Amplifier - Part 1

Lecture 11 - The Common Source Amplifier

Lecture 12 - Large Signal Behaviour of the Common Source Amplifier

Lecture 13 - The Common Source Amplifier Swing Limits

Lecture 14 - Introduction to Robust Biasing

Lecture 15 - Robust Biasing Part 1 Common Source Amplifier with DC Drain Feedback

Lecture 16 - Robust Biasing with the Current Mirror and Drain Gate Resistor

Lecture 17 - Robust Baising With Source Feedback - Part 1

Lecture 18 - Robust Biasing with Source Feedback - Part 2

Lecture 19 - Robust Biasing with Source Degeneration

Lecture 20 - Introduction to Negative Feedback

Lecture 21 - The Ideal Operational Amplifier

Lecture 22 - Negative Feedback (Continued...)

Lecture 23 - Robust Baising with Drain Measurement and Source Feedback

Lecture 24 - Robust biasing with source measurement and gate feedback

Lecture 25 - The Incremental Voltage Controlled Voltage Source The Common drain Amplifier Incremental Picture

Lecture 26 - Baising of the Common Drain Amplifier and Signal Swings

Lecture 27 - The VCVS Continued, the Incremental

Lecture 28 - Introducing the Current Controlled Voltage Source

Lecture 29 - The Incremental Current Controlled Voltage Source Transimpedance Amplifier

Lecture 30 - The Transimpedance amplifier (Continued...)

Lecture 31 - The Incremental current controlled current source, the common gate amplifier

Lecture 32 - Summary of controlled Sources and finite output Impedance of the Transistor

Lecture 33 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 1

Lecture 34 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 2

Lecture 35 - Effect of Finite Output Resistance on the Basic Building Blocks - Part 3

Lecture 36 - Finite output Effect in current Mirrors the Cascode Current Mirror

Lecture 37 - Comparison of Current Mirrors The High Swing Cascode

Lecture 38 - Precision High Swing Cascode

Lecture 39 - The PMOS transistor

Lecture 40 - Small Signal Model and Bias Stabilization

Lecture 41 - Basic Building Blocks with PMOS Devices

Lecture 42 - Fixed Transconductance Bias Circuits from First Principles

Lecture 43 - Limitation of a Resistive Load

Lecture 44 - The Active Load

Lecture 45 - The Active Load (Continued...)

Lecture 46 - The CMOS Inverter

Lecture 47 - The CMOS Inverter (Continued...)

Lecture 48 - The Differential Amplifier

Lecture 49 - Half - Circuit Analysis

Lecture 50 - The Different Amplifier with Active Load - Part 1

Lecture 51 - The Different Amplifier with Active Load - Part 2

Lecture 52 - Large Signal Behaviour of the Different Pair

Lecture 53 - The two Stage Opamp and Single Supply Operation

Lecture 54 - The two Stage Opamp (Continued...)

Lecture 55 - The Two Stage Opamp (Continued...)

Lecture 56 - Swing Limits of the Two Stage OTA

Lecture 57 - The Two-Stage Opamp

Lecture 58 - The Bandgap Reference Principle

Lecture 59 - The Bandgap Reference - Part 1

Lecture 60 - The Bandgap Reference - Part 2

Lecture 61 - Memory Effects in MOS Transistors

Lecture 62 - The Common Source Amplifier with Parasitic Capacitances

Lecture 63 - The Common Source Amplifier with Parasitic Capacitances

Lecture 64 - Frequency Response of the Common Drain Amplifier

Lecture 65 - Frequency Response of the Common Gate Amplifier

Lecture 66 - Stability of Negative Feedback System The First Order Forward Amplifier

Lecture 67 - Stabilty of Second Order Feedback System

Lecture 68 - Stability of Third Order Negative Feedback System

Lecture 69 - Dominant Pole Compensation - Part 1

Lecture 70 - Dominant Pole Cpmpensation - Part 2

Lecture 71 - Phase Margin

Lecture 72 - Example Phase Margin Caculations

Lecture 73 - Dominant Pole Compensation Summary

Lecture 74 - Phase Margin Example

Lecture 75 - The 2 Stage Miller Compensated Amplifier

Lecture 76 - 2 Stage Operational Amplifier and Miller Compensation (Continued...)

Lecture 77 - Intuition Behind the Dominant and Second Poles in a Miller Compensated OTA

Lecture 78 - 2 Stage Operational Amplifier and Miller Compensation Cancelling the RHP Zero

Lecture 79 - Miller Compensation OTA Schematic

Lecture 80 - Bipolar Junction Transistor Circuits-Device Equations and Small Signal Model

Lecture 81 - BJT Biasing and Basic Building Blocks

Lecture 82 - Bipolar Junction Transistor Circuits Swing Limits and Two Stage Opamp

Lecture 83 - Input Stage of the 741 Opamp

Lecture 84 - Basic Analysis of the 741

NPTEL : NOC:Modern Computer Vision (Electrical Engineering)

Co-ordinators : Prof. A. N. Rajagopalan

Lecture 1 - Course introduction - 1

Lecture 2 - Course introduction - 2

Lecture 3 - Introduction to Deep Learning - 1

Lecture 4 - Introduction to Deep Learning - 2

Lecture 5 - Introduction to Deep Learning - 3

Lecture 6 - Introduction to Neuron - 1

Lecture 7 - Introduction to Neuron - 2

Lecture 8 - Introduction to Neuron - 3

Lecture 9 - Multilayer Perceptron

Lecture 10 - Regression and classification losses

Lecture 11 - Training a neural network

Lecture 12 - Gradient descent

Lecture 13 - Activation function

Lecture 14 - Backpropagation in MLP - 1

Lecture 15 - Backpropagation in MLP - 2

Lecture 16 - Optimization and Regularization - 1

Lecture 17 - Optimization and Regularization - 2

Lecture 18 - Regularization

Lecture 19 - Dropout

Lecture 20 - Pre-processing

Lecture 21 - Convolutional Neural Networks - 1

Lecture 22 - Convolutional Neural Networks - 2

Lecture 23 - Convolutional Neural Networks - 3

Lecture 24 - CNN Properties

Lecture 25 - Alexnet

Lecture 26 - CNN Architectures - 1

Lecture 27 - CNN Architectures - 2

Lecture 28 - CNN Architectures - 3

Lecture 29 - Introduction to RNN - 1

Lecture 30 - Introduction to RNN - 2

Lecture 31 - Encoder-Decoder models in RNN

Lecture 32 - LSTM

Lecture 33 - Low-level vision - 1

Lecture 34 - Low-level vision - 2

Lecture 35 - Low-level vision - 3

Lecture 36 - Spatial Domain Filtering

Lecture 37 - Frequency Domain Filtering

Lecture 38 - Edge Detection - 1

Lecture 39 - Edge Detection - 2

Lecture 40 - DeepNets for Edge Detection

Lecture 41 - Line detection

Lecture 42 - Feature detectors

Lecture 43 - Harris Corner Detector - 1

Lecture 44 - Harris Corner Detector - 2

Lecture 45 - Harris Corner Detector - 3

Lecture 46 - Blob detection - 1

Lecture 47 - Blob detection - 2

Lecture 48 - Blob detection - 3

Lecture 49 - SIFT - 1

Lecture 50 - SIFT - 2

Lecture 51 - Feature descriptors - 1

Lecture 52 - Feature descriptors - 2

Lecture 53 - SURF - 1

Lecture 54 - SURF - 2

Lecture 55 - Single-View Geometry - 1

Lecture 56 - Single-View Geometry - 2

Lecture 57 - 2D Geometric transformations - 1

Lecture 58 - 2D Geometric transformations - 2

Lecture 59 - Camera intrinsics and extrinsics - 1

Lecture 60 - Camera intrinsics and extrinsics - 2

Lecture 61 - Two-view stereo - 1

Lecture 62 - Two-view stereo - 2

Lecture 63 - Two-view stereo - 3

Lecture 64 - Algebraic representation of epipolar geometry - 1

Lecture 65 - Algebraic representation of epipolar geometry - 2

Lecture 66 - Fundamental matrix computation - 1

Lecture 67 - Fundamental matrix computation - 2

Lecture 68 - Structure from Motion - 1

Lecture 69 - Structure from Motion - 2

Lecture 70 - Structure from Motion - 3

Lecture 71 - Batch processing in SFM

Lecture 72 - Multi-view SFM

Lecture 73 - Factorization methods in SFM

Lecture 74 - Bundle adjustment

Lecture 75 - Dense 3D reconstruction

Lecture 76 - Some results in Stereo and SFM

Lecture 77 - Deepnets for stereo and SFM - 1

Lecture 78 - Deepnets for stereo and SFM - 2

Lecture 79 - Mid-level vision - 1

Lecture 80 - Mid-level vision - 2

Lecture 81 - Lucas-Kanade method for OF

Lecture 82 - Handling large motion in optical flow

Lecture 83 - Image segmentation

Lecture 84 - GMM for clustering

Lecture 85 - Deepnets for Segmentation and OF -1

Lecture 86 - Deepnets for Segmentation and OF -2

Lecture 87 - Deepnets for Segmentation and OF -3

Lecture 88 - Deepnets for Object Detection - 1

Lecture 89 - Deepnets for Object Detection - 2

Lecture 90 - Vision and Language

NPTEL : NOC:Optical Wireless Communications for Beyond 5G Networks and IoT (Electrical Engineering)

Co-ordinators : Prof. Anand Srivastava

Lecture 1 - Introduction to Optical Wireless Communications (OWC)

Lecture 2 - Basics of Lighting System

Lecture 3 - Optical Sources (LED)

Lecture 4 - Optical Sources (LASER)

Lecture 5 - Photodetecors

Lecture 6 - Photodetectors (Continued...)

Lecture 7 - SNR for PIN and APD

Lecture 8 - Indoor OWC channel modelling

Lecture 9 - Indoor OWC channel modelling (Continued...)

Lecture 10 - Channel model for single source

Lecture 11 - Channel model for multiple sources

Lecture 12 - MIMO channel

Lecture 13 - MIMO channel (Continued...)

Lecture 14 - Outdoor Optical Channel Modelling

Lecture 15 - Range equation of FSO link

Lecture 16 - Range equation of FSO link (Continued...)

Lecture 17 - Atmospheric Turbulence

Lecture 18 - Atmospheric Turbulence (Continued...)

Lecture 19 - Turbulence Mitigation techniques

Lecture 20 - Underwater OWC Channel Model

Lecture 21 - Underwater OWC Channel Model (Continued...)

Lecture 22 - Modulation Schemes for OWC, BER for OOK

Lecture 23 - BER of M-PPM, BER of L-PPM

Lecture 24 - Differential Pulse Interval Modulation (DPIM) and (DAPPM)

Lecture 25 - Variable Pulse Position Modulation (VPPM)

Lecture 26 - OFDM Basics

Lecture 27 - Cyclic Prefix (CP), OFDM with CP, BER of OFDM System

Lecture 28 - Frequency Offset in OFDM, PAPR in OFDM

Lecture 29 - OFDM in VLC, DCO-OFDM

Lecture 30 - ACO-OFDM

Lecture 31 - Color Shift Keying (CSK)

Lecture 32 - Higher order CSK

Lecture 33 - NOMA

Lecture 34 - NOMA VLC

Lecture 35 - MIMO

Lecture 36 - VLC based MIMO NOMA

Lecture 37 - Power allocation in VLC based MIMO NOMA

Lecture 38 - Hybrid Network LiFi and WiFi Coexistance

Lecture 39 - Vehicle to Vehicle communication using Visible light

Lecture 40 - Anand Singh Part - 1

Lecture 41 - Anand Singh Part - 2

Lecture 42 - Dilnasin lecture - 1

Lecture 43 - Saswati Paramita

Lecture 44 - Dilnashin Tutorial - 2

Lecture 45 - Guriendar Prof Anand 001

Lecture 46 - Rehana Prof Anand

NPTEL : NOC:VLSI Design Flow: RTL to GDS (Electrical Engineering)

Co-ordinators : Prof. Sneh Saurabh

Lecture 1 - Basic Concepts of Integrated Circuit - I

Lecture 2 - Basic Concepts of Integrated Circuit - II

Lecture 3 - Overview of VLSI Design Flow - I

Lecture 4 - Overview of VLSI Design Flow - II

Lecture 5 - Tutorial 1

Lecture 6 - Overview of VLSI Design Flow - III

Lecture 7 - Overview of VLSI Design Flow - IV

Lecture 8 - Overview of VLSI Design Flow - V

Lecture 9 - Overview of VLSI Design Flow - VI

Lecture 10 - Introduction to TCL

Lecture 11 - Hardware Modeling: Introduction to Verilog - I

Lecture 12 - Hardware Modeling: Introduction to Verilog - II

Lecture 13 - Functional Verification using Simulation

Lecture 14 - High-level synthesis using Bambu - Tutorial 3

Lecture 15 - RTL Synthesis - Part I

Lecture 16 - RTL Synthesis - Part II

Lecture 17 - Logic Optimization - Part I

Lecture 18 - Simulation-based Verification using Icarus

Lecture 19 - Logic Optimization - Part II

Lecture 20 - Logic Optimization - Part III

Lecture 21 - Formal Verification - I

Lecture 22 - Logic Synthesis using Yosys

Lecture 23 - Formal Verification - II

Lecture 24 - Formal Verification - III

Lecture 25 - Formal Verification - IV

Lecture 26 - Technology Library

Lecture 27 - Logic Optimization using Yosys

Lecture 28 - Static Timing Analysis - I

Lecture 29 - Static Timing Analysis - II

Lecture 30 - Static Timing Analysis - III

Lecture 31 - Static Timing Analysis using OpenSTA

Lecture 32 - Constraints - I

Lecture 33 - Constraints - II

Lecture 34 - Technology Mapping

Lecture 35 - Timing-driven Optimization

Lecture 36 - Technology Library and Constraints

Lecture 37 - Power Analysis

Lecture 38 - Power Optimization

Lecture 39 - Basic Concepts of DFT

Lecture 40 - Scan Design Flow

Lecture 41 - Power Analysis using OpenSTA

Lecture 42 - Automatic Test Pattern Generation (ATPG)

Lecture 43 - Built-in Self Test (BIST)

Lecture 44 - Basic Concepts for Physical Design - I

Lecture 45 - Basic Concepts for Physical Design - II

Lecture 46 - Installation of OpenRoad

Lecture 47 - Chip Planning - I

Lecture 48 - Chip Planning - II

Lecture 49 - Placement

Lecture 50 - Chip Planning and Placement

Lecture 51 - Clock Tree Synthesis (CTS)

Lecture 52 - Routing

Lecture 53 - Post-layout Verification and Signoff

Lecture 54 - Clock Tree Synthesis (CTS) and Routing

NPTEL : NOC:Fundamentals of Wireless Communication (Hindi) (Electrical Engineering)

Co-ordinators : Dr.Vivek Bohara

Lecture 1 - Introduction to the Course

Lecture 2 - Basics of Wireless Communication Systems

Lecture 3 - Path-Loss Models for a Wireless Channel

Lecture 4 - Log-Normal Shadowing

Lecture 5 - Small-Scale Fading

Lecture 6 - Statistical Multipath Channel Models

Lecture 7 - MATLAB programming for Path Loss Models

Lecture 8 - Statistical Multipath Channel Models - Part 1

Lecture 9 - Statistical Multipath Channel Models - Part 2

Lecture 10 - Digital Modulation and Detection (Binary Modulations) - Part 1

Lecture 11 - Digital Modulation and Detection (Binary Modulations) - Part 2

Lecture 12 - Digital Modulation and Detection (Binary Modulations) - Part 3

Lecture 13 - MATLAB programming for Wireless Fading Channels

Lecture 14 - Digital Modulation and Detection (Binary Modulations) - Part 1

Lecture 15 - Digital Modulation and Detection (Binary Modulations) - Part 2

Lecture 16 - Digital Modulation and Detection (M-ary Modulation) - Part 1

Lecture 17 - Digital Modulation and Detection (M-ary Modulation) - Part 2

Lecture 18 - Digital Modulation and Detection (M-ary Modulation) - Part 3

Lecture 19 - MATLAB programming for Modulation Schemes

Lecture 20 - Digital Modulation and Detection (GMSK)

Lecture 21 - Performance of Digital Modulation over Wireless Channels

Lecture 22 - Performance of Digital Modulation over Wireless Channels

Lecture 23 - MATLAB programaming: Error performance in AWGN channel

Lecture 24 - Receiver Diversity Techniques - Part 1

Lecture 25 - Receiver Diversity Techniques - Part 2

Lecture 26 - Receiver Diversity Techniques - Part 3

Lecture 27 - Error performance in Fading Channel Part 1

Lecture 28 - Error performance in Fading Channel Part 2

Lecture 29 - Multi-Carrier Modulation and OFDM - Part 1

Lecture 30 - Multi-Carrier Modulation and OFDM - Part 2

Lecture 31 - Multi-Carrier Modulation and OFDM - Part 3

Lecture 32 - Multi-Carrier Modulation and OFDM - Part 4

Lecture 33 - Numerical on OFDM

Lecture 34 - Programming for OFDM

Lecture 35 - OFDM System with Cyclic Prefix

Lecture 36 - OFDM Signal Transmission and OFDM System Design

Lecture 37 - Advantages and Drawbacks of OFDM System

Lecture 38 - OFDM Standards

Lecture 39 - Multiple Access Schemes

Lecture 40 - Technologies for Wireless Cellular Standards

NPTEL : NOC:Sensor Technologies: Physics, Fabrication, and Circuits (Electrical Engineering)

Co-ordinators : Prof.Mitradip Bhattacharjee

Lecture 1 - Sensors and Transducers - Basics

Lecture 2 - Introduction to Sensors

Lecture 3 - Materials for sensors

Lecture 4 - Multidisciplinary Aspects of Sensors

Lecture 5 - Introduction to Sensor Parameters

Lecture 6 - Sensor Parameters - II

Lecture 7 - Sensor Parameters - III

Lecture 8 - Sensor Parameters - IV

Lecture 9 - Sensor Parameters - V

Lecture 10 - Numerical Examples

Lecture 11 - Introduction: Physics of Sensors

Lecture 12 - Capacitive Sensor Architecture

Lecture 13 - Different Types of Capacitive Sensors

Lecture 14 - Thermal Sensors Basics

Lecture 15 - Dynamic Condition of Thermal Sensors

Lecture 16 - Classification of Thermal Sensors

Lecture 17 - Chemical Sensor Basics

Lecture 18 - Electrochemical Sensors

Lecture 19 - Impedimetric Sensors

Lecture 20 - Numerical Examples

Lecture 21 - Physics of Optical Sensors

Lecture 22 - Physics of Magnetic Sensors

Lecture 23 - Physics of Acoustic Sensors

Lecture 24 - Physics of Microfluidic Sensors

Lecture 25 - Various Sensor Geometries and Examples

Lecture 26 - Microfabrication Technologies

Lecture 27 - Deposition Techniques

Lecture 28 - Physical Vapor Deposition

Lecture 29 - Chemical Vapor Deposition

Lecture 30 - Patterning Techniques

Lecture 31 - Lithography Techniques

Lecture 32 - Basics of Etching Techniques

Lecture 33 - Dry Etching Techniques

Lecture 34 - Optical and Electron Microscopy

Lecture 35 - Other Microscopy Techniques

Lecture 36 - Sensor System: Basic Circuits

Lecture 37 - Amplifier Circuits

Lecture 38 - Instrumentation Amplifier

Lecture 39 - Filter Circuits

Lecture 40 - Sensor System: Experimental Demonstration

NPTEL : NOC:Advanced topics in Wireless Communication (Hindi) (Electrical Engineering)

Co-ordinators : Prof. Vivek Ashok Bohara

Lecture 1 - Overview of Advanced Topics in Wireless Communication System - Part A

Lecture 2 - Overview of Advanced Topics in Wireless Communication System - Part B

Lecture 3 - Revision of Wireless Fundamentals - Part A

Lecture 4 - Revision of Wireless Fundamentals - Part B

Lecture 5 - Revision of Wireless Fundamentals - Part C

Lecture 6 - Revision of Wireless Fundamentals - Part D

Lecture 7 - Revision of Wireless Fundamentals - Part E

Lecture 8 - Channel Capacity in AWGN channel

Lecture 9 - Channel Capacity in flat fading channel

Lecture 10 - Channel Capacity with Optimal Power Adaptation

Lecture 11 - Tutorial 1 - MATLAB Tutorial: Channel Capacity

Lecture 12 - Introduction to Channel Coding

Lecture 13 - Channel Coding: Uncoded and Coded Performnace

Lecture 14 - Introduction to Linear Block Codes

Lecture 15 - Tutorial 2 - MATLAB Tutorial: Linear Block Codes

Lecture 16 - Linear Block Codes: Error Detection

Lecture 17 - Linear Block Codes: Error Correction

Lecture 18 - Examples of Linear Block Codes

Lecture 19 - Introduction to Convolution Codes

Lecture 20 - Convolution Code: Decoder-Viterbi Algorithm

Lecture 21 - Tutorial 3 - MATLAB Tutorial: Syndrome Identification and Correction

Lecture 22 - Convolution Codes: State Diagram and Transfer Function

Lecture 23 - Turbo codes

Lecture 24 - Low Density Parity Check (LDPC) Codes: Encoding

Lecture 25 - Low Density Parity Check (LDPC) Codes: Decoding

Lecture 26 - Introduction to Polar Codes

Lecture 27 - Polar Codes: Encoding and Decoding

Lecture 28 - Introduciton to MIMO systems

Lecture 29 - Spatial Diversity Techniques

Lecture 30 - Introduction to Space Time Block Codes

Lecture 31 - Tutorial 4 - Convolution Codes: Hard and Soft Decoding

Lecture 32 - MIMO Zero-Forcing Receiver

Lecture 33 - MIMO MMSE Receiver

Lecture 34 - Introduction to MIMO SVD

Lecture 35 - Diagonalization of MIMO channel

Lecture 36 - Optimal Capacity of MIMO channel and MIMO Beamforming

Lecture 37 - Tutorial 5 - Random Access Technoques: ALOHA and CSMA

Lecture 38 - MIMO V-BLAST Receivers

Lecture 39 - Introduction to Adaptive Modulation and Coding

Lecture 40 - Modulation and Coding with Variable MQAM

Lecture 41 - Conventional Multiple Access Schemes

Lecture 42 - Next generation Multiple Access Schemes and Multi-User Channels

Lecture 43 - Overview of Cellular and Wi-Fi Standards

Lecture 44 - Evolution of Cellular and Wi-Fi Standards

Lecture 45 - Tutorial 6 - MIMO SVD Example

Lecture 46 - Tutorial 7 - Rate Splitting Multiple Access

NPTEL : NOC:State Space Approach to Control System Analysis and Design (Electrical Engineering)

Co-ordinators : Prof A P Tiwari

Lecture 1 - Introduction

Lecture 2 - Standard State-space Representation of Physical Systems

Lecture 3 - Mathematical Modeling from First Principles

Lecture 4 - Mathematical Modeling from First Principles

Lecture 5 - State-space Representation of Transfer Functions

Lecture 6 - State-space Representation of Transfer Functions (Continued...)

Lecture 7 - Equivalent Dynamical Equations

Lecture 8 - Transformation of State Equations into Canonical forms

Lecture 9 - Solution of State Equations

Lecture 10 - Solution of State Equations: Methods to determine the STM

Lecture 11 - Simulation: An Overview

Lecture 12 - Numerical Solution of State Equations

Lecture 13 - Controllability

Lecture 14 - Controllability

Lecture 15 - Controllability

Lecture 16 - Observability

Lecture 17 - Lypunov's Stability - 1

Lecture 18 - Lypunov's Stability - 2

Lecture 19 - Lypunov's Stability - 3

Lecture 20 - Pole Placement Design-I: Concept of State feedback

Lecture 21 - Pole Placement Design-II: Properties of State Feedback

Lecture 22 - Pole Placement Design-III: Pole placement formulae, Selection of Closed loop pole locations

Lecture 23 - Linear Quadratic Optimal Control - Part 1

Lecture 24 - Linear Quadratic Optimal Control - Part 2

Lecture 25 - Linear Observers-Full Order Observer

Lecture 26 - Linear Observers-Reduced Order Observer

Lecture 27 - Separation Principle

Lecture 28 - Multirate Sampling Controllers-Relationship between System state, multirate output samples and inputs

Lecture 29 - Multirate Output Controller (MROC)

Lecture 30 - Fast Output Sampling (FOS) Controller

Lecture 31 - Periodic Output Feedback (POF) Controller

Lecture 32 - Continuous-Time Kalman Filter

Lecture 33 - Discrete-Time Kalman Filter

Lecture 34 - Case Study of Nuclear Reactor: Nonlinear Model Development

Lecture 35 - Case Study of Nuclear Reactor: Model Linearization

Lecture 36 - Case Study of Nuclear Reactor: Output Feedback Control Design

Lecture 37 - Case Study of Nuclear Reactor: Periodic Output Feedback Design

Lecture 38 - Case Study of Nuclear Reactor: Fast Output Sampling based Control Design

Lecture 39 - Case Study of Nuclear Reactor: Application of Kalman Filtering to Response Improvement of Vanadium SPND

NPTEL : NOC:Optimization Theory and Algorithms (Electrical Engineering)

Co-ordinators : Prof. Uday K Khankhoje

Lecture 1 - Introduction to the course - 1 - Prerequisites, key elements

Lecture 2 - Introduction to the course - 2 - Types of problems

Lecture 3 - Introduction to the course - 3 - An optimization example to live longer

Lecture 4 - Summary of background material - Linear Algebra - I

Lecture 5 - Summary of background material - Linear Algebra - II

Lecture 6 - Summary of background material - Analysis - I

Lecture 7 - Summary of background material - Analysis - II

Lecture 8 - Summary of background material - Analysis - III

Lecture 9 - Summary of background material - Calculus - I

Lecture 10 - Summary of background material - Calculus - II

Lecture 11 - Summary of background material - Calculus - III

Lecture 12 - Example of Multivariate Differentiation

Lecture 13 - Gradient of Quadratic form and product rule

Lecture 14 - Directional derivative, hessian, and mean value theorem

Lecture 15 - Unconstrained optimization - 1 - Roadmap of the course and Taylorâ€™s theorem

Lecture 16 - Unconstrained optimization - 2 - Identifying a local minima - 1st and 2nd order conditions

Lecture 17 - Unconstrained optimization - 3 - Proof of 1st Order Condition

Lecture 18 - Unconstrained optimization - 4 - overview of algorithms and choosing a descent direction

Lecture 19 - Unconstrained optimization - 5 - properties of descent directions steepest descent direction

Lecture 20 - Unconstrained optimization - 6 - properties of descent directions newton direction

Lecture 21 - Unconstrained optimization - 7 - Trust Region Methods

Lecture 22 - A MATLAB session

Lecture 23 - Introduction to Line Search

Lecture 24 - Wolfe Conditions

Lecture 25 - Strong Wolfe Conditions

Lecture 26 - Backtracking Line Search

Lecture 27 - Line Search - Analysis

Lecture 28 - Line Search - Convergence and Rate - 1

Lecture 29 - Line Search - Convergence and Rate - 2

Lecture 30 - Convergence analysis of a descent algorithm - 1

Lecture 31 - Convergence analysis of a descent algorithm - 2

Lecture 32 - Implementation of an optimization algorithm in MATLAB

Lecture 33 - Conjugate Gradient Methods - Introduction and Proof

Lecture 34 - Visualizing Quadratic Forms

Lecture 35 - Orthogonality and Conjugacy

Lecture 36 - Conjugate Directions Method - Introduction and Proof

Lecture 37 - Discussion on doubts

Lecture 38 - More on Conjugate Directions Method

Lecture 39 - Ways of Generating Conjugate Directions

Lecture 40 - Expanding Subspace Theorem

Lecture 41 - Discussion on doubts

Lecture 42 - Conjugate Gradient Method

Lecture 43 - MATLAB implementation on CGM

Lecture 44 - Discussion on doubts

Lecture 45 - Preconditioned Conjugate Gradient - Part 1

Lecture 46 - Preconditioned Conjugate Gradient - Part 2

Lecture 47 - Preconditioned Conjugate Gradient - Part 3

Lecture 48 - Non Linear Conjugate Gradient method

Lecture 49 - Intro to Newton methods

Lecture 50 - Newton methods and convergence

Lecture 51 - Checks for positive definite matrices

Lecture 52 - Hessian Modification

Lecture 53 - Quasi newton methods

Lecture 54 - BFGS method

Lecture 55 - Least squares problems

Lecture 56 - Linear least squares - Part 1

Lecture 57 - Linear least squares - Part 2

Lecture 58 - Solving least squares using SVD

Lecture 59 - Non linear least squares

Lecture 60 - Constrained Optimisation

Lecture 61 - Single equality constraint

Lecture 62 - Single inequality constraint - Part 1

Lecture 63 - Single inequality constraint - Part 2

Lecture 64 - Two inequality constraints example

Lecture 65 - Linearised feasible directions

Lecture 66 - Feasible sequences and tangent cone

Lecture 67 - LICQ conditions

Lecture 68 - KKT conditions (First order necessary conditions)

Lecture 69 - Proof sketch for KKT conditions - Part 1

Lecture 70 - Proof sketch for KKT conditions - Part 2

Lecture 71 - Introduction to Projected gradient descent

Lecture 72 - Projected gradient descent and proof of convergence

Lecture 73 - Proof of convergence - Part 2

Lecture 74 - Subgradients and Subdifferential

Lecture 75 - Projection onto l1 ball

Lecture 76 - Soft thresholding example

Lecture 77 - Recap of Projection onto l1 ball

Lecture 78 - KKT and duality introduction

Lecture 79 - Intuition of duality and dual problem

Lecture 80 - Proof of concavity of the dual problem - Part 1

Lecture 81 - Proof of concavity of the dual problem - Part 2

Lecture 82 - Proof of concavity of the dual problem - Part 3

NPTEL : NOC:Power Electronics with Wide Band Gap Devices (Electrical Engineering)

Co-ordinators : Prof. Moumita Das

Lecture 1 - Introduction Wide Bandgap Devices

Lecture 2 - Characterization Of Wide Bandgap Devices

Lecture 3 - Static Characterization Of Power Devices

Lecture 4 - Junction Capacitance Characterization Of Power Devices

Lecture 5 - Fundamentals Of Dynamic Characterization

Lecture 6 - Fundamentals Of Dynamic Characterization (Continued...)

Lecture 7 - Gate Drive For Dynamic Characterization

Lecture 8 - Gate Drive For Dynamic Characterization (Continued...)

Lecture 9 - Gate Drive For Dynamic Characterization (Continued...)

Lecture 10 - Gate Driver Protection

Lecture 11 - Dpt-Protection

Lecture 12 - Protection-Dpt

Lecture 13 - Cross Talk Consideration

Lecture 14 - Cross Talk Consideration (Continued...)

Lecture 15 - Layout Design And Parasitic Management

Lecture 16 - Layout Design And Parasitic Management (Continued...)

Lecture 17 - Layout

Lecture 18 - Heat Sink

Lecture 19 - Heat Sink (Continued...)

Lecture 20 - Electromagnetic Interference (EMI) - Part 1

Lecture 21 - Electromagnetic Interference (EMI) - Part 2

Lecture 22 - Electromagnetic Interference (EMI) - Part 3

Lecture 23 - Electromagnetic Interference (EMI) - Passive Filter

Lecture 24 - Electromagnetic Interference (EMI) - Active Filter

Lecture 25 - Getting Started With Ltspice

Lecture 26 - Getting Started With Ltspice - Part 1

Lecture 27 - Getting Started With Ltspice - Part 2

Lecture 28 - EMI Simulation with LTspice - Part 1

Lecture 29 - EMI Simulation with LTspice - Part 2

Lecture 30 - Power Density - Part 1

Lecture 31 - Power Density - Part 2

Lecture 32 - Introduction to PCB Design

Lecture 33 - PCB Design

Lecture 34 - WBG Applications - IMD

Lecture 35 - WBG Applications - Renewable Energy Sources

Lecture 36 - WBG Applications - Reliability Analysis

NPTEL : NOC:Optimal Control (Electrical Engineering)

Co-ordinators : Prof. Barjeev Tyagi

Lecture 1 - Introduction and Performance Index

Lecture 2 - Basic Concepts of Calculus of Variation

Lecture 3 - The Basic Variational Problem

Lecture 4 - Fixed End Point Problem

Lecture 5 - Free End Point Problem

Lecture 6 - Free End Point Problem (Continued...)

Lecture 7 - Free End Point Problem (Continued...)

Lecture 8 - Free End Point Problem (Continued...)

Lecture 9 - Optimum of Functions with Conditions

Lecture 10 - Optimum of Functions with Conditions (Lagrange Multiplier Method)

Lecture 11 - Optimum of Functional with Conditions

Lecture 12 - Variational Approach to Optimal Control Systems

Lecture 13 - Variational Approach to Optimal Control Systems (Continued...)

Lecture 14 - Linear Quadratic Optimal Control Systems

Lecture 15 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 16 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 17 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 18 - Linear Quadratic Optimal Control Systems (Continued...)

Lecture 19 - Linear Quadratic Optimal Control Systems (Optimal Value of Performance Index)

Lecture 20 - Infinite Horizon Regulator Problem

Lecture 21 - Infinite Horizon Regulator Problem (Continued...)

Lecture 22 - Analytical Solution of MDRE - State Transition Matrix Approach

Lecture 23 - Analytical Solution of MDRE - Similarity Transformation Approach

Lecture 24 - Analytical Solution of MDRE - Similarity Transformation Approach (Continued...)

Lecture 25 - Frequency Domain Interpretation of LQR - Linear Time Invariant System

Lecture 26 - Frequency Domain Interpretation of LQR - Linear Time Invariant System (Continued...)

Lecture 27 - LQR with a Specified Degree of Stability

Lecture 28 - Inverse Matrix Riccati Equation

Lecture 29 - Linear Quadratic Tracking System

Lecture 30 - Discrete-Time Optimal Control Systems

Lecture 31 - Discrete-Time Optimal Control Systems (Continued...)

Lecture 32 - Discrete-Time Optimal Control Systems (Continued...)

Lecture 33 - Matrix Discrete Riccati Equation

Lecture 34 - Analytical Solution of Matrix Difference Riccati Equation

Lecture 35 - Analytical Solution of Matrix Difference Riccati Equation (Continued...)

Lecture 36 - Optimal Control using Dynamic Programming

Lecture 37 - The Hamilton-Jacobi-Bellman (HJB) Equation

Lecture 38 - LQR System Using HJB Equation

Lecture 39 - Time Optimal Control System - Constrained Input

Lecture 40 - Time Optimal Control System (Continued...)

NPTEL : NOC:Basics of Software Defined Radios and Practical Applications (Electrical Engineering)

Co-ordinators : Dr. Meenakshi Rawat

Lecture 1 - Foundation for software defined radio

Lecture 2 - Components of a software defined radio

Lecture 3 - Software defined radio architectures - Part I

Lecture 4 - Software defined radio architectures - Part II

Lecture 5 - Software defined radio architectures - Part III

Lecture 6 - Software defined radio architectures - Part IV

Lecture 7 - Distortion Parameters - Part I

Lecture 8 - Distortion Parameters - Part II

Lecture 9 - Distortion Parameters: Nonlinear Distortion

Lecture 10 - Distortion Parameters: Nonlinearity Specifications

Lecture 11 - Power Amplifiers: Nonlinear Distortion in Transmitted Signals

Lecture 12 - Power Amplifiers: Useful Definitions

Lecture 13 - Case study-I: Power amplifier Line-up for achieving linearity and power requirement example

Lecture 14 - Case study-II: Power amplifier Line-up for linearity and power requirement: Need for linearization techniques

Lecture 15 - Behavioral models for representing nonlinear distortions

Lecture 16 - Linearization Techniques for nonlinear distortion

Lecture 17 - Predistortion Techniques for nonlinearity distortion in SDR

Lecture 18 - Basic Digital Predistortion Techniques for nonlinear distortion in SDR

Lecture 19 - State-of-the-art Digital Predistortion Techniques for Nonlinear Distortion in SDR

Lecture 20 - Digital Predistortion Techniques for Linear as well as Nonlinear Distortion in SDR

NPTEL : NOC:Electrical Distribution System Analysis (Electrical Engineering)

Co-ordinators : Prof. N P Padhy, Late Prof. G. B. Kumbhar

Lecture 1 - Introduction to Electrical Distribution System

Lecture 2 - Components of Distribution System Substation and Busbar Layouts

Lecture 3 - Components of Distribution System and Feeder Configurations

Lecture 4 - Nature of Loads in a Distribution System

Lecture 5 - Load Allocation in a Distribution System

Lecture 6 - K Factors and Their Applications

Lecture 7 - Analysis of Uniformly Distributed Loads

Lecture 8 - Lumping Loads in Geometric Configurations: Rectangular

Lecture 9 - Lumping Loads in Geometric Configurations: Triangular

Lecture 10 - Impedance of Distribution Lines and Feeders - Part I

Lecture 11 - Series Impedance of Distribution Lines and Feeders - Part II

Lecture 12 - Models of Distribution Lines and Cables

Lecture 13 - Modelling of Single-Phase and Three-Phase Transformers

Lecture 14 - Modelling of Three-Phase Transformers - Part I

Lecture 15 - Modelling of Three-Phase Transformers - Part II

Lecture 16 - Modelling of Three-Phase Transformers - Part III

Lecture 17 - Modelling of Three-Phase Transformers - Part IV

Lecture 18 - Modelling of Step Voltage Regulators - Part I

Lecture 19 - Modelling of Step Voltage Regulators - Part II

Lecture 20 - Modelling of Step Voltage Regulators - Part III

Lecture 21 - Modelling of Step Voltage Regulators - Part IV

Lecture 22 - Load Models in Distribution System - Part I

Lecture 23 - Load Models in Distribution System - Part II

Lecture 24 - Modelling of Distributed Generation

Lecture 25 - Applications and Modeling of Capacitor Banks

Lecture 26 - Summary of Modelling of Distribution System Components

Lecture 27 - Backward/Forward Sweep Load Flow Analysis - Part I

Lecture 28 - Backward/Forward Sweep Load Flow Analysis - Part II

Lecture 29 - Direct Approach Based Load Flow Analysis - Part I

Lecture 30 - Direct Approach Based Load Flow Analysis - Part II

Lecture 31 - Direct Approach Based Load Flow Analysis - Part III

Lecture 32 - Direct Approach Based Load Flow Analysis: Weakly Meshed System

Lecture 33 - Gauss Implicit Z-matrix Method

Lecture 34 - Sequence Component Based Short Circuit Analysis

Lecture 35 - Thevenin's Equivalent and Phase Variable Based Short Circuit Analysis

Lecture 36 - Direct Approach for Short-Circuit Analysis: Introduction and LG Fault

Lecture 37 - Direct Approach for Short-Circuit Analysis: LLG and LLLG Fault

Lecture 38 - Direct Approach for Short-Circuit Analysis: LL Fault and Examples

Lecture 39 - Direct Approach for Short-Circuit Analysis: Weakly Meshed System

Lecture 40 - Applications of Distribution System Analysis

Lecture 41 - Distributed Generation Integration Issues in Distribution System

Lecture 42 - Distribution System Protection Issues

Lecture 43 - Power Quality, Reliability and Availability

Lecture 44 - Design and Operation - Part I

Lecture 45 - Design and Operation - Part II

Lecture 46 - Definition and objective of Volt-var control (VVC)

Lecture 47 - Traditional approaches of VVC

Lecture 48 - Distribution Automation

Lecture 49 - SCADA-Based VVC and Integrated VVC

Lecture 50 - Advanced technologies for VVC - Part I

Lecture 51 - Advanced technologies for VVC - Part II

Lecture 52 - System Planning - Part I

Lecture 53 - System Planning - Part II

Lecture 54 - Electricity Forecasting

Lecture 55 - Case study: IIT Roorkee distribution system

Lecture 56 - Optimization techniques

Lecture 57 - Optimal location and sizing battery energy storage system (BESS)

Lecture 58 - Practical Insights into Electrical Distribution Systems

Lecture 59 - Field Deployment of BESS

Lecture 60 - Emerging Technologies and Future Trends

NPTEL : NOC:Introduction to Smart Grid (Electrical Engineering)

Co-ordinators : Prof. Premalata Jena, Prof. N.P. Padhy

Lecture 1 - Introduction to Smart Grid - I

Lecture 2 - Introduction to Smart Grid - II

Lecture 3 - Architecture of smart grid system

Lecture 4 - Standards for smart grid system

Lecture 5 - Elements and Technologies of smart grid system - I

Lecture 6 - Elements and Technologies of smart grid system - II

Lecture 7 - Distributed Generation Resources - I

Lecture 8 - Distributed Generation Resources - II

Lecture 9 - Distributed Generation Resources - III

Lecture 10 - Distributed Generation Resources - IV

Lecture 11 - Wide Area Monitoring System - I

Lecture 12 - Wide Area Monitoring System - II

Lecture 13 - Phasor Estimation - I

Lecture 14 - Phasor Estimation - II

Lecture 15 - Digital Relays for Smart Grid Protection

Lecture 16 - Islanding Detection Techniques - I

Lecture 17 - Islanding Detection Techniques - II

Lecture 18 - Islanding Detection Techniques - III

Lecture 19 - Smart Grid Protection - I

Lecture 20 - Smart Grid Protection - II

Lecture 21 - Smart Grid Protection - III

Lecture 22 - Smart Grid Protection - IV

Lecture 23 - Modelling of Storage Devices

Lecture 24 - Modelling of DC Smart Grid Components

Lecture 25 - Operation and Control of AC Microgrid - I

Lecture 26 - Operation and Control of AC Microgrid - Il

Lecture 27 - Operation and Control of DC Microgrid - I

Lecture 28 - Operation and Control of DC Microgrid - II

Lecture 29 - Operation and Control of AC-DC hybrid Microgrid - I

Lecture 30 - Operation and Control of AC-DC hybrid Microgrid - II

Lecture 31 - Simulation and Case Study of AC Microgrid

Lecture 32 - Simulation and Case Study of DC Microgrid

Lecture 33 - Simulation and Case Study of AC-DC Hybrid Microgrid

Lecture 34 - Demand Side Management in Smart Grid

Lecture 35 - Demand Response Analysis of Smart Grid

Lecture 36 - Energy Management

Lecture 37 - Design of Smart Grid and Practical Smart Grid Case Study - I

Lecture 38 - Design of Smart Grid and Practical Smart Grid Case Study - II

Lecture 39 - System Analysis of AC/DC Smart Grid

Lecture 40 - Conclusions

NPTEL : NOC:Facts Devices (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Switch Realization

Lecture 4 - PWM - I

Lecture 5 - PWM - II

Lecture 6 - Closed Loop Control

Lecture 7 - Multi Level Inverter - I

Lecture 8 - Multi Level Inverter - II

Lecture 9 - Multi Level Inverter - III

Lecture 10 - Shunt Compensator Analysis

Lecture 11 - Shunt Compensator TCR and TSC - I

Lecture 12 - Shunt Compensator TCR and TSC - II

Lecture 13 - Static Var Compensator - I

Lecture 14 - Static Var Compensator - II

Lecture 15 - STATCOM - I

Lecture 16 - STATCOM - II

Lecture 17 - STATCOM/SVC Comparisons

Lecture 18 - External Control Design of Static Var Compensator

Lecture 19 - DSTATCOM

Lecture 20 - Design of DSTATCOM

Lecture 21 - Series Compensator - I

Lecture 22 - Series Compensator - II

Lecture 23 - GCSC and SSSC

Lecture 24 - SSSC - II

Lecture 25 - SSSC - III and TSSC

Lecture 26 - TSSC - II and TCSC

Lecture 27 - TCSC Characteristics and Control

Lecture 28 - Voltage and Phase Angle Regulation

Lecture 29 - Voltage and Phase Angle Regulator Device - I

Lecture 30 - Voltage and Phase Angle Regulator Device - II

Lecture 31 - UPQC Introduction and Classification

Lecture 32 - UPQC Classification - I

Lecture 33 - Operation and Control of UPQC - II

Lecture 34 - Operation and Control of UPQC - III

Lecture 35 - UPFC

Lecture 36 - Control Structure of UPFC

Lecture 37 - Comparison of UPFC with PAR and Series Compensators

Lecture 38 - Interline Power Flow Controller (IPFC) - I

Lecture 39 - Interline Power Flow Controller (IPFC) - II

Lecture 40 - Practical Application and Conclusion

NPTEL : NOC:Advanced Linear Continuous Control Systems: Applications with MATLAB Programming and Simulink (Electrical Engineering)

Co-ordinators : Prof. Yogesh Vijay Hote

Lecture 1 - Introduction to State Space

Lecture 2 - State Space Representation

Lecture 3 - State Space Representation: Companion Form (Controllable Canonical Form)

Lecture 4 - State Space Representation: Extended Controllable Canonical Form

Lecture 5 - State Space Representation: Observable Canonical Form

Lecture 6 - State Space Representation: Diagonal Canonical Form - Part I

Lecture 7 - State Space Representation: Diagonal Canonical Form - Part II

Lecture 8 - State Space Representation: Jordan Canonical Form

Lecture 9 - State Space Representation: Numerical Examples on State space Modelling - Part I

Lecture 10 - State Space Representation: Numerical Examples on State space Modelling - Part II

Lecture 11 - Modelling of Mechanical Systems in State Space

Lecture 12 - Modelling of DC Servo Motor - Part I

Lecture 13 - Modelling of DC Servo Motor - Part II

Lecture 14 - Determination of Transfer Function from State Space Model - Part I

Lecture 15 - Determination of Transfer Function from State Space Model - Part II

Lecture 16 - Stability Analysis in State Space: Concept of Eigenvalues and Eigenvectors - Part I

Lecture 17 - Stability Analysis in State Space - Part II

Lecture 18 - Stability Analysis in State Space: Lyapunov Stability Analysis (Sylvesterâ€™s Criterion) - Part III

Lecture 19 - Stability Analysis in State Space: Lyapunov Stability Analysis (Stability Criterion) - PartIV

Lecture 20 - Stability Analysis in State Space: Lyapunov Stability Analysis (Direct Method) - Part V

Lecture 21 - Concept of Diagonalization

Lecture 22 - Solution of State Equation

Lecture 23 - Solution of State Equation (Forced System)

Lecture 24 - Steady State Error for State Space System

Lecture 25 - State Transition Matrix - Part I

Lecture 26 - State Transition Matrix - Part II

Lecture 27 - State Transition Matrix using Cayley-Hamilton Theorem - Part III

Lecture 28 - MATLAB Programming with State Space

Lecture 29 - Controllability in State Space - Part I

Lecture 30 - Controllability in State Space - Part II

Lecture 31 - Observability in State Space - Part I

Lecture 32 - Observability in State Space - Part II

Lecture 33 - Pole Placement by State Feedback - Part I

Lecture 34 - Pole Placement by State Feedback - Part II

Lecture 35 - Pole Placement by State Feedback - Part III

Lecture 36 - Tracking Problem in State Feedback Design - Part I

Lecture 37 - Tracking Problem in State Feedback Design - Part II

Lecture 38 - State Observer Design - Part I

Lecture 39 - State Observer Design - Part II

Lecture 40 - State Observer Design - Part III

NPTEL : NOC:Computer Aided Power System Analysis (Electrical Engineering)

Co-ordinators : Prof. Biswarup Das

Lecture 1 - Modeling of Power System Components

Lecture 2 - Modeling of Power System Components (Continued...)

Lecture 3 - Bus Admittance Matrix

Lecture 4 - Bus Admittance Matrix with Mutual Impedance

Lecture 5 - Bus Admittance Matrix with mutual impedance (Continued...)

Lecture 6 - Power flow equations and classification of buses

Lecture 7 - Basic Gauss - Seidel Numerical Method

Lecture 8 - Gauss - Seidel Load Flow (GSLF)

Lecture 9 - GSLF with Multiple Generators

Lecture 10 - Example of GSLF

Lecture 11 - Basics of Newton Raphson Numerical Method

Lecture 12 - Newton - Raphson Load Flow (NRLF) in Polar Co-Ordinate

Lecture 13 - NRLF in polar co-ordinate (Continued...)

Lecture 14 - NRLF in polar co-ordinate (Continued...)

Lecture 15 - NRLF (Polar) Algorithm and Example

Lecture 16 - NRLF in rectangular coordinate

Lecture 17 - NRLF in rectangular coordinate (Continued...)

Lecture 18 - NRLF in rectangular coordinate (Continued...)

Lecture 19 - Example of NRLF (Rectangular) Method

Lecture 20 - Fast decoupled load flow (FDLF)

Lecture 21 - FDLF (Continued...)

Lecture 22 - FDLF (Continued...)

Lecture 23 - AC- DC Load Flow

Lecture 24 - AC- DC Load Flow (Continued...)

Lecture 25 - AC- DC Load Flow (Continued...)

Lecture 26 - Sparsity and Gaussian Elimination

Lecture 27 - Gaussian Elimination Method

Lecture 28 - Example of Gaussian Elimination Method

Lecture 29 - Gaussian Elimination and Optimal Ordering

Lecture 30 - Triangular Factorization

Lecture 31 - LU Decomposition

Lecture 32 - Introduction to Contingency Analysis

Lecture 33 - Linear Sensitivity Factor

Lecture 34 - Linear Sensitivity Factors (Continued...)

Lecture 35 - Line outage sensitivity factor

Lecture 36 - Line outage sensitivity factor (Continued...)

Lecture 37 - Line outage sensitivity factor (Continued...)

Lecture 38 - State Estimation Technique

Lecture 39 - Weighted Least Square (WLS) Method

Lecture 40 - WLS (Continued...)

Lecture 41 - WLS Examples

Lecture 42 - Error Analysis

Lecture 43 - Error Analysis (Continued...)

Lecture 44 - Bad Data Detection

Lecture 45 - Power system state estimation

Lecture 46 - Power system state estimation (Continued...)

Lecture 47 - Power system state estimation (Continued...)

Lecture 48 - Power system state estimation (Continued...)

Lecture 49 - Fault Analysis

Lecture 50 - Fault Analysis (Continued...)

Lecture 51 - Fault Analysis (Continued...)

Lecture 52 - Fault Analysis (Continued...)

Lecture 53 - Fault Analysis (Continued...)

Lecture 54 - Fault Analysis (Continued...)

Lecture 55 - Fault Analysis (Continued...)

Lecture 56 - Fault Analysis (Continued...)

Lecture 57 - Fault Analysis (Continued...)

Lecture 58 - Fault Analysis (Continued...)

Lecture 59 - Fault Analysis (Continued...)

Lecture 60 - Fault Analysis (Continued...)

NPTEL : NOC:Advance Power Electronics and Control (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

Lecture 1 - Introduction

Lecture 2 - Basic Concept of Switches

Lecture 3 - Device Physics - I

Lecture 4 - Device Physics - II

Lecture 5 - Device Physics - III

Lecture 6 - Device Physics - IV

Lecture 7 - Application and Analysis of Switches - I

Lecture 8 - Application and Analysis of Switches - II

Lecture 9 - Single Phase Converter

Lecture 10 - Single Phase Converters - II

Lecture 11 - Single Phase Converters - III

Lecture 12 - Three Phase Converters - I

Lecture 13 - Three Phase Converters - II

Lecture 14 - Multipulse Converters II

Lecture 15 - Effect of Source Inductance and PWM Rectifiers

Lecture 16 - PWM Rectifiers - II

Lecture 17 - PWM Rectifiers - III and Power Factor Improvement Techniques

Lecture 18 - PWM Rectifiers - IV and Power Factor Improvement Techniques - II

Lecture 19 - Power Factor Improvement Techniques III and Non Isolated DC- DC Converters

Lecture 20 - Non Isolated DC- DC Converters - II

Lecture 21 - Non Isolated and Isolated DC- DC Converters and Choppers

Lecture 22 - Isolated DC-DC Converters and Choppers

Lecture 23 - Isolated DC-DC Converters - II

Lecture 24 - Isolated DC-DC Converters - III

Lecture 25 - Isolated DC-DC Converters - IV and VSI and CSI

Lecture 26 - VSI and CSI

Lecture 27 - VSI and CSI II and MLI

Lecture 28 - PWM Techniques II and MLI

Lecture 29 - MLI II and ZSI

Lecture 30 - ZSI II and Space Vector Modulation (SVM)

Lecture 31 - SVM II and AC to AC Converters

Lecture 32 - SVM III and AC to AC Converters

Lecture 33 - Cycloconverters and Matrix Converters

Lecture 34 - Matrix Converter - II

Lecture 35 - Matrix Converter - III and Power Quality Mitigation Devices

Lecture 36 - Power Quality Mitigation Devices - II

Lecture 37 - Linear and Non Linear Control in Power Electronics - I

Lecture 38 - Linear and Non Linear Control in Power Electronics - II

Lecture 39 - Non-Linear Control in Power Electronics

Lecture 40 - Application and Conclusion

NPTEL : NOC:CMOS Digital VLSI Design (Electrical Engineering)

Co-ordinators : Prof. Sudeb Dasgupta

Lecture 1 - MOS Transistor Basics - I

Lecture 2 - MOS Transistor Basics - II

Lecture 3 - MOS Transistor Basics - III

Lecture 4 - MOS Parasitics and SPICE Model

Lecture 5 - CMOS Inverter Basics - I

Lecture 6 - CMOS Inverter Basics - II

Lecture 7 - CMOS Inverter Basics - III

Lecture 8 - Power Analysis - I

Lecture 9 - Power Analysis - II

Lecture 10 - SPICE Simulation - I

Lecture 11 - SPICE Simulation - II

Lecture 12 - Combinational Logic Design - I

Lecture 13 - Combinational Logic Design - II

Lecture 14 - Combinational Logic Design - III

Lecture 15 - Combinational Logic Design - IV

Lecture 16 - Combinational Logic Design - V

Lecture 17 - Combinational Logic Design - VI

Lecture 18 - Combinational Logic Design - VII

Lecture 19 - Combinational Logic Design - VIII

Lecture 20 - Combinational Logic Design - IX

Lecture 21 - Combinational Logic Design - X

Lecture 22 - Logical Efforts - I

Lecture 23 - Logical Efforts - II

Lecture 24 - Logical Efforts - III

Lecture 25 - Sequential Logic Design - I

Lecture 26 - Sequential Logic Design - II

Lecture 27 - Sequential Logic Design - III

Lecture 28 - Sequential Logic Design - IV

Lecture 29 - Sequential Logic Design - V

Lecture 30 - Sequential Logic Design - VI

Lecture 31 - Sequential Logic Design - VII

Lecture 32 - Sequential Logic Design - VIII

Lecture 33 - Clocking Strategies for Sequential Design - I

Lecture 34 - Clocking Strategies for Sequential Design - II

Lecture 35 - Clocking Strategies for Sequential Design - III

Lecture 36 - Clocking Strategies for Sequential Design - IV

Lecture 37 - Sequential Logic Design - IX

Lecture 38 - Clocking Strategies for Sequential Design - V

Lecture 39 - Concept of Memory and its Designing - I

Lecture 40 - Concept of Memory and its Designing - II

NPTEL : NOC:Microelectronics: Devices to Circuits (Electrical Engineering)

Co-ordinators : Prof. Sudeb Dasgupta

Lecture 1 - Bipolar Junction Transistor : Physical structure and Modes of Operation

Lecture 2 - Bipolar Junction Transistor : Modes of operation - I

Lecture 3 - Bipolar Junction Transistor : Modes of operation - II

Lecture 4 - BJT Operation in active mode Circuit symbol and conventions - I

Lecture 5 - BJT Operation in active mode Circuit symbol and conventions - II

Lecture 6 - BJT as an amplifier small circuit model - I

Lecture 7 - BJT as an amplifier small circuit model - II

Lecture 8 - BJT Small Signal Circuit Model - I

Lecture 9 - BJT Small Signal Circuit Model - II

Lecture 10 - BJT as a switch and Ebers Moll Model

Lecture 11 - Simple BJT Inverter and second order effects

Lecture 12 - BJT Second order effects - I

Lecture 13 - BJT Second order effects - II

Lecture 14 - MOS Transistor basics - I

Lecture 15 - MOS Transistor basics - II

Lecture 16 - MOS Transistor basics - III

Lecture 17 - MOS Parasitic and SPICE Model

Lecture 18 - CMOS Inverter Basics - I

Lecture 19 - CMOS Inverter Basics - II

Lecture 20 - CMOS Inverter Basics - III

Lecture 21 - Power Analysis - I

Lecture 22 - Logical Efforts - I

Lecture 23 - Fabrication-Process - I

Lecture 24 - Fabrication-Process - II

Lecture 25 - Biasing of Amplifier and its behaviour as an Analog switch - I

Lecture 26 - Biasing of Amplifier and its behaviour as an Analog switch - II

Lecture 27 - Biasing of Amplifier and its behaviour as an Analog switch - III

Lecture 28 - CMOS CS/CG/CD Amplifier Configuration

Lecture 29 - CMOS CG/CD Amplifier Configuration

Lecture 30 - Internal CAP Models and high frequency Modelling - I

Lecture 31 - Internal CAP Models and high frequency Modelling - II

Lecture 32 - JFET, Structure and Operation

Lecture 33 - Multistage and Differential Amplifier - I

Lecture 34 - Multistage and Differential Amplifier - II

Lecture 35 - MOS Differential Amplifier - I

Lecture 36 - MOS Differential Amplifier - II

Lecture 37 - Small signal operation and Differential Amplifiers - I

Lecture 38 - Small signal operation and Differential Amplifiers - II

Lecture 39 - Multistage Amplifier with SPICE Simulation

Lecture 40 - S-Domain Analysis, Transfer Function, Poles and Zeros - I

Lecture 41 - S-Domain Analysis, Transfer Function, Poles and Zeros - II

Lecture 42 - High Frequency response of CS and CE Amplifier

Lecture 43 - High Frequency response of CC and SF Configuration

Lecture 44 - Frequency response of Differential Amplifier

Lecture 45 - General Feedback Structure and properties of negative Feedback

Lecture 46 - Basic Feedback Topologies

Lecture 47 - Design of feedback amplifier for all configuration

Lecture 48 - Stability and amplifier poles

Lecture 49 - Bode plots and Frequency Plot

Lecture 50 - Ideal Operational Amplifier and its terminal

Lecture 51 - Op-amp as a Integrator and Differentiator

Lecture 52 - Large Signal Operation of Op-amp and second order effects

Lecture 53 - Combinational logic design - I

Lecture 54 - Combinational logic design - II

Lecture 55 - Combinational logic design - III

Lecture 56 - Combinational logic design - IV

Lecture 57 - Sequential logic design - I

Lecture 58 - Clocking strategies For Sequential design - I

Lecture 59 - Clocking strategies For Sequential design - II

Lecture 60 - Memory Design

NPTEL : NOC:DC Microgrid (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

Lecture 1 - Overview of Microgrids

Lecture 2 - Concept of Microgrids

Lecture 3 - Microgrid and distributed generation

Lecture 4 - Microgrid vs Conventional Power System

Lecture 5 - AC and DC Microgrid with Distributed Energy Resources (AC Microgrid Part)

Lecture 6 - AC and DC Microgrid with Distributed Energy Resources (AC Microgrid Part) (Continued...)

Lecture 7 - Power Electronics for Microgrid

Lecture 8 - Power Electronic Converters in Microgrid Applications

Lecture 9 - Power Electronic Converters in Microgrid Applications (Power Electronic for Interfacing)

Lecture 10 - Power Electronic Converters in Microgrid Applications (Converter Modulation Techniques)

Lecture 11 - Modeling of converters in microgrid power system (AC/DC and DC/AC Converters Modeling)

Lecture 12 - Modeling of Power Converters in Microgrid Power System (DC/DC Converter Modeling and Control)

Lecture 13 - Modeling of Renewable Energy Resources (Modeling of Wind Energy System)

Lecture 14 - Modeling of Renewable Energy Resources (Modeling of Photovoltaic System)

Lecture 15 - Modeling of Energy Storage System

Lecture 16 - Microgrid Dynamics and Modeling

Lecture 17 - Microgrid Dynamics and Modeling (Continued...)

Lecture 18 - Microgrid Operation Modes and Standards - Part I

Lecture 19 - Microgrid Operation Modes and Standards - Part II

Lecture 20 - Microgrid Control Architectures

Lecture 21 - Microgrid Control Architectures (Continued...)

Lecture 22 - Intelligent Microgrid Operation and Control

Lecture 23 - Intelligent Microgrid Operation and Control (Continued...)

Lecture 24 - Intelligent Microgrid Operation and Control (Continued...)

Lecture 25 - Energy Management in Microgrid System (Continued...)

Lecture 26 - DC Microgrid System Architecture and AC Interface

Lecture 27 - DC Microgrid System Architecture and AC Interface (Continued...)

Lecture 28 - DC Microgrid System Architecture and AC Interface (Continued...)

Lecture 29 - DC Microgrid Dynamics and Modeling

Lecture 30 - DC Microgrid Dynamics and Modeling (Continued...)

Lecture 31 - Control of DC Microgrid System

Lecture 32 - Control of DC Microgrid System (Continued...)

Lecture 33 - Applications of DC Microgrids

Lecture 34 - Stability in Microgrid

Lecture 35 - Stability Analysis of DC Microgrid

Lecture 36 - Stability Analysis of DC Microgrid (Continued...)

Lecture 37 - DC Microgrid stabilization strategies (Passive damping method)

Lecture 38 - DC Microgrid Stabilization Strategies (Impedance/Admittance stability criteria)

Lecture 39 - DC microgrid stabilization using nonlinear Techniques

Lecture 40 - General Summary of DC Microgrids

NPTEL : NOC:Power Quality Improvement Technique (Electrical Engineering)

Co-ordinators : Prof. Avik Bhattacharya

Lecture 1 - Introduction

Lecture 2 - Overview - I

Lecture 3 - Overview - II

Lecture 4 - Overview - III

Lecture 5 - Source of Poor Power Quality - I

Lecture 6 - Source of Poor Power Quality - II

Lecture 7 - AC Power Quality Standard

Lecture 8 - Improvement of Power Factor by Capacitor

Lecture 9 - Passive Filter - I

Lecture 10 - Passive Filter - II

Lecture 11 - Passive Filter Design - I

Lecture 12 - Passive Filter Design - II

Lecture 13 - PWM Rectifier - I

Lecture 14 - PWM Rectifier - II

Lecture 15 - PWM Rectifier - III

Lecture 16 - Three phase converters - I

Lecture 17 - Three Phase Converters - II and multi pulse Converters

Lecture 18 - Three Phase Converters - III and multi-pulse Converters

Lecture 19 - VSI and CSI

Lecture 20 - Multilevel Inverter - I

Lecture 21 - Multilevel Inverter - II

Lecture 22 - Multilevel Inverter - III

Lecture 23 - PWM for Voltage Source Inverter - I

Lecture 24 - PWM for Voltage Source Inverter - II

Lecture 25 - PWM for Voltage Source inverter - III

Lecture 26 - PWM for Voltage Source Inverter - IV

Lecture 27 - Operation and Control of Grid-Connected VSC

Lecture 28 - Grid Connected VSC with inner Current Control

Lecture 29 - Shunt Active Power Filter - I

Lecture 30 - Shunt Active Power Filter - II

Lecture 31 - Shunt Active Power Filter - III

Lecture 32 - Shunt Active Power Filter - IV

Lecture 33 - Hybrid Active Power Filter - I

Lecture 34 - Hybrid Active power Filter - II

Lecture 35 - Hybrid Shunt Active Power Filter

Lecture 36 - UPQC Introduction and classification

Lecture 37 - UPQC Classification

Lecture 38 - Operation and Control of UPQC

Lecture 39 - Control of UPQC

Lecture 40 - Conclusion

NPTEL : NOC:Power System Protection and Switchgear (Electrical Engineering)

Co-ordinators : Prof. Bhaveshkumar R. Bhalja

Lecture 1 - Fundamentals of Protective Relaying - I

Lecture 2 - Fundamentals of Protective Relaying - II

Lecture 3 - Fundamentals of Protective Relaying - III

Lecture 4 - Fundamentals of Protective Relaying - IV

Lecture 5 - Fundamentals of Protective Relaying - V

Lecture 6 - Current based Relaying Scheme - I

Lecture 7 - Current based Relaying Scheme - II

Lecture 8 - Current based Relaying Scheme - III

Lecture 9 - Current based Relaying Scheme - IV

Lecture 10 - Current based Relaying Scheme - V

Lecture 11 - Current based Relaying Scheme - VI

Lecture 12 - Current based Relaying Scheme - VII

Lecture 13 - Current based Relaying Scheme - VIII

Lecture 14 - Protection of Transmission Lines using Distance Relays - I

Lecture 15 - Protection of Transmission Lines using Distance Relays - II

Lecture 16 - Protection of Transmission Lines using Distance Relays - III

Lecture 17 - Protection of Transmission Lines using Distance Relays - IV

Lecture 18 - Protection of Transmission Lines using Distance Relays - V

Lecture 19 - Carrier Aided Schemes for Transmission Lines - I

Lecture 20 - Carrier Aided Schemes for Transmission Lines - II

Lecture 21 - Carrier Aided Schemes for Transmission Lines - III

Lecture 22 - Carrier Aided Schemes for Transmission Lines - IV

Lecture 23 - Auto-reclosing and Synchronizing - I

Lecture 24 - Auto-reclosing and Synchronizing - II

Lecture 25 - Auto-reclosing and Synchronizing - III

Lecture 26 - Protection of Transformers - I

Lecture 27 - Protection of Transformers - II

Lecture 28 - Protection of Generators - I

Lecture 29 - Protection of Generators - II

Lecture 30 - Protection of Induction Motors

Lecture 31 - Protection of Busbars

Lecture 32 - Protection against Transients and Surges along with System Response to Severe Upsets - I

Lecture 33 - Protection against Transients and Surges along with System Response to Severe Upsets - II

Lecture 34 - Arc Interruption Theory in Circuit Breaker - I

Lecture 35 - Arc Interruption Theory in Circuit Breaker - II

Lecture 36 - Arc Interruption Theory in Circuit Breaker - III

Lecture 37 - Arc Interruption Theory in Circuit Breaker - IV

Lecture 38 - Types of Circuit Breakers

Lecture 39 - Testing, Commissioning and Maintenance of Relays - I

Lecture 40 - Testing, Commissioning and Maintenance of Relays - II

NPTEL : NOC:RF Transceiver of Design (Electrical Engineering)

Co-ordinators : Prof. Darshak Bhatt

Lecture 1 - Basic of Wireless Communication - I

Lecture 2 - Basic of Wireless Communication - II

Lecture 3 - Basic of Wireless Communication - III

Lecture 4 - Basic of Wireless Communication - IV

Lecture 5 - Basic of Wireless Communication - V

Lecture 6 - Basic of Wireless Communication - VI

Lecture 7 - Noise in RF Systems - I

Lecture 8 - Noise in RF Systems - II

Lecture 9 - Noise in RF Systems - III

Lecture 10 - Noise in RF Systems - IV

Lecture 11 - Non-Linearity in RF Systems - I

Lecture 12 - Non-Linearity in RF Systems - II

Lecture 13 - Non-Linearity in RF Systems - III

Lecture 14 - Transceiver Architecture - I

Lecture 15 - Transceiver Architecture - II

Lecture 16 - Transceiver Architecture - III

Lecture 17 - Transceiver Architecture - IV

Lecture 18 - Transceiver Architecture - V

Lecture 19 - Transceiver Architecture - VI

Lecture 20 - Transceiver Architecture - VII

Lecture 21 - Active Devices - I

Lecture 22 - Active Devices - II

Lecture 23 - Active Devices - III

Lecture 24 - Active Devices - IV

Lecture 25 - Passive Components and Impedance Matching - I

Lecture 26 - Passive Components and Impedance Matching - II

Lecture 27 - Passive Components and Impedance Matching - III

Lecture 28 - Passive Components and Impedance Matching - IV

Lecture 29 - Passive Components and Impedance Matching - V

Lecture 30 - Passive Components and Impedance Matching - VI

Lecture 31 - Passive Components and Impedance Matching - VII

Lecture 32 - Stability and Amplifier Design - I

Lecture 33 - Stability and Amplifier Design - II

Lecture 34 - Stability and Amplifier Design - III

Lecture 35 - Stability and Amplifier Design - IV

Lecture 36 - Low Noise Amplifier Design - I

Lecture 37 - Low Noise Amplifier Design - II

Lecture 38 - Low Noise Amplifier Design - III

Lecture 39 - Low Noise Amplifier Design - IV

Lecture 40 - Low Noise Amplifier Design - V

Lecture 41 - Low Noise Amplifier Design - VI

Lecture 42 - Mixer Design - I

Lecture 43 - Mixer Design - II

Lecture 44 - Mixer Design - III

Lecture 45 - Mixer Design - IV

Lecture 46 - Mixer Design - V

Lecture 47 - Mixer Design - VI

Lecture 48 - Mixer Design - VII

Lecture 49 - Mixer Design - VIII

Lecture 50 - Mixer Design - IX

Lecture 51 - Oscillator Design - I

Lecture 52 - Oscillator Design - II

Lecture 53 - Oscillator Design - III

Lecture 54 - Oscillator Design - IV

Lecture 55 - Power Amplifier Design - I

Lecture 56 - Power Amplifier Design - II

Lecture 57 - Power Amplifier Design - III

Lecture 58 - Basics of Phase Locked Loop - I

Lecture 59 - Basics of Phase Locked Loop - II

Lecture 60 - System Level Considerations

Lecture 61 - RF Testing and Measurement Techniques

NPTEL : NOC:VLSI Physical Design with Timing Analysis (Electrical Engineering)

Co-ordinators : Prof. Bishnu Prasad Das

Lecture 1 - Introduction to VLSI Design

Lecture 2 - Introduction to VLSI Physical Design

Lecture 3 - Complexity Analysis for Algorithms

Lecture 4 - Graphs for Physical Design

Lecture 5 - Graph searching Algorithms

Lecture 6 - Spanning Tree and Shortest Path Algorithms

Lecture 7 - Overview of Timing Analysis

Lecture 8 - Timing Arcs and Unateness

Lecture 9 - Delay Parameters of a Combinational Circuit

Lecture 10 - Delay Parameters of a Sequential Circuit

Lecture 11 - Timing Analysis in a Sequential Circuit

Lecture 12 - STA in Sequential Circuit with Clock Skew - I

Lecture 13 - STA in Sequential Circuit with Clock Skew - II

Lecture 14 - STA in Sequential Circuit with Clock Jitter

Lecture 15 - STA considering OCV and CRPR (Setup check)

Lecture 16 - STA considering OCV and CRPR (Hold check)

Lecture 17 - STA for Combinational Circuits - I

Lecture 18 - STA for Combinational Circuits - II

Lecture 19 - Introduction to Partitioning - I

Lecture 20 - Introduction to Partitioning - II

Lecture 21 - Partitioning Algorithms

Lecture 22 - Kernighan-Lin (KL) Algorithm

Lecture 23 - Fidduccia-Mattheyeses (FM) Algorithm

Lecture 24 - Introduction to Floorplanning

Lecture 25 - Floorplanning Representations

Lecture 26 - Floorplanning Algorithms - 1

Lecture 27 - Floorplanning Algorithms - 2

Lecture 28 - Pin Assignment and Power - Ground Routing

Lecture 29 - Introduction to Placement

Lecture 30 - Wirelength estimation techniques

Lecture 31 - Min-cut placement

Lecture 32 - Placement Algorithms

Lecture 33 - Placement algorithms and legalization

Lecture 34 - Introduction to Clock Tree Synthesis

Lecture 35 - Clock Routing Algorithms - I

Lecture 36 - Clock Routing Algorithms - II

Lecture 37 - Clock Routing Algorithms - III

Lecture 38 - Introduction and Optimization Goals - Global Routing

Lecture 39 - Single net routing (Rectilinear routing)

Lecture 40 - Global Routing in the connectivity graph

Lecture 41 - Finding Shortest Paths with Dijkstra's Algorithm

Lecture 42 - Full-Netlist Routing

Lecture 43 - Introduction: Detailed Routing

Lecture 44 - Channel Routing Algorithms - I

Lecture 45 - Channel Routing Algorithms - II

Lecture 46 - Switchbox and Over the cell routing

Lecture 47 - Timing Constraints in latch based system

Lecture 48 - Timing Constraints in Pulsed Latch-based System

Lecture 49 - Time Borrowing in Latch

Lecture 50 - Crosstalk Analysis

Lecture 51 - Standard Cell Library

Lecture 52 - Low Power Cells in Standard Cell Library

Lecture 53 - Sub-threshold Standard Cell Library

Lecture 54 - Timing Library for Standard Cells

Lecture 55 - PDK and Other files

Lecture 56 - Open-Source Tool Installation and Qflow

Lecture 57 - Open-Source tool - YOSYS

Lecture 58 - OpenSTA Static Timing Analyzer

Lecture 59 - OpenROAD Physical Synthesis Flow - I

Lecture 60 - OpenROAD Physical Synthesis Flow - II

NPTEL : NOC:Modeling, Analysis and Estimation of Three Phase Unbalanced Power Network (Electrical Engineering)

Co-ordinators : Prof. Biswarup Das

Lecture 1 - Introduction

Lecture 2 - Carsonâ€™s Line

Lecture 3 - Carsonâ€™s Line (Continued...)

Lecture 4 - Three-phase Transmission Line - 1

Lecture 5 - Three-phase Transmission Line - 2

Lecture 6 - Three-phase Transmission Line (Continued...)

Lecture 7 - Three-phase Transmission Line (Continued...)

Lecture 8 - Three-phase Transmission Line (Continued...)

Lecture 9 - Transposition of Transmission Line

Lecture 10 - Transposition of Transmission Line (Continued...)

Lecture 11 - Sequence impedance of Transmission Line

Lecture 12 - Sequence impedance of Transmission Line (Continued...)

Lecture 13 - Impedance of Transmission Line

Lecture 14 - Impedance of Transmission Line (Continued...)

Lecture 15 - Impedance of Transmission Line (Continued...)

Lecture 16 - Impedance of Transmission Line (Continued...)

Lecture 17 - Impedance of Transmission Line (Continued...)

Lecture 18 - Impedance of Transmission Line (Continued...)

Lecture 19 - Impedance of Transmission Line (Continued...)

Lecture 20 - Impedance of Transmission Line (Continued...)

Lecture 21 - Capacitance of Transmission Line

Lecture 22 - Capacitance of Transmission Line (Continued...)

Lecture 23 - Capacitance of Transmission Line (Continued...)

Lecture 24 - Capacitance of Transmission Line (Continued...)

Lecture 25 - Transformer Modeling (Introduction, YgYg0)

Lecture 26 - Transformer Modeling (YgYg0, YgYg4)

Lecture 27 - Transformer Modeling (YgD1)

Lecture 28 - Transformer Modeling (YgD1, YD1)

Lecture 29 - Transformer Modeling (YD1) (Continued...)

Lecture 30 - Transformer Modeling (YD1) (Continued...)

Lecture 31 - Transformer Modeling (YYg0, Dd0)

Lecture 32 - Transformer Modeling (Dd0, Overall Summary)

Lecture 33 - Three-Phase Load Flow (Network Modelling)

Lecture 34 - Three-Phase Load Flow (Formation of bus admittance matrix)

Lecture 35 - Three-Phase Load Flow (Formation of bus admittance matrix) (Continued...)

Lecture 36 - Three-Phase Load Flow (Formation of bus admittance matrix) (Continued...)

Lecture 37 - Three-Phase Load Flow (General expression of bus admittance matrix)

Lecture 38 - Three-Phase Load Flow (General expression of bus injected current)

Lecture 39 - Three-Phase Load Flow (Derivation of power flow equations)

Lecture 40 - Three-Phase Load Flow (Concept of Generator Internal Bus)

Lecture 41 - Three-Phase Load Flow (Unknown Quantities)

Lecture 42 - Three-Phase Load Flow (Classification of Unknown Quantities)

Lecture 43 - Three-Phase Load Flow (Classification of Known Quantities)

Lecture 44 - Three-Phase Load Flow (Equations Relating Known and Unknown Quantities)

Lecture 45 - Three-Phase Load Flow (NRLF Polar Method)

Lecture 46 - Three-Phase Load Flow (General Definitions and Dimensions of Jacobian Submatrices)

Lecture 47 - Three-Phase Load Flow (Derivation of J1)

Lecture 48 - Three-Phase Load Flow (Derivation of J1) (Continued...)

Lecture 49 - Three-Phase Load Flow (Derivation of J2)

Lecture 50 - Three-Phase Load Flow (Derivation of J3)

Lecture 51 - Three-Phase Load Flow (Derivation of J3) (Continued...)

Lecture 52 - Three-Phase Load Flow (Derivation of J4, J5, J6, J7, J8)

Lecture 53 - Three-Phase Load Flow (Derivation of J9)

Lecture 54 - Three-Phase Load Flow (Derivation of J9, J10)

Lecture 55 - Three-Phase Load Flow (Derivation of J11, J12)

Lecture 56 - Three-Phase Load Flow (Derivation of J13, J14, J15 and J16, Algorithm and Example)

Lecture 57 - Three-Phase State Estimation (Revision of WLS State Estimation Method for Balanced Systems)

Lecture 58 - Three-Phase State Estimation (Derivation of Measurement Functions for Unbalanced Systems)

Lecture 59 - Three-Phase State Estimation (Derivation of Measurement Functions for Unbalanced Systems)

Lecture 60 - Three-Phase State Estimation (General Structure of Jacobian Matrix, Example)

NPTEL : An Introduction to Electronics Systems Packaging (Electrical Engineering)

Co-ordinators : Prof. G.V. Mahesh

Lecture 1 - Introduction and Objectives of the course

Lecture 2 - Definition of a system and history of semiconductors

Lecture 3 - Products and levels of packaging

Lecture 4 - Packaging aspects of handheld products; Case studies in applications

Lecture 5 - Case Study (continued); Definition of PWB, summary and Questions for review

Lecture 6 - Basics of Semiconductor and Process flowchart; Video on â€œSand-to-Siliconâ€

Lecture 7 - Wafer fabrication, inspection and testing

Lecture 8 - Wafer packaging; Packaging evolution; Chip connection choices

Lecture 9 - Wire bonding, TAB and flipchip-1

Lecture 10 - Wire bonding, TAB and flipchip-2; Tutorials

Lecture 11 - Why packaging? & Single chip packages or modules (SCM)

Lecture 12 - Commonly used packages and advanced packages; Materials in packages

Lecture 13 - Advances packages (continued); Thermal mismatch in packages; Current trends in packaging

Lecture 14 - Multichip modules (MCM)-types; System-in-package (SIP); Packaging roadmaps; Hybrid circuits; Quiz on packages

Lecture 15 - Electrical Issues â€“ I; Resistive Parasitic

Lecture 16 - Electrical Issues â€“ II; Capacitive and Inductive Parasitic

Lecture 17 - Electrical Issues â€“ III; Layout guidelines and the Reflection problem

Lecture 18 - Electrical Issues â€“ IV; Interconnection

Lecture 19 - Quick Tutorial on packages; Benefits from CAD; Introduction to DFM, DFR & DFT

Lecture 20 - Components of a CAD package and its highlights

Lecture 21 - Design Flow considerations; Beginning a circuit design with schematic work and component layout

Lecture 22 - Demo and examples of layout and routing; Technology file generation from CAD; DFM check list and design rules; Design for Reliability

Lecture 23 - Review of CAD output files for PCB fabrication; Photo plotting and mask generation

Lecture 24 - Process flow-chart; Vias; PWB substrates

Lecture 25 - Substrates continued; Video highlights; Surface preparation

Lecture 26 - Photoresist and application methods; UV exposure and developing; Printing technologies for PWBs

Lecture 27 - PWB etching; Resist stripping; Screen-printing technology

Lecture 28 - Through-hole manufacture process steps; Panel and pattern plating methods

Lecture 29 - Video highlights on manufacturing; Solder mask for PWBs; Multilayer PWBs; Introduction to microvias

Lecture 30 - Microvia technology and Sequential build-up technology process flow for high-density interconnects

Lecture 31 - Conventional Vs HDI technologies; Flexible circuits; Tutorial session

Lecture 32 - SMD benefits; Design issues; Introduction to soldering

Lecture 33 - Reflow and Wave Soldering methods to attach SMDs

Lecture 34 - Solders; Wetting of solders; Flux and its properties; Defects in wave soldering

Lecture 35 - Vapour phase soldering, BGA soldering and Desoldering/Repair; SMT failures

Lecture 36 - SMT failure library and Tin Whiskers

Lecture 37 - Tin-lead and lead-free solders; Phase diagrams; Thermal profiles for reflow soldering; Lead-free alloys

Lecture 38 - Lead-free solder considerations; Green electronics; RoHS compliance and e-waste recycling issues

Lecture 39 - Thermal Design considerations in systems packaging

Lecture 40 - Introduction to embedded passives; Need for embedded passives; Design Library; Embedded resistor processes

Lecture 41 - Embedded capacitors; Processes for embedding capacitors; Case study examples; Summary of materials in packaging

Lecture 42 - Chapter-wise summary

NPTEL : Power Electronics and Distributed Generation (Electrical Engineering)

Co-ordinators : Dr. Vinod John

Lecture 1 - Course introduction and overview

Lecture 2 - Distributed generation technologies

Lecture 3 - Distributed storage technologies

Lecture 4 - Distribution system protection

Lecture 5 - Circuit breaker coordination

Lecture 6 - Symmetrical component analysis and sequence excitation

Lecture 7 - Modeling of distribution system components

Lecture 8 - Protection components

Lecture 9 - Impact of distributed generation of distribution protection

Lecture 10 - Consumption and distribution grounding

Lecture 11 - Islanding of distribution systems

Lecture 12 - Modeling of islanded distribution systems

Lecture 13 - Distribution system problems and examples

Lecture 14 - Distribution system problems and examples continued

Lecture 15 - Anti-islanding methods

Lecture 16 - Solid state circuit switching

Lecture 17 - Relaying for distributed generation

Lecture 18 - Feeder voltage regulation

Lecture 19 - Grounding, distribution protection coordination problems and examples

Lecture 20 - Ring and network distribution

Lecture 21 - Economic evaluation of DG systems

Lecture 22 - Design for effective initial cost

Lecture 23 - Single phase inverters

Lecture 24 - DC bus design in voltage source inverter

Lecture 25 - Electrolytic capacitor reliability and lifetime

Lecture 26 - Inverter switching and average model

Lecture 27 - Common mode and differential mode model of inverters

Lecture 28 - Two leg single phase inverter

Lecture 29 - Distribution system problems, and examples

Lecture 30 - DG evaluation problems and examples

Lecture 31 - Switch selection in two level voltage source inverters and loss evaluation

Lecture 32 - Thermal model, management and cycling failure of IGBT modules

Lecture 33 - Semiconductor switch design reliability considerations

Lecture 34 - AC filters for grid connected inverters

Lecture 35 - AC inductor design and need for LCL filter

Lecture 36 - LCL filter design

Lecture 37 - Examples in power electronic design for DG systems

Lecture 38 - Examples in power electronic design for DG systems continued

Lecture 39 - Higher order passive damping design for LCL filters

Lecture 40 - Balance of hardware component for inverters in DG systems

NPTEL : Pulse width Modulation for Power Electronic Converters (Electrical Engineering)

Co-ordinators : Dr. G. Narayanan

Lecture 1 - Electronic switches

Lecture 2 - DC - DC converters

Lecture 3 - DC - AC converters

Lecture 4 - Multilevel converters - I

Lecture 5 - Multilevel converters - II

Lecture 6 - Applications of voltage source converter - I

Lecture 7 - Applications of voltage source converter - II

Lecture 8 - Applications of voltage source converter - III

Lecture 9 - Purpose of PWM - I

Lecture 10 - Purpose of PWM - II

Lecture 11 - Low switching frequency PWM - I

Lecture 12 - Low switching frequency PWM - II

Lecture 13 - Selective harmonic elimination

Lecture 14 - Off-line optimized pulsewidth modulation

Lecture 15 - Sine-triangle pulsewidth modulation

Lecture 16 - Harmonic injection pulsewidth modulation

Lecture 17 - Bus-clamping pulsewidth modulation

Lecture 18 - Triangle-comparison based PWM for three-phase inverter

Lecture 19 - Concept of space vector

Lecture 20 - Conventional space vector PWM

Lecture 21 - Space vector based bus-clamping PWM

Lecture 22 - Space vector based advanced bus-clamping PWM

Lecture 23 - Harmonic analysis of PWM techniques

Lecture 24 - Analysis of RMS line current ripple using the notion of stator flux ripple

Lecture 25 - Evaluation of RMS line current ripple using the notion of stator flux ripple

Lecture 26 - Analysis and design of PWM techniques from line current ripple perspective

Lecture 27 - Instantaneous and average dc link current in a voltage source inverter

Lecture 28 - DC link current and DC capacitor current in a voltage source inverter

Lecture 29 - Analysis of torque ripple in induction motor drives - I

Lecture 30 - Analysis of torque ripple in induction motor drives - II

Lecture 31 - Evaluation of conduction loss in three-phase inverter

Lecture 32 - Evaluation of switching loss in three-phase inverter

Lecture 33 - Design of PWM for reduced switching loss in three-phase inverter

Lecture 34 - Effect of dead-time on inverter output voltage for continuous PWM schemes

Lecture 35 - Effect of dead-time on inverter output voltage for bus-clamping PWM schemes

Lecture 36 - Analysis of overmodulation in sine-triangle PWM from space vector perspective

Lecture 37 - Overmodulation in space vector modulated inverter

Lecture 38 - PWM for three-level neutral-point-clamped inverter - I

Lecture 39 - PWM for three-level neutral-point-clamped inverter - II

Lecture 40 - PWM for three-level neutral-point-clamped inverter - III

NPTEL : Switched Mode Power Conversion (Electrical Engineering)

Co-ordinators : Prof. L. Umanand, Prof. V. Ramanarayanan

Lecture 1 - Introduction to DC-DC converter

Lecture 2 - Diode

Lecture 3 - Controlled Switches

Lecture 4 - Prior Art

Lecture 5 - Inductor

Lecture 6 - Transformer

Lecture 7 - Capacitor

Lecture 8 - Issues related to switches

Lecture 9 - Energy storage - Capacitor

Lecture 10 - Energy storage - Inductor

Lecture 11 - Primitive Converter

Lecture 12 - Non-Isolated converter - I

Lecture 13 - Non-Isolated converter - II

Lecture 14 - Isolated Converters - I

Lecture 15 - Isolated Converters - II

Lecture 16 - Conduction Mode

Lecture 17 - Problem set - I

Lecture 18 - Problem set - II

Lecture 19 - Modeling DC-DC converters

Lecture 20 - State space representation - I

Lecture 21 - State Space representation - II

Lecture 22 - Circuit Averaging - I

Lecture 23 - Circuit Averaging - II

Lecture 24 - State Space Model of Boost Converter

Lecture 25 - DC-DC converter controller

Lecture 26 - Controller Structure

Lecture 27 - PID Controller - I

Lecture 28 - PID Controller - II

Lecture 29 - PID Controller - III

Lecture 30 - Implementation of PID controller

Lecture 31 - Pulse Width Modulator

Lecture 32 - Controller Design - I

Lecture 33 - Controller Design - II

Lecture 34 - Controllers and Sensing Circuit

Lecture 35 - Regulation of Multiple outputs - I

Lecture 36 - Regulation of Multiple outputs - II

Lecture 37 - Current Control

Lecture 38 - Unity Power Factor Converter

Lecture 39 - Magnetic Design

Lecture 40 - DC-DC Converter Design

NPTEL : Basic Electrical Technology (Electrical Engineering)

Co-ordinators : Prof. L. Umanand

Lecture 1 - Basic Electrical Technology

Lecture 2 - Passive Components

Lecture 3 - Sources

Lecture 4 - Kirchoff's Law

Lecture 5 - Modelling of Circuit - Part 1

Lecture 6 - Modelling of Circuit - Part 2

Lecture 7 - Analysis Using MatLab

Lecture 8 - Sinusoidal steady state

Lecture 9 - Transfer Function and Pole Zero domain

Lecture 10 - Transfer function & pole zero

Lecture 11 - The Sinusoid

Lecture 12 - Phasor Analysis - Part 1

Lecture 13 - Phasor Analysis - Part 2

Lecture 14 - Power Factor

Lecture 15 - Power ports

Lecture 16 - Transformer Basics - Part 1

Lecture 17 - Transformer Basics - Part 2

Lecture 18 - Transformer Basics - Part 3

Lecture 19 - The Practical Transformer - Part 1

Lecture 20 - The Practical Transformer - Part 2

Lecture 21 - The Practical Transformer - Part 3

Lecture 22 - DC Machines - Part 1

Lecture 23 - DC Machines - Part 2

Lecture 24 - DC Generators - Part 1

Lecture 25 - DC Generators - Part 2

Lecture 26 - DC Motors - Part 1

Lecture 27 - DC Motors - Part 2

Lecture 28 - DC Motors - Part 3

Lecture 29 - Three Phase System - Part 1

Lecture 30 - Three Phase System - Part 2

Lecture 31 - Three Phase System - Part 3

Lecture 32 - Three Phase System - Part 4

Lecture 33 - Three Phase Transformer - Part 1

Lecture 34 - Three Phase Transformer - Part 2

Lecture 35 - Induction Motor - Part 1

Lecture 36 - Induction Motor - Part 2

Lecture 37 - Induction Motor - Part 3

Lecture 38 - Induction Motor - Part 4

Lecture 39 - Synchronous Machine

NPTEL : Industrial Drives - Power Electronics (Electrical Engineering)

Co-ordinators : Prof. K. Gopakumar

Lecture 1 - Electric Drive

Lecture 2 - Controlled Rectifier - Part-1

Lecture 3 - Controlled Rectifier - Part-2 (Three phase)

Lecture 4 - Controlled Rectifier - Part-3 (Three phase)

Lecture 5 - Controlled Rectifier - Part-4 (Three Phase)

Lecture 6 - Controlled Rectifier - Part-5 (Three Phase)

Lecture 7 - Power Electronics Improvements

Lecture 8 - Four Quadrant Dc to Dc Converter

Lecture 9 - Sine Triangle PWM Control of Converter

Lecture 10 - Front-end Ac-Dc Converter with harmonic control

Lecture 11 - Ac to Dc Converter Close Loop Control Schematic

Lecture 12 - Ac-Dc Converter Close loop Control Block Diagram

Lecture 13 - Design of the Converter Controller & AC to DC

Lecture 14 - Front-End Ac to Dc Converter-Design

Lecture 15 - Front-End Ac to Dc Converter - Simulation study

Lecture 16 - Dc Motor Speed Control - Introduction

Lecture 17 - Dc Motor Speed Control - Block Diagram

Lecture 18 - Dc Motor Speed Control Current Control & S C L

Lecture 19 - Dc-Motor Speed Control Controller Design - Part-1

Lecture 20 - Dc Motor Speed Control Controller Design - Part-2

Lecture 21 - Dc Motor Speed Control Controller Design - Part-3

Lecture 22 - Basics of DC to AC Converter - Part-1

Lecture 23 - Basics of DC to AC Converter - Part-2

Lecture 24 - Inverter Sine Triangle PWM

Lecture 25 - Inverter - Current Hysteresis Controlled PWM

Lecture 26 - C H controlled & Basics of space vector PWM

Lecture 27 - Space Vector PWM - Part-2

Lecture 28 - Space Vector PWM - Part-3

Lecture 29 - Space Vector PWM Signal Generation

Lecture 30 - Speed Control of Induction Motor - Part-1

Lecture 31 - Speed Control of Induction Motor - Part-2

Lecture 32 - High dynamic performance of I M Drive

Lecture 33 - Dynamic Model of Induction Motor - Part-1

Lecture 34 - Dynamic Model of Induction Motor - Part-2

Lecture 35 - Vector Control of Induction Motor

Lecture 36 - Effect of Switching Time lag in Inverter

Lecture 37 - Power Switch Protection - Snubbers

NPTEL : NOC:Design for Internet of Things (Electrical Engineering)

Co-ordinators : Prof. T.V. Prabhakar

Lecture 1 - Introduction to IOTs - Part I

Lecture 2 - Introduction to IOTs - Part II

Lecture 3 - Introduction to IOTs - Examples

Lecture 4 - IOT applications - I

Lecture 5 - IOT applications - II

Lecture 6 - Power management in IOT device

Lecture 7 - Introduction to LDO

Lecture 8 - Design with an LDO

Lecture 9 - Introduction to switching regulators

Lecture 10 - Designing with LDO's, switching regulators and case studies - Part I

Lecture 11 - Designing with LDO's, switching regulators and case studies - Part II

Lecture 12 - Designing with LDO's, switching regulators and case studies - Part II

Lecture 13 - Designing with LDO's, switching regulators and case studies - Part IV

Lecture 14 - Power Conditioning with Energy Harvesters - I

Lecture 15 - Power Conditioning with Energy Harvesters - II

Lecture 16 - Power Conditioning with Energy Harvesters - III

Lecture 17 - Battery less power supply and battery life calculation for embedded devices - I

Lecture 18 - Battery less power supply and battery life calculation for embedded devices - II

Lecture 19 - Battery less power supply and battery life calculation for embedded devices - III

Lecture 20 - Introduction to MQTT

Lecture 21 - Quality of Service in MQTT

Lecture 22 - Standards and Security in MQTT

Lecture 23 - Introduction and Implementation of AMQP

Lecture 24 - Implementation of CoAP and MDNS

Lecture 25 - Basics of RFID

Lecture 26 - RFID protocol and applications

Lecture 27 - BLE Security

Lecture 28 - LPWAN technologies

Lecture 29 - Choice of Microcontrollers

Lecture 30 - Case Study 1 - Joule Jotter

Lecture 31 - Case Study 2 - Cloud Based Systems

NPTEL : NOC:Advances in UHV Transmission and Distribution (Electrical Engineering)

Co-ordinators : Prof Subba Reddy B

Lecture 1 - Advantages of HVAC/DC Transmission, Introduction to Grid Management

Lecture 2 - Transmission system development, Important components of transmission system

Lecture 3 - Insulation coordination, over voltage in power systems

Lecture 4 - Design/selection of insulators, Importance of grading/cc rings

Lecture 5 - Non ceramic insulators performance-service experience

Lecture 6 - Failure of apparatus in the field, importance of reliability and testing

Lecture 7 - Pollution flashover phenomena, modeling etc

Lecture 8 - Planning of High Voltage laboratories

Lecture 9 - Importance of High Voltage testing and techniques employed

Lecture 10 - Basic philosophy of HV testing, tests for various HV apparatus

Lecture 11 - HV testing techniques for various apparatus

Lecture 12 - HV testing on Composite Insulators

Lecture 13 - Surface degradation studies on composite insulators

Lecture 14 - Surface morphological techniques for composite insulators

Lecture 15 - Conductors used for EHV/UHV transmission

Lecture 16 - Corona nad interference on transmission lines

Lecture 17 - Introduction of HTLS conductors and their advantages

Lecture 18 - Mechanical considerations for HV conductors

Lecture 19 - Introduction to Towers and importance of foundations

Lecture 20 - Selection/Design of clearances for HV towers

Lecture 21 - Design Optimization for UHV towers

Lecture 22 - Introduction to 1100kV HVDC

Lecture 23 - Introduction to HV Substations

Lecture 24 - Types of Substations, comparison

Lecture 25 - Insulation coordination, Components in a typical substation

Lecture 26 - Preventive maintenance of Substation

Lecture 27 - Electric and magnetic fields, mitigations techniques

Lecture 28 - Importance of Grounding, reducing Earthing resistance

Lecture 29 - Introduction to the use of Fiber optic cables, OPGW

Lecture 30 - Introduction to communication and SCADA

Lecture 31 - Precautions and safety measures in substation

Lecture 32 - Electrical hazards, minimum clearances in substation

Lecture 33 - Importance of Generation of HVDC in the laboratory

Lecture 34 - Importance of Generation of HVAC, Impulse Voltage and Currents in the laboratory

Lecture 35 - Measurements of High Voltages

Lecture 36 - Measurements of High Voltages (Continued...)

Lecture 37 - Introduction to digital recorders, measurement

Lecture 38 - Upgradation/uprating of transmission lines- advantages

Lecture 39 - Upgradation/uprating of transmission lines- advantages (Continued...)

Lecture 40 - Summary of the course

NPTEL : NOC:Mathematical Methods and Techniques in Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Shayan Srinivasa Garani

Lecture 1 - Introduction to signal processing

Lecture 2 - Basics of signals and systems

Lecture 3 - Linear time-invariant systems

Lecture 4 - Modes in a linear system

Lecture 5 - Introduction to state space representation

Lecture 6 - State space representation

Lecture 7 - Non-uniqueness of state space representation

Lecture 8 - Introduction to vector space

Lecture 9 - Linear independence and spanning set

Lecture 10 - Unique representation theorem

Lecture 11 - Basis and cardinality of basis

Lecture 12 - Norms and inner product spaces

Lecture 13 - Inner products and induced norm

Lecture 14 - Cauchy Schwartz inequality

Lecture 15 - Orthonormality

Lecture 16 - Problem on sum of subspaces

Lecture 17 - Linear independence of orthogonal vectors

Lecture 18 - Hilbert space and linear transformation

Lecture 19 - Gram Schmidt orthonormalization

Lecture 20 - Linear approximation of signal space

Lecture 21 - Gram Schmidt orthogonalization of signals

Lecture 22 - Problem on orthogonal complement

Lecture 23 - Problem on signal geometry (4-QAM)

Lecture 24 - Basics of probability and random variables

Lecture 25 - Mean and variance of a random variable

Lecture 26 - Introduction to random process

Lecture 27 - Statistical specification of random processes

Lecture 28 - Stationarity of random processes

Lecture 29 - Problem on mean and variance

Lecture 30 - Problem on MAP Detection

Lecture 31 - Fourier transform of dirac comb sequence

Lecture 32 - Sampling theorem

Lecture 33 - Basics of multirate systems

Lecture 34 - Frequency representation of expanders and decimators

Lecture 35 - Decimation and interpolation filters

Lecture 36 - Fractional sampling rate alterations

Lecture 37 - Digital filter banks

Lecture 38 - DFT as filter bank

Lecture 39 - Noble Identities

Lecture 40 - Polyphase representation

Lecture 41 - Efficient architectures for interpolation and decimation filters

Lecture 42 - Problems on simplifying multirate systems using noble identities

Lecture 43 - Problem on designing synthesis bank filters

Lecture 44 - Efficient architecture for fractional decimator

Lecture 45 - Multistage filter design

Lecture 46 - Two-channel filter banks

Lecture 47 - Amplitude and phase distortion in signals

Lecture 48 - Polyphase representation of 2-channel filter banks, signal flow graphs and perfect reconstruction

Lecture 49 - M-channel filter banks

Lecture 50 - Polyphase representation of M-channel filter bank

Lecture 51 - Perfect reconstruction of signals

Lecture 52 - Nyquist and half band filters

Lecture 53 - Special filter banks for perfect reconstruction

Lecture 54 - Introduction to wavelets

Lecture 55 - Multiresolution analysis and properties

Lecture 56 - The Haar wavelet

Lecture 57 - Structure of subspaces in MRA

Lecture 58 - Haar decomposition - 1

Lecture 59 - Haar decomposition - 2

Lecture 60 - Wavelet Reconstruction

Lecture 61 - Haar wavelet and link to filter banks

Lecture 62 - Demo on wavelet decomposition

Lecture 63 - Problem on circular convolution

Lecture 64 - Time frequency localization

Lecture 65 - Basic analysis: Pointwise and uniform continuity of functions

Lecture 66 - Basic Analysis : Convergence of sequence of functions

Lecture 67 - Fourier series and notions of convergence

Lecture 68 - Convergence of Fourier series at a point of continuity

Lecture 69 - Convergence of Fourier series for piecewise differentiable periodic functions

Lecture 70 - Uniform convergence of Fourier series of piecewise smooth periodic function

Lecture 71 - Convergence in norm of Fourier series

Lecture 72 - Convergence of Fourier series for all square integrable periodic functions

Lecture 73 - Problem on limits of integration of periodic functions

Lecture 74 - Matrix Calculus

Lecture 75 - KL transform

Lecture 76 - Applications of KL transform

Lecture 77 - Demo on KL Transform

Lecture 78 - Live Session

Lecture 79 - Live Session 2

NPTEL : NOC:Electronics Enclosures Thermal Issues (Electrical Engineering)

Co-ordinators : Prof. N. V Chalapathi Rao

Lecture 1 - Electronic Equipment Thermal issues

Lecture 2 - Practical Examples - 1

Lecture 3 - Practical Examples - 2

Lecture 4 - CEDT worked examples - 1

Lecture 5 - CEDT worked examples - 2

Lecture 6 - Text book theory

Lecture 7 - Sample heat sinks

Lecture 8 - Published correlations - 1

Lecture 9 - Published correlations - 2

Lecture 10 - Parallel combined effects

Lecture 11 - Mounting of packages

Lecture 12 - Combined Rth of devices

Lecture 13 - Schonholzer moduls

Lecture 14 - 1972 model paper

Lecture 15 - Jensen model

Lecture 16 - Thermal management - 1

Lecture 17 - Thermal management - 2

Lecture 18 - Round up of full model

Lecture 19 - Fan cooling

Lecture 20 - Thermo-electric cooling

Lecture 21 - On-the-net DIY work

Lecture 22 - Practical video

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27 - Real packages

Lecture 28 - Prior art

Lecture 29 - OTS standard profiles

Lecture 30 - CAD detailed design of profiles

Lecture 31 - Round up

Lecture 32 - 4X Peltier Cooler

Lecture 33 - Manufacturing Video

Lecture 34 - Peltier heat sink

NPTEL : NOC:Integrated Circuits, MOSFETs, Op-Amps and their Applications (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Introduction to Integrated Circuits (IC) Technology

Lecture 2 - Introduction to fabrication of IC: Substrates

Lecture 3 - Introduction to IC fabrication

Lecture 4 - Introduction to IC fabrication (Continued...)

Lecture 5 - Introduction to the fabrication of sensors

Lecture 6 - Introduction to fabrication technology

Lecture 7 - Introduction to fabrication technology (Continued...)

Lecture 8 - Introduction to fabrication technology (Continued...)

Lecture 9 - Introduction to fabrication technology (Continued...)

Lecture 10 - Introduction to fabrication technology (Continued...)

Lecture 11 - Process flow for Fabrication of MOSFETs

Lecture 12 - Operation of Enhancement type MOSFET

Lecture 13 - Operation of Depletion type MOSFET

Lecture 14 - MOSFETs Characteristics and Applications (Current Mirrors)

Lecture 15 - Introduction to Operational Amplifiers

Lecture 16 - Operational Amplifier Characteristics

Lecture 17 - Operational Amplifier Characteristics (Continued...)

Lecture 18 - Characteristics of an op-amp (Continued...)

Lecture 19 - Operational Amplifier Configarations

Lecture 20 - Operational Amplifier Configarations (Continued...)

Lecture 21 - Applications of Operational Amplifier: Differential Amplifier

Lecture 22 - Applications of Operational Amplifier: Integerator

Lecture 23 - Applications of Operational Amplifier: Differentiator

Lecture 24 - Introduction to Passive and Active Filters and op-amp as Low Pass Filter

Lecture 25 - Operational Amplifier as a High Pass Filter

Lecture 26 - Operational Amplifier as a Band Pass and Band Reject Filter

Lecture 27 - Introduction to Oscillator

Lecture 28 - RC Phase Shift Oscillator using Op-amp

Lecture 29 - Wein Bridge Oscillator using Op-amp

Lecture 30 - Hartley and Colpitts Oscillator using Op-amp

Lecture 31 - Working of Crystal Oscillators

Lecture 32 - Construction and Operation of UJT Relaxation Oscillators

Lecture 33 - Introduction to Noise and its Types

Lecture 34 - Analysis of Data Sheets of an Op-Amp

Lecture 35 - Analysis of Data Sheets of an Op-Amp (Continued...)

Lecture 36 - Analysis of Data Sheets of an Op-Amp (Continued...)

Lecture 37 - Experiment - Introduction to Laboratory Equipment

Lecture 38 - Experiment - Measurement of Active and Passive elements using Multimeter

Lecture 39 - Experiment - Working with Laboratory Equipment: Power Supply

Lecture 40 - Experiment - Working with Laboratory Equipment: Function Generator, Oscilloscope

Lecture 41 - Experiment - Op-Amp Characteristics: Input Bias Current

Lecture 42 - Experiment - Op-Amp Characteristics: Input Offset Current

Lecture 43 - Experiment - Op-Amp Characteristics: Input Offset Voltage

Lecture 44 - Experiment - Op-Amp as Inverting Amplifier

Lecture 45 - Experiment - Op-Amp as Non-Inverting Amplifier

Lecture 46 - Experiment - To study input and output voltage range of an Op-Amp

Lecture 47 - Experiment - Differential amplifier using op-amp

Lecture 48 - Experiment - To study the gain of instrumentation amplifier

Lecture 49 - Experiment - Summing amplifier using op-amp

Lecture 50 - Experiment - To study op-amp based comparator

Lecture 51 - Experiment - To study op-amp based integrator and differentiator

Lecture 52 - Experiment - Study of passive low pass filter

Lecture 53 - Experiment - Op-amp based active low pass filter

Lecture 54 - Experiment - Passive and active high pass filter

Lecture 55 - Experiment - Introduction to experimental set-up of band pass filter

Lecture 56 - Experiment - Passive and active band pass filter

Lecture 57 - Experiment - Introduction to experimental set-up for band reject filter

Lecture 58 - Experiment - Active band reject filter

Lecture 59 - Experiment - Peak detector circuit using Op-Amp

NPTEL : NOC:Semiconductor Devices and Circuits (Electrical Engineering)

Co-ordinators : Prof. Sanjiv Sambandan

Lecture 1 - Quantum Mechanics: Concept of Wave Particle, Schrodinders Equation

Lecture 2 - Quantum Mechanics:Â Particle in a Box

Lecture 3 - Quantum Mechanics:Â Particle in a Box (Continued...), Harmonic Oscillator

Lecture 4 - Solids: Formation of Bands, Kronig-Penny Model

Lecture 5 - Solids: Kronig-Penny Model (Continued...)

Lecture 6 - Solids: Electrons and Holes

Lecture 7 - Solids: Electrons and Holes (Continued...)

Lecture 8 - Solids: Crystals

Lecture 9 - Density of States

Lecture 10 - Density of States (Continued...), Fermi Function

Lecture 11 - Fermi Function - Carrier Concentration

Lecture 12 - Doping

Lecture 13 - Doping (Continued...)

Lecture 14 - Recombination and Generation

Lecture 15 - Recombination and Generation (Continued...)

Lecture 16 - Recombination and Generation (Continued...), Charge Transport

Lecture 17 - Charge Transport (Continued...)

Lecture 18 - Continuity Equation

Lecture 19 - Junctions

Lecture 20 - Metal Semiconductor Junctions

Lecture 21 - Schottky Contact: Electrostatics

Lecture 22 - Schottky Contact: Current-Voltage (IV) Characteristics

Lecture 23 - Schottky Contact: IV Characteristics (Continued...)

Lecture 24 - Schottky Contact: Small Signal Impedance

Lecture 25 - PN Junctions: Electrostatics

Lecture 26 - PN Junctions: IV Characteristics

Lecture 27 - PN Junctions: Small Signal Impedance

Lecture 28 - PN Junctions: Non-Idealities

Lecture 29 - Bipolar Junction Transistors (BJT)

Lecture 30 - BJT: IV Characteristics

Lecture 31 - BJT: Non-Idealities and Equivalent Circuit Modeling

Lecture 32 - Metal Oxide Semiconductor Capacitor (MOSCAP)

Lecture 33 - MOSCAP (Continued...)

Lecture 34 - MOSCAP: CV Characteristics

Lecture 35 - MOSCAP: CV Characteristics (Continued...)

Lecture 36 - MOSFET: Introduction

Lecture 37 - MOSFET: I-V characteristics

Lecture 38 - MOSFET: I-V characteristics (Continued...)

Lecture 39 - MOSFET: I-V characteristics (Continued...)

Lecture 40 - Subthreshold swing, Additional concepts

Lecture 41 - Trapped charge, Body-bias

Lecture 42 - Scaling of MOSFETs

Lecture 43 - Scaling of MOSFETs (Continued...), Leakage currents in MOSFETs

Lecture 44 - MOSFET characterization: Parameter extraction

Lecture 45 - MOSFET characterization: Trapped charges, contact resistance

Lecture 46 - MOSFET as a switch

Lecture 47 - MOSFET as a switch (Continued...)

Lecture 48 - Amplifiers using MOSFET

Lecture 49 - Amplifiers using MOSFET (Continued...)

Lecture 50 - Circuits: Frequency Response, Noise

Lecture 51 - Introduction: Amorphous Semiconductors

Lecture 52 - Thin Film Transistors

Lecture 53 - Tutorials Session - 1

Lecture 54 - Tutorials Session - 2

Lecture 55 - Tutorials Session - 3

NPTEL : NOC:Fabrication Techniques for MEMs-based Sensors: Clinical Perspective (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Introduction to Microengineering Devices

Lecture 2 - Introduction to Microengineering Devices (Continued...)

Lecture 3 - Introduction to Microengineering Devices (Continued...)

Lecture 4 - Silicon, silicon di-oxide and photolithography

Lecture 5 - Silicon, silicon di-oxide and photolithography (Continued...)

Lecture 6 - Physical Vapour Deposition

Lecture 7 - Physical Vapour Deposition (Continued...)

Lecture 8 - Photolithography

Lecture 9 - Mask Aligner

Lecture 10 - Mask Aligner (Continued...)

Lecture 11 - Micromachining

Lecture 12 - Micromachining: Fabrication of VOC Sensor

Lecture 13 - Micromachining: Fabrication of VOC Sensor (Continued...)

Lecture 14 - Micromachining: Fabrication of VOC Sensor and Cantilever

Lecture 15 - Chemical Vapour Deposition

Lecture 16 - Typical Microfabricated Devices for Biomedical Applications

Lecture 17 - Cancer Diagnostic Tool

Lecture 18 - Process flow for Fabrication of Micro Heater

Lecture 19 - Process flow for Fabrication of Interdigited Electrodes

Lecture 20 - Process flow for Fabrication of Interdigited Electrodes (Continued...)

Lecture 21 - Process flow for Fabrication of ETM phenotyping

Lecture 22 - Process flow for Fabrication of Piezo canteliver

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27 - Microchip for Rapid Drug Screening

Lecture 28 - Microchip for Rapid Drug Screening (Continued...)

Lecture 29 - A Microfluidic chip for rapid bacterial antibiotic Susceptibility testing

Lecture 30 - Smart Catheter

Lecture 31 - Smart Catheter: Flexible Force Sensor

Lecture 32 - Smart Catheter: Flexible Force Sensor (Continued...)

Lecture 33 - Tissue and Cell Culture Techniques

Lecture 34 - Clean Room: Equipments Required

Lecture 35 - GLP: Gowning Procedure for using Lab

Lecture 36 - Introduction to Equipments: Refridgerator

Lecture 37 - Gowning Procedure for using Biological Lab Setup

Lecture 38 - Introduction to Equipments: Desiccator

Lecture 39 - Introduction to Equipments: Impedance Analyzer

Lecture 40 - Introduction to Equipments: DAQ

Lecture 41 - Function generator, Multimeter, Sampling, LabVIEW, NI-CDAQ

Lecture 42 - Introduction to Equipments: Stereo Microscope

Lecture 43 - Introduction to Equipments: Metallurgical Microscope

Lecture 44 - Introduction to Equipments: Inverted Microscope

Lecture 45 - Introduction to Equipments: Fire Alarm

Lecture 46 - Introduction to Equipments: Bio-safety Hood

Lecture 47 - Introduction to Equipments: Peristaltic Pump

Lecture 48 - Introduction to Equipments: Incubator

Lecture 49 - Introduction to Equipments: Oven

Lecture 50 - Introduction to Equipments: Micromanipulator

Lecture 51 - PDMS Moulding

Lecture 52 - 3D Printing

Lecture 53 - Introduction to Fabricated Sensors

Lecture 54 - Simulation: Electro- Thermo- Mechanical Properties of Micro-heater using COMSOL Multiphysics

Lecture 55 - Simulation: Electro- Thermo- Mechanical Properties of Micro-heater using COMSOL Multiphysics (Continued...)

NPTEL : NOC:Op-Amp Practical Applications: Design, Simulation and Implementation (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Introduction/Summary on Op-amps

Lecture 2 - Introduction/Summary on Op-amps (Continued...)

Lecture 3 - Introduction/Summary on Op-amps (Continued...)

Lecture 4 - Effect of Loading and Input Impedance - Part 1

Lecture 5 - Effect of Loading and Input Impedance - Part 2

Lecture 6 - Effect of Loading and Input Impedance - Part 3

Lecture 7 - Effect of Loading and Input Impedance - Part 4

Lecture 8 - Introduction to an Analog Circuit Development Board (TI ASLK Pro)

Lecture 9 - Op-amp Applications: Half Wave Rectifier

Lecture 10 - Op-amp Applications: Full Wave Rectifier

Lecture 11 - Op-amp Applications: Clipper

Lecture 12 - Op-amp Circuits using Diodes: Clamper

Lecture 13 - Understanding the Range of Feedback Amplifiers

Lecture 14 - Op-amps as Phase Shift Oscillator

Lecture 15 - Op-amp as Wein Bridge Oscillator

Lecture 16 - Op-amp as Hartley Oscillator

Lecture 17 - Op-amp as Colpitts Oscillator

Lecture 18 - Op-amps as Comparator: Window Comparator

Lecture 19 - Op-amp with Positive Feedback: Inverting Schmitt Trigger

Lecture 20 - Op-amp with Positive Feedback: Non-Inverting Schmitt Trigger

Lecture 21 - Op-amp with Positive Feedback: Astable Multivibrator

Lecture 22 - Op-amp with Positive Feedback: Monostable Multivibrator

Lecture 23 - Op-amp based Voltage Controlled Current Source

Lecture 24 - Measure of Unknown Resistance by Constant Current Drive Circuit Implemented using Op-amp

Lecture 25 - Design and Development of Temperature Controlled Circuit using Op-amp as ON-OFF, Proportional and Proportional Integral Controllers: Introduction

Lecture 26 - Implemetation of Error Detector Cirucit and Signal Conditioning Circuit for Temperature Control

Lecture 27 - Implementation of Plant/Heating Circuit and ON-OFF Controller

Lecture 28 - Implementation of P and PI Controllers

Lecture 29 - Experiment on Controlling the Temperature on the Plant using different Controllers

Lecture 30 - Experiment: Design and Implementation of Signal Conditioning unit for Thermocouple Cold Junction Compensation

Lecture 31 - Introduction to ECG Experiment

Lecture 32 - Desing and Implementation of ECG Preprocessing Stage - Part 1

Lecture 33 - Desing and Implementation of ECG Preprocessing Stage - Part 2

Lecture 34 - Desing and Implementation of ECG Preprocessing Stage - Part 3

Lecture 35 - Desing and Implementation of ECG Preprocessing Stage - Part 4

Lecture 36 - Desing and Implementation of Peak Detetor and Thresholding Circuit for ECG Signal Conditioning

Lecture 37 - Live Demonstration on ECG Signal Acquistion, Conditioning and Measurement of BPM

Lecture 38 - Understanding Analog Multipliers using Development Board

Lecture 39 - Application: Automatic Gain Controller using Development Board

Lecture 40 - Introdution to Data-Acquisition

Lecture 41 - Analog to Digital Conversion Circuits and Experiment on 2-bit Flash Type ADC

Lecture 42 - Digital to Analog Conversion Circuits and Experiment on 4-bit R-2R DAC

Lecture 43 - DAC Basics using Development Board - Introduction

Lecture 44 - Understanding DAC 7821 Datasheet

Lecture 45 - Basic DAC Experiment on Variable Gain Amplifier

Lecture 46 - Understanding DAC: Experiment on Variable Square and Triangular Wave Generator

Lecture 47 - Introduction to CDAQ (Compact DAQ)

Lecture 48 - Software-in-Loop based Temperature Controller using CDAQ and LabVIEW

NPTEL : NOC:Physical Modelling for Electronics Enclosures using Rapid prototyping (Electrical Engineering)

Co-ordinators : Prof. N. V Chalapathi Rao

Lecture 1 - Products prototyping

Lecture 2 - Prototype concepts

Lecture 3 - Physical simulation

Lecture 4 - Rapid Prototyping

Lecture 5 - Products detailing

Lecture 6 - Advantages of Design Modelling

Lecture 7 - Sample product concept

Lecture 8 - Product sample exercise 1

Lecture 9 - Exercise in product sample 2

Lecture 10 - Integration of components 1

Lecture 11 - Components integration in models

Lecture 12 - 3D printing detail 1

Lecture 13 - 3D printing detail 2

Lecture 14 - 3D print assembly design

Lecture 15 - Heat spreader to 3D print

Lecture 16 - Metallic, 3D, build up 1

Lecture 17 - 3D build up 2

Lecture 18 - 3D design 1 from Photo snap

Lecture 19 - 3D design 2 from Photo snap

Lecture 20 - 3D Laser cuts 1, prints

Lecture 21 - 3D Laser cuts 2, open source public prints

Lecture 22 - Demo of 3D Part print

Lecture 23 - Building a model 1

Lecture 24 - Building a model 2

Lecture 25 - Common place objects

Lecture 26 - Materials

Lecture 27 - Future 3D In biology

Lecture 28 - Product clamp variants

Lecture 29 - Product clamp build up

Lecture 30 - Multi direction features

Lecture 31 - Multi direction features (Continued...)

Lecture 32 - Fastening detail

Lecture 33 - Flat objects

Lecture 34 - Modularity

Lecture 35 - Creative design work

Lecture 36 - Creative designs

Lecture 37 - Using flat features

Lecture 38 - Organic shapes

Lecture 39 - Simulation for alternate use

NPTEL : NOC:Recent Advances in Transmission Insulators (Electrical Engineering)

Co-ordinators : Prof Subba Reddy B

Lecture 1 - Introduction to Transmission and distribution Insulators

Lecture 2 - Manufacturing process for Ceramic/glass Insulators

Lecture 3 - Manufacturing process for Polymeric Insulators

Lecture 4 - Design Considerations of Transmission Insulators

Lecture 5 - Field experience of Ceramic/Glass and Polymeric Insulators

Lecture 6 - Comparison of Transmission Insulators

Lecture 7 - Environmental issues with transmission Insulators

Lecture 8 - Reliability and Philosophy of Testing

Lecture 9 - Testing of Ceramic, Glass and Composite Insulators

Lecture 10 - Cleaning methods adopted for Insulators

Lecture 11 - Cleaning methods adopted for Insulators (Continued...)

Lecture 12 - Coating techniques for Insulators

Lecture 13 - Introduction to Hybrid Insulators

NPTEL : NOC:Fundamentals of Semiconductor Devices (Electrical Engineering)

Co-ordinators : Prof. Digbijoy N. Nath

Lecture 1 - Introduction to semiconductors

Lecture 2 - Introduction to energy bands

Lecture 3 - Fundamentals of band structure

Lecture 4 - Band structure (Continued...) and Fermi-Dirac distribution

Lecture 5 - Density of states

Lecture 6 - Doping and intrinsic carrier concentration

Lecture 7 - Equilibrium carrier concentration

Lecture 8 - Temperature-dependence of carrier concentration

Lecture 9 - High doping effects and incomplete ionization

Lecture 10 - Carrier scattering and mobility

Lecture 11 - Low-field and high-field transport, introduction to diffusion

Lecture 12 - Drift-diffusion and trap statistics

Lecture 13 - Current continuity equation

Lecture 14 - Continuity equation (Continued...) and introduction to p-n junction

Lecture 15 - p-n junction under equilibrium

Lecture 16 - p-n junction under equilibrium (Continued...)

Lecture 17 - p-n junction under bias

Lecture 18 - p-n junction under bias (Continued...)

Lecture 19 - p-n junction: generation-recombination currents

Lecture 20 - Application of p-n junctions

Lecture 21 - Breakdown of junction and C-V profiling

Lecture 22 - Introduction to Schottky junction

Lecture 23 - Schottky junction under equilibrium

Lecture 24 - Schottky junction under bias

Lecture 25 - Introduction to transistors: BJT

Lecture 26 - Basics of BJT

Lecture 27 - Working of BJT

Lecture 28 - Working of BJT (Continued...)

Lecture 29 - Delays in BJT

Lecture 30 - MOS: Introduction

Lecture 31 - MOS: Capacitance-voltage

Lecture 32 - Ideal MOS system: derivation of threshold voltage

Lecture 33 - MOS C-V in more details

Lecture 34 - MOSFET - An introduction

Lecture 35 - Gradual Channel Approximation: Derivation of I-V characteristics

Lecture 36 - Substrate bias effect and subthreshold conduction in MOSFET

Lecture 37 - Short Channel Effects in MOSFET

Lecture 38 - Introduction to compound semiconductors

Lecture 39 - Basics of heterojunctions

Lecture 40 - Band diagram of heterojunctions

Lecture 41 - Heterojunctions (Continued....)

Lecture 42 - Heterojunction transistors

Lecture 43 - III-nitrides

Lecture 44 - Solar cell basics

Lecture 45 - Solar cell (Continued...)

Lecture 46 - Solar cell: Shockley Quiesser Limit

Lecture 47 - Basics of photodetectors

Lecture 48 - Photodetectors: figures of merit and types of devices

Lecture 49 - Junction photodetectors

Lecture 50 - Basics of recombination

Lecture 51 - Basics of LED

Lecture 52 - LED: light extraction and design issues

Lecture 53 - Visible LED: photometry and colorimetry

Lecture 54 - Transistors for power electronics

Lecture 55 - Transistors for power electronics (Continued...) and for RF electronics

Lecture 56 - Transistors for RF (Continued...) and transistors for Memory

Lecture 57 - Basics of microelectronic fabrication

Lecture 58 - Microelectronic fabrication (Continued...)

Lecture 59 - Summary

NPTEL : NOC:Advanced IOT Applications (Electrical Engineering)

Co-ordinators : Prof. T V Prabhakar

Lecture 1 - Overview of localization using IoT sensors

Lecture 2 - Outdoor localization without GPS - I

Lecture 3 - Outdoor localization without GPS - II

Lecture 4 - Outdoor localization using elevation - pressure mapping

Lecture 5 - Localization using IMU sensors - I

Lecture 6 - Localization using IMU sensors - II

Lecture 7 - Localization using IMU sensors - III

Lecture 8 - RFID based localization - I

Lecture 9 - RFID based localization - II

Lecture 10 - Simulation of simple algorithms for object detection

Lecture 11 - Building smart vehicle for collision avoidance

Lecture 12 - Basic computer vision algorithms - Part 1

Lecture 13 - Basic computer vision algorithms - Part 2

Lecture 14 - Code walkthrough of computer vision algorithm

Lecture 15 - Introduction to LiDAR

Lecture 16 - Range estimation and Obstacle avoidance

Lecture 17 - Introduction to vehicle platooning

Lecture 18 - Building blocks for autonomous vehicles - 1

Lecture 19 - Building blocks for autonomous vehicles - 2

Lecture 20 - On Board Diagnostics and protocols

Lecture 21 - Diagnostic services and fuel-injection ratio control unit

Lecture 22 - Real time event processing and Anomaly detection

Lecture 23 - OBD-II and stream processing demonstration

Lecture 24 - Speech recognition - Part 1

Lecture 25 - Speech recognition - Part 2

Lecture 26 - Speech recognition - Part 3

Lecture 27 - Speech recognition - Part 4

Lecture 28 - Device Security - Part 1

Lecture 29 - Device Security - Part 2

Lecture 30 - Device Security - Part 3

Lecture 31 - Need for air quality monitoring

Lecture 32 - Air quality : pollutants and standards

Lecture 33 - Introduction to air quality sensors

Lecture 34 - Calibration techniques for IoT air quality sensors

Lecture 35 - Sensor types : semiconductor and electrochemical

Lecture 36 - Air quality : Overview of system design

Lecture 37 - Air quality : System design - Part 1

Lecture 38 - Air quality : System design - Part 2

Lecture 39 - Air quality : Real time measurement for a drive cycle

Lecture 40 - Introduction to First Responder networks

Lecture 41 - First Responders - Applications - Part 1

Lecture 42 - First Responders - Applications - Part 2

Lecture 43 - Cargo monitoring for tamper detection - Part 1

Lecture 44 - Cargo monitoring for tamper detection - Part 2

NPTEL : NOC:Electronic Systems for Cancer Diagnosis (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Tissue and Cell Culture Techniques: Introduction

Lecture 2 - Tissue and Cell Culture Techniques: Methods

Lecture 3 - Tissue and Cell Culture Techniques: Devices

Lecture 4 - Cleanroom Equipments

Lecture 5 - Cleanroom Equipments (Continued...)

Lecture 6 - Introduction to photolithography

Lecture 7 - Photolithography: Mask Aligner

Lecture 8 - Photolithography: Designing Mask Aligner

Lecture 9 - Micromachining Techniques

Lecture 10 - Breast Cancer and Oral Cancer Statistics

Lecture 11 - Fabrication of MEMs-based Biochip for cancer diagnosis

Lecture 12 - Fabrication of MEMs-based Biochip for cancer diagnosis (Continued...)

Lecture 13 - Fabrication of Piezoresistive Sensor

Lecture 14 - Fabrication of Piezoresistive Sensor (Continued...)

Lecture 15 - Fabrication of SU-8 pillar on piezoresistive Sensor

Lecture 16 - Portable Cancer Diagnostic Tool Using a Disposable MEMS-Based Biochip

Lecture 17 - Mechanical Phenotyping of Breast Cancer using MEMS

Lecture 18 - Electrical characterization of Breast Tissue Cores

Lecture 19 - Fabrication of MEMS-based sensor for electro-mechanical phenotyping of breast cancer

Lecture 20 - Fabrication of electro-mechanical sensor (Continued...)

Lecture 21 - Assemby of the electro-mechanical sensor

Lecture 22 - Silicon substrate devices for breast cancer diagnosis

Lecture 23 - Understanding the methods and mechanism to study cell morphology

Lecture 24 - Cytology - A detail study on Spin Coater and Cytospin

Lecture 25 - Techniques in oral cytology studies

Lecture 26 - Techniques in cell morphology analysis

Lecture 27 - Comparitive study on diagnostic tools for oral cancer screening

Lecture 28 - Basic building blocks of Electronics System: Amplifiers

Lecture 29 - Basic building blocks of Electronics System: Amplifiers (Continued...)

Lecture 30 - Basic building blocks of Electronics System: Amplifiers (Continued...)

Lecture 31 - Basic building blocks of Electronics System: Filters

Lecture 32 - Basic building blocks of Electronics System: Filters (Continued...)

Lecture 33 - Basic building blocks of Electronics System: Filters (Continued...)

Lecture 34 - Basic building blocks of Electronics System: Data Converteres

Lecture 35 - Basic building blocks of Electronics System: Data Converteres (Continued...)

Lecture 36 - Basic building blocks of Electronics System: Signal Conditioning Circuits

Lecture 37 - Etching Process and Figure of Merits

Lecture 38 - ECG Signal Processing to calculate BPM

Lecture 39 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 40 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 41 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 42 - ECG Signal Processing to calculate BPM (Continued...)

Lecture 43 - ECG Signal Processing to calculate BPM [Continued...)

Lecture 44 - MEMS based Force Sensor for Catheter Contact Force Measurement

Lecture 45 - 3D Printing: Introduction and Work Flow

Lecture 46 - 3D Fabrication Techniques

Lecture 47 - Gowning Procedure in Clean Room

Lecture 48 - Introduction to Equipments: Desiccators

Lecture 49 - PDMS Moulding procedure

Lecture 50 - Introduction to Equipments: Pristaltic Pump

Lecture 51 - Introduction to Equipments: Stereo Microscopy, Metallurgical Microscopy, Inverted Microscopy

Lecture 52 - Micromanipulator

Lecture 53 - Biosafety Cabinet and Ultrasonicbath

Lecture 54 - Incubator Shaker

Lecture 55 - Hotplate and Microcentrifuge

Lecture 56 - Autoclave

Lecture 57 - Impedance Analyser

Lecture 58 - Rapid Prototyping using 3D Printer

Lecture 59 - Etching Process

Lecture 60 - Electronic System for Drug Screening

Lecture 61 - Introduction to Equipments: DAQ

Lecture 62 - Introduction to Equipments: DAQ (Continued...)

Lecture 63 - Electronic Module for Gas sensor

Lecture 64 - Fabrication process flow for a metal oxide gas sensor

Lecture 65 - MEMS Simulation using Comsol Multiphysics

Lecture 66 - Introduction to COMSOL Multiphysics

Lecture 67 - COMSOL Examples for MEMS Applications

Lecture 68 - COMSOL Examples for MEMS Applications (Continued...)

Lecture 69 - Demonstration of Thermal Acutator and Understanding of Application Builder

Lecture 70 - Closed loop control of temperature sensor

Lecture 71 - Experimental Set-up of closed loop control of temperature sensor

NPTEL : NOC:Electronic Modules for Industrial Applications using Op-Amps (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Introduction to Op-amp

Lecture 2 - Introduction Wafer Manufacturing Process and Clean room Protocols

Lecture 3 - Introduction to Fabrication Process Technology and Op-amp

Lecture 4 - Op-amp Characteristics and Datasheet Parameters

Lecture 5 - Overview of Active Filters and Oscillators

Lecture 6 - Overview of Op-amp Oscillators

Lecture 7 - Introduction to ECG Experiment

Lecture 8 - Design and Implementation of ECG Preprocessing Stage - Part 1

Lecture 9 - Design and Implementation of ECG Preprocessing Stage - Part 2

Lecture 10 - Design and Implementation of ECG Preprocessing Stage - Part 3

Lecture 11 - Design and Implementation of ECG Preprocessing Stage - Part 4

Lecture 12 - Design and Implementation of Peak Detector and Thresholding Circuit for ECG Signal Conditioning

Lecture 13 - Experiment: Live Demonstration of ECG Signal Acquistion, Conditioning and Measurement of BPM

Lecture 14 - Application: ECG Signals for detecting AF and the role of sensors

Lecture 15 - Photolithography: Masks

Lecture 16 - Understanding the process of photolithography

Lecture 17 - Photolithography: Mask Aligner

Lecture 18 - Photolithography: Designing of Mask Aligner System

Lecture 19 - Fabrication of Piezoresistive Sensor

Lecture 20 - Fabrication of MEMS based Catheter Contact Force Sensor

Lecture 21 - Design of Speed Control of DC Motor: Introduction

Lecture 22 - Design of Speed Control of DC Motor: Circuit Explanation

Lecture 23 - Design of Speed Control of DC Motor: Encoder Calibration

Lecture 24 - Design of Speed Control of DC Motor: Encoder Signal Conditioning Circuit - 1

Lecture 25 - Design of Speed Control of DC Motor: Encoder Signal Conditioning Circuit - 2

Lecture 26 - Design of Speed Control of DC Motor: Encoder Signal Conditioning Circuit - 3

Lecture 27 - Design of Speed Control of DC Motor: Encoder Signal Conditioning Circuit - 4

Lecture 28 - Design of Speed Control of DC Motor: Error Amplifier

Lecture 29 - Design of Speed Control of a DC Motor using Op-amp: Controllers

Lecture 30 - Design of Speed Control of a DC Motor using Op-amp: Circuit Implementation

Lecture 31 - Design of Speed Control of a DC Motor using DAQ - Part 1

Lecture 32 - Design of Speed Control of a DC Motor using DAQ - Part 2

Lecture 33 - Design of Speed Control of a DC Motor using DAQ - Part 3

Lecture 34 - Introduction to Hot-Wire Anemometer

Lecture 35 - Signal-conditioning Circuit for Hot-Wire Anemometer

Lecture 36 - Signal-conditioning Circuit for Hot-Wire Anemometer Part 2

Lecture 37 - Signal-conditioning Circuit for Hot-Wire Anemometer: Simulation

Lecture 38 - Signal-conditioning Circuit for Hot-Wire Anemometer: Experiment

Lecture 39 - Introduction to Gas Sensors

Lecture 40 - Fabrication Process for Gas Sensor

Lecture 41 - Signalconditioning Circuit for Operating Heater Voltage of MQ-7 Gas Sensor - Part 1

Lecture 42 - Signalconditioning Circuit for Operating Heater Voltage of MQ-7 Gas Sensor - Part 2

Lecture 43 - Signalconditioning Circuit for Operating Heater Voltage of MQ-7 Gas Sensor - Part 3

Lecture 44 - Fundamentals of Electrophysiological signals

Lecture 45 - Fundamentals of EEG Signal

Lecture 46 - Application of EEG Signal for Detection of Hearing Loss

Lecture 47 - Closed loop control of temperature using DAQ and LabVIEW

Lecture 48 - Experimental Set-up of closed loop control of temperature sensor

Lecture 49 - Introduction to MEMS Simulation using Comsol Multiphysics

Lecture 50 - Introduction to COMSOL Multiphysics

Lecture 51 - COMSOL Examples for MEMS Applications

Lecture 52 - COMSOL Examples for MEMS Applications (Continued...)

Lecture 53 - Demonstration of Thermal Acutator and Understanding of Application Builder

NPTEL : NOC:Sensors and Actuators (Electrical Engineering)

Co-ordinators : Prof. Hardik Jeetendra Pandya

Lecture 1 - Sensors - Part 1

Lecture 2 - Sensors - Part 2

Lecture 3 - Sensors - Part 3

Lecture 4 - Sensors - Part 4

Lecture 5 - Sensors - Part 5

Lecture 6 - Recent Microsensors based system: E-Nose

Lecture 7 - Recent Microsensors based system: Force Sensor, Basics of Actuators

Lecture 8 - Microfabrication Basics

Lecture 9 - Introduction to cleanroom

Lecture 10 - Cleanroom Protocols

Lecture 11 - Introduction to Cleanroom Equipments: Micromanipulator, Stereo Microscope, metallurgical microscope, Incubator, Static Incubator, Inverted Microscope, Oven, Autoclave, Sonicator

Lecture 12 - Fabrication Process Flow of Microheater and Micromachining

Lecture 13 - Wafer Bonding and PDMS moulding

Lecture 14 - Overview of MEMS based sensors

Lecture 15 - Introduction to Cleanroom Equipments: Impedance Analyzer, LCR Meter, Micromanipulator

Lecture 16 - Introduction to Cleanroom Equipments: Biosafety Hood and safety

Lecture 17 - Process Sensor Process Flow, Cell based Diagnosis Device

Lecture 18 - Basics of Patterning and Drug Screening Device

Lecture 19 - MEMS applications in automobile system

Lecture 20 - Arduino Interfacing for Sensors and Actuators

Lecture 21 - Demonstration of DC Motor as an actuator

Lecture 22 - Demonstration of peristaltic pump using Arduino

Lecture 23 - Demonstration of PDMS Patterning

Lecture 24 - Crystal Orientation and Si-SiO2 interface

Lecture 25 - Surface Profilometry and Physical Vapour Deposition Techniques

Lecture 26 - Introduction to COMSOL Multiphysics and Modelling Examples

Lecture 27 - Demonstration of Thermal Actuators using COMSOL

Lecture 28 - Demonstration of MQ3 Gas sensor using Arduino

Lecture 29 - Photolithography - Part 1

Lecture 30 - Signal Conditioning Circuit for Temperature Sensors

Lecture 31 - Demonstration of Microheaters in COMSOL Multiphysics

Lecture 32 - Introduction to Cleanroom facilities for biomedical applications

Lecture 33 - Physical Deposition Techniques

Lecture 34 - Demonstration on peristaltic pump in cleanroom

Lecture 35 - Installation of Oxygen Plasma System

Lecture 36 - Demonstration of IR Based Sensor using Arduino

Lecture 37 - Illustration of fabricated Microfluidic Device for biochips with PDMS moulding

Lecture 38 - Photolithography - Part 2

Lecture 39 - Photolithography - Part 3

Lecture 40 - Introduction and Demonstration of Shape Memory Alloy

Lecture 41 - Applications of Shape Memory Alloy as a light weight actuators

Lecture 42 - Discussion on Fabricated Sensor with Silicon as Substrate

Lecture 43 - Discussion and Microscopic Inspection of Fabricated Sensor with Silicon as a Substrate

Lecture 44 - Tissue Deparaffinization for Biosensors

Lecture 45 - Clean room guidelines and Cancer Dianostic tool

Lecture 46 - Basics of Pressure Sensor and Demonstration using Arduino Microcontroller

Lecture 47 - Basics of Stepper Motor and Demonstration using Arduino Microcontroller

Lecture 48 - Microscopic Inspection of Diced wafers and CNT Sensing Layer for fabricated sensor

Lecture 49 - Process flow for Microcantilever for Mechanical Phenotyping of breast cancer tissues

Lecture 50 - Applications of microcantilever for Mechanical Phenotyping of breast cancer tissues

Lecture 51 - Installation and Introduction to Physical Vapour Deposition System

Lecture 52 - Human Machine Interface for Controlling Deposition System

Lecture 53 - Flexible MEMS for phenotyping tissue properties - I

Lecture 54 - Flexible MEMS for phenotyping tissue properties - II

Lecture 55 - System Demonstration for Physical Vapor Deposition

Lecture 56 - Introduction to CAD Modelling - I

Lecture 57 - Introduction to CAD Modelling - II

Lecture 58 - Biosensors for ETM Phenotyping of breast cancer tissues for better prognosis

Lecture 59 - Biosensors for Electrothermal sensor

Lecture 60 - MEMS based sensor for catheter contact force measurement

Lecture 61 - Microfluidics based Drug Screening

Lecture 62 - Basic aspects of 3D Printing

Lecture 63 - 3D Printing Materials and Demonstration of Remote 3D Printing

NPTEL : NOC:Neural Networks for Signal Processing-I (Electrical Engineering)

Co-ordinators : Prof. Shayan Srinivasa Garani

Lecture 1 - The human brain

Lecture 2 - Introduction to Neural Networks

Lecture 3 - Models of a neuron

Lecture 4 - Feedback and network architectures

Lecture 5 - Knowledge representation

Lecture 6 - Prior information and invariances

Lecture 7 - Learning processes

Lecture 8 - Perceptron - 1

Lecture 9 - Perceptron - 2

Lecture 10 - Batch perceptron algorithm

Lecture 11 - Perceptron and Bayes classifier

Lecture 12 - Linear regression - 1

Lecture 13 - Linear regression - 2

Lecture 14 - Linear regression - 3

Lecture 15 - Logistic regression

Lecture 16 - Multi-layer perceptron - 1

Lecture 17 - Multi-layer perceptron - 2

Lecture 18 - Back propagation - 1

Lecture 19 - Back propagation - 2

Lecture 20 - XOR problem

Lecture 21 - Universal approximation function

Lecture 22 - Complexity Regularization and Cross validation

Lecture 23 - Convolutional Neural Networks (CNN)

Lecture 24 - Coverâ€™s Theorem

Lecture 25 - Multivariate interpolation problem

Lecture 26 - Radial basis functions (RBF)

Lecture 27 - Recursive least squares algorithm

Lecture 28 - Comparison of RBF with MLP

Lecture 29 - Kernel regression using RBFs

Lecture 30 - Kernel Functions

Lecture 31 - Basics of constrained optimization

Lecture 32 - Optimization with equality constraint

Lecture 33 - Optimization with inequality constraint

Lecture 34 - Support Vector Machines (SVM)

Lecture 35 - Optimal hyperplane for linearly separable patterns

Lecture 36 - Quadratic optimization for finding optimal hyperplane

Lecture 37 - Optimal hyperplane for non-linearly separable patterns

Lecture 38 - Inner product kernel and Mercerâ€™s theorem

Lecture 39 - Optimal design of an SVM

Lecture 40 - Îµ-insensitive loss function

Lecture 41 - XOR problem revisited using SVMs

Lecture 42 - Hilbert Space

Lecture 43 - Reproducing Kernel Hilbert Space

Lecture 44 - Representer Theorem

Lecture 45 - Generalized applicability of the representer theorem

Lecture 46 - Regularization Theory

Lecture 47 - Euler-Lagrange Equation

Lecture 48 - Regularization Networks

Lecture 49 - Generalized RBF networks

Lecture 50 - XOR problem revisited using RBF

Lecture 51 - Structural Risk Minimization

Lecture 52 - Bias-Variance Dilemma

Lecture 53 - Estimation of regularization parameters

Lecture 54 - Basics of L1 regularization

Lecture 55 - Grafting

Lecture 56 - Kernel PCA

Lecture 57 - Hebbian based maximum eigen filter - 1

Lecture 58 - Hebbian based maximum eigen filter - 2

Lecture 59 - Hebbian based maximum eigen filter - 3

Lecture 60 - VC dimension

Lecture 61 - Autoencoders

Lecture 62 - Denoising Autoencoders

Lecture 63 - Demo - Perceptron

Lecture 64 - Demo - Motivation for CNN

Lecture 65 - Back propagation in Convolutional Neural Network

Lecture 66 - Ethics in AI research and coverage summary

NPTEL : NOC:Electronics Equipment Integration and Prototype Building (Electrical Engineering)

Co-ordinators : Prof. N.V.Chalapathi Rao

Lecture 1 - Introduction to electronics products

Lecture 2 - Examples from real life: Parts to system

Lecture 3 - Common Simulation of flat prismatic parts

Lecture 4 - Common flat parts enclosures

Lecture 5 - Real life parts to scale on a graph

Lecture 6 - Early First steps

Lecture 7 - Top down, outside to internals

Lecture 8 - Using a print and fabrication video

Lecture 9 - Details of displays and keys

Lecture 10 - Improvement on marking and skill

Lecture 11 - Mass production in sheet metal

Lecture 12 - Prototyping of user interfaces for concepts

Lecture 13 - Stacking of equipment to make a system

Lecture 14 - Recapitualising a sub system

Lecture 15 - Off the shelf enclosures and making a user interface

Lecture 16 - Looking around for concepts and integration

Lecture 17 - Representation on paper

Lecture 18 - Example features of surfaces and solids

Lecture 19 - Simple and curved surfaces

Lecture 20 - Describing inclined surfaces

Lecture 21 - Basics of engineering Drawing

Lecture 22 - Introduction to sizing and fits

Lecture 23 - Practical mechanical assemblies

Lecture 24 - Analogous Mechanical - Electronics detailing

Lecture 25 - Solid modelling

Lecture 26 - Importance of dimensioning

Lecture 27 - Ease of editing redesign

Lecture 28 - Dimensioning of electronics components

Lecture 29 - 2D flat representation

Lecture 30 - Electronics to Mechanical interfacing

Lecture 31 - Complexity of 3D assemblies with wiring

Lecture 32 - Illustrative simple design

Lecture 33 - Practical detailing

Lecture 34 - Rendered on screen

Lecture 35 - Fastenings and hardware

Lecture 36 - Fastener representation, deatiling

Lecture 37 - Practical detailing.

Lecture 38 - Recapitulation, context of course

Lecture 39 - Low cost is the key

NPTEL : NOC:Design and Simulation of Power Conversion using Open Source Tools (Electrical Engineering)

Co-ordinators : Prof. L. Umanand

Lecture 1 - Getting started with NgSpice

Lecture 2 - Refractoring the .cir

Lecture 3 - Sub-circuits

Lecture 4 - gschem and netlist generation

Lecture 5 - Setting up for simulation with Octave

Lecture 6 - Getting started with equation based simulation

Lecture 7 - Resuming a simulation in Octave

Lecture 8 - PV cell model - review

Lecture 9 - PV cell characteristic - review

Lecture 10 - PV cell - symbol and subcircuit

Lecture 11 - Rectifier-capacitor filter - operation review

Lecture 12 - Rectifier-capacitor filter - NgSpice simulation

Lecture 13 - Rectifier-capacitor filter with non-idealities

Lecture 14 - 3 phase Rectifier-capacitor filter

Lecture 15 - Equation based simulation in Octave

Lecture 16 - Passive power factor improvement - review

Lecture 17 - Passive power factor circuit in NgSpice

Lecture 18 - Buck converter - review

Lecture 19 - Buck converter - NgSpice

Lecture 20 - Boost converter - review

Lecture 21 - Boost converter - NgSpice

Lecture 22 - Buck-boost converter - review

Lecture 23 - Buck-boost converter - NgSpice

Lecture 24 - Equation based simulation of converters

Lecture 25 - Forward Converter - review

Lecture 26 - Forward Converter simulation

Lecture 27 - Understanding Core flux reset

Lecture 28 - Core flux reset - simulation

Lecture 29 - Flyback converter - review

Lecture 30 - Flyback converter - simulation

Lecture 31 - Pushpull converter - review

Lecture 32 - Pushpull converter - simulation

Lecture 33 - Half bridge converter - review

Lecture 34 - Half bridge converter - simulation

Lecture 35 - Full bridge converter - review

Lecture 36 - Full bridge converter - simulation

Lecture 37 - Close loop operation

Lecture 38 - Close loop with feed forward control

Lecture 39 - NgSpice simulation of close loop control

Lecture 40 - Battery charging with current control

Lecture 41 - Slope compensation for current control

Lecture 42 - NgSpice simulation of battery charging

Lecture 43 - Single phase PWM for single phase inverter

Lecture 44 - NgSpice simulation of single phase PWM

Lecture 45 - 2-axes theory for 3-phase systems

Lecture 46 - Transformations for 2 and 3 axes systems

Lecture 47 - Maximum power point tracking - NgSpice

Lecture 48 - Space vector PWM - digital

Lecture 49 - Space vector PWM - analog

Lecture 50 - SVPWM analog - NgSpice simulation

Lecture 51 - Induction motor model

Lecture 52 - Induction motor simulation in Octave

Lecture 53 - V/F control of induction motor - NgSpice

NPTEL : NOC:Introductory Neuroscience and Neuro-Instrumentation (Electrical Engineering)

Co-ordinators : Prof. Mahesh Jayachandra

Lecture 1 - Cellular (Microscopic) Structure of the Central Nervous System (CNS)

Lecture 2 - Anatomical (Macroscopic) structure of the CNS

Lecture 3 - Introduction to Cleanroom and IC Fabrication Techniques

Lecture 4 - Introduction to EEG applications for Hearing Loss

Lecture 5 - Electrophysiological Recordings

Lecture 6 - Neocortical Circuits

Lecture 7 - The resting Membrane Potential

Lecture 8 - Applications of MEMS Fabrication Technologies

Lecture 9 - Fundamentals of biopotentials and applications

Lecture 10 - Fundamentals of EEG and applications

Lecture 11 - The Action Potential (1)

Lecture 12 - The Action Potential (2)

Lecture 13 - Axonology, Neuronal Biophysics (1)

Lecture 14 - Axonology, Neuronal Biophysics (2)

Lecture 15 - Experimental Setup for EEG Recording

Lecture 16 - Introduction to Cleanroom Protocols and Demonstration of Gowning Procedure

Lecture 17 - Electromagnetic Stimulation of the Brain (1)

Lecture 18 - Electromagnetic Stimulation of the Brain (2)

Lecture 19 - Introduction to Event Related Potentials

Lecture 20 - Introduction to 3D Printing

Lecture 21 - 3D Printing: Applications and Demonstrations

Lecture 22 - Introduction to Event Related Potentials (2)

Lecture 23 - Different Event Related Potentials (1)

Lecture 24 - Different Event Related Potentials (2)

Lecture 25 - Introduction to Silicone Wafer Processing Techniques

Lecture 26 - Basics of Silicone Dioxide: Oxidation, Characterization and Applications

Lecture 27 - Inverse Problem, EEG source localization (1)

Lecture 28 - Inverse Problem, EEG source localization (2)

Lecture 29 - Introduction to Brain Computer Interfaces

Lecture 30 - Signal Conditioning Circuit for EEG Bioamplifiers

Lecture 31 - Basics of BCI Experimentation: Introdcution BCI Applications

Lecture 32 - Different Brain Computer Interfaces

Lecture 33 - Introduction to EEGLAB, ERPLAB and AEP Demonstration (1)

Lecture 34 - Introduction to EEGLAB, ERPLAB and AEP Demonstration (2)

Lecture 35 - Introduction to Photolithography

Lecture 36 - Basics of BCI Experimentation: Stimuli Generation and Insertion

Lecture 37 - MMN Demonstration with EEGLAB and ERPLAB (1)

Lecture 38 - MMN Demonstration with EEGLAB and ERPLAB (2)

Lecture 39 - Introduction to Photolithography (2)

Lecture 40 - Basics of Instrumentation Amplifier and Online Simulation

Lecture 41 - Basics of BCI Experimentation: Experimental Setup and Biopotential Acquisition

Lecture 42 - P300 Demonstration with EEGLAB/ERPLAB (1)

Lecture 43 - P300 Demonstration with EEGLAB/ERPLAB (2)

Lecture 44 - Wavelet Analysis with VEP (1)

Lecture 45 - Details of Lithography, E-beam Lithography and Mask Aligner

Lecture 46 - Basics of BCI Experimentation: Signal Acquisition using MATLAB (EEGLAB)

Lecture 47 - Wavelet Analysis with VEP (2)

Lecture 48 - Demonstration: Resting Membrane Potential

Lecture 49 - Demonstration: Membrane Time Constant (Ï„)

Lecture 50 - Photoresist (SU-8) and soft lithography

Lecture 51 - Physical Vapour Deposition: Thermal Evaporation

Lecture 52 - Introduction to Epilepsy and Classification

Lecture 53 - Epileptogenisis

Lecture 54 - Demonstration: Membrane Length Constant (Î»)

Lecture 55 - Demonstration: Action Potential

Lecture 56 - Demonstration: Voltage Clamp

Lecture 57 - Demonstration: Synaptic Potentials & Current

Lecture 58 - Physical Vapour Deposition: E-beam Evaporation

Lecture 59 - Physical Vapour Deposition: Sputtering

Lecture 60 - Recent Trends: Epilepsy Classification using EEG data

Lecture 61 - Demonstration: Wireless EEG with dry electrodes

Lecture 62 - Basics of EEG, ERP and acquisition

Lecture 63 - Photolithography with example

Lecture 64 - Stress Tissue Analysis using COMSOL Multiphysics

Lecture 65 - Recent Trends: Microelectrode Arrays and Deep Brain Stimulation

NPTEL : NOC:Information Theory (Electrical Engineering)

Co-ordinators : Prof. Himanshu Tyagi

Lecture 1 - What is information?

Lecture 2 - How to model uncertainty?

Lecture 3 - Basic concepts of probability

Lecture 4 - Estimates of random variables

Lecture 5 - Limit theorems

Lecture 6 - Review

Lecture 7 - Source model

Lecture 8 - Motivating examples

Lecture 9 - A compression problem

Lecture 10 - Shannon entropy

Lecture 11 - Random hash

Lecture 12 - Review 2

Lecture 13 - Uncertainty and randomness

Lecture 14 - Total variation distance

Lecture 15 - Generating almost random bits

Lecture 16 - Generating samples from a distribution using uniform randomness

Lecture 17 - Typical sets and entropy

Lecture 18 - Review 3

Lecture 19 - Hypothesis testing and estimation

Lecture 20 - Examples

Lecture 21 - The log-likelihood ratio test

Lecture 22 - Kullback-Leibler divergence and Stein's lemma

Lecture 23 - Properties of KL divergence

Lecture 24 - Review 4

Lecture 25 - Information per coin-toss

Lecture 26 - Multiple hypothesis testing

Lecture 27 - Error analysis of multiple hypothesis testing

Lecture 28 - Mutual information

Lecture 29 - Fano's inequality

Lecture 30 - Measures of information

Lecture 31 - Chain rules

Lecture 32 - Shape of measures of information

Lecture 33 - Data processing inequality

Lecture 34 - Midyear Review

Lecture 35 - Proof of Fano's inequality

Lecture 36 - Variational formulae

Lecture 37 - Capacity as information radius

Lecture 38 - Proof of Pinsker's inequality

Lecture 39 - Continuity of entropy

Lecture 40 - Lower bound for compression

Lecture 41 - Lower bound for hypothesis testing

Lecture 42 - Review 7

Lecture 43 - Lower bound for random number generation

Lecture 44 - Strong converse

Lecture 45 - Lower bound for minmax statistical estimation

Lecture 46 - Variable length source codes

Lecture 47 - Review 8

Lecture 48 - Kraft's inequality

Lecture 49 - Shannon code

Lecture 50 - Huffman code

Lecture 51 - Minmax Redundancy

Lecture 52 - Type based universal compression

Lecture 53 - Review 9

Lecture 54 - Arithmetic code

Lecture 55 - Online probability assignment

Lecture 56 - Compression of databases: A scheme

Lecture 57 - Compression of databases: A lower bound

Lecture 58 - Repetition code

Lecture 59 - Channel capacity

Lecture 60 - Sphere packing bound for BSC

Lecture 61 - Random coding bound for BSC

Lecture 62 - Random coding bound for general channel

Lecture 63 - Review 11

Lecture 64 - Converse proof for channel coding theorem

Lecture 65 - Additive Gaussian Noise channel

Lecture 66 - Mutual information and differential entropy

Lecture 67 - Channel coding theorem for Gaussan channel

Lecture 68 - Parallel channels and water-filling

NPTEL : NOC:Photonic Integrated Circuit (Electrical Engineering)

Co-ordinators : Prof. Shankar Kumar Selvaraja

Lecture 1 - Photonic integrated circuits course introduction

Lecture 2 - Wave optics review

Lecture 3 - Electromagnetic theory review - 1

Lecture 4 - Electromagnetic theory review - 2

Lecture 5 - Photonic integrated circuits: an introduction

Lecture 6 - Photonic integrated circuits evolution

Lecture 7 - Photonic integrated circuit components - 1

Lecture 8 - Photonic integrated circuit components - 2

Lecture 9 - Dispersion

Lecture 10 - Phase velocity and Group velocity

Lecture 11 - Anisotropic medium and reciprocity

Lecture 12 - Polarisation in anisotropic medium

Lecture 13 - Optical axes

Lecture 14 - Waveguide structure

Lecture 15 - Waveguide modes - 1

Lecture 16 - Waveguide modes - 2

Lecture 17 - Field Equation

Lecture 18 - Guided modes in symmetric slab waveguides

Lecture 19 - Waveguide design - Boundary value formulation

Lecture 20 - Waveguide design - BVP solution

Lecture 21 - Waveguide design - Perturbation approach

Lecture 22 - Waveguide design - Effective Index method

Lecture 23 - Coupled mode theory - 1

Lecture 24 - Coupled mode theory - 2

Lecture 25 - Two-mode coupling

Lecture 26 - Co and counter propagating mode coupling

Lecture 27 - Phase matching

Lecture 28 - Directional coupler

Lecture 29 - Y-splitter

Lecture 30 - Multi-Mode Interference coupler

Lecture 31 - MZI

Lecture 32 - Micro-Ring Resonators

Lecture 33 - Light-chip coupling

Lecture 34 - End-fire coupling

Lecture 35 - Light Modulator introduction

Lecture 36 - Electro-Optic effect

Lecture 37 - Waveguide modulator

Lecture 38 - Optical transition in semiconductors

Lecture 39 - Transition rates

Lecture 40 - Absorption and gain in semiconductors

Lecture 41 - Semiconductor Light Emitting Diodes

Lecture 42 - Semiconductor Light Emitting Diodes (Continued...)

Lecture 43 - Semiconductor Lasers

Lecture 44 - Semiconductor photodetector

Lecture 45 - Semiconductor photodetector noise

Lecture 46 - Fabrication process - 1

Lecture 47 - Fabrication process - 2

Lecture 48 - PIC technology - Building a simple circuit

Lecture 49 - PIC for communication

Lecture 50 - PIC for sensing - 1

Lecture 51 - PIC for sensing - 2

NPTEL : NOC:Design for Internet of Things (2021) (Electrical Engineering)

Co-ordinators : Prof. T V Prabhakar

Lecture 1 - Introduction and Definition of IoT

Lecture 2 - Location, Applications, and Power

Lecture 3 - Challenges - Part 1

Lecture 4 - Challenges - Part 2

Lecture 5 - Challenges - Part 3

Lecture 6 - Challenges - Part 4

Lecture 7 - Unique ID

Lecture 8 - Introduction to RFID

Lecture 9 - RFID DEMO

Lecture 10 - RFID Theory - 1

Lecture 11 - RFID Theory - 2

Lecture 12 - RFID Theory - 3

Lecture 13 - Energy harvesting - 1

Lecture 14 - Energy harvesting - 2

Lecture 15 - Energy harvesting - 3

Lecture 16 - Power management systems - 1

Lecture 17 - Power management systems - 2

Lecture 18 - Battery life calculation

Lecture 19 - Introduction to System Design for low power

Lecture 20 - LDO - 1

Lecture 21 - LDO - 2

Lecture 22 - LDO - 3

Lecture 23 - Buck converter - 1

Lecture 24 - Buck converter - 2

Lecture 25 - Lab experiment

Lecture 26 - Introduction to Sensors and Actuators

Lecture 27 - Sensors

Lecture 28 - Actuators

Lecture 29 - Case study on Sensing and Actuation

Lecture 30 - Introduction to low power software

Lecture 31 - ADC driver design and development

Lecture 32 - Power optimization

Lecture 33 - Introduction to protocols

Lecture 34 - MQTT - 1

Lecture 35 - MQTT - 2

Lecture 36 - COAP - 1

Lecture 37 - COAP - 2

Lecture 38 - Websockets

Lecture 39 - Introduction to low power wireless - 1

Lecture 40 - Introduction to low power wireless - 2

Lecture 41 - Bluetooth low energy (BLE) - 1

Lecture 42 - Bluetooth low energy (BLE) - 2

Lecture 43 - IEEE 802.15.4e - 1

Lecture 44 - IEEE 802.15.4e - 2

Lecture 45 - IEEE 802.15.4e - 3

Lecture 46 - Wi-Fi

Lecture 47 - Introduction to Wide area technologies

Lecture 48 - LoRa - 1

Lecture 49 - LoRa - 2

Lecture 50 - NBIoT, LTEM1

Lecture 51 - BLE mesh technology

Lecture 52 - Course conclusion

NPTEL : NOC:Mathematical Aspects of Biomedical Electronic System Design (Electrical Engineering)

Co-ordinators : Prof. Chandramani Singh

Lecture 1 - Introduction to Signals and Systems

Lecture 2 - MATLAB Demo on Signal Types and Moving Average System

Lecture 3 - Microfabrication Basics for Biomedical Systems

Lecture 4 - Fluid Flow in Body Lumen

Lecture 5 - Fourier Series

Lecture 6 - Continuous Time Fourier Transform

Lecture 7 - Biological Tissues as disordered systems

Lecture 8 - Introduction to electrical equivalent circuit models for biological systems

Lecture 9 - Discrete Time Fourier Transform and Sampling

Lecture 10 - Percolation Theory and applications in biological tissues

Lecture 11 - Electrical properties of cells and tissues revisited: Examples and Applications

Lecture 12 - Linear Algebra - I

Lecture 13 - MATLAB Live Demo on Moving average and signal acquisition

Lecture 14 - Oxidation and Thickness Characterization

Lecture 15 - Basics of Photolithography with Process flow examples

Lecture 16 - Linear Algebra - II

Lecture 17 - Introduction to Biomedical Optics

Lecture 18 - Optical Properties of Tissues and Mathematical modelling

Lecture 19 - System of Linear Equations

Lecture 20 - Scaling Laws

Lecture 21 - Thermal Properties of a tissue

Lecture 22 - Introduction to Probability

Lecture 23 - Tissue Electrode Interface

Lecture 24 - Thermal Properties of a tissue and cells

Lecture 25 - Probability: Random Variables and CDF

Lecture 26 - Basics of Silicon, Silicon Dioxide for Microfabrication Process

Lecture 27 - Mechanical Properties of human brain tissues and modelling

Lecture 28 - Probability: Important measures and generating functions

Lecture 29 - Near Infrared Spectroscopy and Ultrasound Techniques

Lecture 30 - Thermal Properties of Tissues and Modelling

Lecture 31 - Multisim Simulations for Biomedical Signal Conditioning Circuit

Lecture 32 - Cleanroom Entry Demonstration

Lecture 33 - Spin Coating Demonstration

Lecture 34 - Common Random Variables

Lecture 35 - Introduction to signal Conditioning circuits for biomedical devices

Lecture 36 - Siganl Conditioning circuits units and design

Lecture 37 - E Beam Evaporation System Demonstration

Lecture 38 - Joint and Marginal Probability Distribution

Lecture 39 - Temprature Sensor Interfacing Analysis

Lecture 40 - Demo of Temprature data acqusitio system using LabVIEW

Lecture 41 - Recent Trends in Biomedical Electronic System Design

Lecture 42 - Aspects of Biomedical Electronics System Design

NPTEL : NOC:Concentration Inequalities (Electrical Engineering)

Co-ordinators : Prof. Himanshu Tyagi

Lecture 1 - Why study concentration inequalities?

Lecture 2 - Chernoff bound

Lecture 3 - Examples of Chernoff bound for common distributions

Lecture 4 - Hoeffding and Bernstein inequalities

Lecture 5 - Azuma and McDiarmid inequalities

Lecture 6 - Bounding variance using the Efron-Stein inequality

Lecture 7 - The Gaussian-Poincare inequality

Lecture 8 - Tail bounds using the Efron-Stein inequality

Lecture 9 - Herbst's argument and the entropy method

Lecture 10 - Log-Sobolev inequalities

Lecture 11 - Binary and Gaussian Log-Sobolev inequalities and concentration

Lecture 12 - Variational formulae forKullback-Leibler and Bregman Divergence

Lecture 13 - A modified log-Sobolev inequality and concentration

Lecture 14 - Introduction to the transportation method for showing concentration bounds

Lecture 15 - Transportation lemma and a proof of McDiarmid's inequality using the transportation method

Lecture 16 - Concentration bounds for functions beyond bounded difference using transportation method

Lecture 17 - Marton's conditional transportation cost inequality

Lecture 18 - Isoperimetry and concentration of measure

Lecture 19 - Isoperimetry and bounded difference

Lecture 20 - Equivalence of Stam's inequality and log Sobolev inequality

Lecture 21 - An information theoretic proof of log Sobolev inequality

Lecture 22 - Hypercontractivity and strong data processing inequality for RÃ©nyi divergence

Lecture 23 - An information theoretic characterization of hypercontractivity

Lecture 24 - Equivalence of Gaussian hypercontractivity and Gaussian log Sobolev inequality

Lecture 25 - Uniform deviation bounds for random walks and the law of the iterated logarithm

Lecture 26 - Self normalized concentration inequalities and application to online regression

NPTEL : NOC:Real-Time Digital Signal Processing (Electrical Engineering)

Co-ordinators : Prof. Rathna G N

Lecture 1 - Introduction

Lecture 2 - Basics of Signal Processing

Lecture 3 - Lab - CCS

Lecture 4 - Number System

Lecture 5 - Architecture - 1

Lecture 6 - Architecture - 2

Lecture 7 - Real-time Constraints

Lecture 8 - FIR - Filters

Lecture 9 - Pipelining and Parallel Processing for Low Power Applications - I

Lecture 10 - Pipelining and Parallel Processing for Low Power Applications - II

Lecture 11 - Lab: Sine Generation

Lecture 12 - IIR Filters - 1

Lecture 13 - IIR Filters - 2

Lecture 14 - Lab: Sine Generatioon, FIR and IIR

Lecture 15 - Lab 3 IIR Filter as Resonator

Lecture 16 - Lab 4 Use of FDA tool box to generate co-efficients

Lecture 17 - Lab: Real-Time Audio Output through Sine Generation

Lecture 18 - IIR Filters 4

Lecture 19 - Lab: FIR Filter in generation of music

Lecture 20 - Lab: Real-Time Audio Output through FIR Filter

Lecture 21 - DFT, DTFT, twiddle factors, properties, circular convolution and examples

Lecture 22 - Complexity of Filtering and the FFT

Lecture 23 - Lab: Filtering Using FFT

Lecture 24 - Lab: FFT in CCS

Lecture 25 - FFT - 1

Lecture 26 - FFT - 2

Lecture 27 - FFT - 3

Lecture 28 - Overlap - Add

Lecture 29 - Overlap Save Method

Lecture 30 - Lab: Overlap Add and Save Method using MATLAB

Lecture 31 - Correlation

Lecture 32 - Lab: Different ways of implementing FFT in CCS

Lecture 33 - Adaptive Filter

Lecture 34 - Lab: LMS Algorith in MATLAB

Lecture 35 - LMS Algorithm

Lecture 36 - Lab: Error surface and error contour

Lecture 37 - Adaptive Filter Applications

Lecture 38 - Lab: Application of adaptive filter in MATLAB

Lecture 39 - Adaptive Echo Cancellation

Lecture 40 - Lab: Application of adaptive filter in CCS, Echo, scrambling and graphic equilizer in MATLAB

Lecture 41 - Graphic Equalizer

Lecture 42 - Lab: Adaptive filters (MATLAB)

Lecture 43 - Speech Coding - I

Lecture 44 - Speech Coding - II

Lecture 45 - Speech Coding - III

Lecture 46 - Lab: LPC for speech synthesis

Lecture 47 - Discrete Cosine Transform - 1

Lecture 48 - Discrete Cosine Transform - 2

Lecture 49 - Discrete Cosine Transform - 3

Lecture 50 - Discrete Cosine Transform - 4

Lecture 51 - Lab: Adaptive filters (CCS) - 1

Lecture 52 - Lab: Adaptive filters (CCS) - 2

Lecture 53 - Lab: Discrete Cosine Transformation

Lecture 54 - Lab: Echogeneration

Lecture 55 - Lab: Using JiDSP

Lecture 56 - Summary

NPTEL : NOC:Advanced Neural Science for Engineers (Electrical Engineering)

Co-ordinators : Prof. Vikas V

Lecture 1 - Introduction to Biomedical Research

Lecture 2 - Fabricated Biosensors and Systems

Lecture 3 - Lab 1 - Introduction to the Fabrication lab

Lecture 4 - Lab 2 - Cleanroom and Gowning Protocol

Lecture 5 - Developed Systems at a glance

Lecture 6 - Silicon and Silicon Dioxide

Lecture 7 - Piranha Cleaning of Silicon Wafer

Lecture 8 - Polyimide Coating on Silicon Wafer

Lecture 9 - Thermal Oxidation of Silicon and Thickness measurement

Lecture 10 - Fundamental of Physical Vapour Deposition

Lecture 11 - Lab 3 - Lithography: Demonstration

Lecture 12 - Sputtering

Lecture 13 - Basics of Photolithography

Lecture 14 - Lab 4 - E-Beam Evaporation: Demo

Lecture 15 - Photolithography - II

Lecture 16 - Photolithography - III

Lecture 17 - Lab 5 - E-Beam Evaporation: Demo - II

Lecture 18 - Lab 6 - Liftoff Demonstration

Lecture 19 - Lithography Optics - I

Lecture 20 - Soft Lithography - I

Lecture 21 - Soft Lithography - II

Lecture 22 - Lab 7 - Sputtering Demonstration - I

Lecture 23 - Lab 8 - Sputtering Demonstration - II

Lecture 24 - Thin Film Deposition: CVD - I

Lecture 25 - Thin Film Deposition: CVD - II

Lecture 26 - Lithography Optics - II

Lecture 27 - Role of Fabrication in Neural Engineering

Lecture 28 - Micromachining

Lecture 29 - Overview of Experimental Neurophysiology

Lecture 30 - Fabrication of Neural Implants

Lecture 31 - Introduction to Packaging for Neural Systems

Lecture 32 - Lab 9 - 3D Printing for neural devices

Lecture 33 - Introduction to Biopotentials

Lecture 34 - EEG: Introduction, Demonstration and Applications

Lecture 35 - Neural Implants: Fabrication and Characterization

Lecture 36 - Design of Wireless Biphasic Pulse Generator

Lecture 37 - Basics of EEG/ERP Experimental Desing

Lecture 38 - Micromachining and Etching

Lecture 39 - Epileptic Seizure Detection and Classification

Lecture 40 - Newborn Hearing Screening - I

Lecture 41 - Newborn Hearing Screening - II

Lecture 42 - Applications of EEG/ERP Experimental Design

Lecture 43 - Flexible MEA for Electrocorticography Signal Acquisition

Lecture 44 - Flexible biodegradable MEAs

Lecture 45 - Microneedle Electrode Array

Lecture 46 - Neurosurgery-based MEA Implantation - I

Lecture 47 - Neurosurgery-based MEA Implantation - II

Lecture 48 - Neurosurgery-based MEA Implantation - III

Lecture 49 - Neurosurgery-based MEA Implantation - IV

Lecture 50 - Deep Brain Stimulation/Recording for Parkinson's - I

Lecture 51 - Deep Brain Stimulation/Recording for Parkinson's - II

Lecture 52 - Computational Neuroscience Fundamentals

Lecture 53 - Mathematical Analysis in Neural Science

Lecture 54 - Neuroanatomy for Neural Engineering

NPTEL : NOC:Design of Electric Motors (Electrical Engineering)

Co-ordinators : Dr. Prathap Reddy

Lecture 1 - History Prospect of Electrical Machines

Lecture 2 - Electric Fields

Lecture 3 - Magnetic Fields - 1

Lecture 4 - Magnetic Fields - 2

Lecture 5 - Electric and Magnetic Circuits Interface

Lecture 6 - Magnetic Materials and Concepts of BH Curves

Lecture 7 - Analysis of Magnetic Circuits With and Without Air Gaps

Lecture 8 - Example Problems of Magnetic Circuits

Lecture 9 - Magnetic Circuits with Multiple Windings and Permanent Magnets

Lecture 10 - Force Equations in Electromechanical Systems - 1

Lecture 11 - Force Equations in Electromechanical Systems - 2

Lecture 12 - Design of Electromagnetic Systems

Lecture 13 - Realization of Electrical Machines - 1

Lecture 14 - Realization of Electrical Machines - 2

Lecture 15 - Magnetic Fields in DC Machines - 1

Lecture 16 - Magnetic Fields in AC Machines - 1

Lecture 17 - Magnetic Fields in AC Machines - 2

Lecture 18 - Magnetic Fields in AC Machines - 3

Lecture 19 - MMFDistribution ofAC Machines

Lecture 20 - Basics of Electrical Machine Windings

Lecture 21 - Stator winding design-single layer winding

Lecture 22 - Stator winding design-double layer winding

Lecture 23 - Stator Winding Design-Fractional Slot Double Layer Winding

Lecture 24 - Variable Pole Machine Stator Winding Design (Pole-Phase Modulation) - 1

Lecture 25 - Variable Pole Machine Stator Winding Design (Pole-Phase Modulation) - 2

Lecture 26 - Importance of Motor Design and Standards of Electric Motors

Lecture 27 - Electric Machine Sizing Equations-Output Power and Volume (D2L) Product Equation

Lecture 28 - Lab Session on Re-winding of Induction Motor (Example: Double Layer Winding)

Lecture 29 - The Figure of Merits for Electric Motors and Aspect Ratio to Decouple the D2L Product

Lecture 30 - Electric Machine Sizing Equations-Output Power Equation in terms of D3L Product - 1

Lecture 31 - Electric Machine Sizing Equations-Output Power Equation in terms of D3L Product - 2

Lecture 32 - Analysis of Copper Function and Output Function w r t the Electric Machine D3L Product Eqn

Lecture 33 - Example Problems on Output Power Equation in terms of D3L Product

Lecture 34 - Electric Machine Sizing Equations-Output Power Equation in terms of D the power 2.5 L Product

Lecture 35 - Design Procedure of an Electric Machine

Lecture 36 - Name Plate Details and Datasheets of Induction Motor

Lecture 37 - Design of Induction Machine- Stator Design - 1 (Stator Core design)

Lecture 38 - Design of Induction Machine- Stator Design - 2 (Stator Winding Design)

Lecture 39 - Design of Induction Machine- Stator Design - 3 (Stator Slot Geometry)

Lecture 40 - Design of Induction Machine- Rotor Design - 1 (Rotor Slots Selection)

Lecture 41 - Design of Induction Machine- Rotor Design - 2 (Rotor MMF and Bar Currents)

Lecture 42 - Design of Induction Machine- Rotor Design - 3 (Rotor Slot Geometry)

Lecture 43 - Design of Induction Machine- Rotor Design - 4 (Skewing of Rotor)

Lecture 44 - Design of Induction Machine- Rotor Design - 4 (Resistance of Rotor Winding)

Lecture 45 - Carter's Coefficient of Electrical Machines

Lecture 46 - Effective Length Equations of the Machine Core with Different Stator and Rotor Lengths

Lecture 47 - Stator MMF and Magnetizing Current Equations of Induction Machine

Lecture 48 - Magnetizing Inductance of Induction Machine

Lecture 49 - Stator and Rotor Leakage Inductances of Induction Machine

Lecture 50 - Equivalent Circuit Parameters of Induction Machine

Lecture 51 - Loss Calculation of Induction Machine - 1

Lecture 52 - Loss Calculation of Induction Machine - 2 and Performance Parameters of Induction Motor

Lecture 53 - Switched Reluctance Machine Sizing Equations-Output Power and Volume (D2L) Product Equation

Lecture 54 - The Figure of Merits for SRM and Example Problem on Output Power Equation i t f D2L Product

Lecture 55 - Design of Switched Reluctance Machine: Stator Design - 1

Lecture 56 - Design of Switched Reluctance Machine: Stator Design - 2 and Rotor Design

Lecture 57 - Procedure for Calculation of SRM Inductance: Aligned Inductance - 1

Lecture 58 - Calculation of SRM Inductance: Aligned Inductance - 2

Lecture 59 - Efficiency and Loss Calculation of SRM

Lecture 60 - Importance of Thermal Design and Thermal Limits for Electrical Machines

Lecture 61 - Electric and Thermal Circuits Interface

Lecture 62 - Heat Transfer Methods and Basic Equations for Thermal Resistance

Lecture 63 - Heat Flow in Electrical Machines

Lecture 64 - Cooling Methods and Standards for Electrical Machines

Lecture 65 - Basics of Thermal Equivalent Circuits

Lecture 66 - Thermal Equivalent Circuit - 1

Lecture 67 - Thermal Equivalent Circuit - 2

NPTEL : NOC:Basics of Semiconductor Microwave Devices (Electrical Engineering)

Co-ordinators : Prof Digbijoy N Nath

Lecture 1 - An Introduction to the course and outline of the course

Lecture 2 - Historical overview of the development of microwave devices

Lecture 3 - Applications of semiconductor microwave devices

Lecture 4 - Applications of semiconductor microwave devices (Continued...)

Lecture 5 - Heterojunction device physics

Lecture 6 - Heterojunction device physics (Continued...) and III-nitrides

Lecture 7 - III-nitrides and polarization

Lecture 8 - III-nitride high electron mobility transistors

Lecture 9 - Varactors and Schottky multipliers

Lecture 10 - Varactors and Schottky multipliers (Continued...)

Lecture 11 - Diodes for microwave applications

Lecture 12 - IMPATT diode

Lecture 13 - Tunnel diodes and Introduction to Gunn diodes

Lecture 14 - Gunn diode and its modes

Lecture 15 - Introduction to MESFETs

Lecture 16 - Advanced concepts of GaAs MESFETs

Lecture 17 - GaAs MESFET fabrication and practical aspects

Lecture 18 - Practical aspects of FET design and small-signal model

Lecture 19 - GaAs MESFETs: cut-off frequency and aspects of power devices

Lecture 20 - GaAs MESFETs for power amplifiers

Lecture 21 - Modulation doping in compound semiconductors

Lecture 22 - Band diagram of MODFETs/HEMTs

Lecture 23 - Design issues and methodology for microwave HEMTs

Lecture 24 - Small-signal model and noise in HEMTs

Lecture 25 - The concept of pseudomorphic or pHEMTs

Lecture 26 - Multi-finger HEMTs

Lecture 27 - pHEMTs for low noise and introduction to InP HEMT

Lecture 28 - InP HEMTs for power and the concept of metamorphic HEMTs

Lecture 29 - AlGaN/GaN HEMT: applications, structure, substrates and FOM

Lecture 30 - AlGaN/GaN HEMT: device basics, current collapse and passivation

Lecture 31 - AlGaN/GaN HEMT: gate process, field-plate and trade-offs in design

Lecture 32 - AlGaN/GaN HEMT: Practical aspects and commercial HEMTs

Lecture 33 - GaN RF HEMT on eval board, and emerging topics of research

Lecture 34 - Linearity in GaN HEMTs - A device perspective

Lecture 35 - Nanoscale MOSFETs and short channel effects

Lecture 36 - Parasitic resistances and capacitances in nanoscale MOSFETs

Lecture 37 - RF MOSFET Layout and RF Silicon-on-insulator

Lecture 38 - Noise in MOSFETs and Introduction to LDMOS

Lecture 39 - Working of LDMOS and VDMOS

Lecture 40 - LDMOS: Parasitics, and the concept of RESURF

Lecture 41 - LDMOS: HCI, snapback, finger layout and some aspects of commercial devices

Lecture 42 - BJT: common base and common emitter from the device point of view

Lecture 43 - BJT: Kirk effect, Ebers-Moll model and base transit time

Lecture 44 - BJT: small-signal model, gain and cut-off frequency

Lecture 45 - BJT: Emitter and base designs and drift transistor

Lecture 46 - Collector design in modern BJT and Introduction to HBTs

Lecture 47 - HBT: base current and collapse of the current gain

Lecture 48 - High-frequency HBT and Introduction to SiGe HBT

Lecture 49 - SiGe HBT: various resistances and capacitances, scaling and aspects of BiCMOS

Lecture 50 - Basics of microwave: transmission line theory

Lecture 51 - Waveguides, T-lines and introduction to 2-port networks

Lecture 52 - S-parameters and the basics of Smith Chart

Lecture 53 - Smith chart and matching

Lecture 54 - Impedance matching using Smith Chart and stub line

Lecture 55 - Passives in microwave circuits

Lecture 56 - Inductors in microwave circuits

Lecture 57 - More on passive elements in microwave circuits

Lecture 58 - On-wafer measurement and S-parameters

Lecture 59 - On-wafer de-embedding

Lecture 60 - On-wafer and fixture-based measurements and calibration

Lecture 61 - More on fixtures and basic transistor concepts for power amplifiers

NPTEL : Adv. Digital Signal Processing - Multirate and wavelets (Electronics and Communication Engineering)

Co-ordinators : Prof. V.M. Gadre

Lecture 1 - Introduction

Lecture 2 - The Haar Wavelet

Lecture 3 - The Haar Multiresolution Analysis

Lecture 4 - Wavelets And Multirate Digital Signal Processing

Lecture 5 - Equivalence - Functions And Sequences

Lecture 6 - The Haar Filter Bank

Lecture 7 - Haar Filter Bank Analysis And Synthesis

Lecture 8 - Relating psi, phi and the Filters

Lecture 9 - Iterating the filter bank from Psi, Phi

Lecture 10 - Z-Domain Analysis Of Multirate Filter Bank

Lecture 11 - Two Channel Filter Bank

Lecture 12 - Perfect Reconstruction - Conjugate Quadrature

Lecture 13 - Conjugate Quadrature Filters - Daubechies Family of MRA

Lecture 14 - Daubechies' Filter Banks - Conjugate Quadrature Filters

Lecture 15 - Time And Frequency Joint Perspective

Lecture 16 - Ideal Time Frequency Behaviour

Lecture 17 - The Uncertainty Principle

Lecture 18 - Time Bandwidth Product Uncertainty

Lecture 19 - Evaluating and Bounding squareroot t.squareroot omega

Lecture 20 - The Time Frequency Plane & its Tilings

Lecture 21 - Short time Fourier Transform & Wavelet Transform in General

Lecture 22 - Reconstruction & Admissibility

Lecture 23 - Admissibility in Detail Discretization of Scale

Lecture 24 - Logarithmic Scale Discretization, Dyadic Discretization

Lecture 25 - The Theorem of (DYADIC) Multiresolution Analysis

Lecture 26 - Proof of the Theorem of (DYADIC) Multiresolution Analysis

Lecture 27 - Introducing Variants of The Multiresolution Analysis Concept

Lecture 28 - JPEG 2000 5/3 FilterBank & Spline MRA

Lecture 29 - Orthogonal Multiresolution Analysis with Splines

Lecture 30 - Building Piecewise Linear Scaling Function, Wavelet

Lecture 31 - The Wave Packet Transform

Lecture 32 - Nobel Identities & The Haar Wave Packet Transform

Lecture 33 - The Lattice Structure for Orthogonal Filter Banks

Lecture 34 - Constructing the Lattice & its Variants

Lecture 35 - The Lifting Structure & Polyphase Matrices

Lecture 36 - The Polyphase Approach - The Modulation Approach

Lecture 37 - Modulation Analysis and The 3-Band Filter Bank, Applications

Lecture 38 - The Applications *Data Mining, *Face Recognition

Lecture 39 - Proof that a non-zero function can not be both time and band-limited

Lecture 40 - M-Band Filter Banks and Looking Ahead

Lecture 41 - Tutorial -Session 1

Lecture 42 - Student's Presentation

Lecture 43 - Tutorial on Uncertainty Product

Lecture 44 - Tutorial on Two band Filter Bank

Lecture 45 - Tutorial -Frequency Domain Analysis of Two band Filter Bank

Lecture 46 - Zoom in and Zoom out using Wavelet Transform

Lecture 47 - More Thoughts on Wavelets : Zooming In

Lecture 48 - Towards selecting Wavelets through vanishing moments

Lecture 49 - In Search of Scaling Coefficients

Lecture 50 - Wavelet Applications

NPTEL : Advanced Optical Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. R.K. Shevgaonkar

Lecture 1 - Introduction

Lecture 2 - Basics of Light

Lecture 3 - Ray Model - I

Lecture 4 - Ray Model - II

Lecture 5 - Wave Model - I

Lecture 6 - Wave Model - II

Lecture 7 - Wave Model - III

Lecture 8 - Signal Distortion - I

Lecture 9 - Signal Distortion - II

Lecture 10 - Signal Distortion - III

Lecture 11 - Practical issues in Implementation of Fiber link

Lecture 12 - Optical Sources

Lecture 13 - Light Emitting Diodes - I

Lecture 14 - Light Emitting Diodes - II

Lecture 15 - Laser - I

Lecture 16 - Laser - II

Lecture 17 - Laser - III

Lecture 18 - Laser - IV

Lecture 19 - Laser - V + Photon Detector

Lecture 20 - Photo Diodes and Detector Noise

Lecture 21 - Photo Detector

Lecture 22 - Optical Receivers - I

Lecture 23 - Optical Receivers - II

Lecture 24 - Receiver Sensitivity Degradation

Lecture 25 - Fiber Optic Link Design

Lecture 26 - Wavelength Division Multiplexed Systems

Lecture 27 - EDFA

Lecture 28 - Integrated Optics - I

Lecture 29 - Integrated Optics - II

Lecture 30 - Tutorials - I

Lecture 31 - Tutorials - II

Lecture 32 - Introduction to Non-Linear Fiber Optics

Lecture 33 - Non-linear Schrodinger Equation

Lecture 34 - Group Velocity Dispersion (GVD)

Lecture 35 - Self Phase Modulation (SPM)

Lecture 36 - Solitonic Communication

Lecture 37 - Raman Amplifier

Lecture 38 - Cross Phase Modulation and four wave mixing

Lecture 39 - Laboratory Experiments - I

Lecture 40 - Laboratory Experiments - II

Lecture 41 - Laboratory Experiments - III

NPTEL : Advanced VLSI Design (Electronics and Communication Engineering)

Co-ordinators : Prof. A.N. Chandorkar, Prof. D.K. Sharma, Prof. Sachin Patkar, Prof. Virendra Singh

Lecture 1 - Historical Perspective and Future Trends in CMOS VLSI Circuit and System Design - Part I

Lecture 2 - Historical Perspective and Future Trends in CMOS VLSI Circuit and System Design - Part II

Lecture 3 - Logical Effort - A way of Designing Fast CMOS Circuits - Part I

Lecture 4 - Logical Effort - A way of Designing Fast CMOS Circuits - Part II

Lecture 5 - Logical Effort - A way of Designing Fast CMOS Circuits - Part III

Lecture 6 - Power Estimation and Control in CMOS VLSI circuits - Part I

Lecture 7 - Power Estimation and Control in CMOS VLSI circuits - Part II

Lecture 8 - Low Power Design Techniques - Part I

Lecture 9 - Low Power Design Techniques - Part II

Lecture 10 - Arithmetic Implementation Strategies for VLSI - Part I

Lecture 11 - Arithmetic Implementation Strategies for VLSI - Part II

Lecture 12 - Arithmetic Implementation Strategies for VLSI - Part III

Lecture 13 - Arithmetic Implementation Strategies for VLSI - Part IV

Lecture 14 - Interconnect aware design: Impact of scaling, buffer insertion and inductive peaking

Lecture 15 - Interconnect aware design: Low swing and Current mode signaling

Lecture 16 - Interconnect aware design: capacitively coupled interconnects

Lecture 17 - Introduction to Hardware Description Languages

Lecture 18 - Managing concurrency and time in Hardware Description Languages

Lecture 19 - Introduction to VHDL

Lecture 20 - Basic Components in VHDL

Lecture 21 - Structural Description in VHDL

Lecture 22 - Behavioral Description in VHDL

Lecture 23 - Introduction to Verilog

Lecture 24 - FSM + datapath (GCD example)

Lecture 25 - FSM + datapath (Continued...)

Lecture 26 - Single Cycle MMIPS

Lecture 27 - Multicycle MMIPS

Lecture 28 - Multicycle MMIPS Â– FSM

Lecture 29 - Brief Overview of Basic VLSI Design Automation Concepts

Lecture 30 - Netlist and System Partitioning

Lecture 31 - Timing Analysis in the context of Physical Design Automation

Lecture 32 - Placement algorithm

Lecture 33 - Introduction to VLSI Testing

Lecture 34 - VLSI Test Basics - I

Lecture 35 - VLSI Test Basics - II

Lecture 36 - VLSI Testing: Automatic Test Pattern Generation

Lecture 37 - VLSI Testing: Design for Test (DFT)

Lecture 38 - VLSI Testing: Built-In Self-Test (BIST)

Lecture 39 - VLSI Design Verification: An Introduction

Lecture 40 - VLSI Design Verification: An Introduction

Lecture 41 - VLSI Design Verification: Equivalence/Model Checking

Lecture 42 - VLSI Design Verification: Model Checking

NPTEL : Broadband Networks: Concepts and Technology (Electronics and Communication Engineering)

Co-ordinators : Prof. Abhay Karandikar

Lecture 1 - Introduction to Broadband Networks

Lecture 2 - Qos in Packet Switching and ATM

Lecture 3 - ATM Networks

Lecture 4 - Effective Bandwidth - I

Lecture 5 - Effective Bandwidth - II

Lecture 6 - Traffic Descriptor in ATM

Lecture 7 - Calculus for QOS - I

Lecture 8 - Calculus For Qos - II

Lecture 9 - Packet Scheduling Algorithm Introduction

Lecture 10 - Fluid Fair Queueing and Weighted Fair Queueing

Lecture 11 - Virtual Time In Scheduling

Lecture 12 - Fairness of WFO and SCFO Scheduling Algorithms

Lecture 13 - Rate Proportional Servers

Lecture 14 - Latency Rate Servers - I

Lecture 15 - Latency Rate Servers - II And Delay Bounds

Lecture 16 - QOS In Best Effort Internet

Lecture 17 - TCP Congestion Control

Lecture 18 - Analysis of TCP

Lecture 19 - TCP Throughput

Lecture 20 - Buffer Management

Lecture 21 - IP Addressing Scheme

Lecture 22 - IP Addressing Lookup And Packet Classification

Lecture 23 - IP Over ATM

Lecture 24 - Multiple Label Switching (MPLS)

Lecture 25 - MPLS and Traffic Engineering

Lecture 26 - Optical Network and MPLS

Lecture 27 - Integrated Service Internet (IntServ) and RSVP

Lecture 28 - Differentiated Services Internet

Lecture 29 - Voice over IP

Lecture 30 - RTP

Lecture 31 - Metro Ethernet Access Networks

Lecture 32 - Metro Ethernet Access Networks

NPTEL : Digital Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. Bikash Kumar Dey

Lecture 1 - Introduction to Digital Communication

Lecture 2 - Sampling

Lecture 3 - Quantization, PCM and Delta Modulation

Lecture 4 - Probability and Random Processes (Part-1)

Lecture 5 - Probability and Random Processes (Part-2)

Lecture 6 - Channels and their Models (Part-1)

Lecture 7 - Channels and their Models (Part-2)

Lecture 8 - Information Theory (Part-1)

Lecture 9 - Information Theory (Part-2)

Lecture 10 - Bandpass Signal Representation (Part-1)

Lecture 11 - Bandpass Signal Representation (Part-2)

Lecture 12 - Digital Modulation Techniques (Part-1)

Lecture 13 - Digital Modulation Techniques (Part-2)

Lecture 14 - Digital Modulation Techniques (Part-3)

Lecture 15 - Digital Modulation Techniques (Part-4)

Lecture 16 - Digital Modulation Techniques (Part-5)

Lecture 17 - Digital Modulation Techniques (Part-6)

Lecture 18 - Digital Modulation Techniques (Part-7)

Lecture 19 - Digital Modulation Techniques (Part-8)

Lecture 20 - Digital Modulation Techniques (Part-9)

Lecture 21 - Digital Modulation Techniques (Part-10)

Lecture 22 - Probability of Error Calculation

Lecture 23 - Calculation of Probability of Error

Lecture 24 - Calculation of Probability of Error

Lecture 25 - Equalizers

Lecture 26 - Source Coding (Part-1)

Lecture 27 - Source Coding (Part-2)

Lecture 28 - Source Coding (Part-3)

Lecture 29 - Source Coding (Part-4)

Lecture 30 - Channel Coding

Lecture 31 - Fundamentals of OFDM

Lecture 32 - Conclusion

NPTEL : Information Theory and Coding (Electronics and Communication Engineering)

Co-ordinators : Prof. S.N. Merchant

Lecture 1 - Introduction to Information Theory and Coding

Lecture 2 - Definition of Information Measure and Entropy

Lecture 3 - Extention of An Information Source and Markov Source

Lecture 4 - Adjoint of An Information Source, Joint and Conditional Information Measure

Lecture 5 - Properties of Joint and Conditional Information Measures and A Morkov Source

Lecture 6 - Asymptotic Properties of Entropy and Problem Solving in Entropy

Lecture 7 - Block Code and its Properties

Lecture 8 - Instantaneous Code and Its Properties

Lecture 9 - Kraft-Mcmillan Equality and Compact Codes

Lecture 10 - Shannon's First Theorem

Lecture 11 - Coding Strategies and Introduction to Huffman Coding

Lecture 12 - Huffman Coding and Proof of Its Optamality

Lecture 13 - Competitive Optamality of The Shannon Code

Lecture 14 - Non-Binary Huffman Code and Other Codes

Lecture 15 - Adaptive Huffman Coding - Part-I

Lecture 16 - Adaptive Huffman Coding - Part-II

Lecture 17 - Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding

Lecture 18 - Arithmetic Coding - Part-I

Lecture 19 - Arithmetic Coding - Part-II

Lecture 20 - Introdution to Information Channels

Lecture 21 - Equivocation and Mutual Information

Lecture 22 - Properties of Different Information Channels

Lecture 23 - Reduction of Information Channels

Lecture 24 - Properties of Mutual Information and Introdution to Channel Capacity

Lecture 25 - Calculation of Channel Capacity for Different Information Channels

Lecture 26 - Shannon's Second Theorem

Lecture 27 - Discussion On Error Free Communication Over Noisy Channel

Lecture 28 - Error Free Communication Over A Binary Symmetric Channel and Introdution to Continous Sources and Channels

Lecture 29 - Differential Entropy and Evaluation of Mutual Information for Continuous Sources and Channels

Lecture 30 - Channel Capacity of A BandLimited Continuous Channel

Lecture 31 - Introduction to Rate-Distortion Theory

Lecture 32 - Definition and Properties of Rate-Distortion Functions

Lecture 33 - Calculation of Rate-Distortion Functions

Lecture 34 - Computational Approach for Calculation of Rate-Distortion Functions

Lecture 35 - Introdution to Quantization

Lecture 36 - Lloyd-Max Quantizer

Lecture 37 - Companded Quantization

Lecture 38 - Variable Length Coding and Problem Solving in Quantizer Design

Lecture 39 - Vector Quantization

Lecture 40 - Transform Coding - Part-I

Lecture 41 - Transform Coding - Part-II

NPTEL : Transmission Lines and EM Waves (Electronics and Communication Engineering)

Co-ordinators : Prof. R.K. Shevgaonkar

Lecture 1 - Introduction to EM waves and various techniques of communication

Lecture 2 - Equations of Voltage and Current on TX line

Lecture 3 - Propagation constant, Characteristic impedance and reflection coefficient

Lecture 4 - Impedance Transformation

Lecture 5 - Loss-less and Low loss Transmission line and VSWR

Lecture 6 - Power transfer on TX line

Lecture 7 - Smith Chart

Lecture 8 - Admittance Smith Chart

Lecture 9 - Experimental setup for transmission line measurements

Lecture 10 - Applications of transmission lines

Lecture 11 - Applications of transmission lines-II

Lecture 12 - Impedance Matching

Lecture 13 - Lossy Transmission Line

Lecture 14 - Problems on Transmission line

Lecture 15 - Types of transmission line

Lecture 16 - Basics of Vectors

Lecture 17 - Vector calculus

Lecture 18 - Basic laws of Electromagnetics

Lecture 19 - Maxwell\\\'s Equations

Lecture 20 - Boundary conditions at Media Interface

Lecture 21 - Uniform plane wave

Lecture 22 - Propagation of wave

Lecture 23 - Wave polarization

Lecture 24 - Pioncere\\\'s Sphere

Lecture 25 - Wave propagation in conducting medium

Lecture 26 - Wave propagation and phase velocity

Lecture 27 - Power flow and Poynting vector

Lecture 28 - Surface current and power loss in a conductor

Lecture 29 - Plane wave in arbitary direction

Lecture 30 - Plane wave at dielectric interface

Lecture 31 - Reflection and refraction at media interface

Lecture 32 - Total internal reflection

Lecture 33 - Polarization at media interface

Lecture 34 - Reflection from a conducting boundary

Lecture 35 - Parallel plane waveguide

Lecture 36 - Wave propagation in parallel plane waveguide

Lecture 37 - Analysis of waveguide general approach

Lecture 38 - Rectangular waveguide

Lecture 39 - Modal propagation in rectangular waveguide

Lecture 40 - Surface currents on the waveguide walls

Lecture 41 - Field visualization and Attenuation in waveguide

Lecture 42 - Attenuation in waveguide continued

Lecture 43 - Radiation (Antenna)

Lecture 44 - Solution for potential function

Lecture 45 - Radiation form the Hertz dipole

Lecture 46 - Power radiated by hertz dipole

Lecture 47 - Thin linear antenna

Lecture 48 - Radiation Parameters of antenna

Lecture 49 - Receiving antenna

Lecture 50 - Monopole and Dipole antenna

Lecture 51 - Fourier transform relation between current and radiation pattern

Lecture 52 - Antenna arrays

Lecture 53 - Uniform Linear array

Lecture 54 - Uniform Linear array continued

Lecture 55 - Synthesis of array

Lecture 56 - Binomial array and general array synthesis

Lecture 57 - Problems on uniform plane wave

Lecture 58 - Problems on uniform plane wave in a meduim

Lecture 59 - Problems on waveguides

Lecture 60 - Problems on Antennas and radiation

NPTEL : CMOS Analog VLSI Design (Electronics and Communication Engineering)

Co-ordinators : Prof. A.N. Chandorkar

Lecture 1 - Introduction to CMOS Analog VLSI Design

Lecture 2 - Introduction to CMOS Analog VLSI Design (Continued...)

Lecture 3 - MOS Fundamentals

Lecture 4 - MOS Fundamentals (Continued...)

Lecture 5 - Basic of MOS Amplifier (Part-1)

Lecture 6 - Basic of MOS Amplifier (Part-2)

Lecture 7 - Basic of MOS Amplifier (Part-3)

Lecture 8 - Cascode Amplifier

Lecture 9 - Types of MOSFET Amplifier

Lecture 10 - Types of MOSFET Amplifier

Lecture 11 - Differential Amplifier

Lecture 12 - Differential Amplifier

Lecture 13 - Current Sources

Lecture 14 - Current Sources

Lecture 15 - Current Sources

Lecture 16 - Frequency Response of Amplifier

Lecture 17 - Basic of CMOS OPAMP

Lecture 18 - OPAMP Design Issues

Lecture 19 - OPAMP Design

Lecture 20 - OPMAP Design

Lecture 21 - Operational Transconductance Amplifier

Lecture 22 - OTA Operation Transconductance Amplifier and Application

Lecture 23 - Fully Differential Amplifier and Noise

Lecture 24 - Noise

Lecture 25 - Noise (Continued...)

Lecture 26 - Layout of Analog Circuit

Lecture 27 - Oscillators

Lecture 28 - Oscillators (Continued...)

Lecture 29 - Oscillators (Continued...)

NPTEL : Analog Circuits (Electronics and Communication Engineering)

Co-ordinators : Prof. A.N. Chandorkar

Lecture 1 - Introduction to Analog Circuits - An Overview

Lecture 2 - Two Parts of Review of Analog Filter Approximation

Lecture 3 - BJT Small Signal Model

Lecture 4 - BJT Small Signal Model [Continuation from Lecture 3]

Lecture 5 - MOS Circuit Model

Lecture 6 - Biasing of Circuits

Lecture 7 - Amplifiers

Lecture 8 - MOS Amplifiers

Lecture 9 - Cascode Amplifier

Lecture 10 - Frequency Response of Amplifier

Lecture 11 - Frequency Response of Amplifier

Lecture 12 - Frequency Response of Amplifier

Lecture 13 - Frequency Response of Amplifier

Lecture 14 - Differential Amplifier

Lecture 15 - Differential Amplifier

Lecture 16 - Differential Amplifier

Lecture 17 - Feedback Theory

Lecture 18 - Feedback Theory

Lecture 19 - OPAMP Circuits

Lecture 20 - OPAMP Circuits

Lecture 21 - Active RC Filters

Lecture 22 - Active Filters

Lecture 23 - Oscillators

Lecture 24 - Oscillators

Lecture 25 - DAC/ADC

NPTEL : NOC:Microwave Integrated Circuits (Electronics and Communication Engineering)

Co-ordinators : Prof. Jayanta Mukherjee

Lecture 1 - Introduction

Lecture 2 - Reflection Coefficient, VSWR, Smith Chart

Lecture 3 - Reflection Coefficient, VSWR

Lecture 4 - Smith Chart

Lecture 5 - Application of the Smith Chart

Lecture 6 - Microwave Components

Lecture 7 - Broadband Impedance Matching

Lecture 8 - Multi-section transformer

Lecture 9 - Maximally flat (binomial) transformer, Chebyshev transformer

Lecture 10 - Non-uniform transmission line (Tapers)

Lecture 11 - Scattering Parameters

Lecture 12 - Properties of Scattering Parameters

Lecture 13 - Properties of Scattering Parameters (Continued...)

Lecture 14 - Signal flow graph, ABCD parameters

Lecture 15 - 1 and 2 Port passive Components

Lecture 16 - 3 Port Microwave Components

Lecture 17 - Couplers

Lecture 18 - Coupled Line Couplers

Lecture 19 - Resonators and narrow band filters

Lecture 20 - Narrow-band filters

Lecture 21 - Filter design: Image parameter method, Insertion loss method

Lecture 22 - Filter synthesis, KurodaÂ's Identity

Lecture 23 - Impedance Matching Circuits for Amplifiers

Lecture 24 - Microstrip Matching (Continued...), Masons Rule, Power Gain Equations

Lecture 25 - Amplifier Gain Stability

Lecture 26 - Amplifier Gain Stability (Continued...)

Lecture 27 - Gain Circles

Lecture 28 - Gain Circles (Continued...)

Lecture 29 - Noise

Lecture 30 - Noise Figure Circles (Continued...)

Lecture 31 - DC Bias

Lecture 32 - Amplifier Classes, Frequency Compensation

Lecture 33 - Linearity

Lecture 34 - Oscillator Design

NPTEL : NOC:Foundations of Wavelets and Multirate Digital Signal Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. V.M. Gadre

Lecture 1 - Introduction

Lecture 2 - Origin of wavelets

Lecture 3 - Haar wavelet

Lecture 4 - Dyadic wavelet

Lecture 5 - Dilates and translates of Haar wavelet

Lecture 6 - L2 norm of a function

Lecture 7 - Piecewise constant representation of a function

Lecture 8 - Ladder of subspaces

Lecture 9 - Scaling function of Haar wavelet

Lecture 10 - Demonstration: Piecewise constant approximation of functions

Lecture 11 - Vector representation of sequences

Lecture 12 - Properties of norm

Lecture 13 - Parsevals theorem

Lecture 14 - Equivalence of functions and sequences

Lecture 15 - Angle between Functions and their Decomposition

Lecture 16 - Additional Information on Direct-Sum

Lecture 17 - Introduction to filter banks

Lecture 18 - Haar Analysis filter bank in Z-domain

Lecture 19 - Haar Synthesis filter bank in Z-domain

Lecture 20 - Moving from Z-domain to frequency domain

Lecture 21 - Frequency Response of Haar Analysis Low pass Filter bank

Lecture 22 - Frequency Response of Haar Analysis High pass Filter bank

Lecture 23 - Ideal Two-band Filter bank

Lecture 24 - Disqualification of Ideal Filter bank

Lecture 25 - Realizable Two-band Filter bank

Lecture 26 - Demonstration: DWT of images

Lecture 27 - Relating Fourier transform of scaling function to filter bank

Lecture 28 - Fourier transform of scaling function

Lecture 29 - Construction of scaling and wavelet functions from filter bank

Lecture 30 - Demonstration: Constructing scaling and wavelet functions.

Lecture 31 - Conclusive Remarks and Future Prospects

NPTEL : RF Integrated Circuits (Electronics and Communication Engineering)

Co-ordinators : Dr. Shouribrata Chatterjee

Lecture 1 - RF system basic architectures

Lecture 2 - Transmission media reflection

Lecture 3 - Maximum power transfer

Lecture 4 - Parallel RLC tank

Lecture 5 - Matching

Lecture 6 - Other matching networks

Lecture 7 - Resistors capacitors

Lecture 8 - Inductors

Lecture 9 - Inductors and wires

Lecture 10 - Wires

Lecture 11 - Transmission lines

Lecture 12 - Device review

Lecture 13 - MOS capacitances

Lecture 14 - Bandwidth estimation constants

Lecture 15 - Bandwidth estimation constants (Continued.)

Lecture 16 - Bandwidth estimation using short circuit

Lecture 17 - Bandwidth groupdelay and peaking

Lecture 18 - Shunt series amplifier

Lecture 19 - Shunt series amplifier (Continued.)

Lecture 20 - Various noise sources

Lecture 21 - Noise in a mosfet

Lecture 22 - Motivation first cut design

Lecture 23 - Motivation first cut design (Continued.)

Lecture 24 - Noise other possible topologies

Lecture 25 - Multiplier Fundamentals

Lecture 26 - Mixer non idealties

Lecture 27 - Mixer non idealties (Continued.)

Lecture 28 - A tank based oscillators

Lecture 29 - Phase noise in oscillators

Lecture 30 - Other oscillators topologies

Lecture 31 - Phase locked loop basics

Lecture 32 - Charge pump

Lecture 33 - Pll dynamics integer

Lecture 34 - Spurious frequencies fractional and synthesis

Lecture 35 - Fractional spurs

Lecture 36 - Delta and sigma modulation

Lecture 37 - Class abc power amplifiers

Lecture 38 - Class bcd power amplifiers

Lecture 39 - Class cd pwm amplifiers

Lecture 40 - Course summary and conclusion

NPTEL : Communication Engineering (Electronics and Communication Engineering)

Co-ordinators : Prof. Surendra Prasad

Lecture 1 - Introduction to Communication Engineering

Lecture 2 - Communication channel

Lecture 3 - Brief Review of Signal and Systems

Lecture 4 - The Hilbert Transform

Lecture 5 - Analytic Representation of band pass Signals

Lecture 6 - Fundamentals of Analog Signal Transmission

Lecture 7 - Analog Modulation of Carriers

Lecture 8 - Amplitude Modulation

Lecture 9 - Amplitude Modulation

Lecture 10 - Single Sideband Modulation

Lecture 11 - Suppressed Sideband Modulation

Lecture 12 - VSB Modulation - Superhet Receiver

Lecture 13 - Superhet Receiver etc

Lecture 14 - Practical Mixers-Effects of Tonal

Lecture 15 - Angle Modulation

Lecture 16 - Angle Modulation

Lecture 17 - Generation of FM Signals

Lecture 18 - FM Generation and Detection

Lecture 19 - Demodulation of Angle Modulated Signals

Lecture 20 - Demodulation of Angle Modulated Signals

Lecture 21 - Demodulation of Angle Modulated Signals

Lecture 22 - Feedback Demodulators - phase locked loop

Lecture 23 - The Phase Locked Loop

Lecture 24 - Frequency Compressive Feedback Demodulator

Lecture 25 - FM Receivers

Lecture 26 - TV Transmission

Lecture 27 - Review of Probability Theory and Random Process

Lecture 28 - Review of Probability Theory and Random Variables

Lecture 29 - Random Processes

Lecture 30 - Random Processes

Lecture 31 - Random Processes

Lecture 32 - Gaussian Random Processes

Lecture 33 - Behaviour of Communication System

Lecture 34 - Performance of AM Systems in Noise

Lecture 35 - Noise in AM and Angle Modulation Systems

Lecture 36 - Noise in Phase and Frequency Modulation systems

Lecture 37 - Noise in Angle Modulation

Lecture 38 - Pre emphasis - De emphasis

Lecture 39 - Pulse Modulation Schemes - PWM and PPM

Lecture 40 - Data Modulation

Lecture 41 - Pulse Code Modulation

NPTEL : Digital Signal Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. S.C. Dutta Roy

Lecture 1 - Digital Signal Processing Introduction

Lecture 2 - Digital Signal Processing Introduction (Continued.)

Lecture 3 - Digital Systems

Lecture 4 - Characterization Description, Testing of Digital Systems

Lecture 5 - LTI Systems Step & Impulse Responses, Convolution

Lecture 6 - Inverse Systems, Stability, FIR & IIR

Lecture 7 - FIR & IIR; Recursive & Non Recursive

Lecture 8 - Discrete Time Fourier Transform

Lecture 9 - Discrete Fourier Transform (DFT)

Lecture 10 - DFT (Continued.)

Lecture 11 - DFT (Continued.) Introduction to Z Transform

Lecture 12 - Z Transform

Lecture 13 - Z Transform (Continued.)

Lecture 14 - Discrete Time Systems in the Frequency Domain

Lecture 15 - Simple Digital Filters

Lecture 16 - All Pass Filters, Com.Filters

Lecture 17 - Linear Phase filters, Complementary Transfer Fn

Lecture 18 - Compensatory Transfer Functions, (Continued.)

Lecture 19 - Test for Stability using All Pass Functions

Lecture 20 - Digital Processing of Continuous Time Signals

Lecture 21 - Problem Solving Session: FT, DFT, & Z Transforms

Lecture 22 - Problem Solving Session: FT, DFT, & Z Transforms

Lecture 23 - Analog Filter Design

Lecture 24 - Analog Chebyshev LPF Design

Lecture 25 - Analog Filter Design (Continued.): Transformations

Lecture 26 - Analog frequency Transformation

Lecture 27 - Problem Solving Session on Discrete Time System

Lecture 28 - Digital Filter Structures

Lecture 29 - IIR Realizations

Lecture 30 - All Pass Realizations

Lecture 31 - Lattice Synthesis (Continued.)

Lecture 32 - FIR Lattice Synthesis

Lecture 33 - FIR Lattice (Continued.) and Digital Filter Design

Lecture 34 - IIR Filter Design

Lecture 35 - IIR Design by Bilinear Transformation

Lecture 36 - IIR Design Examples

Lecture 37 - Digital to Digital Frequency Transformation

Lecture 38 - FIR Design

Lecture 39 - FIR Digital Filter Design by Windowing

Lecture 40 - FIR Design by Windowing & Frequency Sampling

Lecture 41 - Solving Problems on DSP Structures

Lecture 42 - FIR Design by Frequency Sampling

Lecture 43 - FIR Design by Frequency Sampling (Continued.)

NPTEL : Wireless Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. Ranjan Bose

Lecture 1 - Motivation and Introduction

Lecture 2 - Types of Wireless communication

Lecture 3 - The modern wireless Communication Systems

Lecture 4 - The cellular concept - System Design issues

Lecture 5 - Cell capacity and reuse

Lecture 6 - Interference and System capacity

Lecture 7 - Improving coverage and system capacity

Lecture 8 - Mobile Radio Propagation

Lecture 9 - Mobile Radio Propagation (Continued.)

Lecture 10 - Mobile Radio Propagation (Continued.)

Lecture 11 - Mobile Radio Propagation (Continued.)

Lecture 12 - Mobile Radio Propagation (Continued.)

Lecture 13 - Mobile Radio Propagation (Continued.)

Lecture 14 - Mobile Radio Propagation II

Lecture 15 - Mobile Radio Propagation II (Continued.)

Lecture 16 - Mobile Radio Propagation II (Continued.)

Lecture 17 - Mobile Radio Propagation II (Continued.)

Lecture 18 - Mobile Radio Propagation II (Continued.)

Lecture 19 - Mobile Radio Propagation II (Continued.)

Lecture 20 - Mobile Radio Propagation II (Continued.)

Lecture 21 - Modulation Techniques for Mobile Communication

Lecture 22 - Modulation Techniques (Continued.)

Lecture 23 - Modulation Techniques (Continued.)

Lecture 24 - Modulation Techniques (Continued.)

Lecture 25 - Modulation Techniques (Continued.)

Lecture 26 - Modulation Techniques (Continued.)

Lecture 27 - Modulation Techniques (Continued.)

Lecture 28 - Equalization and Diversity Techniques

Lecture 29 - Equalization and Diversity Techniques (Continued.)

Lecture 30 - Equalization and Diversity Techniques (Continued.)

Lecture 31 - Equalization and Diversity Techniques (Continued.)

Lecture 32 - Coding Techniques for Mobile Communications

Lecture 33 - Coding Techniques for Mobile Communications (Continued.)

Lecture 34 - Coding Techniques for Mobile Communications (Continued.)

Lecture 35 - Coding Techniques for Mobile Communications (Continued.)

Lecture 36 - Wireless Networks

Lecture 37 - GSM and CDMA

Lecture 38 - GSM and CDMA (Continued.)

NPTEL : Basic Electronics (Electronics and Communication Engineering)

Co-ordinators : Prof. Chitralekha Mahanta

Lecture 1 - Semiconductor materials

Lecture 2 - PN Junction Diodes

Lecture 3 - Diode Equivalent Circuits

Lecture 4 - Diode Rectifier Circuits

Lecture 5 - Zener Diode and Applications

Lecture 6 - Clipping and Clamping Circuits

Lecture 7 - Transistor Operation - Part-1

Lecture 8 - Transistor Operation - Part-2

Lecture 9 - Biasing the BJT - Part-1

Lecture 10 - Biasing the BJT - Part-2

Lecture 11 - BJT Small Signal Analysis

Lecture 12 - BJT Amplifier - Part-1

Lecture 13 - BJT Amplifier - Part-2

Lecture 14 - Frequency Response of BJT Analysis - Part-1

Lecture 15 - Bipolar Junction Transistors

Lecture 16 - Transistor as a Switch

Lecture 17 - MOSFET - Part-1

Lecture 18 - MOSFET - Part-2

Lecture 19 - MOSFET under dc operation

Lecture 20 - Mosfet as an Amplifier

Lecture 21 - Small signal model of MOSFET - Part-1

Lecture 22 - Small signal model of MOSFET - Part-2

Lecture 23 - High Frequency model of mosfet

Lecture 24 - Junction Field Effect Transistor

Lecture 25 - Operational Amplifier Introduction

Lecture 26 - Ideal Op-Amp

Lecture 27 - Op-Amp applications Part-1

Lecture 28 - Op-Amp Applications Part-2

Lecture 29 - Op-Amp Applications Part-3

Lecture 30 - The practical Op-Amp

Lecture 31 - Positive feedback and oscillation

Lecture 32 - Comparator

Lecture 33 - Large Signal Amplifiers

Lecture 34 - Transformer Couple Power Amplifier

Lecture 35 - Class AB Operations of Power Amplifier

Lecture 36 - Power BJTs

Lecture 37 - Regulated Power Supply

Lecture 38 - Four Layered Diode

Lecture 39 - Silicon Control Rectifier

Lecture 40 - SCR Applications

NPTEL : NOC:VLSI Design Verification and Test (Electronics and Communication Engineering)

Co-ordinators : Dr. Santosh Biswas, Jatindra Kumar Deka, Prof.Arnab sarkar

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Overview of VLSI Design Flow

Lecture 4 - High Level Synthesis Overview - Part 1

Lecture 5 - High Level Synthesis Overview - Part 2

Lecture 6 - Scheduling in HLS - Part 1

Lecture 7 - Scheduling in HLS - Part 2

Lecture 8 - Scheduling in HLS - Part 3

Lecture 9 - Scheduling in HLS - Part 4

Lecture 10 - Scheduling in HLS - Part 5

Lecture 11 - Scheduling in HLS - Part 6

Lecture 12 - Scheduling in HLS - Part 7

Lecture 13 - Resource Sharing and Binding in HLS - Part 1

Lecture 14 - Resource Sharing and Binding in HLS - Part 2

Lecture 15 - Resource Sharing and Binding in HLS - Part 3

Lecture 16 - Resource Sharing and Binding in HLS - Part 4

Lecture 17 - Resource Sharing and Binding in HLS - Part 5

Lecture 18 - Resource Sharing and Binding in HLS - Part 6

Lecture 19 - Resource Sharing and Binding in HLS - Part 7

Lecture 20 - Logic Synthesis - Part 1

Lecture 21 - Logic Synthesis - Part 2

Lecture 22 - Logic Synthesis - Part 3

Lecture 23 - Physical Design - Part 1

Lecture 24 - Physical Design - Part 2

Lecture 25 - Physical Design - Part 3

Lecture 26 - Introduction to formal methods for design verification

Lecture 27 - Temporal Logic: Introduction and Basic Operations on Temporal Logic

Lecture 28 - Syntax and Semantics of CLT

Lecture 29 - Syntax and semantics of CTL (Continued...)

Lecture 30 - Equivalences between CTL Formulas

Lecture 31 - Introduction to Model Checking

Lecture 32 - Model checking Algorithms

Lecture 33 - Model checking Algorithms (Continued...)

Lecture 34 - Model Checking with Fairness

Lecture 35 - Binary Decision Diagram: Introduction and Construction

Lecture 36 - Ordered Binary Decision Diagram (OBDD)

Lecture 37 - Operation On OBDD

Lecture 38 - OBDD for State Transition Systems E

Lecture 39 - Symbolic Model Checking

Lecture 40 - Introduction to Digital VLSI Testing

Lecture 41 - Functional and Structural Testing

Lecture 42 - Fault Equivalence

Lecture 43 - Fault Simulation - I

Lecture 44 - Fault Simulation - II

Lecture 45 - Fault Simulation - III

Lecture 46 - Testability Measures (SCOAP)

Lecture 47 - Introduction to Automatic Test Pattern Generation (ATPG) and ATPG Algebras

Lecture 48 - D-Algorithm - I

Lecture 49 - D-Algorithm - II

Lecture 50 - ATPG for Synchronous Sequential Circuits

Lecture 51 - Scan Chain based Sequential Circuit Testing - I

Lecture 52 - Scan Chain based Sequential Circuit Testing - II

Lecture 53 - BIST - I

Lecture 54 - BIST - II

NPTEL : NOC:Design of Power Electronic Converters (Electronics and Communication Engineering)

Co-ordinators : Prof. Shabari Nath

Lecture 1 - Introduction

Lecture 2 - Analysis of Buck Converter

Lecture 3 - Choosing L and C

Lecture 4 - Design Example of Buck Converter

Lecture 5 - Analysis of H Bridge

Lecture 6 - Bipolar PWM

Lecture 7 - Unipolar PWM

Lecture 8 - Bipolar vs Unipolar PWM

Lecture 9 - Different types of power diode

Lecture 10 - Diode characteristics

Lecture 11 - Diode Datasheets

Lecture 12 - Diode Datasheet Examples

Lecture 13 - MOSFET

Lecture 14 - Switching characteristics of MOSFET

Lecture 15 - MOSFET Datasheets - I

Lecture 16 - MOSFET Datasheets - II

Lecture 17 - MOSFET Datasheet example

Lecture 18 - IGBT

Lecture 19 - IGBT Datasheets - I

Lecture 20 - IGBT Datasheets - II

Lecture 21 - IGBT Datasheet Example

Lecture 22 - Introduction to Gate Drivers

Lecture 23 - Gate Driver Requirements

Lecture 24 - Optocouplers based Gate Drivers - I

Lecture 25 - Optocouplers based Gate Drivers - II

Lecture 26 - Desat Protection

Lecture 27 - Bootstrapping

Lecture 28 - Pulse Transformer based Gate Drivers

Lecture 29 - Gate Drivers - Few Other Requirements

Lecture 30 - Introduction to Snubbers

Lecture 31 - RC Snubber Analysis - I

Lecture 32 - RC Snubber Analysis - II : Underdamped Case

Lecture 33 - RC Snubber Analysis - III : Overdamped and Critically Damped Case

Lecture 34 - RC Snubber Design - I

Lecture 35 - RC Snubber Design - II

Lecture 36 - RCD Snubbers - I

Lecture 37 - RCD Snubbers - II

Lecture 38 - Power Loss - I

Lecture 39 - Power Loss - II

Lecture 40 - Thermal Modelling - I

Lecture 41 - Thermal Modelling - II

Lecture 42 - Thermal Modelling - III

Lecture 43 - Choosing Heat Sinks

Lecture 44 - Fundamentals

Lecture 45 - Magnetic Losses

Lecture 46 - Conductors

Lecture 47 - Magnetic Materials

Lecture 48 - Magnetic Core

Lecture 49 - Inductor Design - I

Lecture 50 - Inductor Design - II

Lecture 51 - Transformer Design

Lecture 52 - Inductor Design Example

Lecture 53 - Example of Transformer Design

Lecture 54 - Introduction to EMI

Lecture 55 - EMI Measurements

Lecture 56 - EMI in Power Electronics

Lecture 57 - CM and DM noise

Lecture 58 - Design Solutions of EMI

Lecture 59 - EMI Filter - I

Lecture 60 - EMI Filter - II

Lecture 61 - Sections of Power Converters

Lecture 62 - Capacitors

Lecture 63 - Familiarity with Components - I

Lecture 64 - Familiarity with Components - II

Lecture 65 - PCB - I

Lecture 66 - PCB - II

Lecture 67 - PCB - III

Lecture 68 - Grounds

Lecture 69 - Lab Demo of Hardware Design

Lecture 70 - Tutorial: PCB Designing

NPTEL : NOC:Operation and Planning of Power Distribution Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. Sanjib Ganguly

Lecture 1 - Power systems: Overview and historical developments

Lecture 2 - Introduction to power delivery systems

Lecture 3 - Introduction to electrical loads

Lecture 4 - Load diversity

Lecture 5 - Different load indices

Lecture 6 - Loss factor

Lecture 7 - Load management

Lecture 8 - Brief overview of power distribution substation

Lecture 9 - Substation bus schemes and primary distribution network topology

Lecture 10 - Voltage drop and power loss computations for typical radial distribution feeders

Lecture 11 - Genaralized expression for voltage drop for radial distribution feeder

Lecture 12 - Derivation of K-constant for voltage drop computation

Lecture 13 - Different reliability indices used in distribution networks

Lecture 14 - Different reliability indices with numerical examples

Lecture 15 - Mathematical concept of reliability

Lecture 16 - Reliability evaluation of multiple units connected to series and/or parallel

Lecture 17 - Numerical problems on reliability evaluation

Lecture 18 - Power quality problems in distribution systems

Lecture 19 - Forward backward load flow approach for power distribution systems

Lecture 20 - Forward backward load flow approach for power distribution systems

Lecture 21 - Reactive power compensation: Basic idea

Lecture 22 - Reactive power compensation: Numerical examples

Lecture 23 - Capacitor placement at distribution feeder: Analytical approach

Lecture 24 - Power distribution system planning: Economic aspects

Lecture 25 - Power distribution system planning: Different models and solution strategies

Lecture 26 - Mono-objective power distribution system planning approach

Lecture 27 - Multi-objective power distribution system planning approach

Lecture 28 - Multi-objective planning incorporating sectionalizing switches and tie-lines

Lecture 29 - Reconfiguration of power distribution networks

Lecture 30 - Distribution networks with the integration of Distributed Generation

Lecture 31 - Concept of microgrids

Lecture 32 - Wind and solar energy conversion systems

Lecture 33 - Energy storage systems

Lecture 34 - Distribution system automation and smart grid - Part I

Lecture 35 - Distribution system automation and smart grid - Part II

NPTEL : NOC:Nanophotonics, Plasmonics, and Metamaterials (Electronics and Communication Engineering)

Co-ordinators : Dr. Debabrata Sikdar, Dr. Debabrata Sikdar

Lecture 1 - Introduction to Nanophotonics and Plasmonics

Lecture 2 - Introduction to Metamaterials and Metasurfaces

Lecture 3 - Overview and current status

Lecture 4 - Electromagnetic theory of light

Lecture 5 - Electromagnetic properties of material

Lecture 6 - Electromagnetic waves in dielectric media

Lecture 7 - Polarization of light

Lecture 8 - Reflection and refraction: Fresnel equations

Lecture 9 - Absorption, dispersion and scattering of light

Lecture 10 - Matrix theory of dielectric layered media

Lecture 11 - 1D Photonic crystals

Lecture 12 - Dispersion relation and photonic band structure

Lecture 13 - Real and reciprocal lattices

Lecture 14 - 2D and 3D Photonic crystals

Lecture 15 - Emerging Applications of Photonic Crystals

Lecture 16 - Optical properties of metals

Lecture 17 - Surface Plasmon Polaritons (SPP): Fundamentals

Lecture 18 - Applications of SPPs

Lecture 19 - Localized surface plasmon resonance (LSPR)

Lecture 20 - Plasmonic nanoparticles: Antenna and Waveguides

Lecture 21 - Applications of LSPR

Lecture 22 - Fundamentals of metamaterials

Lecture 23 - Effective medium theories

Lecture 24 - Single and Double-Negative Metamaterials

Lecture 25 - Metamaterial Perfect absorbers

Lecture 26 - Super lens, Hyperbolic Metamaterials and Hyper lens

Lecture 27 - Tunable photonic metamaterial based devices

Lecture 28 - Metasurfaces and Frequency selective surfaces

Lecture 29 - Guided mode resonances (GMR)

Lecture 30 - Applications of metasurfaces and GMR devices

Lecture 31 - Transformation Optics (TO) and Invisibility Cloaks

Lecture 32 - Carpet cloaking and TO metamaterials

Lecture 33 - Introduction to alternative materials

Lecture 34 - Nanofabrication: Physical and Chemical methods

Lecture 35 - Lithography and Pattern transfer

Lecture 36 - Nanophotonic characterization methods

NPTEL : NOC:Power Electronics Applications in Power Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. Sanjib Ganguly

Lecture 1 - Basic Concepts of active and reactive power

Lecture 2 - Basic Concepts of reactive power compensation

Lecture 3 - Basic mathematical modelling of power transmission systems

Lecture 4 - Derivation of the relation of sending and receiving end voltages and currents - Part A

Lecture 5 - Derivation of the relation of sending and receiving end voltages and currents - Part B

Lecture 6 - Derivations of power flow expressions

Lecture 7 - Numerical example showing determination of power flow

Lecture 8 - Generalized expression for active and reactive power at any point of a long line

Lecture 9 - Mid-point voltage and current for long, lossless transmission lines

Lecture 10 - Plot of mid-point voltage vs line loading

Lecture 11 - Numerical example of mid-point compensation - Part A

Lecture 12 - Numerical example of mid-point compensation - Part B

Lecture 13 - Effect of Mid-point compensation on power flow of transmission lines

Lecture 14 - Thyristor controlled reactor (TCR)

Lecture 15 - Harmonics in TCR and Three-phase TCR configuration

Lecture 16 - Operating Characteristics of TCR

Lecture 17 - Categorization of different types of SVC and Fixed capacitor TCR (FC-TCR)

Lecture 18 - Mechanically Switched Capacitor TCR (MSC-TCR) and Thyrisor Switch Capacitor (TSC)

Lecture 19 - Thyristor Switch Capacitor (TSC)

Lecture 20 - Design of TSC-TCR: Numerical Example

Lecture 21 - SVC in enhancement of steady-state power transmission capacity

Lecture 22 - SVC in enhancement of transient stability of power systems

Lecture 23 - SVC in enhancement of synchronizing power coefficient

Lecture 24 - SVC in and power system oscillation damping

Lecture 25 - SVC in voltage control of power systems: Modelling

Lecture 26 - SVC in voltage control of power systems: Control characteristics

Lecture 27 - SVC in voltage control of power systems: Numerical example

Lecture 28 - Basic operating principle of TCSC

Lecture 29 - Basic mathematical modelling of TCSC - Part 1

Lecture 30 - Basic mathematical modelling of TCSC - Part 2

Lecture 31 - TCSC reactance and hamomics analysis

Lecture 32 - Applications of TCSC in power systems

Lecture 33 - Basic mathematical modelling of STATCOM

Lecture 34 - Applications of STATCOM in power systems

Lecture 35 - Basic mathematical modelling of SSSC

Lecture 36 - Applications of SSSC in power systems

NPTEL : Signals and Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. K.S. Venkatesh

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

NPTEL : Advanced 3G and 4G Wireless Mobile Communications (Electronics and Communication Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Introduction to 3G/4G Standards

Lecture 2 - Wireless Channel and Fading

Lecture 3 - Rayleigh Fading and BER of Wired Communication

Lecture 4 - BER for Wireless Communication

Lecture 5 - Introduction to Diversity

Lecture 6 - Multi-antenna Maximal Ratio Combiner

Lecture 7 - BER with Diversity

Lecture 8 - Spatial Diversity and Diversity Order

Lecture 9 - Wireless Channel and Delay Spread

Lecture 10 - Coherence Bandwidth of the Wireless Channel

Lecture 11 - ISI and Doppler in Wireless Communications

Lecture 12 - Doppler Spectrum and Jakes Model

Lecture 13 - Introduction to CDMA, Spread Spectrum and LFSR

Lecture 14 - Generation and Properties of PN Sequences

Lecture 15 - Correlation of PN Sequences and Jammer Margin

Lecture 16 - CDMA Advantages and RAKE Receiver

Lecture 17 - Multi-User CDMA Downlink Part I

Lecture 18 - Multi-User CDMA Downlink Part II

Lecture 19 - Multi-User CDMA Uplink and Asynchronous CDMA

Lecture 20 - CDMA Near-Far Problem and Introduction to MIMO

Lecture 21 - MIMO System Model and Zero-Forcing Receiver

Lecture 22 - MIMO MMSE Receiver and Introduction to SVD

Lecture 23 - SVD Based Optimal MIMO Transmission and Capacity

Lecture 24 - SVD Based Optimal MIMO Transmission and Capacity

Lecture 25 - OSTBCs and Introduction to V-BLAST Receiver

Lecture 26 - V-BLAST (Continued) and MIMO Beamforming

Lecture 27 - Introduction to OFDM and Multi-Carrier Modulation

Lecture 28 - IFFT Sampling for OFDM

Lecture 29 - OFDM Schematic and Cyclic Prefix

Lecture 30 - OFDM Based Parallelization and OFDM Example

Lecture 31 - OFDM Example (Continued) and Introduction to MIMO-OFDM

Lecture 32 - MIMO-OFDM (Continued)

Lecture 33 - Impact of Carrier Frequency Offset (CFO) in OFDM

Lecture 34 - PAPR in OFDM Systems and Introduction to SC-FDMA

Lecture 35 - SC-FDMA (Continued) and Introduction of Wireless Propagation Models

Lecture 36 - Ground Reflection and Okumura Models

Lecture 37 - Hata Model and Log Normal Shadowing

Lecture 38 - Link Budget Analysis

Lecture 39 - Introduction to Teletraffic Theory

Lecture 40 - Cellular Traffic Modeling and Blocking Probability

NPTEL : Digital Switching (Electronics and Communication Engineering)

Co-ordinators : Prof. Yatindra N Singh

Lecture 1 - Digital Switching

Lecture 2 - Digital Switching

Lecture 3 - Digital Switching

Lecture 4 - Digital Switching

Lecture 5 - Digital Switching

Lecture 6 - Digital Switching

Lecture 7 - Digital Switching

Lecture 8 - Digital Switching

Lecture 9 - Digital Switching

Lecture 10 - Digital Switching

Lecture 11 - Digital Switching

Lecture 12 - Digital Switching

Lecture 13 - Digital Switching

Lecture 14 - Digital Switching

Lecture 15 - Digital Switching

Lecture 16 - Digital Switching

Lecture 17 - Digital Switching

Lecture 18 - Digital Switching

Lecture 19 - Digital Switching

Lecture 20 - Digital Switching

Lecture 21 - Digital Switching

Lecture 22 - Digital Switching

Lecture 23 - Digital Switching

Lecture 24 - Digital Switching

Lecture 25 - Digital Switching

Lecture 26 - Digital Switching

Lecture 27 - Digital Switching

Lecture 28 - Digital Switching

Lecture 29 - Digital Switching

Lecture 30 - Digital Switching

Lecture 31 - Digital Switching

Lecture 32 - Digital Switching

Lecture 33 - Digital Switching

Lecture 34 - Digital Switching

Lecture 35 - Digital Switching

Lecture 36 - Digital Switching

Lecture 37 - Digital Switching

NPTEL : NOC:Principles of Modern CDMA-MIMO-OFDM Wireless Communications (Electronics and Communication Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Evolution of Wireless Communication Technologies

Lecture 2 - Modeling Wireless Channel

Lecture 3 - Wireless Fading Channel Model

Lecture 4 - Fading Channel Distribution

Lecture 5 - Rayleigh Fading Channel

Lecture 6 - Bit Error Rate (BER) Performance

Lecture 7 - Bit Error Rate (BER) of AWGN Channels

Lecture 8 - Bit Error Rate of Rayleigh Fading Wireless Channel

Lecture 9 - Exact BER Expression for Rayleigh Fading Wireless Channel

Lecture 10 - Deep Fade Analysis of Wireless Communication

Lecture 11 - Principle of Diversity

Lecture 12 - Multiple Antenna Diversity

Lecture 13 - Maximal-Ratio Combining

Lecture 14 - BER of Multiple Antenna Wireless Systems

Lecture 15 - Approximate BER for Multiple Antenna Wireless System

Lecture 16 - Examples for BER of Wireless Communication

Lecture 17 - Deep Fade in Multi Antenna Systems

Lecture 18 - Intuition for Deep Fade in Multi-Antenna System

Lecture 19 - Definition of Diversity Order

Lecture 20 - Max Delay Spread

Lecture 21 - RMS Delay Spread

Lecture 22 - Delay Spread and Inter Symbol Interference

Lecture 23 - Coherence Bandwidth of Wireless Channel

Lecture 24 - Mobility and Doppler Effect in Wireless Channels

Lecture 25 - Imapact of Doppler Effect on Wireless Channel

Lecture 26 - Introduction to Code Division Multiple Access (CDMA)

Lecture 27 - Chip Time and Bandwidth Expansion in CDMA

Lecture 28 - Code Generation for CDMA

Lecture 29 - CDMA Codes: Properties of PN Sequences

Lecture 30 - BER of CDMA Systems

Lecture 31 - Analysis of Multi-user CDMA

Lecture 32 - Multipath Diversity in CDMA Systems

Lecture 33 - Near-Far Problem in CDMA

Lecture 34 - Multiple Input Multiple Output (MIMO) Systems

Lecture 35 - Examples of MIMO Systems

Lecture 36 - MIMO Receivers

Lecture 37 - BER Performance of ZF Receiver

Lecture 38 - Transmit Beamforming in MISO Systems

Lecture 39 - Alamouti Code and Space-Time Block Codes

Lecture 40 - BER of Alamouti Coded System

Lecture 41 - Singular Value Decomposition (SVD)

Lecture 42 - SVD in MIMO

Lecture 43 - Capacity of MIMO Wireless Systems

Lecture 44 - SVD based MIMO Transmission

Lecture 45 - Orthogonal Frequency Division Multiplexing (OFDM)

Lecture 46 - Transmission in Multicarrier Systems

Lecture 47 - FFT/IFFT Processing in OFDM

Lecture 48 - Cyclic Prefix in OFDM Systems

Lecture 49 - Schematic Represntation of OFDM Transmitter and Receiver

Lecture 50 - BER Performance of OFDM Systems

NPTEL : NOC:Probability and Random Variables, Processes for Wireless Communications (Electronics and Communication Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Basics - Sample Space and Events

Lecture 2 - Axioms of Probability

Lecture 3 - Conditional Probability - Mary-PAM Example

Lecture 4 - Independent Events - Mary-PAM Example

Lecture 5 - Independent Events - Block Transmission Example

Lecture 6 - Independent Events - Multiantenna Fading Example

Lecture 7 - Bayes Theorem and Aposteriori Probabilities

Lecture 8 - Maximum Aposteriori Probability (MAP) Receiver

Lecture 9 - Random Variables, Probability Density Function (PDF)

Lecture 10 - Application: Power of Fading Wireless Channel

Lecture 11 - Mean, Variance of Random Variables

Lecture 12 - Application: Average Delay and RMS Delay Spread of Wireless Channel

Lecture 13 - Transformation of Random Variables and Rayleigh Fading Wireless Channel

Lecture 14 - Gaussian Random Variable and Linear Transformation

Lecture 15 - Special Case: IID Gaussian Random Variables

Lecture 16 - Application: Array Processing and Array Gain with Uniform Linear Arrays

Lecture 17 - Random Processes and Wide Sense Stationarity (WSS)

Lecture 18 - WSS Example Narrowband Wireless Signal with Random Phase

Lecture 19 - Power Spectral Density (PSD) for WSS Random Process

Lecture 20 - PSD Application in Wireless Bandwidth Required for Signal Transmission

Lecture 21 - Transmission of WSS Random Process Through LTI System

Lecture 22 - Special Random Processes Gaussian Process and White Noise AWGN Communication Channel

Lecture 23 - Gaussian Process Through LTI System Example: WGN Through RC Low Pass Fillter Not Started

NPTEL : NOC:Estimation for Wireless Communications, MIMO, OFDM Cellular and Sensor Networks (Electronics and Communication Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Basics - Sensor Network and Noisy Observation Model

Lecture 2 - Likelihood Function and Maximum Likelihood (ML) Estimate

Lecture 3 - Properties of Maximum Likelihood (ML) Estimate Â– Mean and Unbiasedness

Lecture 4 - Properties of Maximum Likelihood (ML) Estimate Â– Variance and Spread Around Mean

Lecture 5 - Reliability of the Maximum Likelihood (ML) Estimate Â– Number of Samples Required

Lecture 6 - Estimation of Complex Parameters Â– Symmetric Zero Mean Complex Gaussian Noise

Lecture 7 - Wireless Fading Channel Estimation Â– Pilot Symbols and Likelihood Function

Lecture 8 - Wireless Fading Channel Estimation Â– Pilot Training based Maximum Likelihood ML Estimate

Lecture 9 - Wireless Fading Channel Estimation Â– Mean and Variance of Pilot Training Based Maximum Likelihood

Lecture 10 - Example Â– Wireless Fading Channel Estimation for Downlink Mobile Communication

Lecture 11 - Cramer Rao Bound (CRB) for Parameter Estimation

Lecture 12 - Cramer Rao Bound CRB Example Â– Wireless Sensor Network

Lecture 13 - Vector Parameter Estimation Â– System Model for Multi Antenna Downlink Channel Estimation

Lecture 14 - Likelihood Function and Least Squares Cost Function for Vector Parameter Estimation

Lecture 15 - Least Squares Cost Function for Vector Parameter Estimation Vector Derivative Gradient

Lecture 16 - Least Squares Solution Maximum Likelihood ML Estimate Pseudo Inverse

Lecture 17 - Properties of Least Squares Estimate Â– Mean Covariance and Distribution

Lecture 18 - Least Squares Multi Antenna Downlink Maximum Likelihood Channel Estimation

Lecture 19 - Multiple Input Multiple Output MIMO Channel Estimation Â– Least Squares Maximum Likelihood ML

Lecture 20 - Example Â– Least Squares Multiple Input Multiple Output MIMO Channel Estimation

Lecture 21 - Channel Equalization and Inter Symbol Interference ISI Model

Lecture 22 - Least Squares based Zero Forcing Channel Equalizer

Lecture 23 - Example of ISI Channel and Least Squares based Zero Forcing

Lecture 24 - Equalization and Approximation Error for Zero Forcing Channel Equalizer

Lecture 25 - Example Equalization and Approximation Error for Zero Forcing Channel Equalizer

Lecture 26 - Introduction to Orthogonal Frequency Division Multiplexing OFDM Â– Cyclic Prefix CP and Circular Convolution

Lecture 27 - Introduction to Orthogonal Frequency Division Multiplexing OFDM Â– FFT at Receiver and Flat Fading

Lecture 28 - Channel Estimation Across Each Subcarrier in Orthogonal Frequency Division Multiplexing OFDM

Lecture 29 - Example Orthogonal Frequency Division Mulltiplexing OFDM Â– Transmission of Samples with Cyclic Prefix

Lecture 30 - Example Orthogonal Frequency Division Mulltiplexing OFDM Â– FFT at Receiver and Channel Estimation

Lecture 31 - Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel Estimation

Lecture 32 - Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel Estimation

Lecture 33 - Example Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel

Lecture 34 - Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless System

Lecture 35 - Example Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless Channels

Lecture 36 - Example Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless Channels

Lecture 37 - Introduction to Sequential Estimation Â– Application in Wireless Channel Estimation

Lecture 38 - Sequential Estimation of Wireless Channel Coefficient Â– Estimate and Variance Update Equation

Lecture 39 - Example Sequential Estimation of Wireless Channel Coefficient

NPTEL : NOC:Error Control Coding - An Introduction to Convolutional Codes (Electronics and Communication Engineering)

Co-ordinators : Dr. Adrish Banerjee

Lecture 1 - Introduction to Error Coding - I

Lecture 2 - Introduction to Error Coding - II

Lecture 3 - Introduction to Error Control Coding - III

Lecture 4 - Introduction to Convolutional Codes - I: Encoding

Lecture 5 - Introduction to Convolutional Codes - II: State Diagram, Trellis Diagram

Lecture 6 - Convolutional Codes: Classification, Realization

Lecture 7 - Convolutional Codes:Distance Properties

Lecture 8 - Decoding of Convolutional Codes - I: Viterbi Algorithm

Lecture 9 - Decoding of Convolutional Codes - II: BCJR Algorithm

Lecture 10 - Problem Solving Session - I

Lecture 11 - Problem Solving Session - II

Lecture 12 - Performance Bounds for Convolutional Codes

Lecture 13 - Turbo Codes

Lecture 14 - Turbo Decoding

Lecture 15 - Convergence of Turbo Codes

Lecture 16 - Applications of Convolutional Codes

Lecture 17 - Problem Solving Sessions - III

NPTEL : NOC:Error Control Coding - An Introduction to Linear Block code (Electronics and Communication Engineering)

Co-ordinators : Dr. Adrish Banerjee

Lecture 1 - Introduction to Error Control Coding - I

Lecture 2 - Introduction to Error Control Coding - II

Lecture 3 - Introduction to Error Control Coding - III

Lecture 4 - Introduction to Linear Block Codes, Generator Matrix and Parity Check Matrix

Lecture 5 - Syndrome, Error Correction and Error Detection

Lecture 6 - Problem Solving Session - I

Lecture 7 - Decoding of Linear Block Codes

Lecture 8 - Distance Properties of Linear Block Codes - I

Lecture 9 - Distance Properties of Linear Block Codes - II

Lecture 10 - Problem Solving Session - II

Lecture 11 - Some Simple Linear Block Codes - I

Lecture 12 - Some Simple Linear Block Codes - II: Reed Muller Codes

Lecture 13 - Bounds on the Size of a Code

Lecture 14 - Problem Solving Session - III

Lecture 15 - Low Density Parity Check Codes

Lecture 16 - Decoding of Low Density Parity Check Codes - I

Lecture 17 - Decoding of Low Density Parity Check Codes - II: Belief Propagation Algorithm

Lecture 18 - Applications of Linear Block Codes

NPTEL : NOC:Bayesian, MMSE Estimation for Wireless Communications MIMO, OFDM Cellular and Sensor Networks (Electronics and Communication Engineering)

Co-ordinators : Prof. Aditya K. Jagannatham

Lecture 1 - Basics Â– Introduction to Bayesian Minimum Mean Squared Error

Lecture 2 - Optimal Bayesian Minimum Mean Squared Error (MMSE) Estimate

Lecture 3 - Derivation of Minimum Mean Squared Error MMSE Estimate for Gaussian Parameter Â– Part I

Lecture 4 - Derivation of Minimum Mean Squared Error MMSE Estimate for Gaussian Parameter Â– Part II

Lecture 5 - Derivation of Minimum Mean Squared Error (MMSE) Estimate for Gaussian Parameter Â– Non-Zero Mean and Vector Parameter / Observation

Lecture 6 - Minimum Mean Squared Error MMSE Estimation Application Â– Wireless Sensor Network

Lecture 7 - Simplification and Example of Minimum Mean Squared Error MMSE Estimate for Wireless Sensor Networks

Lecture 8 - Minimum Mean Squared Error MMSE Estimation Application Â– Wireless Fading Channel Estimation

Lecture 9 - Simplification and Example of Minimum Mean Squared Error MMSE Estimate for Wireless Fading Channel

Lecture 10 - Minimum Mean Squared Error MMSE for Wireless Sensor Network WSN Â– Derivation and Example

Lecture 11 - Reliability of Minimum Mean Squared Error MMSE Estimate Â– Part I

Lecture 12 - Reliability of Minimum Mean Squared Error MMSE Estimate Â– Part II

Lecture 13 - Minimum Mean Squared Error MMSE for Wireless Fading Channel Estimation Â– Derivation

Lecture 14 - Minimum Mean Squared Error (MMSE) for Wireless Fading Channel Estimation Â– Example and Properties of Complex Channel Coefficient Estimate

Lecture 15 - Linear Minimum Mean Squared Error LMMSE Estimate Derivation Â– Part I

Lecture 16 - Linear Minimum Mean Squared Error LMMSE Estimate Derivation Â– Part II

Lecture 17 - Vector Parameter Estimation Â– System Model for Multi-Antenna Downlink Channel Estimation

Lecture 18 - Linear Minimum Mean Squared Error LMMSE Estimate for Multi Antenna Downlink Wireless Channel - Part I

Lecture 19 - Linear Minimum Mean Squared Error LMMSE Estimate for Multi Antenna Downlink Wireless Channel - Part II

Lecture 20 - Example of Linear Minimum Mean Squared Error LMMSE Estimation for Multi Antenna Downlink Wireless Channel

Lecture 21 - Derivation and Example of Error Covariance of Multi Antenna LMMSE Channel Estimation

Lecture 22 - System Model for Multiple Input Multiple Output MIMO Downlink Wireless Channel Estimation

Lecture 23 - Channel/ Noise Statistics for Multiple-Input Multiple-Output (MIMO) Downlink Wireless Channel Estimation

Lecture 24 - LMMSE/ MMSE Estimation for Multiple-Input Multiple-Output(MIMO) Downlink Wireless Channel Estimation

Lecture 25 - Example of LMMSE/ MMSE Estimation for Multiple-Input Multiple-Output (MIMO) Downlink Wireless Channel Estimation

Lecture 26 - Introduction and system model for equalization

Lecture 27 - Linear Minimum Mean Square Error (LMMSE) Channel Equalization

Lecture 28 - Error for LMMSE Channel Equalizer and Example of LMMSE Channel Equalization

Lecture 29 - Example of Linear Minimum Mean Square Error (LMMSE) Channel Equalization

Lecture 30 - Introduction and system model for OFDM

Lecture 31 - System model for OFDMl, IFFT/ FFT Operations

Lecture 32 - LMMSE Estimation for OFDM

Lecture 33 - Estimate and Error variance of LMMSE Estimate

Lecture 34 - Example of OFDM

Lecture 35 - Example of LMMSE estimate and Error variance for OFDM

NPTEL : NOC:Optical communications (Electronics and Communication Engineering)

Co-ordinators : Dr. Pradeep Kumar K

Lecture 1 - Overview of Fiber-optic communications

Lecture 2 - Optical Transmitter - I

Lecture 3 - Optical Transmitter - I (Continued...)

Lecture 4 - Optical Transmitter - II

Lecture 5 - Optical Transmitter - II (Continued...)

Lecture 6 - Intensity modulation

Lecture 7 - Review of Signals and Representations - I

Lecture 8 - Review of Signals and Representations - II

Lecture 9 - Digital Modulation - I

Lecture 10 - Review of Signals and Representations - III

Lecture 11 - Review of Signals and Representations - IV

Lecture 12 - Digital Modulation - II

Lecture 13 - Digital Modulation - II (Continued...)

Lecture 14 - Digital Modulation - III

Lecture 15 - Optical receivers - I

Lecture 16 - Optical receivers - II

Lecture 17 - Optical Modulator : Physical Structure

Lecture 18 - Propagation of Electromagnetic wave

Lecture 19 - Review of EM Theory

Lecture 20 - Reflection of Waves

Lecture 21 - Optical fiber - I

Lecture 22 - Optical fiber - II

Lecture 23 - Modes in Optical fiber - I

Lecture 24 - Modes in Optical fiber - I (Continued...)

Lecture 25 - Modes in Optical fiber - II

Lecture 26 - Dispersion in Fibers

Lecture 27 - Dispersion in Fibers (Continued...)

Lecture 28 - Wrapping up fiber parameters

Lecture 29 - System Design - I

Lecture 30 - Passive WDM components - I

Lecture 31 - Passive WDM components - II

Lecture 32 - Detection of light

Lecture 33 - Detection of light (Continued...)

Lecture 34 - Response time and Noise in Detectors

Lecture 35 - Noise in photodiodes - I Edit Lesson

Lecture 36 - Noise in photodiodes - II

Lecture 37 - Light sources - I

Lecture 38 - Light sources - II Edit Lesson

Lecture 39 - Semiconductor laser diodes

Lecture 40 - Optical communication:Pulse shape and BW

Lecture 41 - Power spectral density

Lecture 42 - Power spectral density (Continued...)

Lecture 43 - Advantage of coherent receiver

Lecture 44 - Dispersion induced limitations

Lecture 45 - Optical amplifiers - I

Lecture 46 - Optical amplifiers - II

Lecture 47 - Noise in optical amplifiers

Lecture 48 - Noise in optical amplifiers (Continued...)

Lecture 49 - ASE induced limitations

Lecture 50 - Determining BER in OOK system

Lecture 51 - BER determination

Lecture 52 - Eye diagram and Higher modulation techniques Edit Lesson

Lecture 53 - Higher modulation techniques (Continued...)

Lecture 54 - Optical OFDM

NPTEL : NOC:Digital Switching-I (Electronics and Communication Engineering)

Co-ordinators : Prof. Yatindra N Singh

Lecture 1 - Introduction to Telephony and Networks

Lecture 2 - Strowger Automatic Exchange

Lecture 3 - Crossbar Switching

Lecture 4 - Logic Circuit for Crosspoint Operation

Lecture 5 - Introduction to Multistage Interconnection Networks

Lecture 6 - Blocking probability of crossbar switches

Lecture 7 - Call congestion and time congestio

Lecture 8 - Clos network

Lecture 9 - Lee's approximation

Lecture 10 - Karnaugh's approximation

Lecture 11 - Time switch

Lecture 12 - Time switch and Clos network

Lecture 13 - TST switch, Strictly Non-blocking network, Rearrangeably non-blocking network

Lecture 14 - Paull's Matrix

Lecture 15 - f-way multicasting

Lecture 16 - Strictly sense non blocking multicasting switch

Lecture 17 - Rearrangeably non blocking networks

Lecture 18 - Slepian Duguid theorem, Paull's theorem

Lecture 19 - Paull's matrix for rearrangeabbly non blocking networks

Lecture 20 - Recursive construction; Crosspoint complexity for rearrangebly and strictly non-blocking networks

Lecture 21 - Cantor network

Lecture 22 - Wide-sense non blocking network

Lecture 23 - Example of wide -sense non-blocking switch

Lecture 24 - Packet Switching

Lecture 25 - Buffering strategies

Lecture 26 - Output Queued Switch

Lecture 27 - Input Queued Switch

Lecture 28 - Banyan Network, Delta Network

Lecture 29 - Shufflenet as Delta network

Lecture 30 - Performance analysis of crossbar and delta network

Lecture 31 - Properties of Delta Network

Lecture 32 - Buffered and Unbuffered Delta network

Lecture 33 - Analysis of Buffered Delta Network - 1 of 3

Lecture 34 - Analysis of Buffered Delta Network - 2 of 3

Lecture 35 - Analysis of Buffered Delta Network - 3 of 3

NPTEL : NOC:An Introduction to Information Theory (Electronics and Communication Engineering)

Co-ordinators : Dr. Adrish Banerjee

Lecture 1 - Introduction

Lecture 2 - Measure of Information

Lecture 3 - Information Inequalities

Lecture 4 - Problem solving session - I

Lecture 5 - Block to Variable Length Coding - I : Prefix-free code

Lecture 6 - Block to Variable Length Coding - II : Bounds on Optimal Code Length

Lecture 7 - Block to Variable Length Coding - III : Huffman Coding

Lecture 8 - Variable to block length coding

Lecture 9 - The asymptotic equipartition property

Lecture 10 - Block to block coding of DMS

Lecture 11 - Problem solving session - II

Lecture 12 - Universal Source Coding - I : Lempel-Ziv Algorithm-LZ77

Lecture 13 - Universal source coding - II : Lempel-Ziv Welch Algorithm (LZW)

Lecture 14 - Coding of sources with memory

Lecture 15 - Channel Capacity

Lecture 16 - Joint typical sequences

Lecture 17 - Noisy channel coding theorem

Lecture 18 - Differential entropy

Lecture 19 - Gaussian channel

Lecture 20 - Parallel Gaussian channel

Lecture 21 - Problem solving session - III

Lecture 22 - Rate distortion theory

Lecture 23 - Blahut-Arimoto Algorithm

Lecture 24 - Problem solving session - IV

NPTEL : NOC:5G Wireless Standard Design (Electronics and Communication Engineering)

Co-ordinators : Prof. Rohit Budhiraja

Lecture 1 - Course Introduction

Lecture 2 - Key 5G Technologies - Adaptive Modulation and Coding (AMC)

Lecture 3 - Key 5G Technologies - Hybrid automatic repeat request (HARQ)

Lecture 4 - Key 5G Technologies - Orthogonal frequency division multiplexing (OFDM)

Lecture 5 - 5G Numerology

Lecture 6 - 5G frame structure

Lecture 7 - 5G physical downlink shared channel (PDSCH) transmit chain- CRC generation

Lecture 8 - 5G PDSCH transmit chain - code block segmentation â€“ Part I

Lecture 9 - 5G PDSCH transmit chain - LDPC coding

Lecture 10 - 5G PDSCH transmit chain - code block segmentation â€“ Part II

Lecture 11 - 5G PDSCH transmit chain - rate matching â€“ Part I

Lecture 12 - 5G PDSCH transmit chain - rate matching â€“ Part II

Lecture 13 - 5G PDSCH transmit chain - interleaving and concatenation

Lecture 14 - 5G PDSCH transmit chain - scrambling and modulation

Lecture 15 - 5G PDSCH transmit chain - recap

Lecture 16 - 5G PDSCH receive chain - Part I

Lecture 17 - 5G PDSCH receive chain - Part II

Lecture 18 - 5G PDSCH - map receiver design - Part I

Lecture 19 - 5G PDSCH - map receiver design - Part II

Lecture 20 - 5G baseband - RF conversion

Lecture 21 - Indigenous 5G network architecture

Lecture 22 - 5G physical downlink control channel (PDCCH) transmit chain - introduction

Lecture 23 - 5G PDCCH transmit chain - CRC and segmentation

Lecture 24 - 5G PDCCH transmit chain - Polar encoding

Lecture 25 - 5G PDCCH transmit chain - CRC interleaver

Lecture 26 - 5G PDCCH transmit chain - sub-block interleaver

Lecture 27 - 5G PDCCH transmit chain - rate matching

Lecture 28 - 5G PDCCH transmit chain - control resource set (CORESET) design â€“ Part I

Lecture 29 - 5G PDCCH transmit chain - CORESET design â€“ Part II

Lecture 30 - 5G PDCCH transmit chain - CORESET design â€“ Part III

Lecture 31 - 5G PDCCH transmit chain - CORESET design â€“ Part IV

Lecture 32 - 5G physical uplink control channel (PUCCH) - Part I

Lecture 33 - 5G physical uplink control channel (PUCCH) - Part II

Lecture 34 - Multiple input multiple output (MIMO) transceiver chain - Part I

Lecture 35 - MIMO transceiver chain - Part II

Lecture 36 - MIMO transceiver chain - Part III

Lecture 37 - MIMO transceiver chain - Part IV

Lecture 38 - MIMO transceiver chain - Part V

Lecture 39 - MIMO transceiver chain - Part VI

Lecture 40 - MIMO transceiver chain - Part VII

Lecture 41 - 5G demodulation reference signal (DM-RS) design - Part I

Lecture 42 - 5G DM-RS design - Part II

Lecture 43 - 5G DM-RS design - Part III

Lecture 44 - 5G DM-RS design - Part IV

Lecture 45 - 5G sounding reference signal (SRS) design - Part I

Lecture 46 - 5G SRS design - Part II

Lecture 47 - 5G SRS design - Part III

Lecture 48 - 5G SRS design - Part IV

Lecture 49 - 5G SRS design - Part V

Lecture 50 - 5G channel state estimation reference signal (CSI-RS) - Part I

Lecture 51 - 5G CSI-RS - Part II

Lecture 52 - 5G MIMO transceiver chain - Part I

Lecture 53 - 5G MIMO transceiver chain - Part II

Lecture 54 - 5G MIMO codebook design - Part I

Lecture 55 - 5G MIMO codebook design - Part II

Lecture 56

Lecture 57

Lecture 58

Lecture 59

Lecture 60

NPTEL : Adaptive Signal Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. Mrityunjoy Chakraborty

Lecture 1 - Introduction to Adaptive Filters

Lecture 2 - Introduction to Stochastic Processes

Lecture 3 - Stochastic Processes

Lecture 4 - Correlation Structure

Lecture 5 - FIR Wiener Filter (Real)

Lecture 6 - Steepest Descent Technique

Lecture 7 - LMS Algorithm

Lecture 8 - Convergence Analysis

Lecture 9 - Convergence Analysis (Mean Square)

Lecture 10 - Convergence Analysis (Mean Square)

Lecture 11 - Misadjustment and Excess MSE

Lecture 12 - Misadjustment and Excess MSE

Lecture 13 - Sign LMS Algorithm

Lecture 14 - Block LMS Algorithm

Lecture 15 - Fast Implementation of Block LMS Algorithm

Lecture 16 - Fast Implementation of Block LMS Algorithm

Lecture 17 - Vector Space Treatment to Random Variables

Lecture 18 - Vector Space Treatment to Random Variables

Lecture 19 - Orthogonalization and Orthogonal Projection

Lecture 20 - Orthogonal Decomposition of Signal Subspaces

Lecture 21 - Introduction to Linear Prediction

Lecture 22 - Lattice Filter

Lecture 23 - Lattice Recursions

Lecture 24 - Lattice as Optimal Filter

Lecture 25 - Linear Prediction and Autoregressive Modeling

Lecture 26 - Gradient Adaptive Lattice

Lecture 27 - Gradient Adaptive Lattice

Lecture 28 - Introduction to Recursive Least Squares

Lecture 29 - RLS Approach to Adaptive Filters

Lecture 30 - RLS Adaptive Lattice

Lecture 31 - RLS Lattice Recursions

Lecture 32 - RLS Lattice Recursions

Lecture 33 - RLS Lattice Algorithm

Lecture 34 - RLS Using QR Decomposition

Lecture 35 - Givens Rotation

Lecture 36 - Givens Rotation and QR Decomposition

Lecture 37 - Systolic Implementation

Lecture 38 - Systolic Implementation

Lecture 39 - Singular Value Decomposition

Lecture 40 - Singular Value Decomposition

Lecture 41 - Singular Value Decomposition

NPTEL : Digital Computer Organization (Electronics and Communication Engineering)

Co-ordinators : Prof. P.K. Biswas

Lecture 1 - Introduction to Digital Computer Organization

Lecture 2 - CPU Design - I

Lecture 3 - CPU Design - II

Lecture 4 - CPU Design Tirning and Control

Lecture 5 - Micro programmed Control - I

Lecture 6 - Micro programmed Control - II

Lecture 7 - Pipeline Concept - I

Lecture 8 - Pipeline Concept - II

Lecture 9 - Pipeline Concept - III

Lecture 10 - Pipeline CPU - I

Lecture 11 - Pipeline CPU - II

Lecture 12 - Pipeline CPU - III

Lecture 13 - Memory Organization - I

Lecture 14 - Memory Organization - II

Lecture 15 - Memory Organization - III

Lecture 16 - Memory Organization - IV

Lecture 17 - Memory Organization - V

Lecture 18 - Cache Memory Architecture

Lecture 19 - Cache Memory Architecture RAM Architecture

Lecture 20 - RAM Architecture

Lecture 21 - DAM Architecture-1

Lecture 22 - DAM Architecture Buffer Cache

Lecture 23 - Buffer Cache

Lecture 24 - Secondary Storage Organization - I

Lecture 25 - Secondary Storage Organization - II

Lecture 26 - Secondary Storage Organization - III

Lecture 27 - I/O Subsystem Organization

Lecture 28 - Error Detection and Correction

NPTEL : Digital Image Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. P.K. Biswas

Lecture 1 - Introduction

Lecture 2 - Image Digitization - I

Lecture 3 - Image Digitization - II

Lecture 4 - Pixels Relationships - I

Lecture 5 - Pixels Relationships - II

Lecture 6 - Basic Transformations

Lecture 7 - Camera Model and Imaging Geometry

Lecture 8 - Camera Calibration and Stereo Imaging

Lecture 9 - Interpolation and Resampling

Lecture 10 - Image Interpolation - II

Lecture 11 - Image Interpolation - I

Lecture 12 - Image Transformation - II

Lecture 13 - Fourier Transformation - I

Lecture 14 - Fourier Transformation - II

Lecture 15 - Discrete Cosine Transform

Lecture 16 - K-L Transform

Lecture 17 - Image Enhancement

Lecture 18 - Image Enhancement

Lecture 19 - Image Enhancement

Lecture 20 - Image Enhancement

Lecture 21 - Image Enhancement Frequency

Lecture 22 - Image Restoration - I

Lecture 23 - Image Restoration - II

Lecture 24 - Image Restoration - III

Lecture 25 - Image Registration

Lecture 26 - Colour Image Processing - I

Lecture 27 - Colour Image Processing - II

Lecture 28 - Colour Image Processing - III

Lecture 29 - Image Segmentation - I

Lecture 30 - Image Segmentation - II

Lecture 31 - Image Segmentation - III

Lecture 32 - Image Segmentation - IV

Lecture 33 - Mathematical Morphology - I

Lecture 34 - Mathematical Morphology - II

Lecture 35 - Mathematical Morphology - III

Lecture 36 - Mathematical Morphology - IV

Lecture 37 - Object Representation and Description - I

Lecture 38 - Object Representation and Description - II

Lecture 39 - Object Representation and Description - III

Lecture 40 - Object Recognition

NPTEL : Digital Systems Design (Electronics and Communication Engineering)

Co-ordinators : Prof. D. Roychoudhury

Lecture 1 - Introduction to Digital Systems Design

Lecture 2 - Introduction

Lecture 3 - Digital Logic - I

Lecture 4 - Digital Logic - II

Lecture 5 - Digital Logic - III

Lecture 6 - Boolean Algebra

Lecture 7 - Boolean Algebra

Lecture 8 - Boolean Function Minimization

Lecture 9 - Boolean Function Minimization

Lecture 10 - Boolean Function Minimization

Lecture 11 - Hazzard Covers by K - Map

Lecture 12 - Combinational Circuit Design

Lecture 13 - Design of ADDER Circuits

Lecture 14 - Design of Subtractor Circuits

Lecture 15 - Digital of Common Digital Elements

Lecture 16 - Design of Complex Combinational Circuits

Lecture 17 - Design of Combinational Circuits

Lecture 18 - Combinational Logic Problem Design

Lecture 19 - Combinational Logic Design

Lecture 20 - Logic Design with PLA

Lecture 21 - Synchronous Sequential Circuit Design

Lecture 22 - Design of Sequential Modules

Lecture 23 - Design of Registers and Counter

Lecture 24 - Finite State Machine Design

Lecture 25 - Finite State Machine Design and Optimization

Lecture 26 - Programmable Logic Devices

Lecture 27 - Programmable Logic Devices

Lecture 28 - Programmable Logic Devices

Lecture 29 - Design of Arithmetic Circuits

Lecture 30 - Design of Arithmetic Circuits

Lecture 31 - Design of Memory Circuits

Lecture 32 - Algorithmic State Machines Chart

Lecture 33 - Design of Computer Instruction Set and the CPU

Lecture 34 - Design of Computer Instruction Set and the CPU

Lecture 35 - Design of Computer Instruction Set and the CPU

Lecture 36 - Design of Computer Instruction Set and the CPU

Lecture 37 - Design of Computer Instruction Set and the CPU

Lecture 38 - Design of Computer Instruction Set and the CPU

Lecture 39 - Design of a Micro Programmed CPU

Lecture 40 - Digital System Design Current State of the Art

NPTEL : Digital Voice and Picture Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. Somnath Sengupta

Lecture 1 - Introduction

Lecture 2 - Speech Production Model

Lecture 3 - Speech Coding : Objectives and Requirements

Lecture 4 - Quantizers for Speech Signal

Lecture 5 - mew - Law and Optimum Quantizer

Lecture 6 - Adaptive Quantizer

Lecture 7 - Differential Quantization

Lecture 8 - LDM and ADM

Lecture 9 - Differential PCM and Adaptive Prediction

Lecture 10 - Linear Prediction of Speech

Lecture 11 - Computational Aspects of LPC parameters

Lecture 12 - Cholesky Decomposition

Lecture 13 - Lattice Formulation of LPC Coefficient

Lecture 14 - Linear Predictive Synthesizer

Lecture 15 - LPC Vocoder

Lecture 16 - Introduction to Image and Video Coding

Lecture 17 - Lossy Image Compression : DCT

Lecture 18 - DCT Quantization and Limitations

Lecture 19 - Theory of Wavelets

Lecture 20 - Discrete Wavelet Transforms

Lecture 21 - DWT on the Images and its Encoding

Lecture 22 - Embedded Zero Tree Wavelet Encoding

Lecture 23 - Video Coding : Basic Building Blocks

Lecture 24 - Motion Estimate Techniques

Lecture 25 - Fast Motion Estimation Techniques

Lecture 26 - Video Coding Standards

Lecture 27 - Advanced Coding Aspects

Lecture 28 - Audio Coding: Basic Concepts

Lecture 29 - Audio Coding AC - 3

Lecture 30 - AC -3 Decoder

Lecture 31 - MPEG - 1 Audio Coding

Lecture 32 - Introduction to VoIP

Lecture 33 - VoIP Signaling : H.323 Protocol

Lecture 34 - H.323 Call Controls and Enhancements

Lecture 35 - Interworking with PSTN Limitations and Solution

Lecture 36 - Multiplexing Schemes

Lecture 37 - H.323:Multiplexing:Header Compression and BW

Lecture 38 - ISDN Video Conferencing

Lecture 39 - Video Conferencing : SIP Protocol

Lecture 40 - 4G Multimedia Conferencing

NPTEL : MEMS and Microsystems (Electronics and Communication Engineering)

Co-ordinators : Prof. Santiram Kal

Lecture 1 - Introduction to MEMS & Microsystems

Lecture 2 - Introduction to Microsensors

Lecture 3 - Evaluation of MEMS, Microsensors, Market Survey

Lecture 4 - Application of MEMS

Lecture 5 - MEMS Materials

Lecture 6 - MEMS Materials Properties

Lecture 7 - MEMS Materials Properties (Continued...)

Lecture 8 - Microelectronic Technology for MEMS - II

Lecture 9 - Microelectronic Technology for MEMS - III

Lecture 10 - Micromachining Technology for MEMS

Lecture 11 - Micromachining Process

Lecture 12 - Etch Stop Techniques and Microstructure

Lecture 13 - Surface and Quartz Micromachining

Lecture 14 - Fabrication of Micromachined Microstructure

Lecture 15 - Microstereolithography

Lecture 16 - MEMS Microsensors Thermal

Lecture 17 - Micromachined Microsensors Mechanical

Lecture 18 - MEMS Pressure and Flow Sensor

Lecture 19 - Micromachined Flow Sensors

Lecture 20 - MEMS Inertial Sensors

Lecture 21 - Micromachined Microaccelerometers for MEMS

Lecture 22 - MEMS Accelerometers for Avionics

Lecture 23 - Temperature Drift and Damping Analysis

Lecture 24 - Piezoresistive Accelerometer Technology

Lecture 25 - MEMS Capacitive Accelerometer

Lecture 26 - MEMS Capacitive Accelerometer Process

Lecture 27 - MEMS Gyro Sensor

Lecture 28 - MEMS for Space Application

Lecture 29 - Polymer MEMS & Carbon Nano Tubes CNT

Lecture 30 - Wafer Bonding & Packaging of MEMS

Lecture 31 - Interface Electronics for MEMS

Lecture 32 - MEMS for Biomedical Applications (Bio-MEMS)

NPTEL : Neural Networks and Applications (Electronics and Communication Engineering)

Co-ordinators : Prof. Somnath Sengupta

Lecture 1 - Introduction to Artificial Neural Networks

Lecture 2 - Artificial Neuron Model and Linear Regression

Lecture 3 - Gradient Descent Algorithm

Lecture 4 - Nonlinear Activation Units and Learning Mechanisms

Lecture 5 - Learning Mechanisms-Hebbian, Competitive, Boltzmann

Lecture 6 - Associative memory

Lecture 7 - Associative Memory Model

Lecture 8 - Condition for Perfect Recall in Associative Memory

Lecture 9 - Statistical Aspects of Learning

Lecture 10 - V.C. Dimensions: Typical Examples

Lecture 11 - Importance of V.C. Dimensions Structural Risk Minimization

Lecture 12 - Single-Layer Perceptions

Lecture 13 - Unconstrained Optimization: Gauss-Newton's Method

Lecture 14 - Linear Least Squares Filters

Lecture 15 - Least Mean Squares Algorithm

Lecture 16 - Perceptron Convergence Theorem

Lecture 17 - Bayes Classifier & Perceptron: An Analogy

Lecture 18 - Bayes Classifier for Gaussian Distribution

Lecture 19 - Back Propagation Algorithm

Lecture 20 - Practical Consideration in Back Propagation Algorithm

Lecture 21 - Solution of Non-Linearly Separable Problems Using MLP

Lecture 22 - Heuristics For Back-Propagation

Lecture 23 - Multi-Class Classification Using Multi-layered Perceptrons

Lecture 24 - Radial Basis Function Networks: Cover's Theorem

Lecture 25 - Radial Basis Function Networks: Separability & Interpolation

Lecture 26 - Posed Surface Reconstruction

Lecture 27 - Solution of Regularization Equation: Greens Function

Lecture 28 - Use of Greens Function in Regularization Networks

Lecture 29 - Regularization Networks and Generalized RBF

Lecture 30 - Comparison Between MLP and RBF

Lecture 31 - Learning Mechanisms in RBF

Lecture 32 - Introduction to Principal Components and Analysis

Lecture 33 - Dimensionality reduction Using PCA

Lecture 34 - Hebbian-Based Principal Component Analysis

Lecture 35 - Introduction to Self Organizing Maps

Lecture 36 - Cooperative and Adaptive Processes in SOM

Lecture 37 - Vector-Quantization Using SOM

NPTEL : Probability and Random Processes (Electronics and Communication Engineering)

Co-ordinators : Prof. Mrityunjoy Chakraborty

Lecture 1 - Introduction to the Theory of Probability

Lecture 2 - Axioms of Probability

Lecture 3 - Axioms of Probability (Continued.)

Lecture 4 - Introduction to Random Variables

Lecture 5 - Probability Distributions and Density Functions

Lecture 6 - Conditional Distribution and Density Functions

Lecture 7 - Function of a Random Variable

Lecture 8 - Function of a Random Variable (Continued.)

Lecture 9 - Mean and Variance of a Random Variable

Lecture 10 - Moments

Lecture 11 - Characteristic Function

Lecture 12 - Two Random Variables

Lecture 13 - Function of Two Random Variables

Lecture 14 - Function of Two Random Variables (Continued.)

Lecture 15 - Correlation Covariance and Related Innver

Lecture 16 - Vector Space of Random Variables

Lecture 17 - Joint Moments

Lecture 18 - Joint Characteristic Functions

Lecture 19 - Joint Conditional Densities

Lecture 20 - Joint Conditional Densities (Continued.)

Lecture 21 - Sequences of Random Variables

Lecture 22 - Sequences of Random Variables (Continued.)

Lecture 23 - Correlation Matrices and their Properties

Lecture 24 - Correlation Matrices and their Properties

Lecture 25 - Conditional Densities of Random Vectors

Lecture 26 - Characteristic Functions and Normality

Lecture 27 - Tchebycheff Inequality and Estimation of an Unknown Parameter

Lecture 28 - Central Limit Theorem

Lecture 29 - Introduction to Stochastic Process

Lecture 30 - Stationary Processes

Lecture 31 - Cyclostationary Processes

Lecture 32 - System with Random Process at Input

Lecture 33 - Ergodic Processes

Lecture 34 - Introduction to Spectral Analysis

Lecture 35 - Spectral Analysis (Continued.)

Lecture 36 - Spectrum Estimation - Non Parametric Methods

Lecture 37 - Spectrum Estimation - Parametric Methods

Lecture 38 - Autoregressive Modeling and Linear Prediction

Lecture 39 - Linear Mean Square Estimation - Wiener (FIR)

Lecture 40 - Adaptive Filtering - LMS Algorithm

NPTEL : Pattern Recognition and Application (Electronics and Communication Engineering)

Co-ordinators : Prof. P.K. Biswas

Lecture 1 - Introduction

Lecture 2 - Feature Extraction - I

Lecture 3 - Feature Extraction - II

Lecture 4 - Feature Extraction - III

Lecture 5 - Bayes Decision Theory

Lecture 6 - Bayes Decision Theory (Continued.)

Lecture 7 - Normal Density and Discriminant Function

Lecture 8 - Normal Density and Discriminant Function (Continued.)

Lecture 9 - Bayes Decision Theory - Binary Features

Lecture 10 - Maximum Likelihood Estimation

Lecture 11 - Probability Density Estimation

Lecture 12 - Probability Density Estimation (Continued.)

Lecture 13 - Probability Density Estimation (Continued.)

Lecture 14 - Probability Density Estimation (Continued.)

Lecture 15 - Probability Density Estimation (Continued.)

Lecture 16 - Dimensionality Problem

Lecture 17 - Multiple Discriminant Analysis

Lecture 18 - Multiple Discriminant Analysis (Tutorial)

Lecture 19 - Multiple Discriminant Analysis (Tutorial)

Lecture 20 - Perceptron Criterion

Lecture 21 - Perceptron Criterion (Continued.)

Lecture 22 - MSE Criterion

Lecture 23 - Linear Discriminator (Tutorial)

Lecture 24 - Neural Networks for Pattern Recognition

Lecture 25 - Neural Networks for Pattern Recognition (Continued.)

Lecture 26 - Neural Networks for Pattern Recognition (Continued.)

Lecture 27 - RBF Neural Network

Lecture 28 - RBF Neural Network (Continued.)

Lecture 29 - Support Vector Machine

Lecture 30 - Hyperbox Classifier

Lecture 31 - Hyperbox Classifier (Continued.)

Lecture 32 - Fuzzy Min Max Neural Network for Pattern Recognition

Lecture 33 - Reflex Fuzzy Min Max Neural Network

Lecture 34 - Unsupervised Learning - Clustering

Lecture 35 - Clustering (Continued.)

Lecture 36 - Clustering using minimal spanning tree

Lecture 37 - Temporal Pattern recognition

Lecture 38 - Hidden Markov Model

Lecture 39 - Hidden Markov Model (Continued.)

Lecture 40 - Hidden Markov Model (Continued.)

NPTEL : NOC:Basic Tools of Microwave Engineering (Electronics and Communication Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

Lecture 1 - Challenges of Microwave Design

Lecture 2 - Introduction to the 1st tool : Smith Chart

Lecture 3 - Measurement of Unknown Impedance

Lecture 4 - Application of Smith Chart for finding unknown impedance in laboratory

Lecture 5 - Problem Solving using Smith Chart

Lecture 6 - Need of Impedance Matching at Microwave Frequency

Lecture 7 - Lumped Element Based Impedance Matching Network Design by Smith Chart

Lecture 8 - Distributed Impedance Matching Design by Smith Chart

Lecture 9 - Broadband Impedance Matching Network Design

Lecture 10 - Tutorial 2: Impedance Matching Network Design by Smith Chart

Lecture 11 - Voltage and Current at Microwave Frequency

Lecture 12 - Scattering Parameter : the Second Tool

Lecture 13 - Properties of Scattering Parameter

Lecture 14 - Network Analyser

Lecture 15 - Tutorial 3: Problem Solving on Equivalent Voltage and Current in Waveguide and on scattering parameters

Lecture 16 - Radiation between S-Parameters and Transmission Parameters

Lecture 17 - Scattering Parameters of Coupler and Magic Tee

Lecture 18 - Signal Flow Graph

Lecture 19 - Understanding Network Analyser Calibration with the help of Signal Flow Graph

Lecture 20 - Tutorial 4: Problem Solving Related to S-Parameters and Signal Flow Graph

NPTEL : NOC:Basic Building Blocks of Microwave Engineering (Electronics and Communication Engineering)

Co-ordinators : Dr. Amitabha Bhattacharya

Lecture 1 - Concept of Mode

Lecture 2 - Mathematical Model of Modes

Lecture 3 - Mathematical Model of TEM Mode

Lecture 4 - Mathematical Model of TE and TM Mode and Impedance Concept

Lecture 5 - Losses Associated with Microwave Transmission

Lecture 6 - Coaxial Line

Lecture 7 - Rectangular Waveguide

Lecture 8 - Circular Waveguide

Lecture 9 - Planar Transmission Line

Lecture 10 - Coaxial Connectors

Lecture 11 - 3 Port Microwave Power Divider/Combiner - Part I

Lecture 12 - 3 Port Microwave Power Divider/Combiner - Part II

Lecture 13 - 4 Port Microwave Power Divider/Combiner

Lecture 14 - Microwave Resonator

Lecture 15 - Microwave Attenuuators

Lecture 16 - Microwave Detector and Switching Diodes

Lecture 17 - Microwave Tubes : Part I Edit Lesson

Lecture 18 - Microwave Tubes : Part II and Amplifiers

Lecture 19 - Microwave Solid State Diode Oscillator and Amplifier

Lecture 20 - Microwave Transistors

NPTEL : NOC:Satellite Communication Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. Kalyankumar Bandyopadhyay

Lecture 1 - Introduction

Lecture 2 - Orbit - 1

Lecture 3 - Orbit - 2

Lecture 4 - Orbit - 3

Lecture 5 - Orbit - 4

Lecture 6 - Space Segment - 1

Lecture 7 - Space Segment - 2

Lecture 8 - Space Segment - 3

Lecture 9 - Space Segment - 4

Lecture 10 - Space Segment - 5

Lecture 11 - Link Budget - 1

Lecture 12 - Link Budget - 2

Lecture 13 - Link Budget - 3

Lecture 14 - Link Budget - 4

Lecture 15 - Link Budget - 5

Lecture 16 - Link Budget - 6

Lecture 17 - Link Budget - 7

Lecture 18 - Link Budget - 8

Lecture 19 - Propagation - 1

Lecture 20 - Propagation - 2

Lecture 21 - Propagation - 3

Lecture 22 - Ground Segment - 1

Lecture 23 - Ground Segment - 2

Lecture 24 - Ground Segment - 3

Lecture 25 - Ground Segment - 4

Lecture 26 - Multiple Access - 1

Lecture 27 - Multiple Access - 2

Lecture 28 - Multiple Access - 3

Lecture 29 - Multiple Access - 4

Lecture 30 - Multiple Access - 5

Lecture 31 - Nonlinearity - I

Lecture 32 - Nonlinearity - II

Lecture 33 - Nonlinearity - III

Lecture 34 - Synchronisation - I

Lecture 35 - Synchronisation - II

Lecture 36 - Effect on Higher Layer - I

Lecture 37 - Effect on Higher Layer - II

Lecture 38 - Effect on Higher Layer - III

Lecture 39 - Satellite Navigation - I

Lecture 40 - Satellite Navigation - II

NPTEL : NOC:Fundamentals of MIMO Wireless Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. Suvra Sekhar Das

Lecture 1 - Evolution of Wireless Communication Systems 1G - 5G

Lecture 2 - Elements of Wireless Communication System

Lecture 3 - Overview of MIMO Communication Systems

Lecture 4 - Layered View of Transmitter and Receiver : Introduction to the Channel

Lecture 5 - Wireless Channel Models - I

Lecture 6 - Large Scale Propagation Models Path Loss

Lecture 7 - Large Scale Propagation Models Path Loss and Shadowing

Lecture 8 - Small Scale Propagation Multipath Model

Lecture 9 - Small Scale Propagation Frequency Flat Fading

Lecture 10 - Small Scale Propagation Envelope Distribution

Lecture 11 - Small Scale Propagation Received Signal Correlation

Lecture 12 - Small Scale Propagation Received Signal Correlation (Continued...)

Lecture 13 - Coherence Time

Lecture 14 - Doppler Spectrum

Lecture 15 - Frequency Selective Fading

Lecture 16 - Frequency Selective Fading - II

Lecture 17 - FSF-Coherence Bandwidth, Delay Doppeler Characteristics

Lecture 18 - Spatial Channel Characteristics - I

Lecture 19 - Expression of MIMO Channel

Lecture 20 - MIMO Channel Characteristics

Lecture 21 - Statistical Properties of H

Lecture 22 - Important Results from Linear Algebra

Lecture 23 - Spatial Diversity

Lecture 24 - Selection Combining

Lecture 25 - Maximal Ratio Combining

Lecture 26 - Problem of Error in MRC

Lecture 27 - Diversity Gain and Transmit MRC

Lecture 28 - Transmit Diversity without Channel known at Tx

Lecture 29 - MIMO Transmit Diversity - 1

Lecture 30 - MIMO Diversity - 2

Lecture 31 - Fundamentals of Information Theory - I

Lecture 32 - Fundamentals of Information Theory - II

Lecture 33 - Fundamentals of Information Theory - III

Lecture 34 - Fundamentals of Information Theory - IV

Lecture 35 - Capacity of Deterministic MIMO Channels

Lecture 36 - Capacity of Channel Unknown at Transmitter

Lecture 37 - Capacity of Channel Known of Transmitter

Lecture 38 - More on MIMO Channel Capacity

Lecture 39 - Capacity of Random Channel

Lecture 40 - MIMO in Practice

NPTEL : NOC:Audio System Engineering (Electronics and Communication Engineering)

Co-ordinators : Prof. S. Dasmandal

Lecture 1 - Introduction

Lecture 2 - Fundamentals of Linear Vibrations Edit Lesson

Lecture 3 - Damped Oscillation and Forced Oscillation

Lecture 4 - Equivalent Electrical Circuits for Oscillation

Lecture 5 - Tutorial I

Lecture 6 - Acoustic Wave Equation

Lecture 7 - Acoustic Wave Equation (Continued...)

Lecture 8 - Acoustic Wave Equation (Continued...)

Lecture 9 - Spherical Waves Propagation

Lecture 10 - Perception at Sound

Lecture 11 - Sound Transmission

Lecture 12 - Sound Transmission (Continued...)

Lecture 13 - The Acoustic Environment

Lecture 14 - Room Acoustics - I

Lecture 15 - Room Acoustics - II

Lecture 16 - Large Room Acoustics and Small Room Acoustics

Lecture 17 - Large Room Acoustics and Small Room Acoustics (Continued...)

Lecture 18 - Auditorium Acoustics

Lecture 19 - Transduction - I

Lecture 20 - Transduction - II

Lecture 21 - Transduction - III

Lecture 22 - Microphone - I

Lecture 23 - Microphone Sensitivity

Lecture 24 - Loudspeaker

NPTEL : NOC:Discrete Time Signal Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. Mrityunjoy Chakraborty

Lecture 1 - Introduction

Lecture 2 - Discrete Time Signals and Systems

Lecture 3 - Linear, Shift Invariant Systems

Lecture 4 - Properties of Discrete Convolution Causal and Stable Systems

Lecture 5 - Graphical Evaluation of Discrete Convolutions

Lecture 6 - Discrete Time Fourier Transform

Lecture 7 - Properties of DTFT

Lecture 8 - Dirac Comb and Sampling Analog Signals

Lecture 9 - Relation between DTFT and Analog Fourier Transform

Lecture 10 - Nyquist Interpolation Formula

Lecture 11 - Rational Systems

Lecture 12 - Properties of Rational Systems

Lecture 13 - Introduction to Z-transform

Lecture 14 - Properties of Z-transform

Lecture 15 - Properties of z-transform

Lecture 16 - Inverse z-transform

Lecture 17 - Introduction to DFT

Lecture 18 - Properties of DFT

Lecture 19 - Introduction to Interpretation of Circular Convolution

Lecture 20 - Graphically Interpretation of Circular Convolution

Lecture 21 - Zero Padding and Linear convolution Via DFT

Lecture 22 - Decimation and DFT of Decimated Sequences

Lecture 23 - Expension and Interpolation of Sequences

Lecture 24 - Factor-of-M Polyphase Decomposition of Sequences

Lecture 25 - Nobel Identifies

Lecture 26 - Efficient Decimator and Interpolator Structure

Lecture 27 - Linear Phase Filters

Lecture 28 - Properties of Linear Phase Filters

Lecture 29 - Structures for IIR Filters

Lecture 30 - Structures for FIR Filters

Lecture 31 - Analog LTI Systems, Fourier and Laplace Transforms

Lecture 32 - Pole, Zero and Stability of of Analog Filters

Lecture 33 - Analog Filter Design Example Butterworth Lowpass Filter

Lecture 34 - IIR Filter Design by Implus Invariance Method

Lecture 35 - Design Filter Design from Analog Proptotype Filters by s-z Transformations

Lecture 36 - Bilinear Transformation

Lecture 37 - FIR Filter Design by Window

Lecture 38 - FFT: Decimation in Time

Lecture 39 - Complexity Analysis of FFT

Lecture 40 - Bit Reversal and FFT

NPTEL : NOC:Digital Image Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. P.K. Biswas

Lecture 1 - Introduction to Digital Image Processing

Lecture 2 - Application of Digital Image Processing

Lecture 3 - Image Digitalization, Sampling Quantization and Display

Lecture 4 - Signal Reconstruction from Samples: Convolution Concept

Lecture 5 - Signal Reconstruction from Image

Lecture 6 - Quantizer Design

Lecture 7 - Relationship between Pixels

Lecture 8 - Relationship of Adjacency and Connected Components Labeling

Lecture 9 - Application of Distance Measures

Lecture 10 - Basic Transform

Lecture 11 - Image Formation - I

Lecture 12 - Image Formation - II

Lecture 13 - Image Geometry - I

Lecture 14 - Image Geometry - II

Lecture 15 - Stereo Imaging Model - II

Lecture 16 - Interpolation and Resampling

Lecture 17 - Interpolation Techniques

Lecture 18 - Interpolation with examples - I

Lecture 19 - Interpolation with Examples - II

Lecture 20 - Image Transformation - I Edit Lesson

Lecture 21 - Image Transformation - 2

Lecture 22 - Separable Transformation

Lecture 23 - Basis Images

Lecture 24 - Fourier Transformation

Lecture 25 - Properties of FT

Lecture 26 - FT Result Display - 2

Lecture 27 - Rotation Invariance Property

Lecture 28 - DCT and Walsh Transform

Lecture 29 - Handmard Transformation

Lecture 30 - Histogram Equalization and Specifications - I

Lecture 31 - KL-transform-2

Lecture 32 - Image Enhancement: Point Processing Techniques

Lecture 33 - Contrast Stretching Operation

Lecture 34 - Histogram Equalization and Specification - I

Lecture 35 - Histogram Equalization and Specification - II

Lecture 36 - Histogram Implementation - I

Lecture 37 - Histogram Implementation - II

Lecture 38 - Image Enhancement : Mask Processing Techniques - I

Lecture 39 - Image Enhancement : Mask Processing Techniques - II

Lecture 40 - Image Enhancement : Mask Processing Techniques - III

Lecture 41 - Frequency Domain Processing Techniques

Lecture 42 - Image Restoration Techniques - I

Lecture 43 - Image Restoration Techniques - II

Lecture 44 - Estimation of Degradation Model and Restoration Techniques - I

Lecture 45 - Estimation of Degradation Model and Restoration Techniques - II

Lecture 46 - Other Restoration Techniques - I

Lecture 47 - Other Restoration Techniques - II

Lecture 48 - Image Registration - I

Lecture 49 - Image Registration - II

Lecture 50 - Colour Image Processing : Colour Fundamentals

Lecture 51 - Colour Model

Lecture 52 - Conversion of one color model to another - I

Lecture 53 - Conversion of one color model to another - II

Lecture 54 - Pseudo color image processing

Lecture 55 - Full color image processing

Lecture 56 - Different Approaches for Image Segmentation

Lecture 57 - Image Segmentation : Global Processing (Hough Transform)

Lecture 58 - Region based Segmentation Operation. Thresholding Techniques

Lecture 59 - Region Splitting and Merging Technique Edit Lesson

NPTEL : NOC:Spread Spectrum Communications and Jamming (Electronics and Communication Engineering)

Co-ordinators : Prof. Debarati Sen

Lecture 1 - Introduction to Spread Spectrum Communication

Lecture 2 - Direct Sequence Spread Spectrum System

Lecture 3 - Performance Analysis of DSSS

Lecture 4 - Concept of Jamming Margin

Lecture 5 - Frequency Hopping Spread Spectrum System

Lecture 6 - Tutorial-1

Lecture 7 - Slow and Fast Frequency Hopping

Lecture 8 - Hybrid Spread Spectrum System and Time Hopped SSS

Lecture 9 - Spread Sequences and Waveforms

Lecture 10 - Generation Mechanism of ML Sequence

Lecture 11 - Properties of Spread Spectrum Sequences

Lecture 12 - Tutorial-2

Lecture 13 - Power Spectral Density of ML Sequence

Lecture 14 - Walsh Hadamard Code and Properties

Lecture 15 - Generation Mechanism and Properties of OVSF and Barker Codes

Lecture 16 - Generation Mechanism and Properties of Gold and Kasami Codes

Lecture 17 - Performance Analysis of DSSS in Presence of Tone Jamming

Lecture 18 - Performance Analysis During Generation Tone Jamming

Lecture 19 - Performance Analysis in Presence of Gaussian Interference

Lecture 20 - Performance Analysis of a Quaternary System

Lecture 21 - Despreading with Matched Filter

Lecture 22 - Noncoherent Systems

Lecture 23 - Tutorial - III

Lecture 24 - Galois Field Mathematics

Lecture 25 - Galois Field Mathematics (Continued...)

Lecture 26 - Galois Field Mathematics (Continued...)

Lecture 27 - Polynomials over Binary Field

Lecture 28 - Long Nonlinear Sequence Generation

Lecture 29 - Rejection of Narrowband Interference

Lecture 30 - Narrow Band Interference Cancellation by Transform Domain Processing

Lecture 31 - PN Code Acquisition Fundamentals

Lecture 32 - Performance Analysis of PN Code Acquisition System - Part I

Lecture 33 - Performance Analysis of PN Code Acquisition System - Part II

Lecture 34 - Tutorial - IV

Lecture 35 - Rapid Acquisition Using Matched Filter - Part I

Lecture 36 - Rapid Acquisition Using Matched Filter - Part II

Lecture 37 - Active Search Acquisition for FFH/MFSK Signals

Lecture 38 - Active Search Code Acquisiton for FFH/MFSK Analysis

Lecture 39 - Detection Probability Analysis of Code Acquisition for FFH / MFSK

Lecture 40 - Tutorial - V

Lecture 41 - DSSS Tracking

Lecture 42 - FHSS Synchronization Method - I

Lecture 43 - FHSS Synchronization Method - II

Lecture 44 - FHSS Synchronization Method - III

Lecture 45 - FHSS Tracking

Lecture 46 - Tutorial - VI

Lecture 47 - Concept of Fading for Wireless Communications

Lecture 48 - Diversity for Fading Channels

Lecture 49 - Rake Receiver

Lecture 50 - Performance Analysis of Rake Receiver

Lecture 51 - Spread Spectrum Multiple Access

Lecture 52 - Tutorial - VII

Lecture 53 - Introduction to CDMA

Lecture 54 - Interference Handling Mechanism in CDMA Networks

Lecture 55 - Interference Handling by Soft Handover

Lecture 56 - Interference Handling by Smart Antenna

Lecture 57 - Multiuser Detection and Interference Cancellation

Lecture 58 - Tutorial - VIII

Lecture 59 - Multiuser Detection - Part I

Lecture 60 - Multiuser Detection - Part II

Lecture 61 - MUD - Probability of Error

Lecture 62 - IS95 and CDMA - Part I

Lecture 63 - IS95 and CDMA - Part II

Lecture 64 - Tutorial - IX

Lecture 65 - WCDMA and UMTS - Part I

Lecture 66 - WCDMA and UMTS - Part II

Lecture 67 - LPI Communications

Lecture 68 - Radiometer

Lecture 69 - Interceptor Detectors

NPTEL : NOC:Digital VLSI Testing (Electronics and Communication Engineering)

Co-ordinators : Prof. Santanu Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - DFT

Lecture 6 - DFT (Continued...)

Lecture 7 - DFT (Continued...)

Lecture 8 - DFT (Continued...)

Lecture 9 - DFT (Continued...)

Lecture 10 - DFT (Continued...)

Lecture 11 - Logic and Fault Simulation

Lecture 12 - Logic and Fault Simulation (Continued...)

Lecture 13 - Logic and Fault Simulation (Continued...)

Lecture 14 - Logic and Fault Simulation (Continued...)

Lecture 15 - Logic and Fault Simulation (Continued...)

Lecture 16 - Logic and Fault Simulation (Continued...)

Lecture 17 - Test Generation

Lecture 18 - Test Generation (Continued...)

Lecture 19 - Test Generation (Continued...)

Lecture 20 - Test Generation (Continued...)

Lecture 21 - Test Generation (Continued...)

Lecture 22 - Test Generation (Continued...)

Lecture 23 - Test Generation (Continued...)

Lecture 24 - Logic BIST

Lecture 25 - Logic BIST (Continued...)

Lecture 26 - Logic BIST (Continued...)

Lecture 27 - Logic BIST (Continued...)

Lecture 28 - Test Compression

Lecture 29 - Test Compression (Continued...)

Lecture 30 - Test Compression (Continued...)

Lecture 31 - Test Compression (Continued...)

Lecture 32 - Low Power Testing

Lecture 33 - Low Power Testing (Continued...)

Lecture 34 - Low Power Testing (Continued...)

Lecture 35 - Low Power Testing (Continued...)

Lecture 36 - Low Power Testing (Continued...)

Lecture 37 - Thermal Aware Testing

Lecture 38 - Thermal Aware Testing (Continued...)

Lecture 39 - Thermal Aware Testing (Continued...)

Lecture 40 - Boundary Scan

Lecture 41 - Boundary Scan (Continued...)

Lecture 42 - Boundary Scan (Continued...)

Lecture 43 - Boundary Scan (Continued...)

Lecture 44 - Boundary Scan (Continued...)

Lecture 45 - System/Network - On - Chip Test

Lecture 46 - System/Network - On - Chip Test (Continued...)

Lecture 47 - System/Network - On - Chip Test (Continued...)

Lecture 48 - System/Network - On - Chip Test (Continued...)

Lecture 49 - System/Network - On - Chip Test (Continued...)

Lecture 50 - System/Network - On - Chip Test (Continued...)

Lecture 51 - System/Network - On - Chip Test (Continued...)

Lecture 52 - System/Network - On - Chip Test (Continued...)

Lecture 53 - System/Network - On - Chip Test (Continued...)

Lecture 54 - System/Network - On - Chip Test (Continued...)

Lecture 55 - System/Network - On - Chip Test (Continued...)

Lecture 56 - System/Network - On - Chip Test (Continued...)

Lecture 57 - Memory Testing

Lecture 58 - Memory Testing (Continued...)

Lecture 59 - Memory Testing (Continued...)

Lecture 60 - Memory Testing (Continued...)

NPTEL : NOC:Design Principles of RF and Microwave Filters and Amplifiers (Electronics and Communication Engineering)

Co-ordinators : Prof. Amitabha Bhattacharya

Lecture 1 - Image Impedance based RF filter design

Lecture 2 - Concept of Image impedance and Propagation Constant

Lecture 3 - Symmetrical lossless network description for filter design

Lecture 4 - Constant k prototype filter design

Lecture 5 - m-derived prototype filter design

Lecture 6 - Introduction to Insertion loss based Microwave Filter Design

Lecture 7 - Prototype low pass filter design

Lecture 8 - Filter transformation

Lecture 9 - Microwave Filter implementation

Lecture 10 - Tutorial an Insertion Loss based Microwave Filter design

Lecture 11 - Gain Definitions of Microwave Amplifiers

Lecture 12 - Stability Analysis of Microwave Amplifiers

Lecture 13 - Conditional stability enforcement for Microwave Amplifier

Lecture 14 - Amplifier design of maximising transducer gain

Lecture 15 - Amplifier design for specified gain

Lecture 16 - Amplifier design for specified noise performance

Lecture 17 - Broadband Amplifier Design

Lecture 18 - Quantitative Characterisation of Nonlinearity for Large Signal Amplifier

Lecture 19 - Quantitative Characterisation of Nonlinearity for Large Signal Amplifier (Continued...)

Lecture 20 - Measurement of Nonlinearity

NPTEL : NOC:Millimeter Wave Technology (Electronics and Communication Engineering)

Co-ordinators : Prof. Mrinal Kanti Mandal

Lecture 1 - Introduction to Millimeter-Wave Technology

Lecture 2 - Introduction to Millimeter-Wave Technology (Continued...)

Lecture 3 - Introduction to Millimeter-Wave Technology (Continued...)

Lecture 4 - Introduction to Millimeter-Wave Technology (Continued...)

Lecture 5 - Introduction to Millimeter-Wave Technology (Continued...)

Lecture 6 - Guiding Structures

Lecture 7 - Guiding Structures (Continued...)

Lecture 8 - Guiding Structures (Continued...)

Lecture 9 - Guiding Structures (Continued...)

Lecture 10 - Guiding Structures (Continued...)

Lecture 11 - Guiding Structures (Continued...)

Lecture 12 - Guiding Structures (Continued...)

Lecture 13 - Guiding Structures (Continued...)

Lecture 14 - Guiding Structures (Continued...)

Lecture 15 - Guiding Structures (Continued...)

Lecture 16 - Antennas at MM-Wave Frequencies

Lecture 17 - Antennas at MM-Wave Frequencies (Continued...)

Lecture 18 - Antennas at MM-Wave Frequencies (Continued...)

Lecture 19 - Antennas at MM-Wave Frequencies (Continued...)

Lecture 20 - Antennas at MM-WaveFrequencies (Continued...)

Lecture 21 - Passive Components

Lecture 22 - Passive Components (Continued...)

Lecture 23 - Passive Components (Continued...)

Lecture 24 - Passive Components (Continued...)

Lecture 25 - Passive Components (Continued...)

Lecture 26 - Active Devices

Lecture 27 - Active Devices (Continued...)

Lecture 28 - Active Devices (Continued...)

Lecture 29 - Active Devices (Continued...)

Lecture 30 - Active Devices (Continued...)

Lecture 31 - Noise and Link Budget

Lecture 32 - Noise and Link Budget (Continued...)

Lecture 33 - Noise and Link Budget (Continued...)

Lecture 34 - Noise and Link Budget (Continued...)

Lecture 35 - Noise and Link Budget (Continued...)

Lecture 36 - Millimeter-Wave Systems

Lecture 37 - Millimeter-Wave Systems (Continued...)

Lecture 38 - Millimeter-Wave Systems (Continued...)

Lecture 39 - Millimeter-Wave Systems (Continued...)

Lecture 40 - Millimeter-Wave Systems (Continued...)

NPTEL : NOC:Power System Analysis (Electronics and Communication Engineering)

Co-ordinators : Prof. Debapriya Das

Lecture 1 - Structure of Power Systems and Few other Aspects - I

Lecture 2 - Structure of Power Systems and Few other Aspects - II

Lecture 3 - Structure of Power Systems and Few other Aspects - III

Lecture 4 - Resistance and Inductance

Lecture 5 - Resistance and Inductance (Continued...)

Lecture 6 - Resistance and Inductance (Continued...)

Lecture 7 - Resistance and Inductance (Continued...)

Lecture 8 - Resistance and Inductance (Continued...)

Lecture 9 - Resistance and Inductance (Continued...)

Lecture 10 - Resistance and Inductance (Continued...)

Lecture 11 - Capacitance of Transmisson Lines

Lecture 12 - Capacitance of Transmisson Lines (Continued...)

Lecture 13 - Capacitance of Transmisson Lines (Continued...)

Lecture 14 - Capacitance of Transmisson Lines (Continued...)

Lecture 15 - Power System Components and per-unit system

Lecture 16 - Power System Components and per-unit system (Continued...)

Lecture 17 - Power System Components and per-unit system (Continued...)

Lecture 18 - Power System Components and per-unit system (Continued...)

Lecture 19 - Power System Components and per-unit system (Continued...)

Lecture 20 - Power System Components and per-unit system (Continued...)

Lecture 21 - Characteristic and performance of transmission lines

Lecture 22 - Characteristic and performance of transmission lines (Continued...)

Lecture 23 - Characteristic and performance of transmission lines (Continued...)

Lecture 24 - Characteristic and performance of transmission lines (Continued...)

Lecture 25 - Characteristic and performance of transmission lines (Continued...)

Lecture 26 - Load flow studies

Lecture 27 - Load flow studies (Continued...)

Lecture 28 - Load flow studies (Continued...)

Lecture 29 - Load flow studies (Continued...)

Lecture 30 - Load flow studies (Continued...)

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36 - Load flow studies (Continued...)

Lecture 37 - Optimal system operation

Lecture 38 - Optimal system operation (Continued...)

Lecture 39 - Optimal system operation (Continued...)

Lecture 40 - Optimal system operation (Continued...)

Lecture 41 - Optimal system operation (Continued...)

Lecture 42 - Optimal system operation (Continued...)

Lecture 43 - Optimal system operation (Continued...)

Lecture 44 - Optimal system operation (Continued...)

Lecture 45 - Three phase fault studies

Lecture 46 - Three phase fault studies (Continued...)

Lecture 47 - Three phase fault studies (Continued...)

Lecture 48 - Three phase fault studies (Continued...)

Lecture 49 - Symmetrical components

Lecture 50 - Symmetrical components (Continued...)

Lecture 51 - Symmetrical components (Continued...)

Lecture 52 - Symmetrical components (Continued...)

Lecture 53 - Symmetrical components (Continued...)

Lecture 54 - Symmetrical components (Continued...)

Lecture 55 - Power system stability>

Lecture 56 - Power system stability (Continued...)

Lecture 57 - Power system stability (Continued...)

Lecture 58 - Power system stability (Continued...)

Lecture 59 - Power system stability (Continued...)

Lecture 60 - Power system stability (Continued...)

NPTEL : NOC:Analog Communication (Electronics and Communication Engineering)

Co-ordinators : Prof. Goutam Das

Lecture 1 - Fourier Series

Lecture 2 - Fourier Series (Continued...)

Lecture 3 - Fourier Series (Continued...)

Lecture 4 - Fourier Series (Continued...)

Lecture 5 - Fourier Series (Continued...)

Lecture 6 - Fourier Series (Continued...)

Lecture 7 - Fourier Series (Continued...)

Lecture 8 - Fourier Transform

Lecture 9 - Fourier Transform (Continued...)

Lecture 10 - Fourier Transform (Continued...)

Lecture 11 - Fourier Transform (Continued...)

Lecture 12 - Energy Spectral Density

Lecture 13 - Power Spectral Density

Lecture 14 - PSD of Random Signal

Lecture 15 - Amplitude Modulation

Lecture 16 - Amplitude Modulation (Continued...)

Lecture 17 - Amplitude Modulation (Continued...)

Lecture 18 - Amplitude Modulation (Continued...)

Lecture 19 - SSB - SC

Lecture 20 - SSB - SC (Continued...)

Lecture 21 - VSB-SC

Lecture 22 - VSB-SC (Continued...)

Lecture 23 - Effect of Carrier Synchronization

Lecture 24 - Comparison of Different Modulation Technique

Lecture 25 - PLL

Lecture 26 - PLL (Continued...)

Lecture 27 - PLL (Continued...)

Lecture 28 - PLL (Continued...) and LTI

Lecture 29 - Dispersion

Lecture 30 - Channel Nonlinearities and Multipath Effects

Lecture 31 - Probability Theory

Lecture 32 - Probability Theory (Continued...)

Lecture 33 - Probability Theory (Continued...)

Lecture 34 - Probability Theory (Continued...)

Lecture 35 - Probability Theory (Continued...)

Lecture 36 - Probability Theory (Continued...)

Lecture 37 - Probability Theory (Continued...)

Lecture 38 - Random Process

Lecture 39 - Random Process (Continued...)

Lecture 40 - Random Process (Continued...)

Lecture 41 - Random Process (Continued...)

Lecture 42 - Random Process (Continued...)

Lecture 43 - Random Process (Continued...)

Lecture 44 - Noise Analysis - DSB-SC

Lecture 45 - Noise Analysis - AM

Lecture 46 - Noise Analysis - SSB-SC

Lecture 47 - Frequency Modulation

Lecture 48 - Frequency Modulation (Continued...)

Lecture 49 - Frequency Modulation (Continued...)

Lecture 50 - Frequency Modulation (Continued...)

Lecture 51 - Frequency Modulation (Continued...)

Lecture 52 - Frequency Modulation (Continued...)

Lecture 53 - FM Noise Analysis

Lecture 54 - FM Noise Analysis (Continued...)

Lecture 55 - FM Noise Analysis (Continued...)>

Lecture 56 - Sampling Theorem

Lecture 57 - Sampling Theorem (Continued...)

Lecture 58 - FDM Vs TDM

Lecture 59 - Flat Top Vs Natural Sampling

Lecture 60 - Pulse Coded Modulation

NPTEL : NOC:Modern Digital Communication Techniques (Electronics and Communication Engineering)

Co-ordinators : Prof. Suvra Sekhar Das

Lecture 1 - Introduction of Digital Communication System

Lecture 2 - Introduction of Digital Communication System (Continued...)

Lecture 3 - Introduction of Digital Communication System (Continued...)

Lecture 4 - Introduction of Digital Communication System (Continued...)

Lecture 5 - Introduction of Digital Communication System (Continued...)

Lecture 6 - Source Coding

Lecture 7 - Source Coding (Continued...)

Lecture 8 - Source Coding (Continued...)

Lecture 9 - Source Coding (Continued...)

Lecture 10 - Source Coding (Continued...)

Lecture 11 - Source Coding (Continued...)

Lecture 12 - Source Coding (Continued...)

Lecture 13 - Source Coding (Continued...)

Lecture 14 - Source Coding (Continued...)

Lecture 15 - Analog to Digital Conversion

Lecture 16 - Analog to Digital Conversion (Continued...)

Lecture 17 - Characterization of Signals and Systems

Lecture 18 - Characterization of Signals and Systems (Continued...)

Lecture 19 - Characterization of Signals and Systems (Continued...)

Lecture 20 - Characterization of Signals and Systems (Continued...)

Lecture 21 - Characterization of Signals and Systems (Continued...)

Lecture 22 - Characterization of Signals and Systems (Continued...)

Lecture 23 - Characterization of Signals and Systems (Continued...)

Lecture 24 - Memoryless Modulation

Lecture 25 - Memoryless Modulation (Continued...)

Lecture 26 - Memoryless Modulation (Continued...)

Lecture 27 - Memoryless Modulation (Continued...)

Lecture 28 - Memoryless Modulation (Continued...)

Lecture 29 - Memoryless Modulation (Continued...)

Lecture 30 - Memoryless Modulation (Continued...)

Lecture 31 - Memoryless Modulation (Continued...)

Lecture 32 - Memoryless Modulation (Continued...)

Lecture 33 - With Memory Modulation

Lecture 34 - With Memory Modulation (Continued...)

Lecture 35 - With Memory Modulation (Continued...)

Lecture 36 - With Memory Modulation (Continued...)

Lecture 37 - With Memory Modulation (Continued...)

Lecture 38 - With Memory Modulation (Continued...)

Lecture 39 - With Memory Modulation (Continued...)

Lecture 40 - Optimum Receivers for AWGN

Lecture 41 - Optimum Receivers for AWGN (Continued...)

Lecture 42 - Optimum Receivers for AWGN (Continued...)

Lecture 43 - Optimum Receivers for AWGN (Continued...)

Lecture 44 - Optimum Receivers for AWGN (Continued...)

Lecture 45 - Optimum Receivers for AWGN (Continued...)

Lecture 46 - Performance of Digital Modulation Techniques

Lecture 47 - Performance of Digital Modulation Techniques (Continued...)

Lecture 48 - Performance of Digital Modulation Techniques (Continued...)

Lecture 49 - Performance of Digital Modulation Techniques (Continued...)

Lecture 50 - Performance of Digital Modulation Techniques (Continued...)

Lecture 51 - Performance of Digital Modulation Techniques (Continued...)

Lecture 52 - Performance of Digital Modulation Techniques (Continued...)

Lecture 53 - Channel Estimation and Equalization

Lecture 54 - Channel Estimation and Equalization (Continued...)

Lecture 55 - Channel Estimation and Equalization (Continued...)>

Lecture 56 - Channel Estimation and Equalization (Continued...)

Lecture 57 - Synchronization Techniques

Lecture 58 - Synchronization Techniques (Continued...)

Lecture 59 - Synchronization Techniques (Continued...)

Lecture 60 - Synchronization Techniques (Continued...)

NPTEL : NOC:Digital Speech Processing (Electronics and Communication Engineering)

Co-ordinators : Prof. Shyamal Kumar Das Mandal

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16 - Human Auditory System

Lecture 17

Lecture 18

Lecture 19 - Time Domain Methods in Speech Processing

Lecture 20

Lecture 21 - Introduction to Liner Prediction

Lecture 22 - Autocorrelation Method of LPC analysis

Lecture 23 - Autocorrelation Method of LPC analysis (Continued...)

Lecture 24 - Lattice Formulations of Linear Prediction

Lecture 25 - Lattice Formulations of Linear Prediction (Continued...)

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31 - Segmental and Supra-segmental features of speech signal

Lecture 32 - Cepstral Transform Coefficients (CC) Parameters extraction

Lecture 33 - Mel Frequency Cepstral Coefficients

Lecture 34 - MFCC features vector

Lecture 35 - Fundamental Frequency (F0) Detection of speech signal

Lecture 36 - Frequency Domain Fundamental Frequency Detection Algorithms

Lecture 37 - Text to Speech Synthesis

Lecture 38 - Text to Speech Synthesis (Continued...)

Lecture 39 - Automatic Speech Recognition

Lecture 40 - Statistical Modeling of Automatic Speech Recognition

Lecture 41 - Speech based Technology Development for e-learning

Lecture 42 - Prosody Modeling

Lecture 43 - Fundamental frequency countur modeling

Lecture 44 - Fundamental frequency contour modeling (Continued...)

NPTEL : NOC:Analog Circuits and Systems through SPICE Simulation (Electronics and Communication Engineering)

Co-ordinators : Prof. Mrigank Sharad

Lecture 1 - Basic Analog Design Part I

Lecture 2 - Basic Analog Design Part I (Continued...)

Lecture 3 - Basic Analog Design Part II

Lecture 4 - Basic Analog Design Part II (Continued...)

Lecture 5 - Basic Analog Design Part III

Lecture 6 - Basic Analog Design Part III (Continued...)

Lecture 7 - Basic Analog Design Part III (Continued...)

Lecture 8 - Basic Analog Design Part III (Continued...)

Lecture 9 - Basic Analog Design Part III (Continued...)

Lecture 10 - Basic Analog Design Part III (Continued...)

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56

Lecture 57

Lecture 58

NPTEL : NOC:Communication Networks (Electronics and Communication Engineering)

Co-ordinators : Prof. Goutam Das

Lecture 1 - Introduction to Communication Networks

Lecture 2 - Introduction to Communication Networks (Continued...)

Lecture 3 - Introduction to Communication Networks (Continued...)

Lecture 4 - Circuit Switch Networks

Lecture 5 - Space switch Artitechture

Lecture 6 - Space switch Architecture (Continued...)

Lecture 7 - Space Switch Architecture (Continued...)

Lecture 8 - Space Switch Architecture (Continued...)

Lecture 9 - Space Switch Architecture (Continued...)

Lecture 10 - Time Switch

Lecture 11 - Space Time Switch

Lecture 12 - Space Time Switch (Continued...)

Lecture 13 - Synchronisation

Lecture 14 - Synchronisation (Continued...)

Lecture 15 - Introduction to Queuing Theory

Lecture 16 - Arrival and Service Process

Lecture 17 - Poisson Process

Lecture 18 - poisson process (Continued...)

Lecture 19 - Memorylessness

Lecture 20 - Little's Theorem

Lecture 21 - Little's Theorem (Continued...)

Lecture 22 - D T M C

Lecture 23 - D T M C (Continued...)

Lecture 24 - D T M C To C T M C

Lecture 25 - C T M C

Lecture 26 - M/M/1 Queue

Lecture 27 - M/M/m And M/M/m/m System

Lecture 28 - Introduction to Data Networks

Lecture 29 - Introduction to Data Networks (Continued...)

Lecture 30 - Introduction to Data Networks (Continued...)

Lecture 31 - Layered Architecture

Lecture 32 - Layered Architecture (Continued...)

Lecture 33 - Broadband Access - Dail Up/ADSL

Lecture 34 - Broadband Access - DSL, Aloha

Lecture 35 - Aloha/Slotted Aloha

Lecture 36 - Slotted Aloha

Lecture 37 - Slotted Aloha (Continued...)

Lecture 38 - Slotted Aloha- Stability Analysis

Lecture 39 - Slotted Aloha- Stability Analysis (Continued...)

Lecture 40 - Stabilized Slotted Aloha-bayesian Estimation

Lecture 41 - Binary Back- off Algorithm

Lecture 42 - Effect of Physical Media

Lecture 43 - PON and Ethernet MAC

Lecture 44 - PON and Ethernet MAC (Continued...)

Lecture 45 - CSMA/CD

Lecture 46 - CSMA/CA

Lecture 47 - CSMA/CA (Continued...)

Lecture 48 - CSMA/CA (Continued...)

Lecture 49 - CSMA/CA (Continued...)

Lecture 50 - Learning Bridges

Lecture 51 - Learning Bridges (Continued...)

Lecture 52 - Distributed Spanning Tree

Lecture 53 - Distributed Spanning Tree (Continued...)

Lecture 54 - Internet Protocol

Lecture 55 - Internet Protocol (Continued...)

Lecture 56 - Subnet and ARP

Lecture 57 - ARP and DHCP

Lecture 58 - DHCP and Routing

NPTEL : NOC:Signal Processing Techniques and its Applications (Electronics and Communication Engineering)

Co-ordinators : Prof. Shyamal Kumar Das Mandal

Lecture 1 - Introduction

Lecture 2 - Signal and its Types

Lecture 3 - Characteristics of a Signal

Lecture 4 - Digitization of Signal

Lecture 5 - Digitization of Signal (Continued...)

Lecture 6 - Concept of Frequency in Continuous-time and Discrete-time Signal

Lecture 7 - Tutorial 1

Lecture 8 - Discrete Time Signal

Lecture 9 - Discrete Time System

Lecture 10 - D.T.S (L.T.I System)

Lecture 11 - Linear Time-Invariant Systems (Continued...)

Lecture 12 - Correlation

Lecture 13 - Tutorial 02

Lecture 14 - Z-Transform

Lecture 15 - Z-Transform Properties

Lecture 16 - Pole and Zero in Z-Transform

Lecture 17 - Inverse Z-Transform

Lecture 18 - Frequency-Domain Representation of Discrete Signals and L.T.I Systems

Lecture 19 - Discrete Fourier Transform (DFT)

Lecture 20 - Discrete Fourier Transform Linear Transform View

Lecture 21 - Discrete Fourier Transform Linear Transform View (Continued...)

Lecture 22 - Properties of Discrete Fourier Transform

Lecture 23 - Properties of Discrete Fourier Transform (Continued...)

Lecture 24 - Properties of Discrete Fourier Transform (Continued...)

Lecture 25 - Properties of Discrete Fourier Transform (Continued...)

Lecture 26 - Linear Filtering

Lecture 27 - Tutorial 5

Lecture 28 - Two Dimensional Discrete Fourier Transform

Lecture 29 - Discrete Cosine Transform

Lecture 30 - Frequency analysis of long signal using DFT

Lecture 31 - Short-Time Fourier Transform (STFT)

Lecture 32 - STFT Synthesis

Lecture 33 - Fast Fourier Transform (FFT) Algorithms

Lecture 34 - Fast Fourier Transform (FFT) Algorithms (Continued...)

Lecture 35 - Radix-2 FFT Algorithms

Lecture 36 - Radix-2 FFT Algorithms (Continued...)

Lecture 37 - Spectrum and spectrogram

Lecture 38 - Digital Filter

Lecture 39 - FIR Filter

Lecture 40 - Linear Symmetric and Anti-symmetric filter

Lecture 41 - FIR Filter Design

Lecture 42 - Frequency Sampling Method

Lecture 43 - Design Optimum equiripple Linear-Phase FIR Filters (optimization methods)

Lecture 44 - Infinite Impulse Response (IIR) Filters

Lecture 45 - Traditional Analog Filter Design

Lecture 46 - Chebyshev filter Design Method

Lecture 47 - Analogue filter to digital filter transformation

Lecture 48 - Linear Prediction and Optimum Linear Filters

Lecture 49 - Autocorrelation Method for Linear Prediction

Lecture 50 - Covariance Method for Linear Prediction

Lecture 51 - Lattice Formulations of Linear Prediction

Lecture 52 - Lattice Formulations of Linear Prediction (Continued....)

Lecture 53 - Introduction to Multirate Signal Processing

Lecture 54 - Analysis of Decimation and Interpolation

Lecture 55 - Fractional Rate Conversion

Lecture 56 - Implementations of Decimator and Interpolator

Lecture 57 - Sample Rate Conversion by Stages

Lecture 58 - Power Spectrum Estimation

Lecture 59 - Power Spectrum Estimation (Continued...)

Lecture 60 - Tutorial 6: Tutorial for Final Examination

NPTEL : Analog IC Design (Electronics and Communication Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 1 - Course introduction; Negative feedback control

Lecture 2 - Negative feedback amplifier

Lecture 3 - Step response, sinusoidal steady state response

Lecture 4 - Loop gain and unity loop gain frequency; Opamp

Lecture 5 - Opamp realization using controlled sources; Delay in the loop

Lecture 6 - Negative feedback amplifier with ideal delay-small delays

Lecture 7 - Negative feedback amplifier with ideal delay-large delays

Lecture 8 - Negative feedback amplifier with parasitic poles and zeros

Lecture 9 - Negative feedback amplifier with parasitic poles and zeros; Nyquist criterion

Lecture 10 - Nyquist criterion; Phase margin

Lecture 11 - Phase margin

Lecture 12 - Single stage opamp realization

Lecture 13 - Two stage miller compensated opamp

Lecture 14 - Two stage miller compensated opamp

Lecture 15 - Two and three stage miller compensated opamps; Feedforward compensated opamp

Lecture 16 - Feedforward compensated opamp

Lecture 17 - Feedforward compensated opamp

Lecture 18 - Feedforward compensated opamp; typical opamp data sheet

Lecture 19 - Opamp offset and CMRR; Transimpedance amplifier using an opamp

Lecture 20 - Components available in a CMOS process

Lecture 21 - MOS transistors-basics

Lecture 22 - MOS transistors-parasitics, mismatch

Lecture 23 - MOS transistors-mismatch, speed

Lecture 24 - Noise in resistors

Lecture 25 - Noise in MOS transistors; Input and output referred noise

Lecture 26 - Noise scaling; Basic amplifier stages-Common source, common gate

Lecture 27 - Basic amplifier stages-Common drain; Frequency response of amplifiers

Lecture 28 - Common source amplifier frequency response; Differential amplifier

Lecture 29 - Differential and common mode half circuits; Differential pair with active load

Lecture 30 - Differential pair with current mirror load

Lecture 31 - Single stage opamp characteristics

Lecture 32 - Opamp with single and dual supplies; Single stage opamp tradeoffs

Lecture 33 - Telescopic cascode opamp

Lecture 34 - Telescopic cascode opamp; Folded cascode opamp

Lecture 35 - Folded cascode opamp

Lecture 36 - Two stage opamp

Lecture 37 - Two stage opamp; Three stage and triple cascode opamps

Lecture 38 - Common mode rejection ratio; Example

Lecture 39 - Fully differential circuits

Lecture 40 - Fully differential single stage opamp

Lecture 41 - Common mode feedback

Lecture 42 - Fully differential single stage opamp

Lecture 43 - Fully differential two stage opamp; Fully differential versus pseudo-differential

Lecture 44 - Circuit simulators and analyses

Lecture 45 - Phase locked loop as frequency multiplier

Lecture 46 - Phase domain model

Lecture 47 - Type I PLL transfer function and reference feedthrough

Lecture 48 - Type II PLL

Lecture 49 - Type II PLL transfer functions; Implementation

Lecture 50 - Type II PLL-extra poles; Random noise in a PLL

Lecture 51 - Oscillator phase noise

Lecture 52 - PLL phase noise; LC and ring Oscillators

Lecture 53 - Generating PTAT and constant MOS gm bias currents

Lecture 54 - Reducing supply sensitivity; Bandgap voltage reference

Lecture 55 - Fractional bandgap reference; Low dropout regulator

Lecture 56 - Low dropout regulators; Continuous-time active filters

Lecture 57 - Continuous-time active filters

Lecture 58 - Continuous-time active filters

Lecture 59 - Discrete-time active filters

Lecture 60 - Transistor sizing in practice; Course summary

NPTEL : Coding Theory (Electronics and Communication Engineering)

Co-ordinators : Dr. Andrew Thangaraj

Lecture 1 - Introduction to Linear Block Codes

Lecture 2 - Properties of Linear Block Codes

Lecture 3 - Dual of Linear Block Codes

Lecture 4 - Minimum Distance of Codes

Lecture 5 - Operations on Codes

Lecture 6 - Bounds on Code Parameters

Lecture 7 - Optimal Decoders

Lecture 8 - Syndrome Decoder, Basics of Finite Fields

Lecture 9 - Constructions of Finite Fields

Lecture 10 - Computations in Finite Fields

Lecture 11 - Codes over Finite Fields, Minimal Polynomials

Lecture 12 - BCH Codes

Lecture 13 - BCH and RS Codes I

Lecture 14 - BCH and RS Codes II

Lecture 15 - Decoding BCH Codes

Lecture 16 - Decoding RS Codes

Lecture 17 - Coded Modulation and Soft Decision Decoding

Lecture 18 - Optimal Decoders for BPSK and AWGN

Lecture 19 - Bitwise Map Decoder for BPSK over AWGN

Lecture 20 - Bitwise Map Decoder from the Dual Code

Lecture 21 - Simulating Coded Modulation

Lecture 22 - Union Bound, Introduction to LDPC Codes

Lecture 23 - LDPC Codes

Lecture 24 - Message Passing, Density Evolution Analysis

Lecture 25 - Thresholds of LDPC Codes

Lecture 26 - Irregular LDPC Codes

Lecture 27 - Optimized Irregular LDPC Codes, Soft Message Passing Decoders

Lecture 28 - Density Evolution for Soft Message Passing Decoding of LDPC Codes

Lecture 29 - LDPC Codes in Practice

Lecture 30 - Introduction to Convolutional Codes

Lecture 31 - Viterbi Decoding of Convolutional Codes

Lecture 32 - Union Bound, Recursive Convolutional Encoders

Lecture 33 - Convolutional Codes in Practice

Lecture 34 - BCJR Decoder

Lecture 35 - BCJR & Max-Log-MAP Decoder, Introduction to Turbo Codes

Lecture 36 - Turbo Decoder

Lecture 37 - Turbo Codes in Practice

Lecture 38 - Modern Codes

NPTEL : Semiconductor Device Modeling (Electronics and Communication Engineering)

Co-ordinators : Prof. S. Karmalkar

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

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Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56

Lecture 57

NPTEL : VLSI Data Conversion Circuits (Electronics and Communication Engineering)

Co-ordinators : Dr. Shanthi Pavan

Lecture 1 - Introduction to Data Conversion

Lecture 2 - Sampling-1

Lecture 3 - Sampling-2

Lecture 4 - Nonidealities in Samples

Lecture 5 - Noise due to Sampling

Lecture 6 - Distortion in a Sampling Switch

Lecture 7 - Gate Boosted Switches-1

Lecture 8 - Gate Boosted Switches-2

Lecture 9 - Charge Injection

Lecture 10 - S/H Characterization-1

Lecture 11 - S/H Characterization-2

Lecture 12 - FFTs and Leakage

Lecture 13 - Spectral Windows-1

Lecture 14 - Spectral Windows-2

Lecture 15 - ADC/DAC Definition

Lecture 16 - Quantization Noise-1

Lecture 17 - Quantization Noise-2

Lecture 18 - Over Sampling and Noise Shaping

Lecture 19 - Delta-Sigma Modulation-1

Lecture 20 - Delta-Sigma Modulation-2

Lecture 21 - Linearized Analysis

Lecture 22 - Stability of Delta Sigma Modulators

Lecture 23 - High Order DSMs

Lecture 24 - NTF Design and Tradeoffs

Lecture 25 - Single bit Modulators

Lecture 26 - Loop Filter Architectures

Lecture 27 - Continous-time Delta Sigma Modulation

Lecture 28 - Implicit Antialiasing

Lecture 29 - Modulators with NRZ and Impulsive DACs

Lecture 30 - High Order CTDSMs

Lecture 31 - CTDM Design

Lecture 32 - Excess Loop Delay (ELD)

Lecture 33 - ELD Compensation

Lecture 34 - Effect of Clock Jitter on CTDSMs-1

Lecture 35 - Effect of Clock Jitter on CTDSMs-2

Lecture 36 - Dynamic Range Scaling

Lecture 37 - Simulation of CTDSMs

Lecture 38 - Integrator Design-1

Lecture 39 - Integrator Design-2

Lecture 40 - Flash ADC Design

Lecture 41 - Latches and Metastability

Lecture 42 - Offset in a Latch-1

Lecture 43 - Offset in a Latch-2 Auto Zeroing

Lecture 44 - Auto Zeroing-2

Lecture 45 - Auto Zeroing-3

Lecture 46 - Auto Zeroing in flash ADCs

Lecture 47 - Flash ADCs Case Study

Lecture 48 - Flash ADC Case Study

Lecture 49 - Flash ADC in a Delta Sigma Loop

Lecture 50 - DAC Basics

Lecture 51 - Binary and Themometer DACs

Lecture 52 - Segmented DACs

Lecture 53 - Optimal DAC Segmentation

Lecture 54 - DAC Nonlinearities

Lecture 55 - Current Steering DACs-1

Lecture 56 - Current Steering DACs-2

Lecture 57 - DAC Mismatches in DSMs

Lecture 58 - Calibration and Randomization

Lecture 59 - Dynamic Element Matching-1

Lecture 60 - Dynamic Element Matching-2

NPTEL : Digital Circuits and Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. S. Srinivasan

Lecture 1 - Introduction To Digital Circuits

Lecture 2 - Introduction To Digital Circuits

Lecture 3 - Combinational Logic Basics

Lecture 4 - Combinational Circuits

Lecture 5 - Logic Simplification

Lecture 6 - Karnaugh Maps And Implicants

Lecture 7 - Logic Minimization Using Karnaugh Maps

Lecture 8 - Karnaugh Map Minimization Using Maxterms

Lecture 9 - Code Converters

Lecture 10 - Parity Generators And Display Decoder

Lecture 11 - Arithmetic Circuits

Lecture 12 - Carry Look Ahead Adders

Lecture 13 - Subtractors

Lecture 14 - 2?'S Complement Subtractor and BCD Adder

Lecture 15 - Array Multiplier

Lecture 16 - Introduction to Sequential Circuits

Lecture 17 - S-R, J-K and D Flip Flops

Lecture 18 - J-K and T Flip Flops

Lecture 19 - Triggering Mechanisms of Flip Flops and Counters

Lecture 20 - Up/Down Counters

Lecture 21 - Shift Registers

Lecture 22 - Application of shift Registers

Lecture 23 - State Machines

Lecture 24 - Design of Synchronous Sequential Circuits

Lecture 25 - Design using J-K Flip Flop

Lecture 26 - Mealy and Moore Circuits

Lecture 27 - Pattern Detector

Lecture 28 - MSI and LSI Based Design

Lecture 29 - Multiplexer Based Design

Lecture 30 - Encoders and Decoders

Lecture 31 - Programmable Logic Devices

Lecture 32 - Design using Programmable Logic Devices

Lecture 33 - Design using Programmable Logic Devices (Continued)

Lecture 34 - MSI and LSI based Implementation of Sequential Circuits

Lecture 35 - MSI and LSI based Implementation of Sequential Circuits (Continued)

Lecture 36 - Design of circuits using MSI sequential blocks

Lecture 37 - System Design Example

Lecture 38 - System Design Example (Continued)

Lecture 39 - System Design using the concept of controllers

Lecture 40 - System Design using the concept of controllers (Continued)

NPTEL : Electronics for Analog Signal Processing - I (Electronics and Communication Engineering)

Co-ordinators : Prof. K. Radhakrishna Rao

Lecture 1 - Introduction

Lecture 2 - Diode

Lecture 3 - Diode characteristics

Lecture 4 - Rectifier

Lecture 5 - Voltage Multiplier

Lecture 6 - Full Wave Rectifier and Peak Detector

Lecture 7 - Diode as a GATE

Lecture 8 - Analog GATE

Lecture 9 - Small Signal Analysis of Diode Circuit

Lecture 10 - Zener Regulator and Voltage Regulator

Lecture 11 - Varactor Diode

Lecture 12 - Amplifiers

Lecture 13 - Cascading of Amplifiers

Lecture 14 - Cascading of Amplifiers

Lecture 15 - h and g Parameters

Lecture 16 - Two Port Analysis

Lecture 17 - Amplifier Applications

Lecture 18 - Frequency Limitations Of An Amplifier

Lecture 19 - Distortion In Amplifiers

Lecture 20 - Bipolar Junction Transistor

Lecture 21 - Transistor (BJT) Inverter

Lecture 22 - Transistor Biasing

Lecture 23 - Stable Way of Biasing

Lecture 24 - Common Emitter Amplifiers

Lecture 25 - Transistor Biasing Using Single Supply

Lecture 26 - Metal Oxide Semiconductor

Lecture 27 - Construction of a MOSFET

Lecture 28 - Varieties of MOSFETS and JFETS

Lecture 29 - Characteristics of MOSFET

Lecture 30 - Cascading Amplifiers

Lecture 31 - Cascading (Direct Coupling)

Lecture 32 - The Differential Amplifiers

Lecture 33 - BJT Differential Amplifiers

Lecture 34 - MOSFET Differential Amplifiers

Lecture 35 - Cascading Differential Amplifiers

Lecture 36 - Current Source and Current Sink

Lecture 37 - NMOS Inverters and CMOS Inverters

Lecture 38 - Active Components used in Electronics

NPTEL : Electronics for Analog Signal Processing - II (Electronics and Communication Engineering)

Co-ordinators : Prof. K. Radhakrishna Rao

Lecture 1 - Feedback Theory

Lecture 2 - Negative Feedback

Lecture 3 - Negative Feedback

Lecture 4 - Y-Feedback

Lecture 5 - h and g Negative Feedback

Lecture 6 - g Feedback with Mosfet

Lecture 7 - Operational Amplifier in Negative Feedback

Lecture 8 - Operational Amplifier in Negative Feedback

Lecture 9 - Positive Feedback (Regenerative)

Lecture 10 - Experimental Demonstration

Lecture 11 - Instrumentation Amplifiers

Lecture 12 - Active Filters

Lecture 13 - Simulation of Harmonic Oscillators

Lecture 14 - Oscillators

Lecture 15 - Oscillators

Lecture 16 - Frequency Compensation in Negative Feedback

Lecture 17 - Frequency Compensation

Lecture 18 - Wideband (video) Amplifiers

Lecture 19 - Wideband Amplifiers

Lecture 20 - ICs For Video And Tuned Amplifier Applications

Lecture 21 - Power Amplifier

Lecture 22 - Power Amplifier

Lecture 23 - Class B and C Power Amplifiers

Lecture 24 - Class-B Power Amplifier Load and Drive

Lecture 25 - Control Circuits

Lecture 26 - Voltage Regulators

Lecture 27 - Voltage Regulators

Lecture 28 - Voltage Regulators

Lecture 29 - Convertors

Lecture 30 - Analog Multipliers (Modems & Mixers)

Lecture 31 - Log-Antilog Multipliers

Lecture 32 - Multipliers

Lecture 33 - Multipliers

Lecture 34 - AGC/AVC

Lecture 35 - AGC/AVC

Lecture 36 - Experimental Demonstration

Lecture 37 - PLL (Phase Locked Loop)

Lecture 38 - PLL (Phase Locked Loop)

Lecture 39 - Lock Range Capture Range and FSK and FM

NPTEL : High Speed Devices and Circuits (Electronics and Communication Engineering)

Co-ordinators : Prof. K.N. Bhat

Lecture 1 - Introduction to Basic concepts

Lecture 2 - Requirements for high speed circuits, devices and materials

Lecture 3 - Classification and properties of semiconductor devices

Lecture 4 - Ternary compound semiconductors and their applications

Lecture 5 - Ternary compound semiconductors and their applications (Continued.)

Lecture 6 - Crystal structures in GaAs

Lecture 7 - Dopants and impurities in GaAs and InP

Lecture 8 - Brief Overview of GaAs Technology for High Speed Devices

Lecture 9 - Epitaxial Techniques for GaAs and high speed devices

Lecture 10 - MBE and LPE for GaAs Epitoxy

Lecture 11 - GaAs and InP devices for Microelectronics

Lecture 12 - Metal Semiconductor contacts for MESFET

Lecture 13 - Metal Semiconductor contacts for MESFET (Continued.)

Lecture 14 - Metal Semiconductor contacts for MESFET (Continued.)

Lecture 15 - Ohmic contacts on semiconductors

Lecture 16 - Fermi level pinning, I V characteristics of Schottky Barrier Diodes

Lecture 17 - Schottky Barrier Diodes I V characteristics of Non idealities -1

Lecture 18 - Schottky Barrier Diodes I V characteristics of Non idealities -1

Lecture 19 - Causes of Non idealities in the Schottky Barrier Diodes (I V characteristics)

Lecture 20 - MESFET operations and I V characteristics

Lecture 21 - MESFET I V characteristics Shockley's Model

Lecture 22 - MESFET Shockley's Model and velocity saturation effect

Lecture 23 - MESFET velocity saturation effect on drain current saturation

Lecture 24 - MESFET : Drain current saturation Ids due to velocity saturation

Lecture 25 - MESFET : Effects of channel length and gate length on IDS and gm

Lecture 26 - MESFET : Effects of velocity saturation and velocity field characteristics

Lecture 27 - MESFET : Effects of velocity field characteristics - Overshoot effects

Lecture 28 - MESFET : Velocity overshoot effect and self aligned MESFET SAINT

Lecture 29 - Self Aligned MESFET SAINT Threshold Voltage and Sub Threshold current

Lecture 30 - Hetero junctions

Lecture 31 - Hetero junctions and high electron Mobility Transistor (HEMT)

Lecture 32 - Hetero junctions and high electron Mobility Transistor (HEMT) (Continued.)

Lecture 33 - High Electron Mobility Transistor

Lecture 34 - HEMT off voltage, I-V characteristics and trans conductance

Lecture 35 - I-V characteristics and trans conductance and optimization

Lecture 36 - Indium phosphide based HEMT

Lecture 37 - Pseudomorphic HEMT and Hetrojunction Bipolar Transistors

Lecture 38 - Hetero junction Bipolar Transistors (HBT)

Lecture 39 - Hetero junction Bipolar Transistors (HBT) (Continued.)

Lecture 40 - Hetero junction Bipolar Transistors (HBT) (Continued.)

Lecture 41 - Hetero junction Bipolar Transistors (HBT) (Continued.)

NPTEL : Solid State Devices (Electronics and Communication Engineering)

Co-ordinators : Prof. S. Karmalkar

Lecture 1 - Introduction on Solid State Devices

Lecture 2 - Evolution and Uniqueness of Semiconductor

Lecture 3 - Equilibrium Carrier Concentration

Lecture 4 - Equilibrium Carrier Concentration

Lecture 5 - Equilibrium Carrier Concentration

Lecture 6 - Equilibrium Carrier Concentration

Lecture 7 - Equilibrium Carrier Concentration

Lecture 8 - Equilibrium Carrier Concentration

Lecture 9 - Equilibrium Carrier Concentration

Lecture 10 - Equilibrium Carrier Concentration

Lecture 11 - Equilibrium Carrier Concentration

Lecture 12 - Carrier Transport

Lecture 13 - Carrier Transport (Continued.)

Lecture 14 - Carrier Transport (Continued.)

Lecture 15 - Excess Carriers

Lecture 16 - Excess Carriers (Continued.)

Lecture 17 - Procedure for Device Analysis

Lecture 18 - Procedure for Device Analysis (Continued.)

Lecture 19 - PN Junction

Lecture 20 - PN Junction (Continued.)

Lecture 21 - PN Junction (Continued.)

Lecture 22 - PN Junction (Continued.)

Lecture 23 - PN Junction (Continued.)

Lecture 24 - PN Junction (Continued.)

Lecture 25 - PN Junction (Continued.)

Lecture 26 - Bipolar Junction Transistor

Lecture 27 - Bipolar Junction Transistor (Continued.)

Lecture 28 - Bipolar Junction Transistor (Continued.)

Lecture 29 - Bipolar Junction Transistor (Continued.)

Lecture 30 - Bipolar Junction Transistor (Continued.)

Lecture 31 - Bipolar Junction Transistor (Continued.)

Lecture 32 - Bipolar Junction Transistor (Continued.)

Lecture 33 - Metal-Oxide-Semiconductor (MOS) Junction

Lecture 34 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)

Lecture 35 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)

Lecture 36 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)

Lecture 37 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)

Lecture 38 - MOS Field Effect Transistor

Lecture 39 - MOS Field Effect Transistor (Continued.)

Lecture 40 - MOS Field Effect Transistor (Continued.)

Lecture 41 - MOS Field Effect Transistor (Continued.)

Lecture 42 - The Final Lecture - Conclusion

NPTEL : VLSI Circuits (Electronics and Communication Engineering)

Co-ordinators : Prof. S. Srinivasan

Lecture 1 - Introduction to VLSI Design

Lecture 2 - Combinational Circuit Design

Lecture 3 - Programmable Logic Devices

Lecture 4 - Programmable Array Logic

Lecture 5 - Review of Flip-Flops

Lecture 6 - Sequential Circuits

Lecture 7 - Sequential Circuit Design

Lecture 8 - MSI Implementation of Sequential Circuits

Lecture 9 - Design of Sequential Circuits using One Hot Controller

Lecture 10 - Verilog Modeling of Combinational Circuits

Lecture 11 - Modeling of Verilog Sequential Circuits - Core Statements

Lecture 12 - Modeling of Verilog Sequential Circuits - Core Statements(Continued.)

Lecture 13 - RTL Coding Guidelines

Lecture 14 - Coding Organization - Complete Realization

Lecture 15 - Coding Organization - Complete Realization (Continued.)

Lecture 16 - Writing a Test Bench

Lecture 17 - System Design using ASM Chart

Lecture 18 - Example of System Design using ASM Chart

Lecture 19 - Examples of System Design using Sequential Circuits

Lecture 20 - Examples of System Design using Sequential Circuits (Continued.)

Lecture 21 - Microprogrammed Design

Lecture 22 - Microprogrammed Design (Continued.)

Lecture 23 - Design Flow of VLSI Circuits

Lecture 24 - Simulation of Combinational Circuits

Lecture 25 - Simulation of Combinational and Sequential Circuits

Lecture 26 - Analysis of Waveforms using Modelsim

Lecture 27 - Analysis of Waveforms using Modelsim (Continued.)

Lecture 28 - ModelSim Simulation Tool

Lecture 29 - Synthesis Tool

Lecture 30 - Synthesis Tool (Continued.)

Lecture 31 - Synplify Tool - Schematic Circuit Diagram View

Lecture 32 - Technology View using Synplify Tool

Lecture 33 - Synopsys Full and Parallel Cases

Lecture 34 - Xilinx Place & Route Tool

Lecture 35 - Xilinx Place & Route Tool (Continued.)

Lecture 36 - PCI Arbiter Design using ASM Chart

Lecture 37 - Design of Memories - ROM

Lecture 38 - Design of Memories- RAM

Lecture 39 - Design of External RAM

Lecture 40 - Design of Arithmetic Circuits

Lecture 41 - Design of Arithmetic Circuits (Continued.)

Lecture 42 - Design of Arithmetic Circuits (Continued.)

Lecture 43 - System Design Examples

Lecture 44 - System Design Examples (Continued.)

Lecture 45 - System Design Examples (Continued.)

Lecture 46 - System Design Examples (Continued.)

Lecture 47 - System Design Examples (Continued.)

Lecture 48 - System Design Examples using FPGA Board

Lecture 49 - System Design Examples using FPGA Board (Continued.)

Lecture 50 - Advanced Features of Xilinx Project Navigator

Lecture 51 - System Design Examples using FPGA Board (Continued.)

Lecture 52 - System Design Examples using FPGA Board (Continued.)

Lecture 53 - System Design Examples using FPGA Board (Continued.)

Lecture 54 - System Design Examples using FPGA Board (Continued.)

Lecture 55 - Project Design Suggested for FPGA/ASIC Implementations

NPTEL : VLSI Technology (Electronics and Communication Engineering)

Co-ordinators : Dr. Nandita Dasgupta

Lecture 1 - Introduction on VLSI Design

Lecture 2 - Bipolar Junction Transistor Fabrication

Lecture 3 - MOSFET Fabrication for IC

Lecture 4 - Crystal Structure of Si

Lecture 5 - Crystal Structure (Continued.)

Lecture 6 - Defects in Crystal + Crystal growth

Lecture 7 - Crystal growth Contd + Epitaxy I

Lecture 8 - Epitaxy II - Vapour phase Epitaxy

Lecture 9 - Epitaxy III - Doping during Epitaxy

Lecture 10 - Molecular beam Epitaxy

Lecture 11 - Oxidation I - Kinetics of Oxidation

Lecture 12 - Oxidation II - Oxidation rate constants

Lecture 13 - Oxidation III - Dopant Redistribution

Lecture 14 - Oxidation IV - Oxide Charges

Lecture 15 - Diffusion I - Theory of Diffusion

Lecture 16 - Diffusion II - Infinite Source

Lecture 17 - Diffusion III - Actual Doping Profiles

Lecture 18 - Diffusion IV - Diffusion Systems

Lecture 19 - Ion - Implantation Process

Lecture 20 - Ion - Implantation Process

Lecture 21 - Annealing of Damages

Lecture 22 - Masking during Implantation

Lecture 23 - Lithography - I

Lecture 24 - Lithography - II

Lecture 25 - Wet Chemical Etching

Lecture 26 - Dry Etching

Lecture 27 - Plasma Etching Systems

Lecture 28 - Etching of Si,Sio2,SiN and other materials

Lecture 29 - Plasma Deposition Process

Lecture 30 - Metallization - I

Lecture 31 - Problems in Aluminium Metal contacts

Lecture 32 - IC BJT - From junction isolation to LOCOS

Lecture 33 - Problems in LOCOS + Trench isolation

Lecture 34 - More about BJT Fabrication and Realization

Lecture 35 - Circuits + Transistors in ECL Circuits

Lecture 36 - MOSFET I - Metal gate vs. Self-aligned Poly-gate

Lecture 37 - MOSFET II Tailoring of Device Parameters

Lecture 38 - CMOS Technology

Lecture 39 - Latch - up in CMOS

Lecture 40 - BICMOS Technology

NPTEL : Basic Electrical Circuits (Electronics and Communication Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 1 - Introduction to the course;Current and Voltage;Kirchhoff's Current and Voltage laws

Lecture 2 - Electrical circuit elements: Voltage and current sources; R, C, L; Voltage sources in series; Example of superposition

Lecture 3 - Elements in series and parallel; Superposition in linear circuits

Lecture 4 - Controlled sources; Determining the characteristics of a two terminal element; Realizing a resistor using a VCCS or a CCVS

Lecture 5 - Nodal analysis of a network with conductances and current sources; Setting up the equations; Conductance matrix; Superposition

Lecture 6 - Circuit analysis; Number of KCL and KVL equations in a circuit; Nodal analysis of a network with conductances and current sources; Setting up the equations; Conductance matrix;

Lecture 7 - Nodal analysis with voltage sources and controlled sources; Brief introduction to modified nodal analysis; Use of supernode to solve circuits with voltage sources; Superposition theorem

Lecture 8 - Mesh analysis of a circuit with resistors and voltage sources; Comparison with nodal analysis; Mesh analysis of circuits with current sources-supermesh

Lecture 9 - Choice of nodal versus mesh analysis; Circuit theorems: Pushing a voltage source through a node, splitting a current source, substitution theorem, superposition

Lecture 10 - Thevenin and Norton (theorem and) equivalent circuits; Power conservation in a circuit

Lecture 11 - Tellegen's theorem; Reciprocity theorem

Lecture 12 - Compensation Theorem; Two ports

Lecture 13 - Two port parameters-y parameters

Lecture 14 - Two port parameters(z, h, and g); Reciprocal two ports

Lecture 15 - Opamp, ideal opamp circuits, non-inverting and inverting amplifiers; Ensuring that the opamp has negative feedback

Lecture 16 - RC circuit natural response; First order differential equation

Lecture 17 - RC (first-order) circuit, complete response with step inputs; Transient(natural) and steady state(forced) responses; Zero-state and zero-input responses

Lecture 18 - Step response of RC circuit with loops of voltage sources and capacitors; RL circuits; RLC circuits

Lecture 19 - Second order(RLC circuit) natural response; Series and prallel RLC circuits; Differential equation-characteristic equation and solutions; Forced response of a second order circuit

Lecture 20 - General formulation of second order(RLC circuit) natural response; Natural frequency and damping/quality factor; Series/parallel RLC circuits; R, L, C in sinusoidal steady state

Lecture 21 - Sinusoidal steady state response of RC and RLC circuits

NPTEL : NOC:Basic Electrical Circuits (Electronics and Communication Engineering)

Co-ordinators : Dr. Nagendra Krishnapura

Lecture 1 - Preliminaries

Lecture 2 - Current

Lecture 3 - Voltage

Lecture 4 - Electrical elements and circuits

Lecture 5 - Kirchhoff's current law (KCL)

Lecture 6 - Kirchhoff's Voltage law (KVL)

Lecture 7 - Voltage Source

Lecture 8 - Current Source

Lecture 9 - Resistor

Lecture 10 - Capacitor

Lecture 11 - Inductor

Lecture 12 - Mutual Inductor

Lecture 13 - Linearity of Elements

Lecture 14 - Solutions to the assignment on units 1 and 2

Lecture 15 - Series connection-Voltage sources in series

Lecture 16 - Series connection of R, L, C, current source

Lecture 17 - Elements in parallel

Lecture 18 - Current source in series with an element; Voltage source in parallel with an element

Lecture 19 - Extreme cases: Open and short circuits

Lecture 20 - Summary

Lecture 21 - Voltage controlled voltage source (VCVS)

Lecture 22 - Voltage controlled current source (VCCS)

Lecture 23 - Current controlled voltage source (CCVS)

Lecture 24 - Current controlled current source (CCCS)

Lecture 25 - Realizing a resistance using a VCCS or CCCS

Lecture 26 - Scaling an element's value using controlled sources

Lecture 27 - Example calculation

Lecture 28 - Solution to the assignment on units 3 and 4

Lecture 29 - Power and energy absorbed by electrical elements

Lecture 30 - Power and energy in a resistor

Lecture 31 - Power and energy in a capacitor

Lecture 32 - Power and energy in an inductor

Lecture 33 - Power and energy in a voltage source

Lecture 34 - Power and energy in a current source

Lecture 35 - Goals of circuit analysis

Lecture 36 - Number of independent KCL equations

Lecture 37 - Number of independent KVL equations and branch relationships

Lecture 38 - Analysis of circuits with a single independent source

Lecture 39 - Analysis of circuits with multiple independent sources using superposition

Lecture 40 - Superposition: Example

Lecture 41 - Solution to the assignment on units 5 and 6

Lecture 42 - What is nodal analysis

Lecture 43 - Setting up nodal analysis equations

Lecture 44 - Structure of the conductance matrix

Lecture 45 - How elements appear in the nodal analysis formulation

Lecture 46 - Completely solving the circuit starting from nodal analysis

Lecture 47 - Nodal analysis example

Lecture 48 - Matrix inversion basics

Lecture 49 - Nodal analysis with independent voltage sources

Lecture 50 - Supernode for nodal analysis with independent voltage sources

Lecture 51 - Nodal analysis with VCCS

Lecture 52 - Nodal analysis with VCVS

Lecture 53 - Nodal analysis with CCVS

Lecture 54 - Nodal analysis with CCCS

Lecture 55 - Nodal analysis summary

Lecture 56 - Solution to the assignment on units 7 and 8

Lecture 57 - Planar circuits

Lecture 58 - Mesh currents and their relationship to branch currents

Lecture 59 - Mesh analysis

Lecture 60 - Mesh analysis with independent current sources-Supermesh

Lecture 61 - Mesh analysis with current controlled voltage sources

Lecture 62 - Mesh analysis with current controlled current sources

Lecture 63 - Mesh analysis using voltage controlled sources

Lecture 64 - Nodal analysis versus Mesh analysis

Lecture 65 - Superposition theorem

Lecture 66 - Pushing a voltage source through a node

Lecture 67 - Splitting a current source

Lecture 68 - Substitution theorem: Current source

Lecture 69 - Substitution theorem: Voltage source

Lecture 70 - Substituting a voltage or current source with a resistor

Lecture 71 - Solutions

Lecture 72 - Extensions to Superposition and Substitution theorem

Lecture 73 - Thevenin's theorem

Lecture 74 - Worked out example: Thevenin's theorem

Lecture 75 - Norton's theorem

Lecture 76 - Worked out example: Norton's theorem

Lecture 77 - Maximum power transfer theorem

Lecture 78 - Preliminaries.

Lecture 79 - Two port parameters

Lecture 80 - y parameters

Lecture 81 - y parameters: Examples

Lecture 82 - Solutions.

Lecture 83 - z parameters

Lecture 84 - z parameters: Examples

Lecture 85 - h parameters

Lecture 86 - h parameters: Examples

Lecture 87 - g parameters

Lecture 88 - g parameters: Examples

Lecture 89 - Calculations with a two-port element

Lecture 90 - Calculations with a two-port element.

Lecture 91 - Degenerate cases

Lecture 92 - Relationships between different two-port parameters

Lecture 93 - Equivalent circuit representation for two ports

Lecture 94 - Reciprocity

Lecture 95 - Proof of reciprocity of resistive two-ports

Lecture 96 - Proof for 4-terminal two-ports

Lecture 97 - Reciprocity in terms of different two-port parameters

Lecture 98 - Reciprocity in circuits containing controlled sources

Lecture 99 - Examples

Lecture 100 - Solutions..

Lecture 101 - Feedback amplifier using an opamp

Lecture 102 - Ideal opamp

Lecture 103 - Negative feedback around the opamp

Lecture 104 - Finding opamp signs for negative feedback

Lecture 105 - Example: Determining opamp sign for negative feedback

Lecture 106 - Analysis of circuits with opamps

Lecture 107 - Inverting amplifier

Lecture 108 - Summing amplifier

Lecture 109 - Instrumentation amplifier

Lecture 110 - Negative resistance and Miller effect

Lecture 111 - Finding opamp signs for negative feedback-circuits with multiple opamps

Lecture 112 - Opamp supply voltages and saturation

Lecture 113 - KCL with an opamp and supply currents

Lecture 114 - Solutions...

Lecture 115 - Circuits with storage elements (capacitors and inductors)

Lecture 116 - First order circuit with zero input-natural response

Lecture 117 - First order RC circuit with zero input-Example

Lecture 118 - First order circuit with a constant input

Lecture 119 - General form of the first order circuit response

Lecture 120 - First order RC circuit with a constant input-Example

Lecture 121 - First order circuit with piecewise constant input

Lecture 122 - First order circuit with piecewise constant input-Example

Lecture 123 - First order circuit-Response of arbitrary circuit variables

Lecture 124 - Summary: Computing first order circuit response

Lecture 125 - Does a capacitor block DC?

Lecture 126 - Finding the order of a circuit

Lecture 127 - First order RC circuits with discontinuous capacitor voltages

Lecture 128 - Summary: Computing first order circuit response with discontinuities

Lecture 129 - First order RL circuits

Lecture 130 - First order RL circuit with discontinuous inductor current-Example

Lecture 131 - First order RC circuit with an exponential input

Lecture 132 - First order RC response to its own natural response

Lecture 133 - First order RC response to a sinusoidal input

Lecture 134 - First order RC response to a sinusoidal input-via the complex exponential

Lecture 135 - Summary: Linear circuit response to sinusoidal input via the complex exponential

Lecture 136 - Three methods of calculating the sinusoidal steady state response

Lecture 137 - Calculating the total response including initial conditions

Lecture 138 - Why are sinusoids used in measurement?

Lecture 139 - Second order system natural response

Lecture 140 - Second order system as a cascade of two first order systems

Lecture 141 - Second order system natural response-critically damped and underdamped

Lecture 142 - Generalized form of a second order system

Lecture 143 - Numerical example

Lecture 144 - Series and parallel RLC circuits

Lecture 145 - Forced response of a second order system

Lecture 146 - Steady state response calculation and Phasors

Lecture 147 - Phasors (Continued...)

Lecture 148 - Magnitude and Phase plots

Lecture 149 - Magnitude and phase plotes of a second order system

Lecture 150 - Maximum power transfer and Conjugate matching

NPTEL : Advanced Logic Synthesis (Electronics and Communication Engineering)

Co-ordinators : Mr. Dhiraj Taneja

Lecture 1 - MOS Transistor

Lecture 2 - MOS Transistor - Detailed Study

Lecture 3 - Combinational Circuits and layout

Lecture 4 - Delay

Lecture 5 - Sequential Circuits

Lecture 6 - Logical Effort

Lecture 7 - Circuit Families

Lecture 8 - Lab-01

Lecture 9 - Lab-02

Lecture 10 - Lab-03

Lecture 11 - Lab-04

Lecture 12 - Introduction to Synthesis

Lecture 13 - Libraries

Lecture 14 - RTL Coding for Synthesis

Lecture 15 - Reading Design in DC

Lecture 16 - Design Environment

Lecture 17 - Design Constraints

Lecture 18 - Compile Flow and stratergies

Lecture 19 - Analysis and Reporting

Lecture 20 - Lab-05

Lecture 21 - Advanced Synthesis Techniques

Lecture 22 - Datapath Extraction Guidelines

Lecture 23 - Power - Methodology and Analysis

Lecture 24 - Lab-06

Lecture 25 - Lab-07

Lecture 26 - Lab-08

Lecture 27 - Lab-09

Lecture 28 - Static Timing Analysis - Concepts and Flow

Lecture 29 - Interconnects and Delay calculation

Lecture 30 - Clock and Exceptions

Lecture 31 - On Chip Variation

Lecture 32 - Introduction to Crosstalk

Lecture 33 - Gaussian / Normal Distribution

Lecture 34 - Equivalence Checking / Formal Verification

NPTEL : ARM Based Development (Electronics and Communication Engineering)

Co-ordinators : Mr. S. Chandramouleeswaran

Lecture 1 - Types of computer Architectures, ISA's and ARM History

Lecture 2 - Embedded System Software and Hardware, stack implementation in ARM, Endianness, condition codes

Lecture 3 - Processor core VS CPU core, ARM7TDMI Interface signals, Memory Interface, Bus Cycle types, Register set, Operational Modes

Lecture 4 - Instruction Format, ARM Core Data Flow Model, ARM 3 stage Pipeline, ARM family attribute comparision

Lecture 5 - ARM 5 stage Pipeline, Pipeline Hazards, Data forwarding - a hardware solution

Lecture 6 - ARM ISA and Processor Variants, Different Types of Instructions, ARM Instruction set, data processing instructions

Lecture 7 - Shift Operations, shift Operations using RS lower byte, Immediate value encoding

Lecture 8 - Dataprocessing Instructions

Lecture 9 - Addressing Mode-1, Addressing Mode-2

Lecture 10 - Addressing Mode-2, LDR/STR, Addressing mode-3 with examples

Lecture 11 - Instruction Timing, Addressing Mode-4 with Examples

Lecture 12 - Swap Instructions, Swap Register related Instructions, Loading Constants

Lecture 13 - Program Control Flow, Control Flow Instructions, B & BL instructions, BX instruction

Lecture 14 - Interrupts and Exceptions, Exception Handlers, Reset Handling

Lecture 15 - Aborts, software Interrupt Instruction, undefined instruction exception

Lecture 16 - Interrupt Latency, Multiply Instructions, Instruction set examples

Lecture 17 - Thumb state, Thumb Programmers model, Thumb Implementation, Thumb Applications

Lecture 18 - Thumb Instructions, Interrupt processing

Lecture 19 - Interrupt Handelling schemes, Examples of Interrupt Handlers

Lecture 20 - Coprocessors

Lecture 21 - Coprocessor Instructions, data Processing Instruction, data transfers, register transfers

Lecture 22 - Number representations, floating point representation

Lecture 23 - Flynn's Taxonomy, SIMD and Vector Processors, Vector Floating Point Processor (VFP), VFP and ARM interactions, An example vector operation

Lecture 24 - Memory Technologies, Need for memory Hierarchy, Hierarchical Memory Organization, Virtual Memory

Lecture 25 - Cache Memory, Mapping Functions

Lecture 26 - Cache Design, Unified or split cache, multiple level of caches, ARM cache features, coprocessor 15 for system control

Lecture 27 - Processes, Memory Map, Protected Systems, ARM systems with MPU, memory Protection Unit (MPU)

Lecture 28 - Physical Vs Virtual Memory, Paging, Segmentation

Lecture 29 - MMU Advantage, virtual memory translation, Multitasking with MMU, MMU organization, Tightly coupled Memory (TCM)

Lecture 30 - ARM Development Environment, Arm Procedure Call Standard (APCS),

Lecture 31 - Example C program

Lecture 32 - Embedded software Development, Image structure, linker inputs and outputs, memory map, application startup

Lecture 33 - AMBA Overview, Typical AMAB Based Microcontroller, AHB bus features, AHB Bus transfers, APB bus transfers, APB bridge

Lecture 34 - DMA, Peripherals, Programming Peripherals in ARM

Lecture 35 - DMA:Direct Memory Access

Lecture 36 - Protocols (I2c, SPI), UART, GPIO

Lecture 37 - ARM ISAs, ARMv5, ARMv6, ARM v7, big.little technology, ARMv8

NPTEL : Embedded Software Testing (Electronics and Communication Engineering)

Co-ordinators : Mr. Madhukeshwara H.M

Lecture 1 - Embedded Systems Basics Session 1

Lecture 2 - Embedded Systems Basics Session 1 (Continued...)

Lecture 3 - Prerequistics for Embedded Systems Testing

Lecture 4 - Test Case Designa and procedures

Lecture 5 - Test Standards

Lecture 6 - Depicting Levels of Testing

Lecture 7 - Depicting Levels of Testing (Continued...)

Lecture 8 - Software Life Cycle

Lecture 9 - Embedded V-Model Life Cycle

Lecture 10 - Embedded V-Model Life Cycle (Continued...)

Lecture 11 - Master Test Planning

Lecture 12 - Dynamic Testing

Lecture 13 - Black Box Testing

Lecture 14 - Black Box Testing (Continued...)

Lecture 15 - Black Box Testing (Continued...)

Lecture 16 - Black Box Testing (Continued...)

Lecture 17 - Model based Design Introduction

Lecture 18 - Dynamic Testing

Lecture 19 - Dynamic Testing (Continued...)

Lecture 20 - White Box Testing

Lecture 21 - White Box Testing (Continued...)

Lecture 22 - Grey-box testing

Lecture 23 - Static Testing

Lecture 24 - Static Analysis

Lecture 25 - Static Analysis (Continued...)

Lecture 26 - Static Analysis (Continued...)

Lecture 27 - Test Metrics

Lecture 28 - Software Testing Metrics

Lecture 29 - Integration Test Strategy

Lecture 30 - Integration Tests Environment

Lecture 31 - Use Case Diagram

Lecture 32 - Depicting Levels of Testing (Continued...)

Lecture 33 - Configure Management Elements

Lecture 34 - SCM Activities

Lecture 35 - Test Management Tool

Lecture 36 - SCM Activities (Continued...)

Lecture 37 - Overview Lecture 1

Lecture 38 - Unit Testing

Lecture 39 - Unit Testing (Continued...)

Lecture 40 - Understading C++

Lecture 41 - Unit Testing (Continued...)

Lecture 42 - Level Testing

Lecture 43 - Identify Test Cases

Lecture 44 - Test Link Work Flow

NPTEL : Linux Programming and Scripting (Electronics and Communication Engineering)

Co-ordinators : Mr. Anand Iyer

Lecture 1 - Linux Basics - I

Lecture 2 - Linux Basics - II

Lecture 3 - Linux Basics - III

Lecture 4 - Linux Basics - IV

Lecture 5 - Linux Networking - I

Lecture 6 - Linux Networking - II

Lecture 7 - File Transfer Protocol

Lecture 8 - Domain Name System

Lecture 9 - DNS (Continued...)

Lecture 10 - DFS

Lecture 11 - AFS and NIS

Lecture 12 - PERL 1

Lecture 13 - PERL 2

Lecture 14 - PERL 3

Lecture 15 - PERL 4

Lecture 16 - PERL 5

Lecture 17 - PERL 6

Lecture 18 - PERL 7

Lecture 19 - PERL 8

Lecture 20 - PERL 9

Lecture 21 - Using sort

Lecture 22 - PERL 10

Lecture 23 - Programming Using Tcl/Tk - I

Lecture 24 - Programming Using Tcl/Tk - II

Lecture 25 - Programming Using Tcl/Tk - III

Lecture 26 - More about Procedures

Lecture 27 - TCP, Ports and Sockets

Lecture 28 - I/O and Processes

Lecture 29 - Bindings

Lecture 30 - Programming Using Tcl/Tk - IV

Lecture 31 - Furniture Arranger

Lecture 32 - Bindtags

Lecture 33 - Tcl in Synopsys Tools

Lecture 34 - Python Programming

Lecture 35 - Scope

Lecture 36 - Iteration

Lecture 37 - More about Regexps

Lecture 38 - Advanced Functions

Lecture 39 - Exception Handling

Lecture 40 - Examples of file Parsing

Lecture 41 - Program on If Statement

Lecture 42 - Program on Lists

Lecture 43 - Makefiles

NPTEL : NOC:Digital Circuits and Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. Shankar Balachandran

Lecture 1 - Introduction

Lecture 2 - Basic Boolean Logic

Lecture 3 - Boolean Theorems

Lecture 4 - Definitions, SoP and Pos

Lecture 5 - Algebraic Minimization Examples

Lecture 6 - Introduction to Verilog

Lecture 7 - Universality, Rearranging Truth Tables

Lecture 8 - Karnaugh Maps

Lecture 9 - K-Map Minimization

Lecture 10 - K-Map with Don't cares

Lecture 11 - Multiple Output Functions

Lecture 12 - Number Systems

Lecture 13 - Encoders and Decoders

Lecture 14 - Multiplexers

Lecture 15 - Multiplexer based Circuit Design

Lecture 16 - Verilog

Lecture 17 - Compiling and Running Verilog - A Demonstration

Lecture 18 - Sequential Elements

Lecture 19 - Gated Latches

Lecture 20 - Flipflops

Lecture 21 - Verilog - Assign Statement and Instantiation

Lecture 22 - Sequential Circuits

Lecture 23 - CMOS+Electrical Properties

Lecture 24 - Delays

Lecture 25 - Sequential Element Delays

Lecture 26 - More Sequential Circuits

Lecture 27 - Introduction to State Machines

Lecture 28 - Always Statement in Verilog

Lecture 29 - Sequential Logic Synthesis

Lecture 30 - FSM Design Problems

Lecture 31 - State Minimization

Lecture 32 - State Assignment

Lecture 33 - Timing Sequential Circuits

Lecture 34 - Verilog Styles + Sequential Elements

Lecture 35 - GCD Algorithm

Lecture 36 - GCD Machines Datapath

Lecture 37 - GCD State Machine

Lecture 38 - GCD Top Level Module

Lecture 39 - Datapath in Verilog

Lecture 40 - Datapath Elements in Verilog

Lecture 41 - FSM in Verilog

Lecture 42 - Putting it all together

Lecture 43 - Pipelining

Lecture 44 - K-stage Pipeline

Lecture 45 - Interleaving and Parallelism

Lecture 46 - Blocking and Non-blocking Statements

Lecture 47 - Modeling Circuits with Pipelining

Lecture 48 - Signed Number Representation

Lecture 49 - Signed Number Addition

Lecture 50 - Adder/Subtracter

Lecture 51 - Fast Adders

Lecture 52 - Multiplication

Lecture 53 - Closing

NPTEL : NOC:Networks and Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. V.G.K. Murti, Mr. C. S. Ramalingam, Dr. Andrew Thangaraj

Lecture 1 - Functions in circuits - constant and sinusoidal functions

Lecture 2 - Functions in circuits - Exponential function

Lecture 3 - Complex numbers and other topics

Lecture 4 - Systems, Signals, Networks

Lecture 5 - Representation and Classification of Systems

Lecture 6 - Linear systems

Lecture 7 - Time-invariance and causality

Lecture 8 - Signals, Elementary continuous signals

Lecture 9 - Complex frequencies of signals

Lecture 10 - Discontinuous signals - step, ramp

Lecture 11 - Unit impulse or delta function

Lecture 12 - Basic discrete-time signals

Lecture 13 - Examples of Signals

Lecture 14 - Introduction to Systems, Complementary Functions, Initial Conditions

Lecture 15 - Special initial conditions

Lecture 16 - Characterization of a linear system

Lecture 17 - Impulse Response

Lecture 18 - Evaluating the Convolution Integral

Lecture 19 - Worked-out Problems

Lecture 20 - Introduction and Motivation

Lecture 21 - Evaluating Fourier series coefficients

Lecture 22 - Symmetry conditions

Lecture 23 - Symmetry Condition Examples

Lecture 24 - Application to Network Analysis

Lecture 25 - Exponential Fourier Series

Lecture 26 - Frequency Spectrum

Lecture 27 - Examples

Lecture 28 - Signal Power and Related Ideas

Lecture 29 - Convergence of Fourier Series

Lecture 30 - Week 1 Solutions

Lecture 31 - Hints for Assignment 2

Lecture 32 - Hints for Assignment 3

Lecture 33 - Additional Properties of Fourier Series

Lecture 34 - Exercises on Fourier Series

Lecture 35 - Lab Demo

Lecture 36 - From Fourier Series to Fourier Transform

Lecture 37 - Continuous Time Fourier Transform

Lecture 38 - Fourier Transform Examples

Lecture 39 - Examples and Some Properties of Fourier Transform

Lecture 40 - Properties of Fourier Transform (contd.)

Lecture 41 - More Fourier Transform Properties

Lecture 42 - Energy Considerations

Lecture 43 - Energy Considerations II

Lecture 44 - Helpful Relationships for Inverse Fourier Transform

Lecture 45 - Fourier transform of signals that are not absolutely integrable

Lecture 46 - Fourier Transform of Periodic Signals, Unit Step and Signum Function

Lecture 47 - Truncated Sine wave and Convolution properties

Lecture 48 - Integration in Time domain

Lecture 49 - Application of continuous-time Fourier transform to system analysis

Lecture 50 - Comments about transient analysis

Lecture 51 - Sampling Theorem and Exercises on Fourier Transforms

Lecture 52 - Introduction to Laplace Transform

Lecture 53 - Laplace transforms of important functions

Lecture 54 - Recap, Poles / Zeros and Laplace Transform Notation

Lecture 55 - Properties: Linearity, differentiation in the time domain

Lecture 56 - Application and properties of Laplace transform

Lecture 57 - More properties of Laplace transform: Shift in frequency domain

Lecture 58 - More properties of Laplace transform

Lecture 59 - Properties: Division by `t, Initial value theorem, Final value theorem

Lecture 60 - Properties: Convolution in time domain

Lecture 61 - Complex convolution and periodic functions

Lecture 62 - Examples of Laplace transform

Lecture 63 - Laplace transform examples

Lecture 64 - Inverse Laplace transform

Lecture 65 - Partial fractions: general case

Lecture 66 - Inverse Laplace Transform and Contour Integration

Lecture 67 - Relating Fourier and Laplace Transform

Lecture 68 - Exercises

Lecture 69 - Applications of Laplace transform to network transients

Lecture 70 - Laplace transform for resistor and system analysis

Lecture 71 - Laplace transform method for mutual inductance

Lecture 72 - Mutual Inductance Continued

Lecture 73 - Examples and Advantages of L-transform

Lecture 74 - General LTI systems and more about H(s)

Lecture 75 - Many facets of the system function (contd)

Lecture 76 - Frequency response and stability

Lecture 77 - Full circuit example

Lecture 78 - Exercises

NPTEL : NOC:Circuit Analysis for Analog Designers (Electronics and Communication Engineering)

Co-ordinators : Prof. Shanthi Pavan

Lecture 1 - Course Introduction and Motivation

Lecture 2 - Kirchoff's Current and Voltage Laws, and the Incidence Matrix

Lecture 3 - Power Conservation and Tellegen's Theorem

Lecture 4 - Intuition behind Tellegen's Theorem

Lecture 5 - Tellegen's Theorem and reciprocity in linear resistive networks

Lecture 6 - Why is reciprocity useful in practice?

Lecture 7 - Inter-reciprocity in linear time-invariant networks

Lecture 8 - Inter-reciprocity in linear time-invariant networks (Continued...)

Lecture 9 - Inter-reciprocity in networks with ideal operational amplifiers

Lecture 10 - Review of Modified Nodal Analysis (MNA) of linear networks

Lecture 11 - MNA stamps of controlled sources - the VCCS and VCVS

Lecture 12 - MNA stamps of controlled sources - the CCCS and CCVS

Lecture 13 - Inter-reciprocity in linear networks - using the MNA stamp approach

Lecture 14 - The Adjoint Network

Lecture 15 - MNA stamp of an ideal opamp

Lecture 16 - Properties of circuits with multiple ideal opamps

Lecture 17 - Introduction to Analog Active Filters

Lecture 18 - Magnitude approximation principles

Lecture 19 - The maximally flat (Butterworth) approximation

Lecture 20 - The Butterworth Approximation (Continued...)

Lecture 21 - Connection between magnitude response and pole locations in an all-pole filter

Lecture 22 - Cascade-of-biquads, realization of stray-insensitive first-order section

Lecture 23 - Opamp-RC biquadratic sections

Lecture 24 - Active-RC biquads and Impedance scaling

Lecture 25 - Opamp-RC biquadratic sections (Continued...)

Lecture 26 - High-order filters using cascade of biquads, Dynamic range scaling in opamp-RC filters

Lecture 27 - The finite gain-bandwidth model of nonideal opamps

Lecture 28 - Effect of finite opamp bandwidth on an active-RC integrator

Lecture 29 - Effect of finite opamp bandwidth on an active-RC biquad

Lecture 30 - Visualization and mitigation of the effect of Q-enhancement

Lecture 31 - Transconductance-Capacitance integrators

Lecture 32 - Introduction to noise in electrical networks

Lecture 33 - Noise processed by a linear time-invariant system

Lecture 34 - kT/C noise in a sample-and-hold circuit

Lecture 35 - Noise in RLC networks

Lecture 36 - Total integrated noise in RLC Networks

Lecture 37 - Bode's Noise Theorem - Frequency domain

Lecture 38 - Input referred noise in electrical networks - Part 1

Lecture 39 - Input referred noise in electrical networks - Part 2

Lecture 40 - Input referred noise and the noise factor

Lecture 41 - Noise Factor Examples

Lecture 42 - Introduction to distributed networks, the ideal transmission line

Lecture 43 - Solving the wave equation in an ideal transmission line

Lecture 44 - Transmisson line circuit analysis : The short circuited and open circuited line

Lecture 45 - Transmission line circuit analysis, the reflection coefficient, open and short-circuited lines

Lecture 46 - Transmission line driven by a source, power in a transmission line

Lecture 47 - The Smith chart

Lecture 48 - The need for scattering parameters

Lecture 49 - Scattering Parameters: Introduction

Lecture 50 - Example scattering matrix calculations

Lecture 51 - Scattering matrices properties

Lecture 52 - Measuring the S-parameters of a one-port

Lecture 53 - The one-port vector network analyzer

Lecture 54 - The two-port vector network analyzer

Lecture 55 - Weak nonlinearity in electronic circuits, second-order harmonic distortion, HD2 and IM2

Lecture 56 - Weak nonlinearity in electronic circuits, second-order intermodulation distortion

Lecture 57 - Gain compression and third-order harmonic distortion

Lecture 58 - Third-order intermodulation distortion

Lecture 59 - Weak nonlinearities in circuits: Intuition behind the method of current injection

Lecture 60 - Weak nonlinearities in circuits: Calculating nonlinear components

Lecture 61 - Current-injection analysis of distortion in a negative feedback system

Lecture 62 - Current-injection analysis of distortion in a negative feedback system (Continued...)

Lecture 63 - Course summary and recap

NPTEL : NOC:Design and Analysis of VLSI Subsystems (Electronics and Communication Engineering)

Co-ordinators : Prof. Madhav Rao

Lecture 1 - Understanding Silicon

Lecture 2 - Introduction to NMOS

Lecture 3 - NMOS Transistor Working

Lecture 4 - PMOS Transistor

Lecture 5 - MOS Capacitances

Lecture 6 - Non Ideal MOS model

Lecture 7 - Short channel current model

Lecture 8 - Short channel current model analysis

Lecture 9 - Channel Length modulation index

Lecture 10 - DC characteristics of Inverter

Lecture 11 - Transfer characteristics of Inverter

Lecture 12 - Skewed Inverter

Lecture 13 - Skewed Inverter and threshold voltage

Lecture 14 - Equivalent of transistors in series

Lecture 15 - Transmission Gate

Lecture 16 - Bad CMOS Buffer - Part 1

Lecture 17 - Bad CMOS Buffer - Part 2

Lecture 18 - Noise margin characteristics of inverter

Lecture 19 - Noise margin parameters

Lecture 20 - Introduction to Delay in CMOS

Lecture 21 - Transient analysis of CMOS Inverter

Lecture 22 - RC approximated delay

Lecture 23 - Switching Resistance

Lecture 24 - CMOS Inverter approximated to RC Circuit

Lecture 25 - Elmore delay

Lecture 26 - Delay of FO4 inverter

Lecture 27 - Extracting capacitances of 3-Nand gate for delay estimation

Lecture 28 - Characterizing Delay of NOR gate

Lecture 29 - Linear Delay model

Lecture 30 - Logical effort and Parasitic delay

Lecture 31 - Logical effort and Parasitic delay for different gates

Lecture 32 - Logical effort for short-channel current model

Lecture 33 - Ring Oscillator design

Lecture 34 - Optimizing Gate Size

Lecture 35 - Optimizing Gate Sizes Example

Lecture 36 - Optimizing the Stages for an inverter path

Lecture 37 - Optimizing the Stages for a General Circuit

Lecture 38 - Decoder Design

Lecture 39 - Introduction to Combinational Circuit and assymetric gates

Lecture 40 - Assymetric Gates analysis

Lecture 41 - Assymetric Gates analysis using short-channel current model

Lecture 42 - Introduction to Skewed gates

Lecture 43 - Skewed gates and best P/N ratio

Lecture 44 - vIntroduction to Pseudo NMOS

Lecture 45 - Psudeo NMOS gates

Lecture 46 - Other Logic Family

Lecture 47 - Dynamic Logic and Domino logic

Lecture 48 - Domino gates

Lecture 49 - Introduction to Stick Diagram

Lecture 50 - Stick Diagram for different gates

Lecture 51 - Applying Eulers path for stick diagram representations

Lecture 52 - Multiplexer design and layout

Lecture 53 - Introduction to Interconnects

Lecture 54 - Interconnects - RC delay, and Energy

Lecture 55 - Introduction to crosstalks in interconnects

Lecture 56 - Transient analysis in Crosstalk

Lecture 57 - Introduction to Repeaters in Interconnect Engineering

Lecture 58 - Repeater Design

Lecture 59 - Energy and delay analysis for interconnectwith repeaters

Lecture 60

Lecture 61 - Introduction to Power

Lecture 62 - Switching Power and Energy Estimation

Lecture 63 - Activity factor and estimating dynamic power for a combinational circuit design

Lecture 64 - Analyzing Dynamic Power

Lecture 65 - Energy estimation through driving factor

Lecture 66 - Energy expression in terms of delay

Lecture 67 - Voltage Scaling

Lecture 68 - DVFS

Lecture 69 - Introduction to subthreshold leakage current model

Lecture 70 - Subthreshold leakage current and Gate leakage current

Lecture 71 - Estimating Static Power

Lecture 72 - Introduction to CMOS Latch design

Lecture 73 - CMOS Latch Design

Lecture 74 - CMOS Latch and flipflop design

Lecture 75 - Static Timing Analysis

Lecture 76 - Static Timing Analysis (Continued...)

Lecture 77 - Static Timing Analysis - Part 2

Lecture 78 - Static Timing Analysis - Part 2.1

Lecture 79 - Static Timing Analysis - Part 3

Lecture 80 - TPDQ and TPCQ

Lecture 81 - Static Timing Analysis - Part 4

Lecture 82 - Static Timing Analysis - Part 5

Lecture 83 - Static Timing Analysis - Part 6

Lecture 84 - SET and CLEAR enabled Latch and Flipflop Design

Lecture 85 - 1-bit Adder design

Lecture 86 - Adder-Part2

Lecture 87 - PG architecture - Part 1

Lecture 88 - PG architecture - Part 2

Lecture 89 - Carry Skip Adder

Lecture 90 - Carry Look Ahead and Carry Increment Adder

Lecture 91 - Other Adder Subsystems

Lecture 92 - Approximate Multipliers - Part 1

Lecture 93 - Approximate Multipliers - Part 2

Lecture 94 - Approximate Adder

NPTEL : NOC:Nonlinear Dynamical Systems and Control (Electronics and Communication Engineering)

Co-ordinators : Prof. Sanjay Bhat, Prof. Vijaysekhar Chellaboina

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Ordinary Differential Equations - Part 1

Lecture 4 - Ordinary Differential Equations - Part 2

Lecture 5 - ODE Solutions via Examples

Lecture 6 - Solutions to ODEs

Lecture 7 - Existence and Uniqueness Theorems

Lecture 8 - Asymptotic Behaviour of Dynamical Systems - Part 1

Lecture 9 - Asymptotic Behaviour of Dynamical Systems - Part 2

Lecture 10 - Asymptotic Behaviour of Dynamical Systems - Part 3

Lecture 11 - Stability Theory: Definitions - Part 1

Lecture 12 - Stability Theory: Definitions - Part 2

Lecture 13 - Stability Theory: Lyapunov Methods - Part 1

Lecture 14 - Stability Theory: Lyapunov Methods - Part 2

Lecture 15 - Lyapunov Function Examples

Lecture 16 - LaSalle's Invariance Theorem

Lecture 17 - Stability Theory: Converse Lyapunov and Instability Theorems

Lecture 18 - Solved Problems - Part 1

Lecture 19 - Solved Problems - Part 2

Lecture 20 - Linear Systems - Part 1

Lecture 21 - Linear Systems - Part 2

Lecture 22 - Linearization of Nonlinear Systems

Lecture 23 - Linear Systems and Linearization: Solved Problems - Part 1

Lecture 24 - Linear Systems and Linearization: Solved Problems - Part 2

Lecture 25 - Nonlinear Analysis: Key Concepts and Results - Part 1

Lecture 26 - Nonlinear Analysis: Key Concepts and Results - Part 2

Lecture 27 - Construction of Lyapunov Functions - Part 1

Lecture 28 - Construction of Lyapunov Functions - Part 2

Lecture 29 - Futher Topics - Part 1

Lecture 30 - Futher Topics - Part 2

Lecture 31 - Introduction to Robust Stability

Lecture 32 - Robust Stability for Structured Uncertainty - Part 1

Lecture 33 - Robust Stability for Structured Uncertainty - Part 2

Lecture 34 - Robust Stability for Structured Uncertainty - Part 3

Lecture 35 - The Absolute Stability (Lure) Problem

Lecture 36 - Robust Stability: A Solved Problem

Lecture 37 - Dissipativity Theory - Part 1

Lecture 38 - Dissipativity Theory - Part 2

Lecture 39 - Dissipativity: Solved Problems

Lecture 40 - Feedback Interconnection of Dissipative Systems - Part 1

Lecture 41 - Feedback Interconnection of Dissipative Systems - Part 2

Lecture 42 - Stable Adaptive Control - Part 1

Lecture 43 - Stable Adaptive Control - Part 2

Lecture 44 - Examples and Generalizations - Part 1

Lecture 45 - Examples and Generalizations - Part 2

Lecture 46 - Optimization - Part 1

Lecture 47 - Optimization - Part 2

Lecture 48 - Functional Optimization - Part 1

Lecture 49 - Functional Optimization - Part 2

Lecture 50 - Optimal Control - Part 1

Lecture 51 - Optimal Control - Part 2

Lecture 52 - Optimal Control - Part 3

Lecture 53 - Stability Margins of Feedback Controllers

Lecture 54 - Control Lyapunov Functions

Lecture 55 - Disturbance Rejection - Part 1

Lecture 56 - Disturbance Rejection - Part 2

Lecture 57 - Revisition through Solved Problems - I

Lecture 58 - Revisition through Solved Problems - I (Continued...)

Lecture 59 - Revision through Solved Problems II

Lecture 60 - Revision through Solved Problems III - Part 1

Lecture 61 - Revision through Solved Problems III - Part 2

Lecture 62 - Assorted Topics: Highlights - Part 1

Lecture 63 - Assorted Topics: Highlights - Part 2

NPTEL : NOC:Digital Protection of Power System (Electronics and Communication Engineering)

Co-ordinators : Prof. Bhaveshkumar R. Bhalja

Lecture 1 - Introduction to Digital Relays - I

Lecture 2 - Introduction to Digital Relays - II

Lecture 3 - Components of Digital Relays

Lecture 4 - Fundamentals of Digital Relays

Lecture 5 - Phasor Estimation Algorithm - I

Lecture 6 - Phasor Estimation Algorithm - II

Lecture 7 - Phasor Estimation Algorithm - III

Lecture 8 - Phasor Estimation Algorithm - IV

Lecture 9 - Phasor Estimation Algorithm - V

Lecture 10 - Frequency Estimation Algorithm

Lecture 11 - Digital Protection of Transformer - I

Lecture 12 - Digital Protection of Transformer - II

Lecture 13 - Digital Protection of Transformer - III

Lecture 14 - Digital Protection of Transformer - IV

Lecture 15 - Digital Protection of Transformer - V

Lecture 16 - Digital Protection of Induction Motors - I

Lecture 17 - Digital Protection of Induction Motors - II

Lecture 18 - Digital Protection of Induction Motors - III

Lecture 19 - Digital Protection of Generators - I

Lecture 20 - Digital Protection OF Generators - II

Lecture 21 - Coordination of Overcurrent Relays for Distribution Network - I

Lecture 22 - Coordination of Overcurrent Relays for Distribution Network - II

Lecture 23 - Coordination of Overcurrent Relays for Distribution Network - III

Lecture 24 - Coordination of Overcurrent Relays for Distribution Network - IV

Lecture 25 - Coordination of Overcurrent Relays for Distribution Network - V

Lecture 26 - Coordination of Overcurrent Relays for Distribution Network - VI

Lecture 27 - Load Shedding and Frequency Relaying - I

Lecture 28 - Load Shedding and Frequency Relaying - II

Lecture 29 - Islanding Detection

Lecture 30 - Digital Distance Relaying Scheme for transmission Line - I

Lecture 31 - Digital Distance Relaying Scheme for transmission Line - II

Lecture 32 - Introduction to Phasor Measurement Unit - I

Lecture 33 - Introduction to Phasor Measurement Unit - II

Lecture 34 - Introduction to Phasor Measurement Unit - III

Lecture 35 - Introduction to IEC 61850 - I

Lecture 36 - Introduction to IEC 61850 - II

Lecture 37 - Application of Big-Data Analytics in Power System Protection

Lecture 38 - Cyber Security Issues in Power System Network

Lecture 39 - Protection of Hybride AC/DC Microgrid: Issues and Challenges

Lecture 40 - Application of AI-Based Techniques in Digital Protection

NPTEL : NOC:Physics of Nanoscale Devices (Electronics and Communication Engineering)

Co-ordinators : Prof. Vishvendra Singh Poonia

Lecture 1 - Introduction

Lecture 2 - Introduction and Course Overview

Lecture 3 - Basics of Quantum Mechanics

Lecture 4 - Electron in a Potential Well

Lecture 5 - Electrons in Solids

Lecture 6 - KP Model

Lecture 7 - KP Model, Effective Mass

Lecture 8 - Bands, Effective Mass, DOS

Lecture 9 - Effective Mass, DOS

Lecture 10 - Density of States

Lecture 11 - Density of States

Lecture 12 - Density of States - 3D, 2D

Lecture 13 - Density of States - 2D, 1D, 0D

Lecture 14 - DOS, Fermi Function

Lecture 15 - Fermi- Dirac Distribution

Lecture 16 - Fermi Function, General Model of Transport

Lecture 17 - General Model of Transport - I

Lecture 18 - General Model of Transport - II

Lecture 19 - General Model of Transport - III

Lecture 20 - General Model of Transport, Modes

Lecture 21 - Modes - I

Lecture 22 - Modes - II

Lecture 23 - Modes, Diffusive Transport

Lecture 24 - Diffusive Transport

Lecture 25 - Diffusive Transport, Conductance

Lecture 26 - Conductance, Bulk Transport - I

Lecture 27 - Conductance, Bulk Transport - II

Lecture 28 - Resistance: Ballistic and Diffusive Cases - I

Lecture 29 - Resistance: Ballistic and Diffusive Cases - II

Lecture 30 - Resistance: Ballistic and Diffusive Cases - III

Lecture 31 - Resistance: Diffusive Case

Lecture 32 - The Idea of Mobility

Lecture 33 - Voltage Drop in Ballistic Conductor

Lecture 34 - 1D and 2D Realistic Conductors

Lecture 35 - Introduction to MOSFET - I

Lecture 36 - Introduction to MOSFET - II

Lecture 37 - MOSFET: A Barrier Controlled Device

Lecture 38 - MOSFET Electrical Characteristics

Lecture 39 - MOSFET IV Characteristics - I

Lecture 40 - MOSFET IV Characteristics - II

Lecture 41 - MOSFET IV Characteristics - III

Lecture 42 - MOSFET IV Characteristics - Traditional Approach

Lecture 43 - MOSFET: Transport - I

Lecture 44 - MOSFET: Transport - II

Lecture 45 - MOSFET: Landauer Transport

Lecture 46 - Landauer Transport and Ballistic MOSFET

Lecture 47 - Ballistic MOSFET

Lecture 48 - Ballistic Injection Velocity

Lecture 49 - Velocity Saturation in Ballistic MOSFET and Electrostatics

Lecture 50 - MOS Electrostatics

Lecture 51 - MOS Electrostatics

Lecture 52 - MOSFET: Electrostatics, Threshold Voltage

Lecture 53 - MOSFET: 2D Electrostatics

Lecture 54 - MOSFET: 2D Electrostatics and Quantum Confinement

Lecture 55 - ETSOI MOSFETs, Quantum Confinement, Strain Engineering

Lecture 56 - Strain Engineering, Thermoelectric Effects

Lecture 57 - Thermoelectric Effects

Lecture 58 - Thermoelectric Effects, Quantum Dot Devices

Lecture 59 - Quantum Dot Devices

Lecture 60 - Quantum Dot Devices - IV Characteristics, DFT, Course Summary

NPTEL : NOC:Low Voltage CMOS Circuit Operation (Electronics and Communication Engineering)

Co-ordinators : Prof. Anand Bulusu

Lecture 1 - Introduction and Motivation

Lecture 2 - Review of MOSFET operation - I

Lecture 3 - Review of MOSFET operation - II

Lecture 4 - Basic charge model - I

Lecture 5 - Basic charge model - II

Lecture 6 - Basic charge model - III

Lecture 7 - Basic charge model - IV

Lecture 8 - Basic charge model - V

Lecture 9 - Basic charge model - VI

Lecture 10 - Basic charge model - VII

Lecture 11 - Basic charge model - VIII

Lecture 12 - Basic charge model - IX

Lecture 13 - Basic charge model - X

Lecture 14 - Minimum energy point - I

Lecture 15 - Minimum energy point - II

Lecture 16 - Minimum energy point - III

Lecture 17 - Transistor sizing for combinational circuit - I

Lecture 18 - Transistor sizing for combinational circuit - II

Lecture 19 - Transistor sizing for asymmetric combinational circuits

Lecture 20 - Charging and discharging mechanism in NTV combinational gates

Lecture 21 - Effective current for NTV inverter

Lecture 22 - Effective current for NTV combinational gates - I

Lecture 23 - Effective current for NTV combinational gates - II

Lecture 24 - Effective current for NTV combinational gates - III

Lecture 25 - Combinational circuit design considering variations - I

Lecture 26 - Combinational circuit design considering variations - II

Lecture 27 - Buffer design considering INWE

Lecture 28 - Decoder design considering INWE

Lecture 29 - Flip-flop operation

Lecture 30 - Warning flip-flops design and operation

Lecture 31 - Single phase flip-flops design and operation

Lecture 32 - Consideration of radiation effects in NTV

Lecture 33 - Radiation-hardened NTV sequential circuit elements

Lecture 34 - Level shifters for multi-Vdd domains

Lecture 35 - Introduction to 6T SRAM

Lecture 36 - Stability and Reliability Issues in 6T SRAM

Lecture 37 - Read and Write-Assist Circuits in 6T SRAM

Lecture 38 - Physical Insights into Channel Charge Distribution

Lecture 39 - FinFET based Standard Cell Design

Lecture 40 - Example problems

NPTEL : Circuits for Analog System Design (Electronics and Communication Engineering)

Co-ordinators : Prof. M.K. Gunasekaran

Lecture 1 - Transistor Amplifier

Lecture 2 - Transistor Op-amp and Transistor Based Voltage Regulator

Lecture 3 - Some applications of transistor - I

Lecture 4 - Some applications of transistor - II

Lecture 5 - Transformer design & Heat sink design

Lecture 6 - Op-amp Based Linear Voltage Regulator

Lecture 7 - Short circuit protection for linear power supply

Lecture 8 - Temperature indicator design using Op-amp

Lecture 9 - On & off Temperature controller design

Lecture 10 - Proportional Temperature Controller Design

Lecture 11 - PID - Temperature Controller Design

Lecture 12 - Heater Drive for Various Temperature Controllers

Lecture 13 - Short Circuit Protection of Power MOSFET

Lecture 14 - Error budgeting for temperature Indicator

Lecture 15 - PID Temperature Controllers with Error Budgeting

Lecture 16 - Error Budgeting for Constant Current Sources

Lecture 17 - Error Budgeting for Thermo Couple Amplifier

Lecture 18 - Error Budgeting for Op amp Circuits

Lecture 19 - Gain Error Calculation in Op amp Circuits

Lecture 20 - Input Resistance Calculations for Op amp

Lecture 21 - Output Resistance Calculations for Op amp

Lecture 22 - Error Budgeting for Different Circuits

Lecture 23 - 4-20 mA current Transmitter design

Lecture 24 - Error budgeting for 4-20mA Current Transmitters

Lecture 25 - LVDT Based Current Transmitters

Lecture 26 - Constant Current Source Design

Lecture 27 - 4-20 MA Based Temperature Transmitter

Lecture 28 - 3-Wire Current Transmitter

Lecture 29 - Various Resistance Measurement Techniques

Lecture 30 - Ratio Transformer Technique to Measure Resistance and capacitance

Lecture 31 - Capacitive Sensor Circuit Design Examples

Lecture 32 - Capacitive Sensor Circuit With High Impedance Amplifier

Lecture 33 - AC- applications of the Op-Amp and Lock in Amplifier Design

Lecture 34 - Design of lock in Amplifier Circuit with example

Lecture 35 - Dual Slopes ADC â€“ Design Examples

Lecture 36 - Dual Slope ADC and Successor approximation ADC

Lecture 37 - MC based ADC

Lecture 38 - Digital to analog Converter design and working, Flash ADC

Lecture 39 - Flash ADC and ADC Converter errors

Lecture 40 - Sigma delta ADC working Principle

NPTEL : Digital System design with PLDs and FPGAs (Electronics and Communication Engineering)

Co-ordinators : Prof. Kuruvilla Varghese

Lecture 1 - Course Contents, Objective

Lecture 2 - Revision of Prerequisite

Lecture 3 - Design of Synchronous Sequential Circuits

Lecture 4 - Analysis of Synchronous Sequential Circuits

Lecture 5 - Top-down Design

Lecture 6 - Controller Design

Lecture 7 - Control algorithm and State diagram

Lecture 8 - Case study 1

Lecture 9 - FSM issues 1

Lecture 10 - FSM Issues 2

Lecture 11 - FSM Issues 3

Lecture 12 - FSM Issues 4

Lecture 13 - FSM Issues 5

Lecture 14 - Synchronization 1

Lecture 15 - Synchronization 2

Lecture 16 - Case study 2

Lecture 17 - Case study on FPGA Board

Lecture 18 - Entity, Architecture and Operators

Lecture 19 - Concurrency, Data flow and Behavioural models

Lecture 20 - Structural Model, Simulation

Lecture 21 - Simulating Concurrency

Lecture 22 - Classes and Data types

Lecture 23 - Concurrent statements and Sequential statements

Lecture 24 - Sequential statements and Loops

Lecture 25 - Modelling flip-flops, Registers

Lecture 26 - Synthesis of Sequential circuits

Lecture 27 - Libraries and Packages

Lecture 28 - Operators, Delay modelling

Lecture 29 - Delay modelling

Lecture 30 - VHDL Examples

Lecture 31 - VHDL coding of FSM

Lecture 32 - VHDL Test bench

Lecture 33 - VHDL Examples, FSM Clock

Lecture 34 - Evolution of PLDs

Lecture 35 - Simple PLDs

Lecture 36 - Simple PLDs: Fitting

Lecture 37 - Complex PLDs

Lecture 38 - FPGA Introduction

Lecture 39 - FPGA Interconnection, Design Methodology

Lecture 40 - Xilinx Virtex FPGAâ€™s CLB

Lecture 41 - Xilinx Virtex Resource Mapping, IO Block

Lecture 42 - Xilinx Virtex Clock Tree

Lecture 43 - FPGA Configuration

Lecture 44 - Altera and Actel FPGAs

NPTEL : Error Correcting Codes (Electronics and Communication Engineering)

Co-ordinators : Prof. P. Vijay Kumar

Lecture 1 - Course Overview & Basics

Lecture 2 - Example Codes and their Parameters

Lecture 3 - Mathematical Preliminaries: Groups

Lecture 4 - Subgroups and Equivalence Relations

Lecture 5 - Cosets, Rings & Fields

Lecture 6 - Vector Spaces, Linear Independence and Basis

Lecture 7 - Linear Codes, & Linear independence

Lecture 8 - Spanning & Basis

Lecture 9 - The Dual Code

Lecture 10 - Systematic Generator Matrix

Lecture 11 - Minimum Distance of a Linear Code

Lecture 12 - Bounds on the size of a Code

Lecture 13 - Asymptotic Bounds

Lecture 14 - Standard Array Decoding

Lecture 15 - Performance Analysis of the SAD

Lecture 16 - State and Trellis

Lecture 17 - The Viterbi Decoder

Lecture 18 - Catastrophic Error Propagation

Lecture 19 - Path Enumeration

Lecture 20 - Viterbi Decoder over the AWGN Channel

Lecture 21 - Generalized Distributive Law

Lecture 22 - The MPF Problem

Lecture 23 - Further Examples of the MPF Problem

Lecture 24 - Junction Trees

Lecture 25 - Example of Junction Tree Construction

Lecture 26 - Message passing on the Junction tree

Lecture 27 - GDL Approach to Decoding Convolutional Codes

Lecture 28 - ML Code-Symbol Decoding of the Convolutional Code

Lecture 29 - LDPC Codes

Lecture 30 - LDPC Code Terminology

Lecture 31 - Gallager Decoding Algorithm A

Lecture 32 - BP Decoding of LDPC Codes

Lecture 33 - BP Decoding (Continued)

Lecture 34 - Density Evolution under BP decoding

Lecture 35 - Convergence & Concentration Theorem - LDPC Codes

Lecture 36 - A Construction for Finite Fields

Lecture 37 - Finite Fields: A Deductive Approach

Lecture 38 - Deductive Approach to Finite Fields

Lecture 39 - Subfields of a Finite field

Lecture 40 - Transform Approach to Cyclic Codes

Lecture 41 - Estimating the Parameters of a Cyclic Code

Lecture 42 - Decoding Cyclic Codes

NPTEL : Nanoelectronics: Devices and Materials (Electronics and Communication Engineering)

Co-ordinators : Dr. Navakanta Bhat, Prof. K.N. Bhat, Dr. S.A. Shivashankar

Lecture 1 - Introduction to Nanoelectronics

Lecture 2 - CMOS Scaling Theory

Lecture 3 - Short Channel Effects

Lecture 4 - Subthreshold Conduction

Lecture 5 - Drain Induced Barrier Lowering

Lecture 6 - Channel and Source / Drain Engineering

Lecture 7 - CMOS Process Flow

Lecture 8 - Gate oxide scaling and reliability

Lecture 9 - High-k gate dielectrics

Lecture 10 - Metal gate transistor

Lecture 11 - Industrial CMOS Technology

Lecture 12 - Ideal MOS C-V Characteristics

Lecture 13 - Effect of non idealities on C-V

Lecture 14 - MOS Parameter Extraction from C-V Characteristics

Lecture 15 - MOS Parameter Extraction from I-V Characteristics

Lecture 16 - MOSFET Analysis, sub-threshold swing Â“SÂ”

Lecture 17 - Interface state density effects on Â“SÂ”. Short Channel Effects (SCE) and Drain Induced Barrier Lowering (DIBL)

Lecture 18 - Velocity Saturation, Ballistic transport, and Velocity Overshoot Effects and Injection Velocity

Lecture 19 - SOI Technology and comparisons with Bulk Silicon CMOS technology

Lecture 20 - SOI MOSFET structures, Partially Depleted (PD)and Fully Depleted (FD) SOIMOSFETs

Lecture 21 - FD SOI MOSFET: Operation Modes and Threshold Voltages and Electric Fields

Lecture 22 - Sub-threshold Slope & SCE suppression in FD SOI MOSFET, Volume Inversion and Ultra thin (UTFD) SOI MOSFET and quantization Effect, FINFET

Lecture 23 - Need for MS contact Source/Drain Junction in Nano scale MOSFETs

Lecture 24 - Rectifying and Ohmic contacts and challenges in MS unction source drain MOSFET Technology

Lecture 25 - Effect of Interface states and Fermi level pinning on MS contacts on Si and passivation techniques for MS S/D MOSFETS

Lecture 26 - Germanium as an alternate to silicon for high performance MOSFETs and the challenges in Germanium Technology

Lecture 27 - Germanium MOSFT technology and recent results on surface passivated Ge MOSFETS

Lecture 28 - Compound semiconductors and hetero junction FETsfor high performance

Lecture 29 - GaAs MESFETs: Enhancement and depletion types. Velocity Overshoot effcts in GaAs MESFETs

Lecture 30 - Hetero-junctions and High Electron Mobility Transistors (HEMT)

Lecture 31 - Introduction to Nanomaterials

Lecture 32 - Basic Principles of Quantum Mechanics

Lecture 33 - Basic Principles of Quantum Mechanics (Continued...)

Lecture 34 - Energy bands in crystalline solids

Lecture 35 - Quantum structures and devices

Lecture 36 - Crystal growth and nanocrystals

Lecture 37 - Nanocrystals and nanostructured thin films

Lecture 38 - Nanowires and other nanostructures

Lecture 39 - Carbon Nanostructures and CVD

Lecture 40 - Atomic layer deposition (ALD)

Lecture 41 - Characterisation of nanomaterials

NPTEL : Pattern Recognition (Electronics and Communication Engineering)

Co-ordinators : Prof. P.S. Sastry

Lecture 1 - Introduction to Statistical Pattern Recognition

Lecture 2 - Overview of Pattern Classifiers

Lecture 3 - The Bayes Classifier for minimizing Risk

Lecture 4 - Estimating Bayes Error; Minimax and Neymann-Pearson classifiers

Lecture 5 - Implementing Bayes Classifier; Estimation of Class Conditional Densities

Lecture 6 - Maximum Likelihood estimation of different densities

Lecture 7 - Bayesian estimation of parameters of density functions, MAP estimates

Lecture 8 - Bayesian Estimation examples; the exponential family of densities and ML estimates

Lecture 9 - Sufficient Statistics; Recursive formulation of ML and Bayesian estimates

Lecture 10 - Mixture Densities, ML estimation and EM algorithm

Lecture 11 - Convergence of EM algorithm; overview of Nonparametric density estimation

Lecture 12 - Convergence of EM algorithm, Overview of Nonparametric density estimation

Lecture 13 - Nonparametric estimation, Parzen Windows, nearest neighbour methods

Lecture 14 - Linear Discriminant Functions; Perceptron -- Learning Algorithm and convergence proof

Lecture 15 - Linear Least Squares Regression; LMS algorithm

Lecture 16 - AdaLinE and LMS algorithm; General nonliner least-squares regression

Lecture 17 - Logistic Regression; Statistics of least squares method; Regularized Least Squares

Lecture 18 - Fisher Linear Discriminant

Lecture 19 - Linear Discriminant functions for multi-class case; multi-class logistic regression

Lecture 20 - Learning and Generalization; PAC learning framework

Lecture 21 - Overview of Statistical Learning Theory; Empirical Risk Minimization

Lecture 22 - Consistency of Empirical Risk Minimization

Lecture 23 - Consistency of Empirical Risk Minimization; VC-Dimension

Lecture 24 - Complexity of Learning problems and VC-Dimension

Lecture 25 - VC-Dimension Examples; VC-Dimension of hyperplanes

Lecture 26 - Overview of Artificial Neural Networks

Lecture 27 - Multilayer Feedforward Neural networks with Sigmoidal activation functions;

Lecture 28 - Backpropagation Algorithm; Representational abilities of feedforward networks

Lecture 29 - Feedforward networks for Classification and Regression; Backpropagation in Practice

Lecture 30 - Radial Basis Function Networks; Gaussian RBF networks

Lecture 31 - Learning Weights in RBF networks; K-means clustering algorithm

Lecture 32 - Support Vector Machines -- Introduction, obtaining the optimal hyperplane

Lecture 33 - SVM formulation with slack variables; nonlinear SVM classifiers

Lecture 34 - Kernel Functions for nonlinear SVMs; Mercer and positive definite Kernels

Lecture 35 - Support Vector Regression and ?-insensitive Loss function, examples of SVM learning

Lecture 36 - Overview of SMO and other algorithms for SVM; ?-SVM and ?-SVR; SVM as a risk minimizer

Lecture 37 - Positive Definite Kernels; RKHS; Representer Theorem

Lecture 38 - Feature Selection and Dimensionality Reduction; Principal Component Analysis

Lecture 39 - No Free Lunch Theorem; Model selection and model estimation; Bias-variance trade-off

Lecture 40 - Assessing Learnt classifiers; Cross Validation;

Lecture 41 - Bootstrap, Bagging and Boosting; Classifier Ensembles; AdaBoost

Lecture 42 - Risk minimization view of AdaBoost

NPTEL : Analog Circuits and Systems 1 (Electronics and Communication Engineering)

Co-ordinators : Prof. K. Radhakrishna Rao

Lecture 1 - Introduction to Sensors, Signals and Systems

Lecture 2 - Role of Analog Signal Processing in Electronic Products - Part I

Lecture 3 - Role of Analog Signal Processing in Electronic Products - Part II

Lecture 4 - Analog Signal Processing using One Port Networks

Lecture 5 - Analog Signal Processing using One Port Networks, Passive Two Ports and Ideal amplifiers

Lecture 6 - Synthesis of Amplifiers using Nullators and Norators

Lecture 7 - Passive Electronic Devices for Analog Signal Processing

Lecture 8 - Active Devices for Analog Signal Processing Systems

Lecture 9 - Electronic Devices for Analog Circuits - Part I

Lecture 10 - Electronic Devices for Analog Circuits - Part II

Lecture 11 - Feedback in Systems

Lecture 12 - Static Charecteristic of Feedback Systems

Lecture 13 - Dynamic Behaviour of Feedback Systems - Part I

Lecture 14 - Dynamic Behavior of Feedback Systems - Part II

Lecture 15 - Design of Feedback Amplifiers - Part I

Lecture 16 - Design of Feedback Amplifiers - Part II

Lecture 17 - Design of Feedback Amplifiers and Instrumentation Amplifiers

Lecture 18 - Instrumentation Amplifiers, Integrators and Differentiators

Lecture 19 - Non-linear Analog Signal Processing

Lecture 20 - DC Voltage Regulators

Lecture 21 - Filters - Approximations to ideal filter functions

Lecture 22 - Passive Filters - Part I

Lecture 23 - Passive Filters - Part II

Lecture 24 - Active Filters - Part I

Lecture 25 - Active Filters - Part II

Lecture 26 - Active Filters: Q-enhancement

Lecture 27 - State Space Filters

Lecture 28 - Universal Active Filter - Effect of Active Device GB

Lecture 29 - State-Space Filters (Tuning of Filters)

Lecture 30 - Automatic Tuning of Filters (PLL) and Review of Filter Design

Lecture 31 - Waveform Generation

Lecture 32 - LC Oscillator - Effect of Non-idealities

Lecture 33 - Transconductor based Oscillator

Lecture 34 - Regenerative Comparators and Non-Sinusoidal Oscillators

Lecture 35 - Non-Sinusoidal Oscillators and VCO (FM & FSK Generators)

Lecture 36 - Phase and Frequency Followers

Lecture 37 - Frequency Locked Loop (Popularly known as PLL)

Lecture 38 - Design of PLL and FLL

Lecture 39 - Analog System Design

NPTEL : NOC:Design and Simulation of DC-DC converters using Open Source Tools (Electronics and Communication Engineering)

Co-ordinators : Prof. L. Umanand

Lecture 1 - System Overview

Lecture 2 - Understanding Rectifier with C-filter

Lecture 3 - Setting up gEDA, ngSpice and Octave

Lecture 4 - Simulation walk-through : Rectifier C-filter example

Lecture 5 - Designing the rectifier capacitor filter circuit

Lecture 6 - Startup surge limiting

Lecture 7 - DC-DC converter concepts

Lecture 8 - Buck, Boost and Buck-Boost Converters

Lecture 9 - Simulation Example of Buck Converter

Lecture 10 - Understanding Buck Converter

Lecture 11 - Understanding Boost and Buck-Boost

Lecture 12 - Forward Converter Topology

Lecture 13 - Waveforms and Design

Lecture 14 - Simulation of Forward Converter

Lecture 15 - Forward Converter with Lossless Core Reset

Lecture 16 - Transformer Design

Lecture 17 - Inductor Design

Lecture 18 - Flyback Converter Topology

Lecture 19 - Pushpull Converter

Lecture 20 - Half and Full Bridge Converters

Lecture 21 - Close Loop Operation of Converters

Lecture 22 - Simulation examples

Lecture 23 - Multi-Output Converters

Lecture 24 - Concluding Remarks

NPTEL : NOC:Enclosure Design of Electronics Equipment (Electronics and Communication Engineering)

Co-ordinators : Prof. N. V Chalapathi Rao

Lecture 1 - Enclosure design for Electronics Equipment Introduction

Lecture 2 - Aspects and features that are non electrical and are essential to Electronic Product Realisation

Lecture 3 - Enclosure Design in electronic equipment

Lecture 4 - Design as applied to small electronics products and projects

Lecture 5 - Sketching in design for communication

Lecture 6 - Sketching as a tool with example and exercise

Lecture 7 - Sketching Part 2

Lecture 8 - Enclosures to Product design

Lecture 9 - Examples of product enclosures ID_PD

Lecture 10 - Enclosures with detailing: Examples

Lecture 11 - Alternate Designs in an everyday item

Lecture 12 - Sheet metal in small equipment (PSU)

Lecture 13 - Layouts and Materials of small equipment

Lecture 14 - Materials used for construction

Lecture 15 - Materials choice

Lecture 16 - Aluminium for common equipment

Lecture 17 - Use of Aluminium extrusions

Lecture 18 - Application of Sheet metal

Lecture 19 - Sheet Metal bending

Lecture 20 - Development of enclosures for bending

Lecture 21 - Video of Fabrication

Lecture 22 - What can be done in the lab Bending

Lecture 23 - Issues in bending and folding

Lecture 24 - Making a quick model

Lecture 25 - Detailing in plastic

Lecture 26 - Fabricating with flat plastic

Lecture 27 - Video in ID Lab

Lecture 28 - Off the shelf enclosures

Lecture 29 - Ready made enclosures

Lecture 30 - Application documentation and Selection

Lecture 31 - Index of protection, Safety

Lecture 32 - NEMA and related

Lecture 33 - Testing for IP class

Lecture 34 - Sealed Enclosures Video

Lecture 35 - Public utility boxes

Lecture 36 - EMI Sealing

Lecture 37 - Sealed Enclosures 2

Lecture 38 - Gasketing practice

Lecture 39 - Gasketing Basics

Lecture 40 - Off the shelf Aluminum enclosures

Lecture 41 - Understanding

Lecture 42 - Heat sink enclosures

Lecture 43 - Detailing of Built in Heat sink boxes

Lecture 44 - Connector basics

Lecture 45 - Connectors - Part 2

Lecture 46 - Common connectors

Lecture 47 - Connectors (multi way) and CoAx

Lecture 48 - MIL C connectors

Lecture 49 - CAD in Layout Drawing

Lecture 50 - Types of CAD

Lecture 51 - CAD for enclosure Design

Lecture 52 - Egpt layout with CAD

Lecture 53 - CAD sample Example

Lecture 54 - CAD Layout

Lecture 55 - Detailing with CAD

Lecture 56 - Integrating Products with CAD

Lecture 57 - Product Detailing

Lecture 58 - Components CAD Physical Models

Lecture 59 - Sheet Metal and Plastic common details

Lecture 60 - Sample of Simple Organic Shapes

Lecture 61 - Conclusion

NPTEL : NOC:Design of Photovoltaic Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. L. Umanand

Lecture 1 - A historical perspective

Lecture 2 - PV cell characteristics and equivalent circuit

Lecture 3 - Model of PV cell

Lecture 4 - Short Circuit, Open Circuit and peak power parameters

Lecture 5 - Datasheet study

Lecture 6 - Cell efficiency

Lecture 7 - Effect of temperature

Lecture 8 - Temperature effect calculation example

Lecture 9 - Fill factor

Lecture 10 - PV cell simulation

Lecture 11 - Identical cells in series

Lecture 12 - Load line

Lecture 13 - Non-identical cells in series

Lecture 14 - Protecting cells in series

Lecture 15 - Interconnecting modules in series

Lecture 16 - Simulation of cells in series

Lecture 17 - Identical cells in parallel

Lecture 18 - Non-identical cells in parallel

Lecture 19 - Protecting cells in parallel

Lecture 20 - Interconnecting modules

Lecture 21 - Simulation of cells in parallel

Lecture 22 - Practicals - Measuring i-v characteristics

Lecture 23 - Practicals - PV source emulation

Lecture 24 - Introduction

Lecture 25 - Insolation and irradiance

Lecture 26 - Insolation variation with time of day

Lecture 27 - Earth centric viewpoint and declination

Lecture 28 - Solar geometry

Lecture 29 - Insolation on a horizontal flat plate

Lecture 30 - Energy on a horizontal flat plate

Lecture 31 - Sunrise and sunset hour angles

Lecture 32 - Examples

Lecture 33 - Energy on a tilted flat plate

Lecture 34 - Energy plots in octave

Lecture 35 - Atmospheric effects

Lecture 36 - Airmass

Lecture 37 - Energy with atmospheric effects

Lecture 38 - Clearness index

Lecture 39 - Clearness index and energy scripts in Octave

Lecture 40 - Sizing PV for applications without batteries

Lecture 41 - Sizing PV Examples

Lecture 42 - Batteries - intro

Lecture 43 - Batteries - Capacity

Lecture 44 - Batteries - C-rate

Lecture 45 - Batteries - Efficiency

Lecture 46 - Batteries - Energy and power densities

Lecture 47 - Batteries - Comparison

Lecture 48 - Battery selection

Lecture 49 - Other energy storage methods

Lecture 50 - PV system design - Load profile

Lecture 51 - PV system design - Days of autonomy and recharge

Lecture 52 - PV system design - Battery size

Lecture 53 - PV system design - PV array size

Lecture 54 - Design toolbox in octave

Lecture 55 - MPPT concept>

Lecture 56 - Input impedance of DC-DC converters - Boost converter

Lecture 57 - Input impedance of DC-DC converters - Buck converter

Lecture 58 - Input impedance of DC-DC converters - Buck-Boost converter

Lecture 59 - Input impedance of DC-DC converters - PV module in SPICE

Lecture 60 - Input impedance of DC-DC converters -Simulation - PV and DC-DC interface

Lecture 61 - Impedance control methods

Lecture 62 - Impedance control methods- Reference cell - voltage scaling

Lecture 63 - Impedance control methods- Reference cell - current scaling

Lecture 64 - Impedance control methods- Reference cell - Sampling method

Lecture 65 - Impedance control methods- Reference cell - Power slope method 1

Lecture 66 - Impedance control methods- Reference cell - Power slope method 2

Lecture 67 - Impedance control methods- Reference cell - Hill climbing method

Lecture 68 - Practical points - Housekeeping power supply

Lecture 69 - Practical points - Gate driver

Lecture 70 - Practical points - MPPT for non-resistive loads

Lecture 71 - Simulation - MPPT

Lecture 72 - Direct PV-battery connection

Lecture 73 - Charge controller

Lecture 74 - Battery charger - Understanding current control

Lecture 75 - Battery charger - slope compensation

Lecture 76 - Battery charger - simulation of current control

Lecture 77 - Batteries in series - charge equalisation

Lecture 78 - Batteries in parallel

Lecture 79 - Peltier device - principle

Lecture 80 - Peltier element - datasheet

Lecture 81 - Peltier cooling

Lecture 82 - Thermal aspects

Lecture 83 - Thermal aspects - Conduction

Lecture 84 - Thermal aspects - Convection

Lecture 85 - Thermal aspects - A peltier refrigeration example

Lecture 86 - Thermal aspects - Radiation and mass transport

Lecture 87 - Demo of Peltier cooling

Lecture 88 - Water pumping principle

Lecture 89 - Hydraulic energy and power

Lecture 90 - Total dynamic head

Lecture 91 - Numerical solution - Colebrook formula

Lecture 92 - Octave script for head calculation

Lecture 93 - PV and Water Pumping Examples

Lecture 94 - Octave script for hydraulic power

Lecture 95 - Centrifugal pump

Lecture 96 - Reciprocating pump

Lecture 97 - PV power

Lecture 98 - Pumped hydro application

Lecture 99 - Grid connection principle

Lecture 100 - PV to grid topologies Part-I

Lecture 101 - PV to grid topologies Part-II

Lecture 102 - PV to grid topologies Part-III

Lecture 103 - 3ph d-q controlled grid connection intro

Lecture 104 - 3ph d-q controlled grid connection dq-axis theory

Lecture 105 - 3ph d-q controlled grid connection AC to DC transformations

Lecture 106 - 3ph d-q controlled grid connection DC to AC transformations

Lecture 107 - 3ph d-q controlled grid connection Complete 3ph grid connection

Lecture 108 - 1ph d-q controlled grid connection

Lecture 109 - 3ph PV-Grid interface example

Lecture 110 - SVPWM - discrete implementation

Lecture 111 - SVPWM - analog implementation

Lecture 112 - Application of integrated magnetics

Lecture 113 - Life cycle Costing Growth models

Lecture 114 - Life cycle Costing Growth model examples

Lecture 115 - Life cycle Costing Annual payment and present worth factor

Lecture 116 - Life cycle Costing LCC with example - 1

Lecture 117 - Life cycle Costing LCC example - 2

Lecture 118 - Life cycle Costing LCC example - 3

NPTEL : NOC:Photonic Integrated Circuits (Electronics and Communication Engineering)

Co-ordinators : Dr. Srinivas Talabatulla

Lecture 1 - Introduction to Photonic Integrated Circuits

Lecture 2 - Optical Waveguide Theory - Symmetric Waveguides

Lecture 3 - Optical Waveguide Theory - Asymmetric Waveguides

Lecture 4 - Vector Modes

Lecture 5 - Channel Waveguide

Lecture 6 - Directional Coupler and Coupled Mode Theory

Lecture 7 - Passive Devices and Beam Propagation Method

Lecture 8 - Dynamic Devices

Lecture 9 - Integrated optical Systems and Applications

Lecture 10 - Fabrication and Characterisation

Lecture 11 - MOEMS

Lecture 12 - Ring Resonators

Lecture 13 - Photonic Band Gap Devices

Lecture 14 - Lecture Summary

NPTEL : NOC:Neural Science for Engineers (Electronics and Communication Engineering)

Co-ordinators : Prof. Vikas V

Lecture 1 - Course Outline and Scope

Lecture 2 - Biological Information Systems

Lecture 3 - Analogy between Living Systems with Semiconductor Structures

Lecture 4 - Action Potential - I

Lecture 5 - Action Potential - II

Lecture 6 - Synaptic Potential

Lecture 7 - Threshold and Action Potential Propogation

Lecture 8 - Anatomy of a Neuron

Lecture 9 - Neuro Muscular Junction

Lecture 10 - Spatial and Temporal Summation of neuronal electrical activities

Lecture 11 - Brain Anatomy Introduction

Lecture 12 - Architecture of the Nervous System

Lecture 13 - Architecture of the Nervous System (Continued...)

Lecture 14 - Analog and Digital Processing in the Neuron - I

Lecture 15 - Analog and Digital Processing in the Neuron - II

Lecture 16 - Energy Sources of Neuronal Systems

Lecture 17 - Skull Demonstration

Lecture 18 - Brain Anatomy: Skull

Lecture 19 - Brain Anatomty 3D - I

Lecture 20 - Brain Anatomty 3D - II

Lecture 21 - Brain Anatomty 3D - III

Lecture 22 - Basics of Brain Imaging Techniques

Lecture 23 - Brain anatomy using MR images - I

Lecture 24 - Brain anatomy using MR images - II

Lecture 25 - Spinal Cord Anatomy

Lecture 26 - Reflexes: Introduction

Lecture 27 - Monosynaptic Reflexes

Lecture 28 - Polysynaptic Reflexes

Lecture 29 - Criteria for electrode material

Lecture 30 - Introduction to brain stimulation

Lecture 31 - Brain Stimulation: Device fabrication - Illustration

Lecture 32 - Brain Stimulation: Electronic Systems (Current Mirrors)

Lecture 33 - Brain regions and associated functions

Lecture 34 - Human vision system - II

Lecture 35 - Network analysis during visual processing

Lecture 36 - Control of eye movements

Lecture 37 - COMSOL Multiphysics for Medical Devices

Lecture 38 - COMSOL Brain Electrical Stimulation Demo

Lecture 39 - Human vision system - III

Lecture 40 - Human auditory system - I

Lecture 41 - Human auditory system - II

Lecture 42 - Human auditory system - III

Lecture 43 - The human balance system

Lecture 44 - Movement: Introduction

Lecture 45 - Movement: Synchronization

Lecture 46 - Movement: Role of Spinall Cord

Lecture 47 - Movement: Role of Cerebellum

Lecture 48 - Memory and Learning - I

Lecture 49 - Memory and Learning - II

Lecture 50 - Microengineering devices for Neural Signal Acquisiton

Lecture 51 - Microfabrication Process for Multi Electrode Array

Lecture 52 - Introduction and Applications of Event Related Potentials

Lecture 53 - ERP Extraction Demonstration

NPTEL : NOC:Analog Circuits and Systems (Electronics and Communication Engineering)

Co-ordinators : Prof. K Radhakrishna Rao

Lecture 1 - Introduction to Sensors, Signals and Systems

Lecture 2 - Role of Analog Signal Processing in Electronic Products - Part 1

Lecture 3 - Role of Analog Signal Processing in Electronic Products - Part 2

Lecture 4 - Analog Signal Processing using One Port Networks

Lecture 5 - Analog Signal Processing using One Port Networks, Passive Two Ports and Ideal amplifiers

Lecture 6 - Synthesis of Amplifiers using Nullators and Norators

Lecture 7 - Passive Electronic Devices for Analog Signal Processing

Lecture 8 - Active Devices for Analog Signal Processing Systems

Lecture 9 - Electronic Devices for Analog Circuits

Lecture 10 - Electronic Devices for Analog Circuits

Lecture 11 - Feedback in Systems

Lecture 12 - Static Charecteristic of Feedback Systems

Lecture 13 - Dynamic Behavior of Feedback Systems - Part I

Lecture 14 - Dynamic Behavior of Feedback Systems - Part II

Lecture 15 - Design of Feedback Amplifiers

Lecture 16 - Design of Feedback Amplifiers

Lecture 17 - Design of Feedback Amplifiers and Instrumentation Amplifiers

Lecture 18 - Instrumentation Amplifiers, Integrators and Differentiators

Lecture 19 - Non-linear Analog Signal Processing

Lecture 20 - DC Voltage Regulators

Lecture 21 - Filters - Approximations to ideal filter functions

Lecture 22 - Passive Filters - Part 1

Lecture 23 - Passive Filters - Part 2

Lecture 24 - Active Filters - Part 1

Lecture 25 - Active Filters - Part 2

Lecture 26 - Active Filters: Q-enhancement

Lecture 27 - State Space Filters

Lecture 28 - Universal Active Filter - Effect of Active Device GB

Lecture 29 - State-Space Filters (Tuning of Filters)

Lecture 30 - Automatic Tuning of Filters (PLL) and Review of Filter Design

Lecture 31 - Waveform Generation

Lecture 32 - LC Oscillator - Effect of Non-idealities

Lecture 33 - Transconductor based Oscillator

Lecture 34 - Regenerative Comparators and Non-Sinusoidal Oscillators

Lecture 35 - Non-Sinusoidal Oscillators and VCO (FM and FSK Generators)

Lecture 36 - Phase and Frequency Followers

Lecture 37 - Frequency Locked Loop (Popularly known as PLL)

Lecture 38 - Design of PLL and FLL

Lecture 39 - Analog System Design

NPTEL : NOC:Innovation by Design (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

Lecture 1 - The Seven Concerns

Lecture 2 - Design Thinking and Collaboration

Lecture 3 - Challenges to Innovation

Lecture 4 - Understanding Users

Lecture 5 - Arriving at Design Insights

Lecture 6 - Prototyping for User Feedback

Lecture 7 - 1st C The Cause

Lecture 8 - Crossing the First Pitfall

Lecture 9 - Trial and Error

Lecture 10 - User Feedback for Development

Lecture 11 - New users, new needs to meet

Lecture 12 - Knowing the Context

Lecture 13 - 2nd C The Context

Lecture 14 - The Basic Need

Lecture 15 - Ingenious Attempts

Lecture 16 - Further Insights

Lecture 17 - The Working Rig

Lecture 18 - Concepts generation

Lecture 19 - Experiencing the Product

Lecture 20 - Refinements

Lecture 21 - 3rd C - The Comprehension

Lecture 22 - Understanding Constraints

Lecture 23 - Positioning the Product

Lecture 24 - Exploring Possibilites

Lecture 25 - More Experiments

Lecture 26 - Understanding the Technology

Lecture 27 - At the 2nd Valley of Death

Lecture 28 - Finishing Touches

Lecture 29 - The Check

Lecture 30 - The Cause

Lecture 31 - The Product, the Users and the Context

Lecture 32 - The Prototyping

Lecture 33 - User needs

Lecture 34 - The Crucial Step Missed

Lecture 35 - 5th C The Conception

Lecture 36 - Synchronic Studies

Lecture 37 - One product, many problems

Lecture 38 - Concept Clusters

Lecture 39 - From idea to product

Lecture 40 - Prototyping

Lecture 41 - Materials and Technologies

Lecture 42 - Collaborative Efforts

Lecture 43 - 6th C - The Crafting

Lecture 44 - Recap

Lecture 45 - The Manufacturing Challenge

Lecture 46 - The User Feedback

Lecture 47 - The Iterative Process

Lecture 48 - 7th C - The Connection

Lecture 49 - The Seed for Innovation

Lecture 50 - Pinnacle for Innovation

Lecture 51 - The Innovation Timeline

Lecture 52 - The Innovation Champions

Lecture 53 - The Innovation Domains

Lecture 54 - The Innovation Templates

Lecture 55 - The Serial Innovation

NPTEL : NOC:Understanding Design (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

Lecture 1 - An Introduction to Design

Lecture 2 - The many notions of design

Lecture 3 - Design as a process and a product

Lecture 4 - The evolution of design

Lecture 5 - Design engages with many disciplines

Lecture 6 - Design is concerned with the user

Lecture 7 - Good design, bad design

Lecture 8 - Users and Contexts

Lecture 9 - Multiple users, differing contexts

Lecture 10 - Understanding user experience

Lecture 11 - Design for a meaningful impact

Lecture 12 - Design and Society

Lecture 13 - Community and Collaboration

Lecture 14 - Understanding Contexts

Lecture 15 - Knowledge and Access

Lecture 16 - Meeting Needs: Necessity or Luxury?

Lecture 17 - Function, Context and Consequences

Lecture 18 - Design and Sustainability

Lecture 19 - The cost of looking the other way

Lecture 20 - Sustainability practices in daily life

Lecture 21 - The perspective of engineering

Lecture 22 - Understanding embodied energy

Lecture 23 - The userâ€™s role in sustainability

Lecture 24 - Framing the worldâ€™s future

Lecture 25 - Design and industry

Lecture 26 - Understanding varied user needs

Lecture 27 - Success through new materials and manufacturing

Lecture 28 - Pushing the boundaries of mass production

Lecture 29 - A Classic chair for all times

Lecture 30 - Breaking familiar assumptions

Lecture 31 - Design and Collaboration

Lecture 32 - Team work

Lecture 33 - Collaborating with unlikely partners

Lecture 34 - Principles of collaboration

Lecture 35 - Design thinking

Lecture 36 - Feedback and assessment

Lecture 37 - Innovation by Design

Lecture 38 - Facilitating the reach of a traditional craft

Lecture 39 - Pitfalls of innovation

Lecture 40 - The seven concerns of innovation

Lecture 41 - From a concern to a palki

Lecture 42 - A little design goes a long way

NPTEL : NOC:Design, Technology and Innovation (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

Lecture 1 - Jaipur Foot - A classic innovation - Part 1

Lecture 2 - Jaipur Foot - A classic innovation - Part 2

Lecture 3 - User Centred Helmet Design - Part 1

Lecture 4 - User Centred Helmet Design - Part 2

Lecture 5 - Challenges of Reaching a Million Users - Part 1

Lecture 6 - Challenges of Reaching a Million Users - Part 2

Lecture 7 - Challenges of Reaching a Million Users - Part 3

Lecture 8 - Technology to Solution - Part 1

Lecture 9 - Technology to Solution - Part 2

Lecture 10 - A Collaborative Excellence - Part 1

Lecture 11 - A Collaborative Excellence - Part 2

Lecture 12 - Collaborative Innovation Methods - Part 1

Lecture 13 - Collaborative Innovation Methods - Part 2

Lecture 14 - Collaborative Innovation Methods - Part 3

Lecture 15 - Learnings from Grassroot Innovation - Part 1

Lecture 16 - Learnings from Grassroot Innovation - Part 2

Lecture 17 - Systemic Approach to Biomed Innovations - Part 1

Lecture 18 - Systemic Approach to Biomed Innovations - Part 2

Lecture 19 - Systemic Approach to Biomed Innovations - Part 3

Lecture 20 - Research to Innovation - Part 1

Lecture 21 - Research to Innovation - Part 2

Lecture 22 - Smartcane for the Blind - A Success Story - Part 1

Lecture 23 - Smartcane for the Blind - A Success Story - Part 2

NPTEL : NOC:Understanding Ethnography (Engineering Design)

Co-ordinators : Prof. Nina Sabnani

Lecture 1 - Introduction

Lecture 2 - Situating Ethnography

Lecture 3 - Engaging with the Other

Lecture 4 - Equality and Empathy

Lecture 5 - Notions of Reality

Lecture 6 - Objectivity and Subjectivity

Lecture 7 - Conclusion

Lecture 8 - Introduction

Lecture 9 - The Ethnographic Process

Lecture 10 - Ethnography: Process or Product

Lecture 11 - Fundamental Concepts

Lecture 12 - Fundamental Concepts (Continued...)

Lecture 13 - Conclusion

Lecture 14 - Introduction

Lecture 15 - The Research Question

Lecture 16 - Is Ethnography the Method?

Lecture 17 - Accessing Existing Knowledge

Lecture 18 - Designing Fieldwork

Lecture 19 - Case Studies: Research Question and Applying Ethnography

Lecture 20 - Case Studies: The Value of Existing Knowledge

Lecture 21 - Case Studies: Identifying Participants, Places, Activities

Lecture 22 - Case Studies: Access and Impact

Lecture 23 - Conclusion

Lecture 24 - Access: Not Just Consent

Lecture 25 - Challenges of Access

Lecture 26 - Building Rapport

Lecture 27 - Gaining Trust

Lecture 28 - Limits to Access

Lecture 29 - Immersion

Lecture 30 - The Ethics of Engaging

Lecture 31 - Conclusion: Covert and Overt Research

Lecture 32 - Introduction

Lecture 33 - Types of Observation

Lecture 34 - (ALM) LxT 1: Observing Imponderabilia

Lecture 35 - What to Observe

Lecture 36 - Participant Observation

Lecture 37 - Degrees of Participation

Lecture 38 - Ethnographic Records

Lecture 39 - Conclusion: Types of Ethnographic Records

Lecture 40 - Introduction

Lecture 41 - Forms of Interviews

Lecture 42 - (ALM) LxT 1: Oral History and Ethnography

Lecture 43 - Characteristics of Interviews

Lecture 44 - Listening and Speaking

Lecture 45 - Reflexivity in Interviewing

Lecture 46 - Designing the Interview

Lecture 47 - Designing the Core Discussion - I

Lecture 48 - Designing the Core Discussion - II

Lecture 49 - Doing the Interview - I

Lecture 50 - Doing the Interview - II

Lecture 51 - Conclusion

Lecture 52 - Introduction

Lecture 53 - Researching THE Visual - I

Lecture 54 - Researching THE Visual - II

Lecture 55 - Researching WITH the Visual

Lecture 56 - Choosing the Visual Medium

Lecture 57 - Representation through Visuals

Lecture 58 - (ALM) LxT 1: Part I: Presentation by Anjali Monteiro and KP Jayasankar

Lecture 59 - Reflexivity in Visual Ethnography - I

Lecture 60 - Reflexivity in Visual Ethnography - II

Lecture 61 - Conclusion

Lecture 62 - Introduction

Lecture 63 - Designing Information for HIV-AIDS Affected Persons - Prof. Anirudha Joshi

Lecture 64 - A New Approach to Urban Housing - Prof. Uday Athavankar

Lecture 65 - Cognitive Ethnography - Prof. Sahana Murthy

Lecture 66 - Participative Design for Language Learning - Prof. Alka Hingorani

Lecture 67 - Conclusion

NPTEL : NOC:Understanding Incubation and Entrepreneurship (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

Lecture 1 - Introduction to Enterpreneurship

Lecture 2 - Hand holding for Entrepreneurship

Lecture 3 - Methodology for Innovation

Lecture 4 - Team Building

Lecture 5 - Problem Statement presentation

Lecture 6 - IDEAS program DSSE IITB

Lecture 7 - From Users to Customers: Solar Oven case-study

Lecture 8 - IITH Student projects: Customer Discovery

Lecture 9 - Healthcare and Innovation

Lecture 10 - Med-Tech success Stories

Lecture 11 - The Innovation Process

Lecture 12 - Human Centered Innovation

Lecture 13 - Creating User Experience Design

Lecture 14 - Humanizing Technology

Lecture 15 - Business Model Canvas

Lecture 16 - Introduction to SINE Incubator

Lecture 17 - Lean Model Canvas SINE

Lecture 18 - Start-up Success Story Atomberg

Lecture 19 - itic incubator IITH

Lecture 20 - Success stories of CfHE

Lecture 21 - Entrepreneurship: Plan to action

Lecture 22 - From Corporate to Entrepreneurship

Lecture 23 - Creative Ideation

Lecture 24 - Building Proof of Concept

Lecture 25 - Network Entrepreneurship

Lecture 26 - Start-up Project Presentation 1

Lecture 27 - Start-up Project Presentation 2

NPTEL : Ergonomics for beginners: Industrial design perspective (Engineering Design)

Co-ordinators : Prof. Debkumar Chakrabarti

Lecture 1 - Introduction

Lecture 2 - Design today - human aid to lifestyle

Lecture 3 - Journey, fitting task to man

Lecture 4 - Domain, philosophy and objective

Lecture 5 - Mutual task comfort: two way dialogue, communication model

Lecture 6 - Ergonomics/ human factors fundamentals

Lecture 7 - Physiology, (work physiology) and stress

Lecture 8 - Human body - structure and function, anthropometrics

Lecture 9 - Anthropometry: body growth and somatotypes

Lecture 10 - Static and synamic anthropometry: standing

Lecture 11 - Anthropometry landmark: sitting postures

Lecture 12 - Anthropometry : squatting and cross-legged postures

Lecture 13 - Measuring techniques

Lecture 14 - Statistical treatment of data and

Lecture 15 - Human body-structure and function

Lecture 16 - Posture and job relation

Lecture 17 - Posture and body supportive devices

Lecture 18 - Chair characteristics

Lecture 19 - Vertical work surface

Lecture 20 - Horizontal work surface

Lecture 21 - Movement

Lecture 22 - Work Counter

Lecture 23 - Communication and cognitive issues

Lecture 24 - Psycho-social behaviour aspects,

Lecture 25 - Information processing and perception

Lecture 26 - Cognitive aspects and mental workload

Lecture 27 - Human error and risk perception

Lecture 28 - Visual performance

Lecture 29 - Visual displays

Lecture 30 - Environmental factors influencing

Lecture 31 - Ergonomics design methodology

Lecture 32 - Ergonomics criteria/check

Lecture 33 - Design process involving

Lecture 34 - Some checklist for task easiness

Lecture 35 - Occupational safety and stress at workplace

Lecture 36 - Workstation design

Lecture 37 - Furniture support

Lecture 38 - Vertical arm reach and relevant

Lecture 39 - Humanising design :Design and human compatibility, comfort and adaptability aspects

Lecture 40 - Scope for exploration

NPTEL : NOC:System Design for Sustainability (Engineering Design)

Co-ordinators : Prof. Sharmistha Banerjee

Lecture 1 - Sustainability and Sustainable Development - Understanding Un-sustainability and need for Sustainability

Lecture 2 - Sustainability and Sustainable Development - Definitions

Lecture 3 - Sustainability and Sustainable Development - Pathway

Lecture 4 - Systems Approach to Design

Lecture 5 - Evolution of sustainability within Design

Lecture 6 - Diverse Approaches to Design for Sustainability - Part A

Lecture 7 - Diverse Approaches to Design for Sustainability - Part B

Lecture 8 - Relationship between approaches to Design for Sustainability and the application context

Lecture 9 - Product Life Cycle Design - Methods and Strategies

Lecture 10 - Product Life Cycle Assessment - Part A

Lecture 11 - Product Life Cycle Assessment - Part B

Lecture 12 - Life Cycle Assessment using Software

Lecture 13 - Design for Product Life Cycle

Lecture 14 - Product-Service System Design - Definition and Types

Lecture 15 - Sustainable Product-Service System Design - Definition and Examples

Lecture 16 - Sustainable Product-Service System Design - Examples

Lecture 17 - Khadi Movement as a precursor to PSS thinking

Lecture 18 - Sustainable Product-Service System Design - Transition Paths, Strategy and Challenges

Lecture 19 - Sustainable Product-Service System Design - Methods and Tools - Part A

Lecture 20 - Sustainable Product-Service System Design - Methods and Tools - Part B

Lecture 21 - Sustainable Product-Service System Design - Methods and Tools - Part C

Lecture 22 - Sustainable Product-Service System Design - Methods and Tools - Part D

Lecture 23 - Sustainable Product-Service System Design - Methods and Tools - Part E

Lecture 24 - Sustainable Product-Service System Design - Methods and Tools - Part F

Lecture 25 - Sustainable Product-Service System Design - Methods and Tools - Part G

Lecture 26 - Sustainable Product-Service System Design - Methods and Tools (Summary)

Lecture 27 - Sufficiency Economy Philosophy applied to Sustainable PSS Thinking

Lecture 28 - LCA of PSS

Lecture 29 - Sustainable Product-Service System Design Applied to Distributed Economy

Lecture 30 - Other Design for Sustainability Tools and approaches - Architecture

Lecture 31 - Other Design for Sustainability Tools and approaches - Agriculture

Lecture 32 - Other Design for Sustainability Tools and approaches - Cities and communities

Lecture 33 - Other Design for Sustainability Tools and approaches - Carbon Footprint

Lecture 34 - Co-design Session

Lecture 35 - Design for Sustainability - Engineering Design Criteria and Guidelines

Lecture 36 - Design for Sustainability - Engineering Design Criteria and Guidelines (ICS Toolkit)

Lecture 37 - Design for Sustainability - Concluding Lecture - Part A

Lecture 38 - Design for Sustainability - Concluding Lecture - Part B

NPTEL : NOC:Product Design and Innovation (Engineering Design)

Co-ordinators : Prof. Debayan Dhar, Prof.Swati Pal, Prof. Supradip Das

Lecture 1 - Introduction to Innovation

Lecture 2 - Design Inspired Innovation and User Innovation

Lecture 3 - Product Design - Part I

Lecture 4 - Product Design - Part II

Lecture 5 - Product Design - Part III

Lecture 6 - Introduction to User study and Problem and need Identification

Lecture 7 - Contextual Enquiry

Lecture 8 - Physical model

Lecture 9 - Creative Techniques and tools for concept generation, concept evaluation

Lecture 10 - Importance and Overview of Human Factors/Ergonomics in Product Design

Lecture 11 - Physical Ergonomics Principles and Issues (Part 1) - Anthropometry

Lecture 12 - Physical Ergonomics Principles and Issues (Part 2) - Biomechanics

Lecture 13 - Cognitive and Emotional aspects of Human Factors with respect to Product Design and Innovation

Lecture 14 - Tools and Techniques for Prototyping

Lecture 15 - Evaluation Tools and Techniques for User-Product Interaction

NPTEL : NOC:Interaction Design (Engineering Design)

Co-ordinators : Prof.Abhishek Shrivastava

Lecture 1 - Basic Definitions and Concepts in Interaction Design

Lecture 2 - Relevance of goals in Interaction Design

Lecture 3 - System model, mental model, and representation model

Lecture 4 - Interaction Models and Interaction Paradigms

Lecture 5 - Interaction paradigm

Lecture 6 - Overview of Goal Directed Design Process

Lecture 7 - The Research phase in Goal Directed Design Process - Part 1

Lecture 8 - The Research phase in Goal Directed Design Process - Part 2

Lecture 9 - The Research phase in Goal Directed Design Process - Part 3

Lecture 10 - The Modeling phase in Goal Directed Design Process

Lecture 11 - The Requirement definition phase in Goal Directed Design Process - Part 1

Lecture 12 - The Requirement definition phase in Goal Directed Design Process - Part 2

Lecture 13 - The Framework definition and refinement phase in Goal Directed Design Process - Interaction framework

Lecture 14 - The Framework definition and refinement phase in Goal Directed Design Process - Visual design and industrial design framework

Lecture 15 - Design evaluation and testing

NPTEL : NOC:Ergonomics in Automotive Design (Engineering Design)

Co-ordinators : Dr. Sougata Karmakar

Lecture 1 - Introduction to Automotive Ergonomics

Lecture 2 - Driver Information Acquisition and Processing

Lecture 3 - Anthropometric and Biomechanical Data in Automotive Design

Lecture 4 - Occupant Packaging : Basics and Details

Lecture 5 - Principles of Control and Display Design

Lecture 6 - Usability evaluation of In-vehicle control and displays

Lecture 7 - Human Fields of View and Driver's Fields of View

Lecture 8 - Vehicle Entry and Exit : Basics and Details

Lecture 9 - Driver Distraction and Driving Performance Measurement

Lecture 10 - Driver Workload Measurement

Lecture 11 - Virtual Ergonomics Evaluation Technique and its application in Automotive Design

Lecture 12 - Automotive Craftsmanship

NPTEL : NOC:Ergonomics Workplace Analysis (Engineering Design)

Co-ordinators : Prof. Urmi R. Salve

Lecture 1 - Introduction to Ergonomics Workplace Assessment - I

Lecture 2 - Introduction to Ergonomics Workplace Assessment - II

Lecture 3 - Task Analysis

Lecture 4 - Physiological Fundamentals of Workplace Evaluation

Lecture 5 - Biomechanics in Workplace Evaluation

Lecture 6 - Assessment of Physical Job Demand

Lecture 7 - Assessment of Physical and Cognitive Work with Psychophysiological Methods

Lecture 8 - Assessment of Physical and Cognitive Work with Psychophysiological Methods

Lecture 9 - Assessment of Mental Workload

Lecture 10 - Neuroergonomics in Work Evaluation

Lecture 11 - Psychosocial Aspect of Workplace Analysis

Lecture 12 - Assessment of Thermal Environment

Lecture 13 - Assessment of Visual Environment

Lecture 14 - Analysis of Auditory Environment and Noise Pollution

NPTEL : NOC:Ergonomics Research Techniques (Engineering Design)

Co-ordinators : Prof. Urmi R. Salve

Lecture 1 - Course Introduction

Lecture 2 - Introduction

Lecture 3 - Plan for Identifiering av Belastnings faktorer (PLIBEL) method

Lecture 4 - Ducth Musculoskeletal Questionnaire (DMQ)

Lecture 5 - Musculoskeletal discomfort National Institute for Occupational Safety and Health (NIOSH)

Lecture 6 - Job Strain Index (JSI)

Lecture 7 - Ovako Working posture Analysis System (OWAS)

Lecture 8 - Rapid Upper Limb Analysis (RULA)

Lecture 9 - Rapid Entire Body Analysis (REBA)

Lecture 10 - Manual handling Assessment Charts (MAC)

Lecture 11 - Manual handling Assessment Charts (MAC)

Lecture 12 - Manual handling at work

Lecture 13 - Quick exposure checklist (QEC)

Lecture 14 - National Institute for Occupational Safety and Health (NIOSH) Lifting equation

Lecture 15 - Borg scale and Rodgers muscle fatigue analysis

Lecture 16 - Snook's Table

Lecture 17 - Lumber motion monitor (LMM)

Lecture 18 - Occupational repetitive action methods (OCRA) methods

Lecture 19 - Hand Arm Risk assessment Method (HARM)

Lecture 20 - Assessment of repetitive tasks of the upper limbs (ART)

Lecture 21 - Risk Assessment of Pushing and Pulling (RAPP)

Lecture 22 - Movement and Assistance of hospital patients (MAPO) method

Lecture 23 - Introduction

Lecture 24 - Observation, interviews and verbal protocol

Lecture 25 - Focus group

Lecture 26 - Hierarchical task analysis

Lecture 27 - Allocation of function methodology

Lecture 28 - Allocation of function methodology

Lecture 29 - Critical decision method

Lecture 30 - Systemic human error reduction and prediction approach (SHERPA)

Lecture 31 - Task analysis for error identification (TAFEI)

Lecture 32 - NASA task load index (TLX)

Lecture 33 - Multiple resource time sharing model

Lecture 34 - Critical path analysis

Lecture 35 - Situational awareness global assessment technique

Lecture 36 - Electroencephalogram (EEG)

Lecture 37 - Eye tracking

Lecture 38 - Human Error Assessment and Reduction Technique (HEART)

Lecture 39 - Cognitive Reliability and Error Analysis Method (CREAM)

Lecture 40 - Measurement of thermal conditions at workplaces

Lecture 41 - Mesasurement of different environmental factors - Part I

Lecture 42 - Mesasurement of different environmental factors - Part II

NPTEL : NOC:Geographic Information System (Engineering Design)

Co-ordinators : Prof. Bharath H Aithal

Lecture 1 - Introduction to GIS

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Real World to Digital World Through GIS

Lecture 7 - Real World to Digital World Through GIS (Continued...)

Lecture 8 - Real World to Digital World Through GIS (Continued...)

Lecture 9 - GIS Data (Continued...)

Lecture 10 - Real World to Digital World Through GIS (Continued...)

Lecture 11 - Representing the Real World

Lecture 12 - Representing the Real World (Continued...)

Lecture 13 - Representing the Real World (Continued...)

Lecture 14 - Representing the Real World in Surface Models (Continued...)

Lecture 15 - Representing the Real World (Continued...)

Lecture 16 - Quering and Georeferencing

Lecture 17 - Elevation, Relative and Discrete Referencing

Lecture 18 - Coordinate Systems

Lecture 19 - Maps and Numbering

Lecture 20 - Map Projections

Lecture 21 - Data Quality and Measures

Lecture 22 - Positional Accuracy and Source of Errors

Lecture 23 - Classification Accuracy and Pixel Errors

Lecture 24 - Spatial Data Editing and Transformations

Lecture 25 - Map Display and Visualization in GIS

Lecture 26 - Introduction to GPS

Lecture 27 - GPS: Working and Signals

Lecture 28 - GPS errors and DGPS

Lecture 29 - GNSS and Applications

Lecture 30 - Introduction to QGIS

Lecture 31 - Introduction to database

Lecture 32 - DataBase Management System - Introduction

Lecture 33 - DataBase Management System - (Continued...)

Lecture 34 - DBMS models

Lecture 35 - Normalization forms

Lecture 36 - Creating and Maintaining a database

Lecture 37 - Spatial Query using SQL - Introduction

Lecture 38 - Spatial analysis

Lecture 39 - Spatial analysis (Continued...)

Lecture 40 - Basic Editing

Lecture 41 - Introduction to Remote Sensing

Lecture 42 - Basic spatial analysis

Lecture 43 - Basic spatial analysis

Lecture 44 - Advanced spatial analysis

Lecture 45 - Advanced spatial analysis

Lecture 46 - Introduction to QGIS and Data Import

Lecture 47 - QGIS Plugins

Lecture 48 - Georeferencing an Image

Lecture 49 - Creating Vector Features

Lecture 50 - Vector Functions and Querying

Lecture 51 - Data Acquisition and Raster Functions - I

Lecture 52 - Data Acquisition and Raster Functions - II

Lecture 53 - Map composition

Lecture 54 - Bhuvan geoportal and Google earth

Lecture 55 - Introduction to R - Part I

Lecture 56 - Introduction to R - Part II

Lecture 57 - Open Source GIS Softwares

Lecture 58 - Open Source GIS softwares: Introduction

Lecture 59 - PROS and CONS of open source

Lecture 60 - GIS Data Standards

Lecture 61 - Open Geospatial Consortium (OGC)

Lecture 62 - National Spatial Data Infrastructure (NSDI)

Lecture 63 - Introduction to Web GIS and Geoserver

Lecture 64 - Geoserver - Raster and SLD Integration

NPTEL : Principles of Engineering System Design (Engineering Design)

Co-ordinators : Dr. T. Asokan

Lecture 1 - Introduction to system Design

Lecture 2 - Engineering systems Classification & examples

Lecture 3 - Modern System design processes

Lecture 4 - Six functions of design process

Lecture 5 - Tools for enabling creative development

Lecture 6 - Team Development : Group Exercises

Lecture 7 - System Requirement Analysis

Lecture 8 - Originating Requirements: Example System Engineering software -CORE

Lecture 9 - Functional Architecture Development

Lecture 10 - Functional Decomposition

Lecture 11 - Functional Decomposition : Examples

Lecture 12 - Physical Architecture Development

Lecture 13 - Implementing Fault Tolerance in Physical Architecture

Lecture 14 - Operational Architecture Development - Part I

Lecture 15 - Operational Architecture Development - Part II

Lecture 16 - Interface architecture Development

Lecture 17 - Interface standards and Design process

Lecture 18 - Integration and qualification

Lecture 19 - Qualification planning and methods

Lecture 20 - System Design Example: Autolink system

Lecture 21 - System Design Examples

Lecture 22 - System Design Examples (Continued...)

Lecture 23 - Graphical Modelling Techniques

Lecture 24 - Process modeling

Lecture 25 - Behavior modeling

Lecture 26 - Graphical Modelling Techniques (Continued...)

Lecture 27 - System modeling and simulation

Lecture 28 - Bondgraph modeling of Dyanamic systems

Lecture 29 - Decision making in System Design

Lecture 30 - Decision making in System Design (Continued...)

NPTEL : Vehicle Dynamics (Engineering Design)

Co-ordinators : Dr. R. Krishnakumar

Lecture 1 - Introduction to Vehicle Dynamics

Lecture 2 - Longitudinal Dynamics

Lecture 3 - Vehicle Load Distribution - Acceleration and Braking

Lecture 4 - Brake Force Distribution, Braking Efficiency and Braking Distance

Lecture 5 - Tractor - Semi Trailer

Lecture 6 - Tire Mechanics - An Introduction

Lecture 7 - Mechanical Properties of Rubber

Lecture 8 - Slip, Grip and Rolling Resistance

Lecture 9 - Tire Construction and Force Development

Lecture 10 - Contact Patch and Contact Pressure Distribution

Lecture 11 - Tire Brush Model

Lecture 12 - Lateral Force Generation

Lecture 13 - Ply Steer and Conicity - Part 1

Lecture 14 - Ply Steer and Conicity - Part 2

Lecture 15 - Tire Models - Magic Formula

Lecture 16 - Classification of Tyre Models and Combined Slip

Lecture 17 - Lateral Dynamics - An Introduction

Lecture 18 - Lateral Dynamics - Bicycle Model

Lecture 19 - Lateral Dynamics - Stability and Steering Conditions

Lecture 20 - Understeer Gradient and State Space Approach

Lecture 21 - Handling Response of a Vehicle

Lecture 22 - Mimuro Plot for Lateral Transient Response - Part 1

Lecture 23 - Mimuro Plot for Lateral Transient Response - Part 2

Lecture 24 - Parameters affecting vehicle handling characteristics

Lecture 25 - Subjective and Objective Evaluation of Vehicle Handling - Part 1

Lecture 26 - Subjective and Objective Evaluation of Vehicle Handling - Part 2

Lecture 27 - Subjective and Objective Evaluation of Vehicle Handling and Rollover P

Lecture 28 - Rollover Prevention (Continued...) and Vertical Dynamics

Lecture 29 - Vertical Dynamics - An Introduction

Lecture 30 - Vertical Dynamics - Quarter Car Model

Lecture 31 - Noise, Vibration and Harshness - Random Processes

Lecture 32 - Random Process and Conclusion (Continued...)

NPTEL : NOC:Control Systems (Engineering Design)

Co-ordinators : Prof. C.S.Shankar Ram

Lecture 1 - Introduction to Control Systems - Part 1

Lecture 2 - Introduction to Control Systems - Part 2

Lecture 3 - Overview of Feedback Control Systems - Part 1

Lecture 4 - Overview of Feedback Control Systems - Part 2

Lecture 5 - Mathematical Preliminaries - Part 1

Lecture 6 - Mathematical Preliminaries - Part 2

Lecture 7 - Transfer Function - Part 1

Lecture 8 - Transfer Function - Part 2

Lecture 9 - System Response - Part 1

Lecture 10 - System Response - Part 2

Lecture 11 - BIBO Stability - Part 1

Lecture 12 - BIBO Stability - Part 2

Lecture 13 - Effect of Zeros - Part 1

Lecture 14 - Effect of Zeros - Part 2

Lecture 15 - Closed Loop System - Part 1

Lecture 16 - Closed Loop System - Part 2

Lecture 17 - First Order Systems - Part 1

Lecture 18 - First Order Systems - Part 2

Lecture 19 - Second Order Systems - Part 1

Lecture 20 - Second Order Systems - Part 2

Lecture 21 - Controllers - Part 1

Lecture 22 - Controllers - Part 2

Lecture 23 - Closed Loop Control - Part 1

Lecture 24 - Closed Loop Control - Part 2

Lecture 25 - Routh's Stabilty Criterion - Part 1

Lecture 26 - Routh's Stabilty Criterion - Part 2

Lecture 27 - Special Cases of Routh's Stability Criterion - Part 1

Lecture 28 - Special Cases of Routh's Stability Criterion - Part 2

Lecture 29 - Performance Specifications - Part 1

Lecture 30 - Performance Specifications - Part 2

Lecture 31 - Steady State Error Analysis - Part 1

Lecture 32 - Steady State Error Analysis - Part 2

Lecture 33 - Root Locus 1 - Part 1

Lecture 34 - Root Locus 1 - Part 2

Lecture 35 - Root Locus 2 - Part 1

Lecture 36 - Root Locus 2 - Part 2

Lecture 37 - Root Locus 3 - Part 1

Lecture 38 - Root Locus 3 - Part 2

Lecture 39 - Root Locus 4 - Part 1

Lecture 40 - Root Locus 4 - Part 2

Lecture 41 - Case Study - Modelling - Part 1

Lecture 42 - Case Study - Modelling - Part 2

Lecture 43 - Case Study - Control Design - Part 1

Lecture 44 - Case Study - Control Design - Part 2

Lecture 45 - State Space Representation - Part 1

Lecture 46 - State Space Representation - Part 2

Lecture 47 - Frequency Response - Part 1

Lecture 48 - Frequency Response - Part 2

Lecture 49 - Bode Plot 1 - Part 1

Lecture 50 - Bode Plot 1 - Part 2

Lecture 51 - Bode Plot 2 - Part 1

Lecture 52 - Bode Plot 2 - Part 2

Lecture 53 - Bode Plot 3 - Part 1

Lecture 54 - Bode Plot 3 - Part 2

Lecture 55 - Bode Plot 4 - Part 1

Lecture 56 - Bode Plot 4 - Part 2

Lecture 57 - Nyquist Plot 1 - Part 1

Lecture 58 - Nyquist Plot 1 - Part 2

Lecture 59 - Nyquist Plot 2 - Part 1

Lecture 60 - Nyquist Plot 2 - Part 2

Lecture 61 - Nyquist Stability Criterion - Part 1

Lecture 62 - Nyquist Stability Criterion - Part 2

Lecture 63 - Relative Stability 1 - Part 1

Lecture 64 - Relative Stability 1 - Part 2

Lecture 65 - Relative Stability 2 - Part 1

Lecture 66 - Relative Stability 2 - Part 2

Lecture 67 - Lead Compensation - Part 1

Lecture 68 - Lead Compensation - Part 2

Lecture 69 - Lead Compensator Design - Part 1

Lecture 70 - Lead Compensator Design - Part 2

Lecture 71 - Lag and Lag-Lead Compensation - Part 1

Lecture 72 - Lag and Lag-Lead Compensation - Part 2

NPTEL : NOC:Fundamentals of Automotive Systems (Engineering Design)

Co-ordinators : Prof. C.S.Shankar Ram

Lecture 1 - Course Overview and Classification of Internal Combustion Engines - Part 1

Lecture 2 - Course Overview and Classification of Internal Combustion Engines - Part 2

Lecture 3 - Engine Components - Part 1

Lecture 4 - Engine Components - Part 2

Lecture 5 - Operation of Four Stroke Engines - Part 1

Lecture 6 - Operation of Four Stroke Engines - Part 2

Lecture 7 - Two Stroke Engine and Engine Cycles - Part 1

Lecture 8 - Two Stroke Engine and Engine Cycles - Part 2

Lecture 9 - Otto Cycle and Diesel Cycle - Part 1

Lecture 10 - Otto Cycle and Diesel Cycle - Part 2

Lecture 11 - Dual Cycle and Engine Performance - Part 1

Lecture 12 - Dual Cycle and Engine Performance - Part 2

Lecture 13 - Engine Performance - Part 1

Lecture 14 - Engine Performance - Part 2

Lecture 15 - Supercharging and Combustion in SI Engines - Part 1

Lecture 16 - Supercharging and Combustion in SI Engines - Part 2

Lecture 17 - Knocking in SI Engines - Part 1

Lecture 18 - Knocking in SI Engines - Part 2

Lecture 19 - Combustion in CI Engines and Carburetion - Part 1

Lecture 20 - Combustion in CI Engines and Carburetion - Part 2

Lecture 21 - Fuel Introduction Systems - Part 1

Lecture 22 - Fuel Introduction Systems - Part 2

Lecture 23 - Analysis of Carburetor - Part 1

Lecture 24 - Analysis of Carburetor - Part 2

Lecture 25 - Engine Emissions - Part 1

Lecture 26 - Engine Emissions - Part 2

Lecture 27 - Emission Control Systems - Part 1

Lecture 28 - Emission Control Systems - Part 2

Lecture 29 - Automotive Powertrain - Part 1

Lecture 30 - Automotive Powertrain - Part 2

Lecture 31 - Automotive Clutch - Part 1

Lecture 32 - Automotive Clutch - Part 2

Lecture 33 - Transmission - Part 1

Lecture 34 - Transmission - Part 2

Lecture 35 - Powertrain Analysis - Part 1

Lecture 36 - Powertrain Analysis - Part 2

Lecture 37 - Powertrain Analysis 2 - Part 1

Lecture 38 - Powertrain Analysis 2 - Part 2

Lecture 39 - Transmission Matching - Part 1

Lecture 40 - Transmission Matching - Part 2

Lecture 41 - Brake System - Part 1

Lecture 42 - Brake System - Part 2

Lecture 43 - Components of a Brake System and Drum Brake - Part 1

Lecture 44 - Components of a Brake System and Drum Brake - Part 2

Lecture 45 - Disc Brake and Introduction to Hydraulic Brake - Part 1

Lecture 46 - Disc Brake and Introduction to Hydraulic Brake - Part 2

Lecture 47 - Hydraulic Brake System - Part 1

Lecture 48 - Hydraulic Brake System - Part 2

Lecture 49 - Air Brake System - Part 1

Lecture 50 - Air Brake System - Part 2

Lecture 51 - Antilock Brake System 1 - Part 1

Lecture 52 - Antilock Brake System 1 - Part 2

Lecture 53 - Antilock Brake System 2 - Part 1

Lecture 54 - Antilock Brake System 2 - Part 2

Lecture 55 - Braking Analysis - Part 1

Lecture 56 - Braking Analysis - Part 2

Lecture 57 - Steering System - Part 1

Lecture 58 - Steering System - Part 2

Lecture 59 - Manual Steering Systems - Part 1

Lecture 60 - Manual Steering Systems - Part 2

Lecture 61 - Power Steering and Kinematic Steering Analysis - Part 1

Lecture 62 - Power Steering and Kinematic Steering Analysis - Part 2

Lecture 63 - Wheel Alignment - Part 1

Lecture 64 - Wheel Alignment - Part 2

Lecture 65 - Introduction to Suspension System - Part 1

Lecture 66 - Introduction to Suspension System - Part 2

Lecture 67 - Shock Absorbers and Independent Suspension - Part 1

Lecture 68 - Shock Absorbers and Independent Suspension - Part 2

Lecture 69 - Dependent Suspension and Suspension Analysis - Part 1

Lecture 70 - Dependent Suspension and Suspension Analysis - Part 2

Lecture 71 - Introduction to Electric and Hybrid Powertrain - Part 1

Lecture 72 - Introduction to Electric and Hybrid Powertrain - Part 2

Lecture 73 - Tyres - Part 1

Lecture 74 - Tyres - Part 2

NPTEL : NOC:Functional and Conceptual Design (Engineering Design)

Co-ordinators : Dr. T Asokan

Lecture 1 - Introduction

Lecture 2 - Birth and Growth of a Product

Lecture 3 - Types of Design

Lecture 4 - Stage-Gate and Spiral Design

Lecture 5 - Stages in New Product Development

Lecture 6 - Laboratory Exercise - 1

Lecture 7 - Reverse Engg. and Redesign

Lecture 8 - Technical Questioning and Mission Statement

Lecture 9 - Mission Statement- Examples

Lecture 10 - Laboratory Exercise - 2

Lecture 11 - Identifying Customer Needs

Lecture 12 - Customer Need Analysis

Lecture 13 - Product Specifications

Lecture 14 - Laboratory Exercise - 3

Lecture 15 - Need - Metric Matrix

Lecture 16 - Establishing Target Specifications

Lecture 17 - HoQ

Lecture 18 - Laboratory Exercise - 4

Lecture 19 - Functional Decomposition

Lecture 20 - FAST Method

Lecture 21 - Laboratory Exercise - 5

Lecture 22 - Function Structure (Flow Method)

Lecture 23 - Flow Method Examples

Lecture 24 - Laboratory Exercise - 6

Lecture 25 - Product and Portfolio Architecture

Lecture 26 - Portfolio Architecture Selection

Lecture 27 - Laboratory Exercise - 7

Lecture 28 - Product Architecture

Lecture 29 - Identification of Modules

Lecture 30 - Laboratory Exercise - 8

Lecture 31 - Concept Development

Lecture 32 - Intuitive Methods

Lecture 33 - Laboratory Exercise - 9

Lecture 34 - Logical Method- TRIZ

Lecture 35 - Concept Selection

Lecture 36 - Laboratory Exercise - 10

Lecture 37 - Concept Scoring

Lecture 38 - Laboratory Exercise - 11

NPTEL : NOC:Introduction to Robotics (Engineering Design)

Co-ordinators : Dr. Krishna Vasudevan, Dr. Balaraman Ravindran, Dr. T Asokan

Lecture 1 - Introduction

Lecture 2 - Evolution of Robotics

Lecture 3 - Kinematics- Coordinate transformations

Lecture 4 - Homogeneus Transformation Matrix

Lecture 5 - Industrial Robot- Kinematic Structures

Lecture 6 - Robot Architectures

Lecture 7 - Kinematic Parameters

Lecture 8 - DH Algorithm

Lecture 9 - DH Algorithm- Examples

Lecture 10 - Forward Kinematics

Lecture 11 - Forward Kinematics- Examples

Lecture 12 - Inverse Kinematics

Lecture 13 - Inverse Kinematics- Examples

Lecture 14 - Differential Relations

Lecture 15 - Manipulator Jacobian and Statics

Lecture 16 - Overview of Electric Actuators and Operational Needs

Lecture 17 - Principles of DC Motor Operation

Lecture 18 - DC Motor Equations and Principles of Control

Lecture 19 - DC Motor Control Regions and Principles of Power Electronics

Lecture 20 - Power Electronic Switching and Current Ripple

Lecture 21 - The H-Bridge and DC Motor Control Structure

Lecture 22 - The Brushless DC Machine

Lecture 23 - Control of the Brushless DC Motor

Lecture 24 - The PM Synchronous Motor (PMSM) and SPWM

Lecture 25 - Principles of PMSM Control

Lecture 26 - Encoders for Speed and Position Estimation

Lecture 27 - Stepper Motors

Lecture 28 - Introduction to Probabilistic Robotics.

Lecture 29 - Recursive State Estimation: Bayes Filter

Lecture 30 - Recursive State Estimation: Bayes Filter Illustration

Lecture 31 - Probability basics

Lecture 32 - Probability basics

Lecture 33 - Kalman Filter

Lecture 34 - Extended Kalman Filter

Lecture 35 - Particle Filter

Lecture 36 - Binary Bayes

Lecture 37 - Velocity Motion Model

Lecture 38 - Odometry Motion Model

Lecture 39 - Occupa Grid Mapping

Lecture 40 - Range Finder Measurement Model

Lecture 41 - Localization Taxonomy

Lecture 42 - Markov Localization

Lecture 43 - Path Planning

NPTEL : NOC:Risk-Based Engineering (General)

Co-ordinators : Prof Prabhakar V Varde

Lecture 1 - RBE: Background and Overview

Lecture 2 - RBE Framework

Lecture 3 - RBE-Framework continuation and Major Procedural Elements

Lecture 4 - RBE-Major Procedural Elements (Continued...)

Lecture 5 - Risk Characterization

Lecture 6 - Reliability Characterization and Probability Distributions-Discrete Distribution

Lecture 7 - Probability Distributions - Continuous Distribution

Lecture 8 - Statistical Estimation in Probability Theory

Lecture 9 - Probability and Confidence Interval

Lecture 10 - Regression Analysis

Lecture 11 - Life Prediction : Introduction

Lecture 12 - Life Prediction : Related Aspects

Lecture 13 - Life Prediction and Assessment Approaches

Lecture 14 - Life Prediction : Accelerated Screening and Life Testing

Lecture 15 - Probabilistic Fracture Mechanic Approach

Lecture 16 - Introduction and Reliability Block Diagram (RBD)

Lecture 17 - RBD - System Redundancies

Lecture 18 - Fault Tree Analysis

Lecture 19 - Fault Tree Analysis ContiÃ¢â‚¬Â¦ and Event Tree Analysis

Lecture 20 - Markov Model

Lecture 21 - Dynamic Fault Tree

Lecture 22 - Dynamic Event Tree and Binary Decision Diagram

Lecture 23 - Common Cause Failure

Lecture 24 - Importance and Sensitivity Analysis

Lecture 25 - Maintainability

Lecture 26 - PRA-Introduction

Lecture 27 - PRA-Organizational and Quality Aspects

Lecture 28 - PRA-Qualitative Modeling and Analysis

Lecture 29 - PRA-Quantification of the PRA model

Lecture 30 - Monte Carlo Simulation, Root Cause Analysis

Lecture 31 - Low Power and Shutdown PRA

Lecture 32 - Internal Flood PRA

Lecture 33 - Level 1 Fire PRA

Lecture 34 - Seismic PRA

Lecture 35 - Level 2 and Level 3 PRA

Lecture 36 - Human Reliability- Introduction

Lecture 37 - State of the Art in Human-Reliability

Lecture 38 - Technique for Human Error Rate Prediction (THERP)

Lecture 39 - Human Cognitive Reliability (HCR) Method

Lecture 40 - CQB - Method Consciousness, Cognition, Conscience and Brain

Lecture 41 - Uncertainty - Introduction

Lecture 42 - Uncertainty: Overview, preliminary discussions considering selected approaches

Lecture 43 - Parametric Approach to Uncertainty

Lecture 44 - Uncertainty Modelling using Fuzzy Approach in RBE

Lecture 45 - Uncertainty â€“ Bayesian, and Monte-Carlo technique

Lecture 46 - Scope of Course and Introduction

Lecture 47 - PoF and FMMECA

Lecture 48 - Failure Mechanism and Models

Lecture 49 - Virtual Qualification

Lecture 50 - Physical qualification and Prognostics

Lecture 51 - PHM Introduction

Lecture 52 - Prognostics and Health Management in RBE

Lecture 53 - Major AI and ML Techniques and Algorithms in PHM

Lecture 54 - Role of ANN technique in RUL Estimation

Lecture 55 - Uncertanity Management in PHM

Lecture 56 - RBE-Introduction

Lecture 57 - RBE for Life Extension in support of regulatory relicensing

Lecture 58 - RBE-Risk Monitor

Lecture 59 - RBE-Inservice-Inspection

Lecture 60 - RB Operator Support System

NPTEL : Introduction to Japanese Language and Culture (General)

Co-ordinators : Mrs. Vatsala Misra

Lecture 1 - Introduction to Japanese scripts

Lecture 2 - Jiko shoukai (Self introduction)

Lecture 3 - Dochira kara desu ka (Where are you from?)

Lecture 4 - Senmon wa nan desu ka (What is your specialization?)

Lecture 5 - Kore wa hon desu (This is a book)

Lecture 6 - Ikura desu ka (How much is it?)

Lecture 7 - Ima nan-ji desu ka (What is the time now?)

Lecture 8 - Kaigi wa roku-ji-han kara desu (The meeting is from 6:30)

Lecture 9 - Ashita Tokyo e ikimasu. (I will go to Tokyo tomorrow)

Lecture 10 - Watashi wa mainichi roku-ji ni okimasu (I wake up at 6â€™oclock everyday)

Lecture 11 - Itsu Kanpur e kimashita ka (When did you come to Kanpur?)

Lecture 12 - Y?binkyoku wa asoko ni arimasu (The post office is over there)

Lecture 13 - Rao san wa doko ni imasu ka (Where is Mr. Rao?)

Lecture 14 - Pikuniku e ikimash? (Letâ€™s go for a picnic)

Lecture 15 - Kesa pan to tamago o tabemashita (I ate eggs and bread for breakfast)

Lecture 16 - Depa-to no tonari no biru wa gink? desu (The building next to the department store is the bank)

Lecture 17 - Taj hoteru wa ookii hoteru desu(Hotel Taj is a big hotel)

Lecture 18 - Hoteru de nani o tabemashita ka (What did you eat at the hotel?)

Lecture 19 - Tokyo wa ?kikute kirei desu (Tokyo is big and beautiful)

Lecture 20 - Ko-hi- wa oishiku arimasen(Coffee is not tasty)

Lecture 21 - Hantai kotoba (Opposites)

Lecture 22 - Watashi wa mainichi miruku o nomimasu (I drink milk everyday)

Lecture 23 - Watashi wa oniisan ni kamera o moratta(I received a camera from my brother)

Lecture 24 - Nani o tabetai desu ka(What do you want to eat?)

Lecture 25 - Nani o sashiagemasu ka (Giving and Receiving)

Lecture 26 - Sensei wa watashi ni hon o kuremashita (My teacher gave me a book)

Lecture 27 - Chotto matte kudasai (Just a minute please)

Lecture 28 - Ke-ki o tabete mite kudasai (Eat and see how is the cake)

Lecture 29 - Nani o shite imasu ka(What are you doing?)

Lecture 30 - Tokyo ni sunde imasu (I live in Tokyo)

Lecture 31 - Kanji ga kakemasu (I can write Kanji)

Lecture 32 - Im?to wa ningy? o hoshigatte imasu (My sister wants a doll)

Lecture 33 - Aisukuri-mu ga ke-ki yori suki desu (I like ice-cream more than cakes)

Lecture 34 - Kutsu o kai ni ikimasu (I am going to buy shoes)

Lecture 35 - Ashita motto atsuku narimasu (It is going to become very hot tomorrow)

Lecture 36 - Rainen Tokyo e iku to omoimasu (I think I will go to Tokyo next year)

Lecture 37 - Pen de kaite mo ii desu ka(Is it alright to write in pen?)

Lecture 38 - Comprehensions and Expressions

Lecture 39 - Basic Kanji

Lecture 40 - Basic Kanji

NPTEL : Astronomy in Ancient, Medieval and Early Telescopic Era of India (General)

Co-ordinators : Prof. Amitabha Ghosh

Lecture 1 - Introduction

Lecture 2 - Pre Siddhantic Astronomy

Lecture 3 - Siddhantic Astronomy

Lecture 4 - Astronomy in Medieval India

Lecture 5 - Introduction to Telescopic Astronomy and Concluding remarks

NPTEL : NOC:Carbon Accounting and Sustainable Designs in Product Lifecycle Management (General)

Co-ordinators : Prof. Amandeep Singh Oberoi, Prof. Deepu Philip, Prof. Prabal Pratap Singh

Lecture 1 - Productivity and Sustainability - Part 1

Lecture 2 - Measuring Productivity

Lecture 3 - Measures Affecting Productivity

Lecture 4 - Productivity and Sustainability - Part 2

Lecture 5 - Environmental Management system

Lecture 6 - Green System

Lecture 7 - Carbon Footprint

Lecture 8 - Carbon Credit Trading

Lecture 9 - Industrial Ecology and Carbon Footprint

Lecture 10 - Examples of Carbon Footprint Calculations

Lecture 11 - Examples of Carbon Footprint Calculations

Lecture 12 - Some More Green Thoughts and Footprints

Lecture 13 - Green Manufacturing

Lecture 14 - Partnership for a New Generation of Vehicles (PNGV)

Lecture 15 - Smart Design and Engineering

Lecture 16 - Road to Product Lifecycle Management - Part 1

Lecture 17 - Road to Product Lifecycle Management - Part 2

Lecture 18 - Road to Product Lifecycle Management - Part 3

Lecture 19 - Sustainability and Green Supply Chain - Part 1

Lecture 20 - Sustainability and Green Supply Chain - Part 2

Lecture 21 - Energy Transformations

Lecture 22 - PLM Components and levels - Part 1

Lecture 23 - PLM Components and levels - Part 2

Lecture 24 - PLM integration - Part 1

Lecture 25 - PLM integration - Part 2

Lecture 26 - Facility carbon accounting

Lecture 27 - Activities of emission - Part 1

Lecture 28 - Activities of emission - Part 2

Lecture 29 - Carbon and business data - Part 1

Lecture 30 - Carbon and business data - Part 2

Lecture 31 - Carbon and business data - Part 3

Lecture 32 - Carbon accounting software - Part 1

Lecture 33 - Carbon accounting software - Part 2

Lecture 34 - Carbon Accounting Model - Part 1

Lecture 35 - Carbon Accounting Model - Part 2

Lecture 36 - Carbon Accounting Model - Part 3

Lecture 37 - Carbon Accounting Model - Part 4

Lecture 38 - Carbon Accounting Model - Part 5

Lecture 39 - Integrated PL,SLM and ALM

Lecture 40 - Environmental, Social and Governace (ESG) Systems

Lecture 41 - Carbon Accounting Databases - Part 1

Lecture 42 - Carbon Accounting Databases - Part 2

Lecture 43 - Carbon Accounting Databases - Part 3

Lecture 44 - Database Management Systems

Lecture 45 - Database Design

Lecture 46 - Terminologies in Database Design - I

Lecture 47 - Terminologies in Database Design - II

Lecture 48 - Database Schema - Part 1

Lecture 49 - Database Schema - Part 2

Lecture 50 - Database Normalization - Part 1

Lecture 51 - Database Normalization - Part 2

Lecture 52 - Carbon Accounting User Interface - Part 1

Lecture 53 - Carbon Accounting User Interface - Part 2

Lecture 54 - Carbon Accounting User Interface - Part 3

NPTEL : NOC:Stress Management (General)

Co-ordinators : Prof. Rajlakshmi Guha

Lecture 1 - What is Stress

Lecture 2 - Sources of stress

Lecture 3 - Types of Stress

Lecture 4 - Personality Factors and Stress

Lecture 5 - Stress and the College Student

Lecture 6 - Stress and Nervous System

Lecture 7 - Hypothalamic-Pituitary-Adrenal (HPA) Axis

Lecture 8 - Effect of Stress on Immune System

Lecture 9 - Health Risk Associated with Chronic Stress

Lecture 10 - Stress and Major Psychiatric Disorders

Lecture 11 - Understanding your stress level

Lecture 12 - Role of Personality Pattern, Self Esteem, Locus of Control

Lecture 13 - Role of Thoughts Beliefs and Emotions - I

Lecture 14 - Role of Thoughts Beliefs and Emotions - II

Lecture 15 - Life Situation Intrapersonal : (Assertiveness, Time Management)

Lecture 16 - Developing Cognitive Coping Skills

Lecture 17 - Autogenic Training, Imagery and Progressive Relaxation

Lecture 18 - Other Relaxation Techniques

Lecture 19 - Exercise and Health

Lecture 20 - DIY Strategies Stress Management

NPTEL : NOC:Outcome Based Pedagogic Principles for Effective Teaching (General)

Co-ordinators : Prof. Shyamal Kumar Das Mandal

Lecture 1 - Introduction to Need of 21st Century Education

Lecture 2 - Accreditation

Lecture 3 - Outcome based Learning

Lecture 4 - Approach to Design Outcome based Learning

Lecture 5 - Approach to Design Outcome based Learning (Continued...)

Lecture 6 - Instructional Design for Active Learning

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

NPTEL : Ayurvedic Inheritance of India (General)

Co-ordinators : Dr. M.S. Valiathan

Lecture 1 - Roots of Ayurveda

Lecture 2 - Traditional Medicine in Buddhist India

Lecture 3 - Period of Systematization

Lecture 4 - Philosophical ideas in Ayurveda

Lecture 5 - Human Body in Health

Lecture 6 - Human Body in Disease

Lecture 7 - Food and Drinks

Lecture 8 - Code for Healthy Living

Lecture 9 - Diseases

Lecture 10 - Diagnosis and Prognosis

Lecture 11 - Medical Treatment of Diseases

Lecture 12 - Materia Medica

Lecture 13 - Surgical Treatment of Diseases

Lecture 14 - Surgical Instruments

Lecture 15 - Treatment of fractures; some surgical procedures

Lecture 16 - Principles and methods of rejuvenation: enhancement of sexual potency and fertility

Lecture 17 - Selection of Students: Oath at initiation: Process of Training

Lecture 18 - A Science Initiative in Ayurveda (ASIIA)

Lecture 19 - Ayurvedic Biology: Illustrative Studies

Lecture 20 - Conclusion: An Ayurvedic View of Life

NPTEL : NOC:Introduction to Research (General)

Co-ordinators : Dr. G. Phanikumar, Prof. C. Balaji, Dr. Arun K.Tangirala, Dr. Abhijit P. Deshpande, Prof. M.S. Ananth, Dr. Prathap Haridoss

Lecture 1 - Insight into research

Lecture 2 - Role of Guide and Student

Lecture 3 - Art of Re-Search

Lecture 4 - Persistent small steps towards success

Lecture 5 - Overview of research

Lecture 6 - Overview of Literature Survey

Lecture 7 - Literature Survey using Web of Science

Lecture 8 - Literature Survey using Scopus

Lecture 9 - Writing Up

Lecture 10 - Tutorial on using BibTeX with LaTeX to add references to a document

Lecture 11 - Tutorial on using Microsoft Word with Bibliographic Sources

Lecture 12 - Tutorial on using Microsoft Word with endnote entries

Lecture 13 - Experimental skills

Lecture 14 - Data analysis - Part 1

Lecture 15 - Data analysis - Part 2

Lecture 16 - Modelling skills - Part 1

Lecture 17 - Modelling skills - Part 2

Lecture 18 - Safety in laboratory

Lecture 19 - How to make Technical presentation

Lecture 20 - Technical Writing

Lecture 21 - Creativity in research - Part 1

Lecture 22 - Creativity in research - Part 2

Lecture 23 - Creativity in Research - Part 3

Lecture 24 - Group discussion on Ethics in Research

Lecture 25 - Intellectual property - Part 1

Lecture 26 - Intellectual property - Part 2

Lecture 27 - DOE Part 1

Lecture 28 - DOE part 2

Lecture 29 - DOE part 3

Lecture 30 - DOE part 4

Lecture 31 - DOE part 5

Lecture 32 - Research in Applied Mechanics

Lecture 33 - Research in Chemical Engineering

Lecture 34 - Research in Civil Engineering

Lecture 35 - Research in Computer Science and Engineering

Lecture 36 - Research in Engineering Design

Lecture 37 - Research in Humanities and Social Sciences

Lecture 38 - Research in Mechanical Engineering

Lecture 39 - Research in Metallurgical and Materials Engineering

Lecture 40 - Research in Ocean Engineering

Lecture 41 - Research in Management Studies

Lecture 42 - Research in Aerospace Engineering

Lecture 43 - Research in Biotechnology

Lecture 44 - Research in Chemistry

Lecture 45 - Research in Electrical Engineering

Lecture 46 - Research in Mathematics

Lecture 47 - Research in Physics

Lecture 48 - Discussion with Research Scholars

NPTEL : NOC:Biology for engineers and other non-biologists (General)

Co-ordinators : Dr. Madhulika Dixit, Prof. G.K. Suraishkumar

Lecture 1 - Introduction

Lecture 2 - Origin of Life

Lecture 3 - Evolution

Lecture 4 - Cells

Lecture 5 - Biomolecules: Lipids

Lecture 6 - Biomolecules: Carbohydrates, Water

Lecture 7 - Biomolecules: Amino acids, Proteins

Lecture 8 - Biomolecules: Enzymes

Lecture 9 - Biomolecules: Nucleotides

Lecture 10 - Cell structure and function Â– Prokaryotes

Lecture 11 - Cell structure and function Â– Eukaryotes

Lecture 12 - Cell cycle

Lecture 13 - Cell division Â– mitosis

Lecture 14 - Cell division Â– meiosis

Lecture 15 - Culture growth

Lecture 16 - Mendelian genetics: Genetic disorders

Lecture 17 - Mendelian genetics: Mendelian inheritance principles

Lecture 18 - Mendelian genetics: Pedigree analysis

Lecture 19 - Mendelian genetics: Non-Mendelian inheritance

Lecture 20 - DNA replication

Lecture 21 - Transcription

Lecture 22 - Translation

NPTEL : NOC:Digital and the Everyday - from Codes to Cloud (General)

Co-ordinators : Prof. Amit Prakash, Prof. Bidisha Chaudhuri

Lecture 1 - Introduction to the Course

Lecture 2 - Introduction to the Winter School

Lecture 3 - Socio-algorithmic processes and the Everyday - Part 1

Lecture 4 - Socio-algorithmic processes and the Everyday - Part 2

Lecture 5 - Socio-algorithmic processes and the Everyday - Part 3

Lecture 6 - Data Protection and Privacy Regulation in the Digital Era - Part 1

Lecture 7 - Data Protection and Privacy Regulation in the Digital Era - Part 2

Lecture 8 - Data Protection and Privacy Regulation in the Digital Era - Part 3

Lecture 9 - Data-driven Identities - Part 1

Lecture 10 - Data-driven Identities - Part 2

Lecture 11 - Data-driven Identities - Part 3

Lecture 12 - Promises and Challenges of e-Health - Part 1

Lecture 13 - Promises and Challenges of e-Health - Part 2

Lecture 14 - Promises and Challenges of e-Health - Part 3

Lecture 15 - Digital Finance - Part 1

Lecture 16 - Digital Finance - Part 2

Lecture 17 - Digital and our everyday interactions with the state - Part 1

Lecture 18 - Digital and our everyday interactions with the state - Part 2

Lecture 19 - Digital and our everyday interactions with the state - Part 3

Lecture 20 - Creating a Machine Zone through Affected Feedback: Leisure and Entertainment on Social Media - Part 1

Lecture 21 - Creating a Machine Zone through Affected Feedback: Leisure and Entertainment on Social Media - Part 2

Lecture 22 - Creating a Machine Zone through Affected Feedback: Leisure and Entertainment on Social Media - Part 3

NPTEL : NOC:Effective Engineering Teaching in Practice (General)

Co-ordinators : Prof. G.K. Suraishkumar

Lecture 1 - Introduction to the course

Lecture 2 - An Inexperienced Engineering Teacherâ€™s View

Lecture 3 - From traditional lecturing to helping students learn - 1

Lecture 4 - From traditional lecturing to helping students learn - 2

Lecture 5 - Better learning (Bloom's Taxonomy)

Lecture 6 - Problem based learning (PBL) and Problem Solving - Part 1

Lecture 7 - Problem based learning (PBL) and Problem Solving - Part 2

Lecture 8 - Writing Learning Outcomes for a Course

Lecture 9 - Active Learning

Lecture 10 - Coorperative Group Learning

Lecture 11 - Flipped Classroom

Lecture 12 - Effective Laboratory Courses

Lecture 13 - Assessment - Part 1

Lecture 14 - Assessment - Part 2

Lecture 15 - How can we use research in education? - Part A1

Lecture 16 - How can we use research in education? - Part A2

Lecture 17 - The Class, as a Whole - Part A3

Lecture 18 - Psychological Type (Orientation) and Learning - Part B

Lecture 19 - Cognitive Development Theories â€“ Two Main Examples - Part C

Lecture 20 - Learning Theories - Part D

Lecture 21 - Feedback and Reflection - Part 1

Lecture 22 - Feedback and Reflection - Part 2

Lecture 23 - Feedback and Reflection - Part 3

Lecture 24 - Live Session 1

Lecture 25 - Live Session 2

NPTEL : NOC:Virtual Reality Engineering (General)

Co-ordinators : Dr. M. Manivannan

Lecture 1 - Course mechanics

Lecture 2 - Goals and VR definitions

Lecture 3 - Historical perspective

Lecture 4 - Birds-eye view (general)

Lecture 5 - Birds-eye view (general) (Continued...)

Lecture 6 - Birds-eye view (hardware)

Lecture 7 - Birds-eye view (software)

Lecture 8 - Birds-eye view (sensation and perception)

Lecture 9 - Geometric modeling

Lecture 10 - Transforming models

Lecture 11 - Matrix algebra and 2D rotations

Lecture 12 - 3D rotations and yaw, pitch, and roll

Lecture 13 - 3D rotations and yaw, pitch, and roll (Continued...)

Lecture 14 - Axis-angle representations

Lecture 15 - Quaternions

Lecture 16 - Converting and multiplying rotations

Lecture 17 - Converting and multiplying rotations (Continued...)

Lecture 18 - Homogeneous transforms

Lecture 19 - The chain of viewing transforms

Lecture 20 - Eye transforms

Lecture 21 - Eye transforms (Continued...)

Lecture 22 - Canonical view transform

Lecture 23 - Viewport transform

Lecture 24 - Viewport transform (Continued...)

Lecture 25 - Three interpretations of light

Lecture 26 - Refraction

Lecture 27 - Simple lenses

Lecture 28 - Diopters

Lecture 29 - Imaging properties of lenses

Lecture 30 - Lens aberrations

Lecture 31 - Optical system of eyes

Lecture 32 - Photoreceptors

Lecture 33 - Sufficient resolution for VR

Lecture 34 - Light intensity

Lecture 35 - Eye movements

Lecture 36 - Eye movements (Continued...)

Lecture 37 - Eye movement issues for VR

Lecture 38 - Neuroscience of vision

Lecture 39 - Three Psychophysical Laws

Lecture 40 - Sensation and Perception

Lecture 41 - Psychophysics of Visual Perception

Lecture 42 - Gamma Encoding

Lecture 43 - Limiting Resolution

Lecture 44 - Depth perception

Lecture 45 - Depth perception (Continued...)

Lecture 46 - Motion perception from Visual Systtem

Lecture 47 - Frame rates and displays

Lecture 48 - Frame rates and displays (Continued...)

Lecture 49 - Psyohophysics of Depth Perception

Lecture 50 - Overview

Lecture 51 - Orientation tracking

Lecture 52 - Tilt drift correction

Lecture 53 - Yaw drift correction

Lecture 54 - Tracking with a camera

Lecture 55 - Perspective n-point problem

Lecture 56 - Filtering

Lecture 57 - Lighthouse approach

Lecture 58 - Visual Rendering-Overview

Lecture 59 - Visual Rendering-overview (Continued...)

Lecture 60 - Shading models

Lecture 61 - Rasterization

Lecture 62 - Pixel shading

Lecture 63 - VR-specific problems

Lecture 64 - Distortion shading

Lecture 65 - Post-rendering image warp

Lecture 66 - Why Haptics?

Lecture 67 - What is Haptics?

Lecture 68 - Branches of Haptics

Lecture 69 - Human Haptics - Tactile System

Lecture 70 - Kinesthetic System

Lecture 71 - Motor System

Lecture 72 - Haptic Devices and Interfaces - Kinesthetic Devices

Lecture 73 - Haptic Devices and Interfaces - Tactile Devices

Lecture 74 - Physics and Physiology

Lecture 75 - Auditory perception

Lecture 76 - Auditory localization

Lecture 77 - Rendering

Lecture 78 - Spatialization and display

Lecture 79 - Combining other senses

Lecture 80 - Interfaces -overview

Lecture 81 - Evaluation of VR Systems

Lecture 82 - Social interaction

Lecture 83 - System control

Lecture 84 - Manipulation

Lecture 85 - Locomotion

Lecture 86 - Principles of Perception

Lecture 87 - Introduction to Kalman Filter

Lecture 88 - Introduction to Extended Kalman Filter

Lecture 89 - Grand Challenges in VR/AR

Lecture 90 - Ultimate VR/AR System

NPTEL : NOC:Non-Conventional Energy Resources (General)

Co-ordinators : Dr. Prathap Haridoss

Lecture 1 - Renewable Energy Technologies

Lecture 2 - Energy Usage by Humans - Estimate of Impact on Atmosphere

Lecture 3 - Conventional Sources of Energy

Lecture 4 - Non-Conventional Sources of Energy - An Overview

Lecture 5 - Energy consumption

Lecture 6 - Details of Energy usage in each sector

Lecture 7 - Consequences of Energy consumption

Lecture 8 - Solar Energy incident on Earth, Solar Spectrum

Lecture 9 - The Solar Energy Budget

Lecture 10 - Electromagnetic Radiation - The Solar Spectrum

Lecture 11 - Solar flat plate collector

Lecture 12 - Solar Radiator

Lecture 13 - Solar Energy - The Semiconductor

Lecture 14 - Solar energy - The p-n junction

Lecture 15 - Solar Cell - Growing the single crystal and making the p-n junction

Lecture 16 - Solar Energy - Interaction of p-n junction with radiation

Lecture 17 - Solar Energy - Solar cell characteristics and usage

Lecture 18 - Solar Energy - Solar cell construction

Lecture 19 - Solar Energy - Solar Photocatalysis

Lecture 20 - Wind Energy - Overview

Lecture 21 - Wind Energy - Energy Considerations

Lecture 22 - Wind Energy - Efficiency

Lecture 23 - Wind Energy - Parts and Materials

Lecture 24 - Wind Energy - Design Considerations

Lecture 25 - Ocean Thermal Energy - Conversion (OTEC)

Lecture 26 - Geothermal Energy

Lecture 27 - Geothermal Energy Technological aspects

Lecture 28 - Biomass Usage and Issues

Lecture 29 - Battery Basics

Lecture 30 - Battery Testing and Performance

Lecture 31 - Lithium ion Batteries

Lecture 32 - Common Battery Structures and Types

Lecture 33 - Types of Fuel Cells

Lecture 34 - Fuel Processing for PEM Fuel Cells

Lecture 35 - Fuel Cells : Concept to Product

Lecture 36 - Characterization of Electrochemical Devices

Lecture 37 - Fuel Cells : Parts and Assembly

Lecture 38 - Supercapacitors

Lecture 39 - Flywheels

Lecture 40 - Magnetohydrodynamic Power Generation

NPTEL : NOC:Introduction to Remote Sensing (General)

Co-ordinators : Dr.Arun K.Saraf

Lecture 1 - What is satellite based remote sensing?

Lecture 2 - Development of remote sensing technology and advantages

Lecture 3 - Different platforms of remote sensing.

Lecture 4 - Electromagnetic Spectrum, solar reflection and thermal emission

Lecture 5 - Interaction of EM radiation with atmosphere including atmosheric scattering, absorbtion and emission

Lecture 6 - Interaction machanism of EM radiation with ground and spectral response curve

Lecture 7 - Principles of image interpretation

Lecture 8 - Multi-spectral scanners and imaging devices

Lecture 9 - Salient characteristics of Landsat, IRS, Cartosat, Resourcesat sensors

Lecture 10 - Image characteristics and different resolutions in Remote Sensing

Lecture 11 - Image interpretation of different geological landforms, rock types and structures

Lecture 12 - Remote Sensing Integration with GIS and GPS

Lecture 13 - Geo-referencing Technique

Lecture 14 - Basic Image Enhancement Techniques

Lecture 15 - Spatial Filtering, Band ratio and Principal Component Analysis techniques

Lecture 16 - Image Classification Techniques

Lecture 17 - InSAR Techniques in its applications

Lecture 18 - Hyperspectral Remote Sensing

Lecture 19 - Integrated applications of RS and GIS in groundwater studies

Lecture 20 - Limitations of Remote Sensing Techniques

NPTEL : NOC:Technical Communications for Engineers (General)

Co-ordinators : Prof. Arun K. Saraf

Lecture 1 - Introduction to Technical Communications and their types

Lecture 2 - Title and an abstract

Lecture 3 - An abstract vs extended abstract vs summary

Lecture 4 - Keywords and Introduction sections

Lecture 5 - Background and review work

Lecture 6 - Data inputs and analytical methods

Lecture 7 - Results and discussion

Lecture 8 - Conclusions and acknowledgement

Lecture 9 - Letters, Email, SMS and WhatsApp message

Lecture 10 - Key components of a chart and types of plots

Lecture 11 - Key components of a chart and types of plots

Lecture 12 - Tables and captions

Lecture 13 - Key elements of a map figure

Lecture 14 - Power Point Presentations - 1

Lecture 15 - Power Point Presentations - 2

Lecture 16 - Power Point Presentations - 3

Lecture 17 - Project Proposals

Lecture 18 - References and bibliography

Lecture 19 - What is Plagiarism - 1

Lecture 20 - What is Plagiarism - 2

NPTEL : NOC:Biomedical Ultrasound: Fundamentals of Imaging and Micromachined Transducers (General)

Co-ordinators : Prof. Himanshu Shekhar, Prof. Karla P. Mercado-Shekhar, Prof. Hardik J. Pandya

Lecture 1 - Introduction to the course

Lecture 2 - Introduction to ultrasound imaging

Lecture 3 - Basics of wave propagation

Lecture 4 - Scattering and acoustic wave equation

Lecture 5 - Intensity, Reflection, Transmission

Lecture 6 - Recap of Week 1

Lecture 7 - Introduction to Imaging modes

Lecture 8 - Imaging artifacts

Lecture 9 - Ultrasound imaging systems

Lecture 10 - Transducers and transducer arrays

Lecture 11 - Recap of Week 2

Lecture 12 - Introduction to Microfabrication

Lecture 13 - Silicon and Silicon Dioxide

Lecture 14 - Numericals on Ultrasound

Lecture 15 - Introduction to Cleanroom

Lecture 16 - Silicon and Silicon Dioxide - II

Lecture 17 - Thermal Oxidation - I

Lecture 18 - Thermal Oxidation - II

Lecture 19 - Thermal Evaporation theory

Lecture 20 - Thermal Evaporation lab demonstration

Lecture 21 - E beam Deposition theory

Lecture 22 - E beam deposition lab demonstration

Lecture 23 - Sputtering theory

Lecture 24 - Sputtering lab demonstration

Lecture 25 - Chemical Vapor Deposition - I

Lecture 26 - Chemical Vapor Deposition - II

Lecture 27 - Lithography

Lecture 28 - Lithography lab demonstration

Lecture 29 - Lithography optics - I

Lecture 30 - Lithography optics - II

Lecture 31 - Introduction to Beamforming

Lecture 32 - Beamforming Pt 2

Lecture 33 - Beamforming and Signal Processing

Lecture 34 - Intro to Field II simulation - impulse response, beam pattern

Lecture 35 - Recap of week 7

Lecture 36 - Ultrasound image quality metrics

Lecture 37 - Contrast agents

Lecture 38 - Contrast-enhanced imaging

Lecture 39 - Nonlinear acoustics and imaging

Lecture 40 - Recap of week 8

Lecture 41 - Field II imaging simulations

Lecture 42 - Doppler ultrasound

Lecture 43 - Color and Power Doppler ultrasound

Lecture 44 - Quantitative Ultrasound

Lecture 45 - Recap of week 9

Lecture 46 - Ultrasound bioeffects

Lecture 47 - Bioeffects and safety

Lecture 48 - Ultrasound elastography

Lecture 49 - Shear wave imaging

Lecture 50 - Recap of week 10

Lecture 51 - RIE and DRIE

Lecture 52 - Wet etching and Miller Indices - I

Lecture 53 - Wet etching and Miller Indices - II

Lecture 54 - Wet bench lab demonstration

Lecture 55 - PCB (Printed Circuit Board)

Lecture 56 - Ultrasonic Sensor

Lecture 57 - Material Characterisation : STM and AFM

Lecture 58 - Wire bonding lab demo

Lecture 59 - Piezoelectric polymers

Lecture 60 - Characterisation of materials - I

Lecture 61 - Characterisation of materials - II

Lecture 62 - Characterisation of materials - III

NPTEL : Contemporary Issues in Philosophy of Mind and Cognition (Humanities and Social Sciences)

Co-ordinators : Dr. Rajakishore Nath, Dr. Ranjan K. Panda

Lecture 1 - Introduction

Lecture 2 - Transcendental Consciousness

Lecture 3 - Plato's Theory of Mind

Lecture 4 - Parable of Cave : Plato's

Lecture 5 - Aristotle's Concept Mind

Lecture 6 - The Concept of Mind in Upanishadas

Lecture 7 - Dualism - I

Lecture 8 - Dualism - II

Lecture 9 - Dualism - III

Lecture 10 - Against Dualism

Lecture 11 - Property Dualism

Lecture 12 - Varieties of Materialism

Lecture 13 - Mind-Body Identity Theory

Lecture 14 - Functionalism

Lecture 15 - Different Models of Cognitive Mind

Lecture 16 - Connectionism and Folk - Psychology

Lecture 17 - Representation - I

Lecture 18 - Representation - II

Lecture 19 - Artificial Intelligence - I

Lecture 20 - Artificial Intelligence - II

Lecture 21 - Artificial Intelligence - III

Lecture 22 - The Limit of Artificial Intelligence - I

Lecture 23 - The Limit of Artificial Intelligence - II

Lecture 24 - Biological Naturalism

Lecture 25 - The Concept of Intentionality

Lecture 26 - The Structure of Consciousness - I

Lecture 27 - The Structure of Consciousness - II

Lecture 28 - Phenomenal Consciousness - I

Lecture 29 - Phenomenal Consciousness - II

Lecture 30 - Language, Representation & Meaning - I

Lecture 31 - Language & Meaning - II

Lecture 32 - Language & Mind

Lecture 33 - Language & World - I

Lecture 34 - Language & World - II

Lecture 35 - Emergentism & Supervenience

Lecture 36 - Reduction & Realization - I

Lecture 37 - Reduction & Realization - II

Lecture 38 - The Cartesian Mind Revisited

Lecture 39 - Personal Identity - I

Lecture 40 - Personal Identity - II

Lecture 41 - Creativity : Human Vs Machine - I

Lecture 42 - Creativity : Human Vs Machine - II

NPTEL : Understanding Creativity and Creative Writing (Humanities and Social Sciences)

Co-ordinators : Prof. Neelima Talwar

Lecture 1 - Overview

Lecture 2 - In Conversation with Richard Schechner

Lecture 3 - Multilingual Plurality: Our Environment - Part I

Lecture 4 - Multilingual Plurality: Our Environment - Part II

Lecture 5 - Interplay of Languages and Forms of Writing - Part I

Lecture 6 - Interplay of Languages and Forms of Writing - Part II

Lecture 7 - Creativity and Cultures

Lecture 8 - Notion of Play and The Three Domain Activities

Lecture 9 - Theory of Enjoyment: Critical Assessment

Lecture 10 - Divergences and Convergences - Part I

Lecture 11 - Divergences and Convergences - Part II

Lecture 12 - Creative and Cultural Spaces for Students

Lecture 13 - Being and Doing: Writing as Performance

Lecture 14 - Writers and Writing: The Dialogic Process

Lecture 15 - Creativity, Writing, Creative Writing: Recent Viewpoints

Lecture 16 - Issues Related to the Teaching of Creative Writing

Lecture 17 - Writers on Writing: Albert Camus

Lecture 18 - Critical Reading of Great Writers: Albert Camus

Lecture 19 - Critical Reading of Important Writers: Margaret Atwood

Lecture 20 - Reading and Writing

Lecture 21 - Indian Writing: Writers/Narrators

Lecture 22 - Contemporary Indian Writers: The Search for Creativity - Part I

Lecture 23 - Contemporary Indian Writers: The Search for Creativity - Part II

Lecture 24 - Mosaic Patterns: Module 2

Lecture 25 - Introduction to Drama

Lecture 26 - Performance and Script Writing: Mime

Lecture 27 - Western Classical Theory

Lecture 28 - Student Response - I

Lecture 29 - Indian Drama: Classical Theory and Practice

Lecture 30 - Interacting Continuum: Classical, Folk and Modern Drama

Lecture 31 - From The Perspective of Playwriting: Monologue

Lecture 32 - From The Playwright's Perspective - Part I

Lecture 33 - From The Playwright's Perspective - Part II

Lecture 34 - From The Perspective of Playwriting: Anton Chekhov

Lecture 35 - Drama in the Classroom: Experience and Writing

Lecture 36 - Student Response - II

Lecture 37 - Performative Reading of the Cherry Orchard

Lecture 38 - Short Story as a Genre

Lecture 39 - Short Stories by Indian Women Writers

Lecture 40 - Modern Western Short Story

Lecture 41 - Varieties of Writing Processes

NPTEL : NOC:Energy Resources, Economics and Environment (Humanities and Social Sciences)

Co-ordinators : Prof. Rangan Banerjee

Lecture 1 - Energy Flow Diagram

Lecture 2 - Global Trends in Energy Use

Lecture 3 - Energy Use in India: Some Calculations

Lecture 4 - Energy and Environment

Lecture 5 - The Kaya Identity

Lecture 6 - Emission Factor

Lecture 7 - Energy and Quality of Life

Lecture 8 - Energy Inequality

Lecture 9 - Energy Security

Lecture 10 - Introduction to Country Energy Balance assignment

Lecture 11 - Energy balance of Japan

Lecture 12 - Energy balance of Australia

Lecture 13 - Energy balance of Mexico

Lecture 14 - Energy Economics - Part 1

Lecture 15 - Energy Economics - Part 2

Lecture 16 - Energy Economics - Part 3

Lecture 17 - Energy Economics - Tutorial

Lecture 18 - Energy resources - Part 1

Lecture 19 - Energy resources - Part 2

Lecture 20 - Renewable Energy Sources - Part 1

Lecture 21 - Renewable Energy Sources - Part 2

Lecture 22 - Materials for Energy

Lecture 23 - Non Renewable Resource Economics - Part 1

Lecture 24 - Non Renewable Resource Economics - Part 2

Lecture 25 - Non Renewable Resource Economics - Part 3

Lecture 26 - Preferences and Utility

Lecture 27 - Utility and Social Choice - Part 1

Lecture 28 - Utility and Social Choice - Part 2

Lecture 29 - Utility and Social Choice - Part 3

Lecture 30 - Utility and Social Choice - Part 4

Lecture 31 - Revision Paper-1 - Part 1

Lecture 32 - Public and Private Good/Bads

Lecture 33 - Aggregation of Demand Curves

Lecture 34 - Externalities

Lecture 35 - Revision Paper-1 - Part 2

Lecture 36 - Revision paper-1 - Part 3

Lecture 37 - Energy Project Financing - Part 1

Lecture 38 - Energy Project Financing - Part 2

Lecture 39 - Energy Project Financing - Tutorial

Lecture 40 - Input Output Analysis - Part 1

Lecture 41 - Input Output Analysis - Part 2

Lecture 42 - Input Output Analysis - Part 3

Lecture 43 - Input Output Analysis - Tutorial

Lecture 44 - Primary Energy Analysis - Part 1

Lecture 45 - Primary Energy Analysis - Part 2

Lecture 46 - Net Energy Analysis - Part 1

Lecture 47 - Net Energy Analysis - Part 2

Lecture 48 - Net Energy Analysis - Part 3

Lecture 49 - Net Energy Analysis - Part 4

Lecture 50 - Energy Policy - Part 1

Lecture 51 - Energy Policy - Part 2

Lecture 52 - Energy Policy Examples - Part 1

Lecture 53 - Energy Policy Examples - Part 2

Lecture 54 - Revision Paper-2 - Part 1

Lecture 55 - Revision Paper-2 - Part 2

Lecture 56 - Future Energy Systems

NPTEL : NOC:Introduction to Paninian Grammar (Humanities and Social Sciences)

Co-ordinators : Prof. Malhar Kulkarni

Lecture 1 - Aims and objectives of the course

Lecture 2 - Systemic and Textual approaches to study PÄá¹‡inian grammar

Lecture 3 - PÄá¹‡ini and his linguistic background

Lecture 4 - Scholars and texts in the PÄá¹‡inian grammatical tradition and their contribution

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NPTEL : NOC:Sandhi in Paninian Grammar (Humanities and Social Sciences)

Co-ordinators : Prof. Malhar Kulkarni

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NPTEL : NOC:à¤¸à¤®à¤¾à¤¸ SamÄsa in PÄá¹‡inian Grammar-I (Humanities and Social Sciences)

Co-ordinators : Prof. Malhar Kulkarni

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Lecture 23 - à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· à¤¸à¤®à¤¾à¤¸ tatpuruá¹£a samÄsa-à¤¤à¥ƒà¤¤à¥€à¤¯à¤¾ tá¹›tÄ«yÄ à¤µà¤¿à¤à¤•à¥à¤¤à¤¿-à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· vibhakti-tatpuruá¹£a - 2

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Lecture 28 - à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· à¤¸à¤®à¤¾à¤¸ tatpuruá¹£a samÄsa-à¤·à¤·à¥à¤ à¥€ á¹£aá¹£á¹hÄ« à¤µà¤¿à¤à¤•à¥à¤¤à¤¿-à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· vibhakti-tatpuruá¹£a - 1

Lecture 29 - à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· à¤¸à¤®à¤¾à¤¸ tatpuruá¹£a samÄsa-à¤·à¤·à¥à¤ à¥€ á¹£aá¹£á¹hÄ« à¤µà¤¿à¤à¤•à¥à¤¤à¤¿-à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· vibhakti-tatpuruá¹£a - 2

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Lecture 39 - à¤à¤•à¥‡à¤¶à¤¿à¤¤à¤¸à¤®à¤¾à¤¸ ekadeÅ›isamÄsa + à¤¨à¤žà¥ à¤¤à¤¤à¥à¤ªà¥à¤°à¥à¤· à¤¸à¤®à¤¾à¤¸ naÃ± tatpuruá¹£a samÄsa

Lecture 40 - à¤ªà¥à¤°à¤¾à¤¦à¤¿à¤¸à¤®à¤¾à¤¸ prÄdisamÄsa + à¤—à¤¤à¤¿à¤¸à¤®à¤¾à¤¸ gatisamÄsa - 1

Lecture 41 - à¤—à¤¤à¤¿à¤¸à¤®à¤¾à¤¸ gatisamÄsa - 2

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Lecture 45 - à¤‰à¤ªà¤ªà¤¦à¤¸à¤®à¤¾à¤¸ upapadasamÄsa - 2

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Lecture 55 - à¤¸à¤®à¤¾à¤¸à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯ samÄsÄntapratyaya - 1

Lecture 56 - à¤¸à¤®à¤¾à¤¸à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯ samÄsÄntapratyaya - I

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Lecture 58 - à¤ªà¥‚à¤°à¥à¤µà¤ªà¤¦à¤•à¤¾à¥à¤¯ pÅ«rvapadakÄrya

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Lecture 60 - Examples

NPTEL : NOC:à¤¸à¤®à¤¾à¤¸ SamÄsa in PÄá¹‡inian Grammar - II (Humanities and Social Sciences)

Co-ordinators : Prof. Malhar Kulkarni

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Lecture 22 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 23 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 24 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 25 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 26 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 27 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 28 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 29 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 30 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 31 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤¸à¤®à¤¾à¤¸ à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 32 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 33 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 34 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 35 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 36 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ avyayÄ«bhÄva samÄsa vidhÄna

Lecture 37 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ à¤µà¤¿à¤§à¤¾à¤¨ - avyayÄ«bhÄva samÄsa samÄsÄntapratyaya vidhÄna

Lecture 38 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ à¤µà¤¿à¤§à¤¾à¤¨- avyayÄ«bhÄva samÄsa samÄsÄntapratyaya vidhÄna

Lecture 39 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ à¤µà¤¿à¤§à¤¾à¤¨- avyayÄ«bhÄva samÄsa samÄsÄntapratyaya vidhÄna

Lecture 40 - à¤…à¤µà¥à¤¯à¤¯à¥€à¤à¤¾à¤µ à¤,à¤®à¤¾à¤, à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ à¤µà¤¿à¤§à¤¾à¤¨- avyayÄ«bhÄva samÄsa samÄsÄntapratyaya vidhÄna

Lecture 41 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna- General information

Lecture 42 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 43 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 44 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 45 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 46 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 47 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 48 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 49 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 50 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 51 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ bahuvrÄ«hi samÄsavidhÄna

Lecture 52 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ bahuvrÄ«hi samÄsÄntapratyaya

Lecture 53 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ bahuvrÄ«hi samÄsÄntapratyaya

Lecture 54 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ bahuvrÄ«hi samÄsÄntapratyaya

Lecture 55 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤-à¤†à¤¦à¥‡à¤¶ bahuvrÄ«hi samÄsÄnta-ÄdeÅ›a

Lecture 56 - à¤¬à¤¹à¥à¤µà¥à¤°à¥€à¤¹à¤¿ à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤-à¤†à¤¦à¥‡à¤¶ bahuvrÄ«hi samÄsÄnta-ÄdeÅ›a

Lecture 57 - à¤¦à¥à¤µà¤¨à¥à¤¦à¥à¤µ à¤,à¤®à¤¾à¤, à¤µà¤¿à¤§à¤¾à¤¨ dvandva samÄsa vidhÄna

Lecture 58 - à¤¦à¥à¤µà¤¨à¥à¤¦à¥à¤µ à¤,à¤®à¤¾à¤, dvandva samÄsa à¤,à¤®à¤¾à¤,à¤¾à¤¨à¥à¤¤à¤ªà¥à¤°à¤¤à¥à¤¯à¤¯à¤¾à¤¨ samÄsÄntapratyaya, à¤ªà¤¦à¤¨à¤¿à¤°à¥à¤§à¤¾à¤°à¤£ padanirdhÄraá¹‡a

Lecture 59 - à¤¦à¥à¤µà¤¨à¥à¤¦à¥à¤µ à¤,à¤®à¤¾à¤, dvandva samÄsa à¤à¤•à¤µà¤¦à¥à¤à¤¾à¤µ ekavadbhÄva

Lecture 60 - à¤¦à¥à¤µà¤¨à¥à¤¦à¥à¤µ à¤,à¤®à¤¾à¤,dvandva samÄsa à¤à¤•à¤µà¤¦à¥à¤à¤¾à¤µ ekavadbhÄva,à¤²à¤¿à¤™à¥à¤—à¤¨à¤¿à¤°à¥à¤§à¤¾à¤°à¤£ liá¹…ganirdhÄraá¹‡a,

NPTEL : NOC:Text, Texuality and Digital Media (Humanities and Social Sciences)

Co-ordinators : Prof. Arjun Ghosh

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Lecture 7 - Walter Ong: Orality and Literacy - Part 3

Lecture 8 - Dastangoi : History - Part 1

Lecture 9 - Dastangoi : Chouboli - Part 2

Lecture 10 - Manuscript Culture: Europe

Lecture 11 - Manuscript Culture: India

Lecture 12 - Feudalism to Capitalism

Lecture 13 - Febre and Martin: â€˜The Discovery of Printingâ€™ and â€˜The Chinese Precedentâ€™

Lecture 14 - Guteberg and Revolution 15th Century

Lecture 15 - Consequences of Print 16-17 Century

Lecture 16 - John Dryden: [macFlecknoe]

Lecture 17 - Robert Darnton: â€˜What is the History of Books?â€™

Lecture 18 - Benedict Anderson: â€˜The Origins of National Consciousnessâ€™

Lecture 19 - Colonialism

Lecture 20 - Print in Bengal

Lecture 21 - Surveillance and Censorship

Lecture 22 - Rise of the Telugu Novel

Lecture 23 - Publishing in Hindi and Urdu

Lecture 24 - Walter Benjamin: 'The Work of Art in the Age of Mechanical Reproduction'

Lecture 25 - Raymond Williams: 'Television'

Lecture 26 - Jay David Bolter: Seeing and Writing

Lecture 27 - Robert Coover: The End of Books - Part 1

Lecture 28 - Robert Coover: The End of Books - Part 2

Lecture 29 - N. katherine Hayles: Electronic Literature

Lecture 30 - Richard Stallman: The GNU Manifesto

Lecture 31 - Lawrence Lessig: Free Cultures

Lecture 32 - Copyright - Part 1

Lecture 33 - Copyright - Part 2

Lecture 34 - Nicholas Carr: Jugglerâ€™s Brain

Lecture 35 - Scott Galloway: Google

Lecture 36 - Zeynep Tufecki: Twitter and Facebook - Part 1

Lecture 37 - Zeynep Tufecki: Twitter and Facebook - Part 2

Lecture 38 - Conclusion

NPTEL : NOC:Positive Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Kamlesh Singh

Lecture 1 - Introduction to Psychology

Lecture 2 - Introduction to Positive Psychology

Lecture 3 - Research Methods

Lecture 4 - Character Strengths and Virtues/Positive Personality Traits - Part 1

Lecture 5 - Character Strengths and Virtues/Positive Personality Traits - Part 2

Lecture 6 - Character Strengths and Virtues/Positive Personality Traits - Part 3

Lecture 7 - Happiness and Well-Being - Part 1

Lecture 8 - Happiness and Well-Being - Part 2

Lecture 9 - Happiness and Well-Being - Part 3

Lecture 10 - Positive Emotional States and Processes - Part 1

Lecture 11 - Positive Emotional States and Processes - Part 2

Lecture 12 - Hope and Optimism

Lecture 13 - Self and related Concepts

Lecture 14 - Resilience

Lecture 15 - Flow

Lecture 16 - Mindfulness

Lecture 17 - Spirituality, Grit and Mindset

Lecture 18 - Minding and Compassion

Lecture 19 - Forgiveness, Humanity and Gratitude

Lecture 20 - Love, Empathy and Altruism

Lecture 21 - Recent Trends and Directions In Positive Psychology - Part 1

Lecture 22 - Recent Trends and Directions In Positive Psychology - Part 2

Lecture 23 - Recent Trends and Directions In Positive Psychology - Part 3

NPTEL : NOC:Science Communication: Research Productivity and Data Analytics using Open Source Software (Humanities and Social Sciences)

Co-ordinators : Prof. Nabi Hasan, Prof. Mohit Garg

Lecture 1 - Introduction to Science Communication

Lecture 2 - Channels of Science Communication

Lecture 3 - Open Science and Open Access

Lecture 4 - Open Research Data and Open Peer Review

Lecture 5 - Overview of Tools for Maximizing Academic Visibility and Impact of Research Output

Lecture 6 - Understanding Research Metrices: Author, Journal and Article Level Metrices

Lecture 7 - Abstract and Citation Database Scopus

Lecture 8 - Abstract and Citation Database: Web of Science

Lecture 9 - Health Science Database: PubMed

Lecture 10 - Free Academic Search Engine: Google Scholar

Lecture 11 - Installation of R

Lecture 12 - Installation of RStudio

Lecture 13 - Object and different types

Lecture 14 - Vector and Data Frame

Lecture 15 - Lists, Matrices, Factor, Array

Lecture 16 - Packages and Help

Lecture 17 - Science communication and different metrices

Lecture 18 - Lotka's law

Lecture 19 - Bradford's law

Lecture 20 - Zipf's Law

Lecture 21 - Descriptive Analysis - I

Lecture 22 - Descriptive Analysis - II

Lecture 23 - Descriptive Analysis - III

Lecture 24 - Analysis of Bradford and Lotka Law

Lecture 25 - Science Mapping - I

Lecture 26 - Science Mapping - II

Lecture 27 - Data Visualization: An overview, history and skills for researchers

Lecture 28 - Data Visualization: Types, tools and technologies

Lecture 29 - Visualization of Scientific Research Patterns and Trends with VOSviewer and CiteSpace

Lecture 30 - Text Mining - Introduction

Lecture 31 - Regular Expression

Lecture 32 - Text Pre-processing

Lecture 33 - Topic Modeling

Lecture 34 - THE, QS, Sanghai (ARWU) and (NIRF) Ranking

Lecture 35 - Academic Integrity and Ethical Guidelines in Science Communication

Lecture 36 - IPR/Copyright Issues and Practices in Print and Digital Environment

Lecture 37 - Predatory Publishing: Issues, Challenges and the Road Ahead

Lecture 38 - Case Study #1 Subject Domain

Lecture 39 - Case Study #2 Author

Lecture 40 - Case Study #3 Journal and Institution

NPTEL : Cultural Studies (Humanities and Social Sciences)

Co-ordinators : Dr. Liza Das

Lecture 1 - Understanding Cultural Studies - Part 1

Lecture 2 - Understanding Cultural Studies - Part 2

Lecture 3 - Evolution and Culture

Lecture 4 - Evolutionary Psychology

Lecture 5 - The Modern Mind: Its Origins

Lecture 6 - Memetics

Lecture 7 - Cultural Theory: Structuralism

Lecture 8 - Marxism - Part 1

Lecture 9 - Marxism - Part 2

Lecture 10 - Poststructuralism

Lecture 11 - Subjectivity

Lecture 12 - Identity

Lecture 13 - Ideology - Part 1

Lecture 14 - Ideology - Part 2

Lecture 15 - Representation - Part 1

Lecture 16 - Representation - Part 2

Lecture 17 - Power

Lecture 18 - Discourse

Lecture 19 - Gender - Part 1

Lecture 20 - Gender - Part 2

Lecture 21 - The Body

Lecture 22 - Space

Lecture 23 - Time

Lecture 24 - Development

Lecture 25 - Language

Lecture 26 - Ethnicity, Race and Nation

Lecture 27 - Globalisation

Lecture 28 - Consumption - Part 1

Lecture 29 - Consumption - Part 2

Lecture 30 - Biology

Lecture 31 - Culture Industry

Lecture 32 - Commodity

Lecture 33 - Media

Lecture 34 - Television

Lecture 35 - New Media

Lecture 36 - Science, Technology and Culture

Lecture 37 - Cyberculture

Lecture 38 - Cultural Policy

Lecture 39 - Critiquing Cultural Studies

Lecture 40 - Conclusion

NPTEL : English Language and Literature (Humanities and Social Sciences)

Co-ordinators : Dr. Krishna Barua, Dr. Liza Das

Lecture 1 - Introduction

Lecture 2 - The Scope of English Studies

Lecture 3 - The English Language

Lecture 4 - International English

Lecture 5 - The Globalization of English

Lecture 6 - World Englishes

Lecture 7 - The Rise of Cultural Studies

Lecture 8 - Old English

Lecture 9 - Middle English

Lecture 10 - Early Modern English

Lecture 11 - Modern English - 1

Lecture 12 - Modern English - 2

Lecture 13 - The Age of Chaucer

Lecture 14 - The Age of Shakespeare

Lecture 15 - Milton and his Times

Lecture 16 - The Augustans

Lecture 17 - The Romantics

Lecture 18 - The Victorians

Lecture 19 - Modern Literature

Lecture 20 - The Novel

Lecture 21 - Poetry

Lecture 22 - Drama

Lecture 23 - Essay

Lecture 24 - Short story

Lecture 25 - Biography

Lecture 26 - Autobiography

Lecture 27 - History Of English Language

Lecture 28 - Marxist Literary Criticism

Lecture 29 - Feminist Criticism

Lecture 30 - Structuralist Criticism

Lecture 31 - Poststructuralism

Lecture 32 - Postcolonialism

Lecture 33 - Cognitive Approaches To Literature

Lecture 34 - Classical Criticism

Lecture 35 - Liberal Humanism

Lecture 36 - Reader-response Criticism

Lecture 37 - New Historicism

Lecture 38 - Ecocriticism

NPTEL : Game Theory for Economists (Humanities and Social Sciences)

Co-ordinators : Dr. Debarshi Das

Lecture 1 - Definition of Game Theory and Rational Choice

Lecture 2 - Interacting Decision Makers

Lecture 3 - Strategic Games : Examples

Lecture 4 - Matching Pennies, Stag Hunt and Nash Equilibrium

Lecture 5 - Examples of Nash Equilibrium

Lecture 6 - Altruism and Prisonerâ€™s Dilemma

Lecture 7 - Variants Stag Hunt Game, Hawk Dove and Coordination Game

Lecture 8 - Public Good Provision, Strict Nash Equilibrium

Lecture 9 - Best Response Functions

Lecture 10 - Strictly and Weakly Dominated Action

Lecture 11 - Application of Weak Domination: Voting

Lecture 12 - Symmetric Games and Symmetric Equilibrium

Lecture 13 - Cournot Model of Oligopoly

Lecture 14 - Different Aspects of Cournot Model

Lecture 15 - Further Aspects of Cournot Model

Lecture 16 - Cournot & Bertrand Models

Lecture 17 - Different Aspects of Bertrand Model

Lecture 18 - Electoral Competition 1

Lecture 19 - Different Aspects of Hotelling Model

Lecture 20 - Hotteling Model: Concluding Remarks

Lecture 21 - War of Attrition

Lecture 22 - Second Price Sealed Bid Auction

Lecture 23 - Further Aspects of Second Price Auction

Lecture 24 - First Price Auction

Lecture 25 - All Pay Auction, Multi Unit Auction

Lecture 26 - Accident Laws

Lecture 27 - Mixed Strategy Nash Equilibrium: Introduction

Lecture 28 - Mixed Strategy, Mixed Strategy Equilibrium

Lecture 29 - Mixed Strategy Equilibrium: Concept and Examples

Lecture 30 - Characterisation of Mixed Strategy Equilibrium

Lecture 31 - Dominated Actions and Iterated Elimination

Lecture 32 - Rationalisability and Beliefs

Lecture 33 - Extensive Games: Introduction

Lecture 34 - Strategy and Equilibrium

Lecture 35 - Nash Equilibrium and Its Problems

Lecture 36 - Subgame Perfect Nash Equilibrium

Lecture 37 - Backward Induction

Lecture 38 - Backward Induction: Exercises

Lecture 39 - Ultimatum Game

Lecture 40 - Stackelberg Duopoly Model

NPTEL : NOC:Digital Human Modeling and Simulation for Virtual Ergonomics Evaluation (Humanities and Social Sciences)

Co-ordinators : Dr. Sougata Karmakar

Lecture 1 - Introduction to Ergonomics

Lecture 2 - Notes 1

Lecture 3 - Use of percentile anthropometric and biomechanical data for product design - Part I

Lecture 4 - Use of percentile anthropometric and biomechanical data for product design - Part II

Lecture 5 - Use of percentile anthropometric and biomechanical data for product design - Part III

Lecture 6 - Use of percentile anthropometric and biomechanical data for product design - Part IV

Lecture 7 - Notes 2

Lecture 8 - Virtual Ergonomics and its Advantages

Lecture 9 - Notes 3

Lecture 10 - Introduction of Digital Human Modeling (DHM) and Simulation

Lecture 11 - Notes 4

Lecture 12 - Techniques/Process of virtual ergonomics evaluation using DHMs - Part A (Part I)

Lecture 13 - Notes 5

Lecture 14 - Techniques/Process of virtual ergonomics evaluation using DHMs - Part B (Part I)

Lecture 15 - Techniques/Process of virtual ergonomics evaluation using DHMs - Part B (Part II)

Lecture 16 - Techniques/Process of virtual ergonomics evaluation using DHMs - Part B (Part III)

Lecture 17 - Notes 6

Lecture 18 - Application of Digital Human Modeling and Simulation in various Industrial Sectors - Part I

Lecture 19 - Application of Digital Human Modeling and Simulation in various Industrial Sectors - Part II

Lecture 20 - Notes 7

Lecture 21 - Future research avenues and steps to be taken towards widespread - Part I

Lecture 22 - Future research avenues and steps to be taken towards widespread - Part II

Lecture 23 - Future research avenues and steps to be taken towards widespread - Part III

Lecture 24 - Notes 8

NPTEL : NOC:Science, Technology and Society (Humanities and Social Sciences)

Co-ordinators : Dr. Sambit Mallick

Lecture 1 - Cognitive Dimensions - I

Lecture 2 - Cognitive Dimensions - II

Lecture 3 - Ethical Dimensions

Lecture 4 - Inductivism and Hypothesism - I

Lecture 5 - Inductivism and Hypothesism - II

Lecture 6 - Positivism - I

Lecture 7 - Positivism - II

Lecture 8 - Karl Popper - I

Lecture 9 - Karl Popper - II

Lecture 10 - Thomas Kuhn

Lecture 11 - Popper versus Kuhn

Lecture 12 - Paul Feyerabend

Lecture 13 - Rewards and Recognitions - I

Lecture 14 - Rewards and Recognitions - II

Lecture 15 - Rewards and Recognitions - III

Lecture 16 - Cumulative Advantage and Symbolism of Intellectual Property - I

Lecture 17 - Cumulative Advantage and Symbolism of Intellectual Property - II

Lecture 18 - Cumulative Advantage and Symbolism of Intellectual Property - III

Lecture 19 - Max Weber

Lecture 20 - Preliminary Exercise and Explanation

Lecture 21 - Edwin Layton Jr.

Lecture 22 - Langdon Winner - I

Lecture 23 - Langdon Winner - II

Lecture 24 - Langdon Winner - III

Lecture 25 - Donald MacKenzie and Judy Wajcman - I

Lecture 26 - Donald MacKenzie and Judy Wajcman - II

Lecture 27 - Thomas Edison

Lecture 28 - Capitalism, class, gender, city, machine, workplace - I

Lecture 29 - Capitalism, class, gender, city, machine, workplace - II

Lecture 30 - Capitalism, class, gender, city, machine, workplace - III

Lecture 31 - Alvin Toffler and Daniel Bell

Lecture 32 - Themes and Factors of Information Technology

Lecture 33 - Information Technology and Reconceptualization of Class

Lecture 34 - Reception of Modern Science in India

Lecture 35 - Science Policies in India

Lecture 36 - Summary of the Course

NPTEL : NOC:Gender and Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Avishek Parui

Lecture 1 - A Brief Overview of the Course

Lecture 2 - Performativity and Embodiment

Lecture 3 - The Chess Players - Part 1

Lecture 4 - The Chess Players - Part 2

Lecture 5 - Shooting an Elephant - Part 1

Lecture 6 - Shooting an Elephant - Part 2

Lecture 7 - Heart of Darkness - Part 1

Lecture 8 - Heart of Darkness - Part 2

Lecture 9 - Heart of Darkness - Part 3

Lecture 10 - The Fly - Part 1

Lecture 11 - The Fly - Part 2

Lecture 12 - Look Back in Anger - Part 1

Lecture 13 - Look Back in Anger - Part 2

Lecture 14 - Look Back in Anger - Part 3

Lecture 15 - Look Back in Anger - Part 4

Lecture 16 - Look Back in Anger - Part 5

Lecture 17 - Look Back in Anger - Part 6

Lecture 18 - Gender and Popular Culture Lecture - 1

Lecture 19 - Gender and Popular Culture Lecture - 2

Lecture 20 - Gender and Popular Culture Lecture - 3

Lecture 21 - Gender and Popular Culture Final Lecture

NPTEL : NOC:Ecology and Society (Humanities and Social Sciences)

Co-ordinators : Prof. Ngamjahao Kipgen

Lecture 1 - Ecology and Society - 1

Lecture 2 - Ecology and Society - 2

Lecture 3 - Culture and Cultural Ecology

Lecture 4 - Cultural Ecology and Eocnomic

Lecture 5 - Cultural Ecological Theory

Lecture 6 - Human Ecology: Concept and Meaning

Lecture 7 - Human Ecology - Theoretical Approach

Lecture 8 - Ecological Anthropology

Lecture 9 - Ecosystem-based and Actor-based Model of Human Ecology

Lecture 10 - Nature and Culture Debate

Lecture 11 - Nature - A Contested Concept

Lecture 12 - Conceptions of Nature

Lecture 13 - Contested Domains and Boundaries of Culture

Lecture 14 - MCQs Discussion

Lecture 15 - Paradigms in Humanâ€"Environmental Relations - Part I

Lecture 16 - Paradigms in Humanâ€"Environmental Relations - Part II

Lecture 17 - Nature, Culture, Magic and Science

Lecture 18 - Religion, Nature and Environment

Lecture 19 - Religion, Nature and Environment Continue

Lecture 20 - The Historical Roots of our Ecological Crisis

Lecture 21 - Biodiversity Conservation Ethics in Buddhism

Lecture 22 - Hinduism and Nature Conservation, Christian Religion Response to Ecological Crisis

Lecture 23 - Hinduism and Nature Conservation, Christian Religion Response to Ecological Crisis

Lecture 24 - Deep Ecology

Lecture 25 - Social Ecology

Lecture 26 - Ecological Feminist Philosophies

Lecture 27 - Indigenous Knowledge

Lecture 28 - Ecological Journey

Lecture 29 - Kuki Jhumming Practices

Lecture 30 - Debates on Shifting Cultivation

Lecture 31 - Course Summary

NPTEL : NOC:Sociological Perspectives on Modernity (Humanities and Social Sciences)

Co-ordinators : Dr. Sambit Mallick

Lecture 1 - Thematic Preliminaries - I

Lecture 2 - Thematic Preliminaries - II

Lecture 3 - Thematic Preliminaries - III

Lecture 4 - Sociological Modernism: Karl Marx - I

Lecture 5 - Sociological Modernism: Karl Marx - II

Lecture 6 - Sociological Modernism: Karl Marx - III

Lecture 7 - Sociological Modernism: Max Weber - I

Lecture 8 - Sociological Modernism: Max Weber - II

Lecture 9 - Sociological Modernism: Max Weber - III

Lecture 10 - Sociological Modernism: Max Weber - IV

Lecture 11 - Sociological Modernism: Marx vs. Weber

Lecture 12 - Structuralist Interpretation - I

Lecture 13 - Structuralist Interpretation - II

Lecture 14 - Structuralist Interpretation - III

Lecture 15 - Western Marxism - I

Lecture 16 - Western Marxism - II

Lecture 17 - Modernity and Social Theory - I

Lecture 18 - Modernity and Social Theory - II

Lecture 19 - Modernity and Social Theory - III

Lecture 20 - Modernity and Social Theory - IV

Lecture 21 - Deconstruction of Modernity: The Feminist Challenge - I

Lecture 22 - Deconstruction of Modernity: The Feminist Challenge - II

Lecture 23 - Deconstruction of Modernity: Towards Cultural Studies - I

Lecture 24 - Deconstruction of Modernity: Towards Cultural Studies - II

Lecture 25 - Deconstruction of Modernity: The Postmodernist Critique - I

Lecture 26 - Deconstruction of Modernity: The Postmodernist Critique - II

Lecture 27 - A New Totality - I

Lecture 28 - A New Totality - II

Lecture 29 - Modernity in India

Lecture 30 - What have we discussed?

NPTEL : NOC:Introduction to Cognitive Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Naveen Kashyap

Lecture 1 - A Brief History of Cognitive Psychology - 1

Lecture 2 - A Brief History of Cognitive Psychology - 2

Lecture 3 - Studying Cognition

Lecture 4 - Perception:Basic Principles

Lecture 5 - Models of Perception - 1

Lecture 6 - Models of Perception - 2

Lecture 7 - Basic Attention Processes

Lecture 8 - Models of Attention

Lecture 9 - Automization and Attention

Lecture 10 - Memory Introduction

Lecture 11 - Short Term Memory

Lecture 12 - Working Memory

Lecture 13 - Long-Term Memory Encoding

Lecture 14 - Retrieval from Long-Term Memory

Lecture 15 - Semantic Memory Basics

Lecture 16 - Models of Semantic Memory

Lecture 17 - Introducing Concepts and Categories - 1

Lecture 18 - Introducing Concepts and Categories - 2

Lecture 19 - Basics of Visual Memory

Lecture 20 - Object Transformation in Visual Memory

Lecture 21 - Basic Issues in Language

Lecture 22 - Comprehension and Understanding of Language

Lecture 23 - Introduction to Problem Solving

Lecture 24 - Factors Influencing Problem Solving

Lecture 25 - Insight and Creativity

Lecture 26 - Reasoning - 1

Lecture 27 - Reasoning - 2

Lecture 28 - Classical Theory of Decision Making

Lecture 29 - Prospect Theory of Decision Making

Lecture 30 - Course Summary

NPTEL : NOC:Introduction to Modern Indian Political Thought (Humanities and Social Sciences)

Co-ordinators : Prof. Mithilesh Kumar Jha

Lecture 1 - Introduction to the course

Lecture 2 - Raja Rammohan Roy : Religious reforms

Lecture 3 - Raja Rammohan Roy : Modern education

Lecture 4 - Raja Rammohan Roy : Freedom of Press

Lecture 5 - Rabindranath Tagore : Nationalism

Lecture 6 - Rabindranath Tagore : Cosmopolitanism

Lecture 7 - Rabindranath Tagore : Idea of man

Lecture 8 - Aurobindo Ghosh : Self

Lecture 9 - Aurobindo Ghosh : Community and Religion

Lecture 10 - Vivekananda : Introduction

Lecture 11 - Vivekananda : Revitalisation of Indian life

Lecture 12 - Mahatma Gandhi : Introduction

Lecture 13 - Mahatma Gandhi : Hind swaraj and Critique of Modern Civilisation

Lecture 14 - Mahatma Gandhi : India of His Dreams

Lecture 15 - Muhammad Iqbal : Community

Lecture 16 - Muhammad Iqbal : Religion and Nation

Lecture 17 - Savarkar : Introduction

Lecture 18 - Savarkar : Hinduism and Hindutva

Lecture 19 - Jawaharlal Nehru : Discovery of India

Lecture 20 - Jawaharlal Nehru : Secularism

Lecture 21 - Jawaharlal Nehru : Internationalism

Lecture 22 - B.R.Ambedkar : Introduction

Lecture 23 - B.R.Ambedkar : Caste

Lecture 24 - B.R.Ambedkar : Liberal Democracy and Constitutional Morality

Lecture 25 - Pandita Ramabai : Introduction

Lecture 26 - Pandita Ramabai : Gender and Caste

Lecture 27 - Rammanohar Lohia : Introduction

Lecture 28 - Rammanohar Lohia : Caste and Class

Lecture 29 - Rammanohar Lohia : Views on Indian Languages

Lecture 30 - Conclusion

NPTEL : NOC:Consumer Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Naveen Kashyap

Lecture 1 - Introduction to Consumer Psychology - I

Lecture 2 - Introduction to Consumer Psychology - II

Lecture 3 - Problem Recognition - I

Lecture 4 - Problem Recognition - II

Lecture 5 - Alternate Evaluation - I

Lecture 6 - Alternate Evaluation - II

Lecture 7 - Alternate Evaluation - III

Lecture 8 - Post Purchase and Consumption - I

Lecture 9 - Post Purchase and Consumption - II

Lecture 10 - Perception and Cognition - I

Lecture 11 - Perception and Cognition - II

Lecture 12 - Memory and Learning - I

Lecture 13 - Memory and Learning - II

Lecture 14 - Emotion Motivation and Mood - I

Lecture 15 - Emotion Motivation and Mood - II

Lecture 16 - Attitude and Attitude Change - I

Lecture 17 - Attitude and Attitude Change - II

Lecture 18 - Communication and Persuassion - I

Lecture 19 - Communication and Persuassion - II

Lecture 20 - Summary

NPTEL : NOC:Introduction to Modern Indian Drama (Humanities and Social Sciences)

Co-ordinators : Prof. Kiran Keshavamurthy

Lecture 1 - Sanskrit and National Theatre

Lecture 2 - History of Parsi Theatre and Female Impersonation

Lecture 3 - Female Impersonation and Indian Folk Traditions

Lecture 4 - Early Indian Playwrights

Lecture 5 - Silence! The Court is in Session

Lecture 6 - A Friend's Story

Lecture 7 - Ghashiram Kotwal

Lecture 8 - Kanyadaan

Lecture 9 - Hayavadana

Lecture 10 - Tughlaq

Lecture 11 - The Dreams of Tipu Sultan

Lecture 12 - The Fire and the Rain

Lecture 13 - Broken Images

Lecture 14 - Summary

Lecture 15 - Introduction and Garbo

Lecture 16 - Old Stone Mansion

Lecture 17 - Desire in the Rocks

Lecture 18 - Sonata

Lecture 19 - Summary of Mahesh Elkunchwar

Lecture 20 - Introduction and Final Solutions

Lecture 21 - Bravely Fought the Queen

Lecture 22 - Dance Like a Man

Lecture 23 - Summary of Mahesh Dattani

Lecture 24 - Introduction and Procession

Lecture 25 - Bhoma

Lecture 26 - Stale News and Summary

Lecture 27 - Conclusion

NPTEL : NOC:Introduction to Political Theory (Humanities and Social Sciences)

Co-ordinators : Prof. Mithilesh Kumar Jha

Lecture 1 - General Outline and methods

Lecture 2 - Political theories and ideologies

Lecture 3 - Liberty: republican conception of freedom

Lecture 4 - Freedom as autonomy;Positive and negative liberty

Lecture 5 - Freedom as Swaraj, Free speech and hate speech

Lecture 6 - Introduction: Equity and egalitarianism

Lecture 7 - Equality of opportunity; preferential treatment

Lecture 8 - Luck Egalitarianism and its critiques; Equality and Liberty

Lecture 9 - Introduction and forms of rights

Lecture 10 - Conflicts between rights

Lecture 11 - Rights and Duties

Lecture 12 - Justice : A distributive concept

Lecture 13 - Justice : Procedural and Substantive; Justice as fairness

Lecture 14 - Justice : Capability approach; libertarian, communitarian conception of Justice

Lecture 15 - Justice : Feminist conceptions of justice; Global justice

Lecture 16 - Introduction to Power and authority

Lecture 17 - Power, legitimacy and hegemony

Lecture 18 - Power and knowledge; different conceptions of power

Lecture 19 - Introduction and different conceptions of state and sovereignty

Lecture 20 - Modern nation state; liberal, Marxist and feminist conceptions of state

Lecture 21 - State and governmentality

Lecture 22 - Introduction: Procedural and Substantive Democracy

Lecture 23 - Various models of democracy

Lecture 24 - Challenges and Limits of Democracy; Free press and Democracy

Lecture 25 - Citizenship: Subject and Citizen

Lecture 26 - T H Marshal and liberal conceptions of citizenship as legal and equal member

Lecture 27 - Muliticulturalism and Cosmopolitan Citizenship

Lecture 28 - Introduction; Doom and Gloom; Democracy and environmental crisis

Lecture 29 - Climate change and environmental justice

Lecture 30 - Revisiting some key themes and concepts

NPTEL : NOC:Human Behaviour (Humanities and Social Sciences)

Co-ordinators : Prof. Naveen Kashyap

Lecture 1 - Introduction to the Science of Human Behavior - I

Lecture 2 - Introduction to the Science of Human Behavior - II

Lecture 3 - Sensation - I

Lecture 4 - Sensation - II

Lecture 5 - Perception - I

Lecture 6 - Perception - II

Lecture 7 - Learning - I

Lecture 8 - Learning - II

Lecture 9 - Memory - I

Lecture 10 - Memory - II

Lecture 11 - Language - I

Lecture 12 - Language - II

Lecture 13 - Intelligence - I

Lecture 14 - Intelligence - II

Lecture 15 - Emotion - I

Lecture 16 - Emotion - II

Lecture 17 - Personality - I

Lecture 18 - Personality - II

Lecture 19 - Social Influence and Cognition - I

Lecture 20 - Social Influence and Cognition - II

Lecture 21 - Summary

NPTEL : NOC:The Psychology of Language (Humanities and Social Sciences)

Co-ordinators : Prof. Naveen Kashyap

Lecture 1 - Communication and Language - I

Lecture 2 - Communication and Language - II

Lecture 3 - Science of Language - I

Lecture 4 - Science of Language - II

Lecture 5 - Speech Perception - I

Lecture 6 - Speech Perception - II

Lecture 7 - Speech Production - I

Lecture 8 - Speech Production - II

Lecture 9 - Words - I

Lecture 10 - Words - II

Lecture 11 - Words - III

Lecture 12 - Sentences - I

Lecture 13 - Sentences - II

Lecture 14 - Discourse - I

Lecture 15 - Discourse - II

Lecture 16 - Reading and Writing - I

Lecture 17 - Reading and Writing - II

Lecture 18 - Bilinguilism - I

Lecture 19 - Bilinguilism - II

Lecture 20 - Overall Review

NPTEL : NOC:Development Research Methods (Humanities and Social Sciences)

Co-ordinators : Prof. Rajshree Bedamatta

Lecture 1 - Reflections on Development Studies and Development Research

Lecture 2 - Types, Forms, and Processes of Development Studies Research

Lecture 3 - The Rigour in Development Studies Research

Lecture 4 - Paradigms of Development Research

Lecture 5 - Development Research-Development Work Continuum and Action Research in Development Studies

Lecture 6 - Ethics in Development Studies and Development Research

Lecture 7 - Literature Study

Lecture 9 - Introducing Qualitative Research Methods

Lecture 10 - Introducing Qualitative Research Methods (Continued...)

Lecture 11 - Interviews and Focus Group Discussions

Lecture 12 - Participatory Methods and Approaches

Lecture 13 - Conducting Case Studies and Maintaining Field Diaries

Lecture 14 - Introducing Quantitative Research Methods

Lecture 15 - An Overview of Mixed Methods Research

Lecture 16 - Field Surveys and Inventories

Lecture 17 - Logical Framwork and SWOT Analysis

Lecture 18 - The importance of Census and other Secondary Data in Development Studies

Lecture 19 - Communicating Research

Lecture 20 - Operationalizing Rights-based Approaches to Development

Lecture 21 - Poverty Measures and Analysis

Lecture 22 - Gender-sensitive Indicators and Gender Analysis

Lecture 23 - Social Capital Assessment Tools

Lecture 24 - Moitoring and Evaluation

Lecture 25 - A Final Note

NPTEL : NOC:Indian Business History (Humanities and Social Sciences)

Co-ordinators : Prof. Vipul Dutta

Lecture 1 - Introduction and General Outline

Lecture 2 - Sources and Methodology to Study Indian Business History

Lecture 3 - East India Company's early ventures in India

Lecture 4 - Agency Houses: Jagat Seths and Early Banking operations

Lecture 5 - Emergence of Bombay and Cotton Trade, 1750-1850

Lecture 6 - Indian Business: Changes and Styles

Lecture 7 - Emergence of Calcutta: Impact on Industries

Lecture 8 - Swadeshi Movement: Impact on Indian Industries

Lecture 9 - Case Studies: Indian Business Houses: TATAs

Lecture 10 - Indian Economy and Business during WW I

Lecture 11 - Impact of the Second World War WW II

Lecture 12 - Political Economy of the Global wars for India; Case Study: Hindustan Aeronautics Limited (HAL)

Lecture 13 - Impact of Independence and Partition: Evolution of the Railways in India

Lecture 14 - Planning, Statistics and Industrialization Policies

Lecture 15 - Global Currents of economic Thought, 1947-1960

Lecture 16 - Industrial Licensing Policies, Institutions 1947-1964

Lecture 17 - Industrial Licensing Policies, 1966-1980

Lecture 18 - Case Study: Amul and Rural Cooperatives

Lecture 19 - Liberalisation of the Indian Economy, 1990s

Lecture 20 - Business Developments in India; Indiaâ€™s Energy Diplomacy through ONGC

Lecture 21 - Indian Business History: Trends and Prospects

Lecture 22 - Learning Outcomes from Indian Business History

NPTEL : NOC:Introduction to Western Political Thought (Humanities and Social Sciences)

Co-ordinators : Prof. Mithilesh Kumar Jha

Lecture 1 - General Outline and Method

Lecture 2 - Method: Text and Context

Lecture 3 - Intro and Justice

Lecture 4 - State and Philosopher King

Lecture 5 - Communism of Wives and Property and Critical Assessment of his Thought

Lecture 6 - Intro and Ethics or Virtue

Lecture 7 - Politics and His Ideal State

Lecture 8 - Aristotle-III: Citizenship, Views on Revolution and Criticall Assessment of his Thought

Lecture 9 - Machiavelli-I: Intro and Virtu and Fortuna

Lecture 10 - Machiavelli-II: Politics, Violence, and Religion

Lecture 11 - Machiavelli-III: Republicanism and Critical Assessment of his Thought

Lecture 12 - Intro and Human Nature

Lecture 13 - The Leviathan or Sovereign

Lecture 14 - Political Obligation and Critical Assessment of his Thought

Lecture 15 - Intro, State of Nature and Natural Rights

Lecture 16 - Limited Government

Lecture 17 - Right to Dissent and Critical Assessment of his Thought

Lecture 18 - Rousseau-I: Intro and Social Contract

Lecture 19 - Rousseau-II: General Will and Critical Assessment of his Thought

Lecture 20 - Kant-I: Intro and What is Enlightenment?

Lecture 21 - Kant-II: Morality, Autonomy and Freedom

Lecture 22 - Kant-III: Kingdom of Ends and Critical Assessment of his Thought

Lecture 23 - Hegel-I: Intro and Freedom

Lecture 24 - Hegel-II: Civil Society and State

Lecture 25 - Hegel-III: Rights and Critical Assessment of his Thought

Lecture 26 - Marx-I: Intro and Historical Materialism

Lecture 27 - Marx-II: State and Class

Lecture 28 - Marx-III: Views on Politics, Communism and Critical Assessment of his Thought

Lecture 29 - Mill-I: Intro, Utilitarianism and Subjection of Women

Lecture 30 - Mill-II: On Liberty, Representative Government and Critical Assessment of his Thought

NPTEL : NOC:Psychology of Stress, Health and Well-being (Humanities and Social Sciences)

Co-ordinators : Prof. Dilwar Hussain

Lecture 1 - The Nature of Stress - 1

Lecture 2 - The Nature of Stress - 2

Lecture 3 - The Biology of Stress

Lecture 4 - Stress, Health, and Non-infectious Diseases

Lecture 5 - Stress and Infectious Diseases

Lecture 6 - Stress and Psychological Disorders

Lecture 7 - Stress, Trauma and Posttraumatic growth - 1

Lecture 8 - Stress, Trauma and Posttraumatic growth - 2

Lecture 9 - Factors Influencing Stress Tolerance

Lecture 10 - Coping Strategies: Definition and Types

Lecture 11 - Unconscious mind and defensive coping

Lecture 12 - Characteristics of constructive coping; Physical ways of coping

Lecture 13 - Coping with relaxation exercises

Lecture 14 - Mental ways of coping

Lecture 15 - Coping with social support

Lecture 16 - Coping with meditation and mindfulness

Lecture 17 - Positive mental health and well-being

Lecture 18 - Well-being and resilience

Lecture 19 - What is happiness? What makes us happy?

Lecture 20 - Socio-demographic factors and happiness

Lecture 21 - Positive emotions

Lecture 22 - Genetic set point and hedonic adaptation

Lecture 23 - Sustainable happiness model

Lecture 24 - Sustainable happiness with intentional activities

Lecture 25 - Cultivating happiness with gratitude

Lecture 26 - Cultivating happiness with acts of kindness

Lecture 27 - Social comparison and happiness

Lecture 28 - Cultivating happiness with signature strengths 1 (VIA character strengths)

Lecture 29 - Cultivating happiness with signature strengths 2 (Gallup's/Clifton strength finder)

Lecture 30 - Cultivating happiness with Flow

Lecture 31 - Humanistic psychology and self-actualization

Lecture 32 - Self-determination, motivation, and well-being

Lecture 33 - Meaning in life and well-being

Lecture 34 - Life goals and well-being

NPTEL : NOC:Phonetics and Phonology: A Broad Overview (Humanities and Social Sciences)

Co-ordinators : Prof. Shakuntala Mahanta

Lecture 1 - Articulation of consonants - 1

Lecture 2 - Articulation of consonants - 2

Lecture 3 - Articulation of vowels

Lecture 4 - Language endangerment and linguistic diversity

Lecture 5 - Linguistic diversity - consonants in the languages of the world

Lecture 6 - Linguistic diversity - consonants and vowels in the languages of the world

Lecture 7 - Linguistic diversity - conclusion

Lecture 8 - Acoustic analysis: sound waves

Lecture 9 - Acoustic analysis: source filter theory and spectrograms

Lecture 10 - Acoustic analysis: vowels and formants

Lecture 11 - Acoustic analysis: formant calculation

Lecture 12 - Perceptual cues, variability in the speech signal, acoustic-phonetic invariance

Lecture 13 - Segmentation problem, categorical perception, cp in infants and animals

Lecture 14 - Measuring perceptual distinctiveness, multidimensional scaling, speech perception theories

Lecture 15 - development of the ideas of phonemes and features

Lecture 16 - phonemes as categories, phonemes in different languages, allophonic rules

Lecture 17 - problems in phonemic analysis, context and phonotactics

Lecture 18 - Psychological reality of phonemes

Lecture 19 - Distinctive features and natural classes

Lecture 20 - Phonological rule application

Lecture 21 - Distinctive features, feature economy and markedness

Lecture 22 - Morphophonological rules

Lecture 23 - Syllables

Lecture 24 - Stress

Lecture 25 - Phonetics and phonology of intonation, microprosody, stylization

Lecture 26 - Nuclear tone, pitch accent and boundary tones

Lecture 27 - Focus, givenness

NPTEL : NOC:Philosophical Foundations of Social Research (Humanities and Social Sciences)

Co-ordinators : Prof. Sambit Mallick

Lecture 1 - Empiricism and Rationalism

Lecture 2 - Comte and Positivism; Epistemology and Ontology

Lecture 3 - The Rules of Sociological Method

Lecture 4 - Sociology of Knowledge

Lecture 5 - Religion and the Division of Labour in Society

Lecture 6 - Positivism and Neo-Kantianism

Lecture 7 - Methodology of the Social Sciences

Lecture 8 - Interpretive Sociology

Lecture 9 - Methodological Individualism and Interpretative Understanding of Social Action

Lecture 10 - Weberian Social Sciences: Methodological Implications

Lecture 11 - Materialist Conception of History

Lecture 12 - Dialectic

Lecture 13 - Nature, Ideology and Science

Lecture 14 - Systematic Falsification

Lecture 15 - Hypothetico - Deductive Model

Lecture 16 - The Structure of Scientific Revolutions

Lecture 17 - Popper Versus Kuhn

Lecture 18 - Positivism Versus Hermeneutics - I

Lecture 19 - Positivism Versus Hermeneutics - II

Lecture 20 - Philosophy of Social Sciences: Taking Stock

Lecture 21 - End of the Philosophy of the Social Sciences

Lecture 22 - Return of Grand Theory in the Human Sciences

Lecture 23 - An Overview of the Course

NPTEL : NOC:Sociology of Development (Humanities and Social Sciences)

Co-ordinators : Prof. Sambit Mallick

Lecture 1 - Sociology of development: An overview

Lecture 2 - Development historically

Lecture 3 - Decolonization, nationalism and development - I

Lecture 4 - Decolonization, nationalism and development - II

Lecture 5 - Decolonization, nationalism and development - III

Lecture 6 - Social evolution and social change

Lecture 7 - Social change and progress

Lecture 8 - Modernization Theory: An Overview

Lecture 9 - State and Class under Peripheral Capitalism

Lecture 10 - Critique of Samuel Huntington

Lecture 11 - Class, State and Revolution

Lecture 12 - The Empirical Peasantry and the Hypothetical Proletariat

Lecture 13 - Class and Classness: Substitutes and Realities

Lecture 14 - Modernization and Huntington's Argument

Lecture 15 - Huntington, Social Sciences and Ideology

Lecture 16 - The Ideological, Empirical and Methodological Critiques - I

Lecture 17 - The Ideological, Empirical and Methodological Critiques - II

Lecture 18 - Dependency Theory: Intellectual Antecedents

Lecture 19 - The Latin American Debates on Underdevelopment - I

Lecture 20 - The Latin American Debates on Underdevelopment - II

Lecture 21 - Dependency Theory in Transition - I

Lecture 22 - Dependency Theory in Transition - II

Lecture 23 - Critiques of Dependency Theory - I

Lecture 24 - Critiques of Dependency Theory - II

Lecture 25 - Limits to Growth - I

Lecture 26 - Limits to Growth - II

Lecture 27 - E. F. Schmacher's Small is Beautiful

Lecture 28 - Ivan Illich's Towards a History of Needs

Lecture 29 - Paradigms Lost, Paradigms Regained: Development studies in the 21st century - I

Lecture 30 - Paradigms Lost, Paradigms Regained: Development studies in the 21st century - II

NPTEL : NOC:Environment and Development (Humanities and Social Sciences)

Co-ordinators : Prof. Ngamjahao Kipgen

Lecture 1 - Development, Economic Growth and Sustainable Development

Lecture 2 - Basic Ecosystem Ecology

Lecture 3 - Environmentalism

Lecture 4 - Environmental movement

Lecture 5 - Environmentalism in the global south

Lecture 6 - Ecofeminism

Lecture 7 - Feminist political ecology

Lecture 8 - Marx and ecology

Lecture 9 - Deep ecology

Lecture 10 - Gandhi and ecology

Lecture 11 - Social ecology

Lecture 12 - Religion, environment and historical roots of ecological crisis

Lecture 13 - Biodiversity conservation ethics in Buddhism and Hinduism

Lecture 14 - Christian religion in the age of ecological crisis

Lecture 15 - Natural resource management

Lecture 16 - Common property vs. private property

Lecture 17 - Livelihoods, forests, and conservation

Lecture 18 - Conservation-induced displacement

Lecture 19 - Environment impact assessment and national rehabilitation and resettlement policy

Lecture 20 - Dispossession and land acquisition

Lecture 21 - Mining, development, and indigenous people

Lecture 22 - Competing visions of development along the Narmada

Lecture 23 - Dams, development, and resistance: Case studies

Lecture 24 - Development theory and gendered approach to development

Lecture 25 - Gender, environment and sustainable development

Lecture 26 - Climate change interventions and policy framework

Lecture 27 - Eastern Himalayas and climate change

Lecture 28 - Ecological knowledge, biodiversity conservation and sustainability

Lecture 29 - Traditional religion and conservation of nature in Northeast India: Case study

Lecture 30 - Indigenous knowledge, environment and development

Lecture 31 - Relevance of indigenous knowledge: Case study

NPTEL : NOC:Introduction to Market Structures (Humanities and Social Sciences)

Co-ordinators : Prof. Amarjyoti Mahanta

Lecture 1 - Introduction to Industrial Organization, Preferences

Lecture 2 - Utility maximization and derivation of demand curve

Lecture 3 - Examples of utility maximization, demand curve and market demand curve

Lecture 4 - Tutorial Module 1

Lecture 5 - Production Function

Lecture 6 - Cost minimization problem

Lecture 7 - Derivation of cost curves

Lecture 8 - Tutorial on Production and cost curves

Lecture 9 - Optimal output and supply curve of a firm

Lecture 10 - Derivation of Market price in competitive market

Lecture 11 - Long run market price and Pareto optimality

Lecture 12 - Tutorial on Perfectly Competitive Market

Lecture 13 - Monopoly price

Lecture 14 - Price Discrimination - I

Lecture 15 - Price Discrimination - II

Lecture 16 - Tutorial on Monopoly

Lecture 17 - Introduction to Game Theory, Iterated Elimination of Dominated Strategy

Lecture 18 - Pure Strategy Nash Equilibrium

Lecture 19 - Mixed Strategy Nash Equilibrium

Lecture 20 - Existence of Nash Equilibrium in Games with 2 Players and 2 Strategies

Lecture 21 - Tutorial on Normal Form Games

Lecture 22 - Dynamic Games, Backward Induction

Lecture 23 - Subgame Perfect Nash Equilibrium

Lecture 24 - Tutorial on Dynamic Games

Lecture 25 - Cournot Duopoly

Lecture 26 - Cournot Oligopoly

Lecture 27 - Tutorial on Cournot Competition

Lecture 28 - Bertrand Competition with and without fixed cost

Lecture 29 - Bertrand Competition with capacity constraint

Lecture 30 - Bertrand Competition with capacity constraint

Lecture 31 - Tutorial on Bertrand Competition

Lecture 32 - Bertrand Competition with Decreasing returns to scale

Lecture 33 - Stackelberg Quantity Competition

Lecture 34 - Tutorial on Bertrand Competition and Stackelberg Quantity Competition

Lecture 35 - Stackelberg Price Competition

Lecture 36 - Simultaneous move Hotelling Model

Lecture 37 - Tutorial on Stackelberg Price Competition

Lecture 38 - Sequential Move Hotelling Model

Lecture 39 - Dixit's Model of Entry Deterrence

Lecture 40 - Tutorial on Sequential move Hotelling Model

Lecture 41 - Dixit's Model of Entry Deterrence

Lecture 42 - Bundling and Tying

Lecture 43 - Tutorial on Dixit's Model of Entry Deterrence

NPTEL : NOC:Mathematics for Economics - I (Humanities and Social Sciences)

Co-ordinators : Prof. Debarshi Das

Lecture 1 - Aim of the course, real numbers

Lecture 2 - Logic, proof

Lecture 3 - Definitions

Lecture 4 - Set operations

Lecture 5 - Definitions

Lecture 6 - Linear functions

Lecture 7 - Quadratic functions

Lecture 8 - Exponential functions, etc.

Lecture 9 - Differentiation: preliminaries

Lecture 10 - Rules of differentiation

Lecture 11 - Partial differentiation

Lecture 12 - Higher order differentiations

Lecture 13 - Approximations and elasticities

Lecture 14 - Differentiability, series, PDV

Lecture 15 - NPV, evaluation of investment projects

Lecture 16 - Exponential, logarithmic functions

Lecture 17 - Tutorials - 1a

Lecture 18 - Tutorials - 1b

Lecture 19 - Tutorials - 1c

Lecture 20 - Extreme, stationary points, first derivative test

Lecture 21 - Global and local extreme points

Lecture 22 - Second derivative test

Lecture 23 - Inflection points

Lecture 24 - Profit maximizations

Lecture 25 - Area under a curve, indefinite integral

Lecture 26 - Definite integral

Lecture 27 - Oil extraction, income distribution, PDV

Lecture 28 - Integration by parts, substitution, Lorenz curve

Lecture 29 - First order difference equations, solution

Lecture 30 - Dynamic stability, Cobweb model

Lecture 31 - Market model with inventory, Phase diagrams, Higher order equations

Lecture 32 - Multiplier-acceleration model

Lecture 33 - Tutorials - 2a

Lecture 34 - Tutorials - 2b

NPTEL : NOC:Language, Culture and Cognition: An Introduction (Humanities and Social Sciences)

Co-ordinators : Prof. Bidisha Som

Lecture 1 - Nature of human thought - I

Lecture 2 - Brain and cognition, Seat of thought - II

Lecture 3 - Language, meaning, reality - III

Lecture 4 - Categorization

Lecture 5 - Categorization: (Continued...)

Lecture 6 - Frames: another way to understand categories

Lecture 7 - Metaphor

Lecture 8 - Metaphor and Metonymy

Lecture 9 - Image schema

Lecture 10 - Image schema (Continued...)

Lecture 11 - Language acquisition

Lecture 12 - Language acquisition (Continued...)

Lecture 13 - Language in the brain

Lecture 14 - Language in the brain (Continued...)

Lecture 15 - Language and attention

Lecture 16 - Language and visual attention

Lecture 17 - Attention in Sentence processing

Lecture 18 - Executive control/function and its facets

Lecture 19 - Role of executive function in language processing

Lecture 20 - Mental simulation and its relation with language; summary of the course

NPTEL : NOC:Bilingualism: A Cognitive and Psycholinguistic Perspective (Humanities and Social Sciences)

Co-ordinators : Prof. Bidisha Som

Lecture 1 - Becoming and being bilingual

Lecture 2 - Attitude, Acculturation and Bilingualism

Lecture 3 - Who is a Bilingual ?

Lecture 4 - Bilingual acquisition among children: simultaneous bilingualism

Lecture 5 - Successive Bilingualism

Lecture 6 - Language and cognition among bilinguals

Lecture 7 - Bilingual cognition (Continued...)

Lecture 8 - Bilingual Memory Models

Lecture 9 - Bilingual brain: neural representation of languages

Lecture 10 - Data from processing studies on bilingual representation in brain

Lecture 11 - Speech perception and comprehension: theories

Lecture 12 - Speech perception and production studies

Lecture 13 - Lexical processing: background

Lecture 14 - Lexical processing: different experimental paradigms: comprehension and production

Lecture 15 - Sentence processing

Lecture 16 - Metalinguistic Awareness

Lecture 17 - Executive Control: bilingual advantage

Lecture 18 - cognitive reserve, new developments

Lecture 19 - New research trends in bilingualism

Lecture 20 - New models. Applied areas

NPTEL : NOC:Psychology of Emotion: Theory and Applications (Humanities and Social Sciences)

Co-ordinators : Prof. Dilwar Hussain

Lecture 1 - Emotions: Concepts and Categories

Lecture 2 - Historical Background and Theories

Lecture 3 - Communication and Measurement of Emotions

Lecture 4 - Universals and cultural differences in emotions - 1

Lecture 5 - Universals and cultural differences in emotions - 2

Lecture 6 - Emotions and the Body

Lecture 7 - Emotions and the Brain

Lecture 8 - Self-evaluative emotions-Guilt, shame, Embarrassment, and pride

Lecture 9 - Social Comparison Emotions-Envy and Jealousy

Lecture 10 - Positive Emotions

Lecture 11 - Happiness and Subjective Well-being - 1

Lecture 12 - Happiness and Subjective Well-being - 2

Lecture 13 - Emotions in Groups - 1

Lecture 14 - Emotions in Groups - 2

Lecture 15 - Emotions and Cognitions: Introduction

Lecture 16 - Emotion and Memory

Lecture 17 - Emotion and Judgment/Decesion making

Lecture 18 - Depression

Lecture 19 - Anxiety Disorders

Lecture 20 - Emotion regulation: Introduction

Lecture 21 - Adaptive emotion regulation using ABC model

Lecture 22 - Adaptive emotion regulation using mindfulness

Lecture 23 - Emotional intelligence: Introduction

Lecture 24 - Skills of EI-Self-awareness

Lecture 25 - Skills of EI-Self-regulation/Self-management

Lecture 26 - Skills of EI-Self-Motivation

Lecture 27 - Skills of EI-Empathy

Lecture 28 - Skills of EI-Social intelligence and social skills

Lecture 29 - Emotional intelligence and workplace

Lecture 30 - Emotional intelligence, health and well-being

Lecture 31 - Development of emotional intelligence

NPTEL : NOC:Economics of Health and Education (Humanities and Social Sciences)

Co-ordinators : Prof. Rajshree Bedamatta

Lecture 1 - Links of Health and Education Achievements to Human Development

Lecture 2 - Health and Education: Human Capital or Human Right?

Lecture 3 - Unique Aspects of Health Economics

Lecture 4 - Perfect Competition and Healthcare Markets

Lecture 5 - Demand for Health-1 (Grossman model)

Lecture 6 - Demand for Health-2 (Is demand for health downward sloping)

Lecture 7 - Demand for Health-3 (Comparative statics)

Lecture 8 - Demand for Health-4 (Health disparities and hypothesis)

Lecture 9 - Economics of Healthcare: Supply side

Lecture 10 - Demand for Insurance

Lecture 11 - Adverse Selection and Moral Hazard

Lecture 12 - Demand for Education

Lecture 13 - A Basic Model of Human Capital Investment and A Few Influential Thinkers

Lecture 14 - Production of Education and Returns to Education - based on global data

Lecture 15 - Fiscal functions of budget policy and the concept of public food

Lecture 16 - Public goods, private goods, merit goods; Market failures and corrections

Lecture 17 - Is higher education a public good, a quasi-public good or a merit good?

Lecture 18 - Inequalities of Outcomes and Opportunities

Lecture 19 - Equity in Healthcare

Lecture 20 - Education Inequalities in Developing Countries and India

Lecture 21 - India's Health Policy

Lecture 22 - India's Education Policy

Lecture 23 - Right to Health and Universal Health Care - The Indian Context

Lecture 24 - Global Disease Burdens

Lecture 25 - How ASER is addressing the problem of Learning Crisis in India

Lecture 26 - The PROBE reports - Public Report on Basic Education

Lecture 27 - Indian Morbidity and Mortality surveys

Lecture 28 - Indian Official Statistics on school education and higher education

Lecture 29 - Health financing

Lecture 30 - Education financing

Lecture 31 - Health Workforce

Lecture 32 - Women in India's Labour Market

Lecture 33 - Summary and Conclusions

NPTEL : NOC:Engineering Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Naveen Kashyap

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Research Methods - 1

Lecture 4 - Research Methods - 2

Lecture 5 - Visual and tactile displays - 1

Lecture 6 - Visual and tactile displays - 2

Lecture 7 - Auditory display - 1

Lecture 8 - Auditory display - 2

Lecture 9 - Methods of evaluation - 1

Lecture 10 - Methods of evaluation - 2

Lecture 11 - Multitasking - 1

Lecture 12 - Multitasking - 2

Lecture 13 - Decision Making - 1

Lecture 14 - Decision Making - 2

Lecture 15 - Motor skill and control - 1

Lecture 16 - Motor skill and control - 2

Lecture 17 - Environmental design - 1

Lecture 18 - Environmental design - 2

Lecture 19 - Human error - 1

Lecture 20 - Human error - 2

Lecture 21 - Course Review

NPTEL : Communication Skills (Humanities and Social Sciences)

Co-ordinators : Dr. T. Ravichandran

Lecture 1 - Introduction

Lecture 2 - Barriers to Communication - 1

Lecture 3 - Barriers to Communication - 2

Lecture 4 - Barriers to Communication - 3

Lecture 5 - Non-Verbal Communication - 1

Lecture 6 - Non-Verbal Communication - 2

Lecture 7 - Non-Verbal Communication - 3

Lecture 8 - Non-Verbal Communication - 4

Lecture 9 - Non-Verbal Communication - 5

Lecture 10 - Listening Skills - 1

Lecture 11 - Listening Skills - 2

Lecture 12 - Listening Skills - 3

Lecture 13 - Business Letters Writing - 1

Lecture 14 - Business Letters Writing - 2

Lecture 15 - Business Letters Writing - 3

Lecture 16 - Business Letters Writing - 4

Lecture 17 - Report Writing - 1

Lecture 18 - Report Writing - 2

Lecture 19 - Group Discussion - 1

Lecture 20 - Group Discussion - 2

Lecture 21 - Group Discussion - 3

Lecture 22 - Interview Skills - 1

Lecture 23 - Interview Skills - 2

Lecture 24 - Interview Skills - 3

Lecture 25 - Interview Skills - 4

Lecture 26 - Interview Skills - 5

Lecture 27 - Interview Skills - 6

Lecture 28 - Interview Skills - 7

Lecture 29 - Netiquette - 1

Lecture 30 - Netiquette - 2

Lecture 31 - Oral Presentation - 1

Lecture 32 - Oral Presentation - 2

Lecture 33 - Oral Presentation - 3

Lecture 34 - Cross Cultural Communication - 1

Lecture 35 - Cross Cultural Communication - 2

Lecture 36 - Cross Cultural Communication - 3

Lecture 37 - Cross Cultural Communication - 4

Lecture 38 - Common Errors - 1

Lecture 39 - Common Errors - 2

Lecture 40 - Common Errors - 3

NPTEL : Ethics (Humanities and Social Sciences)

Co-ordinators : Dr. Vineet Sahu

Lecture 1 - Introduction to Ethics - 'Crtio' A Socratic dialoguea

Lecture 2 - Introduction to Ethics -An assessment of Ethical relativism

Lecture 3 - Consequentialism -Introduction

Lecture 4 - Consequentialism Rule and Act

Lecture 5 - Hedonism

Lecture 6 - Utilitarianism

Lecture 7 - Deontological theories - Introduction

Lecture 8 - Deontological theories - Immanuel Kant

Lecture 9 - Ethical Rules (with reference to W D Ross)

Lecture 10 - Situation Ethics

Lecture 11 - Virtue Ethics

Lecture 12 - Metaethical Theories

Lecture 13 - Ethical Relativism: A discussion on Universal Declaration of Human Rights

Lecture 14 - Ethical Naturalism

Lecture 15 - Ethical Naturalism (Continued...)

Lecture 16 - Ethical Naturalism-Emotivism

Lecture 17A - Ethical Non-naturalism

Lecture 17B - Ethical Non-naturalism-II

Lecture 18 - Non-cognitive or Nondescriptivist Theories - Intuitionism

Lecture 19 - Non-cognitive or Nondescriptivist Theories - Intuitionism Nihilism

Lecture 20 - Why be Moral?

Lecture 21 - Ethics in the Indian tradition

Lecture 22 - Theory of Karma - Part 1

Lecture 23 - Theory of Karma - Part 2

Lecture 24 - Nishkama Karma - Part 1

Lecture 25 - Nishkama Karma - Part 2

Lecture 26 - Gandhian Ethics - Part 1

Lecture 27 - Gandhian Ethics - Part 2

Lecture 28 - Gandhian Ethics - Part 3 (Satyagraha)

Lecture 29 - Purusharthas

Lecture 30 - Buddhist Ethics - Part 1

Lecture 31 - Buddhist Ethics - Part 2 - Jaina Ethics

Lecture 32 - Some ethical issues (Applied Ethics) Discussing Peter Singer's 'Famine Affluence and Morality'

Lecture 33 - Some ethical issues (Applied Ethics) Discussing Peter Singer's 'Famine Affluence and Morality'

Lecture 34 - Discussing Thomas Pogge's 'Real World Justice' - Part 1

Lecture 35 - Discussing Thomas Pogge's 'Real World Justice' - Part 2

Lecture 36 - Discussing Thomas Pogge's 'Real World Justice' - Part 3

Lecture 37 - Sexuality: Ethical Perspectives - Part 1

Lecture 38 - Sexuality: Ethical Perspectives - Part 2

NPTEL : International Economics (Humanities and Social Sciences)

Co-ordinators : Dr. Somesh K. Mathur

Lecture 1 - International Economics

Lecture 2 - International Economics

Lecture 3 - International Economics

Lecture 4 - International Economics

Lecture 5 - International Economics

Lecture 6 - International Economics

Lecture 7 - International Economics

Lecture 8 - International Economics

Lecture 9 - International Economics

Lecture 10 - International Economics

Lecture 11 - International Economics

Lecture 12 - International Economics

Lecture 13 - International Economics

Lecture 14 - International Economics

Lecture 15 - International Economics

Lecture 16 - International Economics

Lecture 17 - International Economics

Lecture 18 - International Economics

Lecture 19 - International Economics

Lecture 20 - International Economics

Lecture 21 - International Economics

Lecture 22 - International Economics

Lecture 23 - International Economics

Lecture 24 - International Economics

Lecture 25 - International Economics

Lecture 26 - International Economics

Lecture 27 - International Economics

Lecture 28 - International Economics

Lecture 29 - International Economics

Lecture 30 - International Economics

Lecture 31 - International Economics

Lecture 32 - International Economics

Lecture 33 - International Economics

Lecture 34 - International Economics

Lecture 35 - International Economics

Lecture 36 - International Economics

Lecture 37 - International Economics

Lecture 38 - International Economics

Lecture 39 - International Economics

Lecture 40 - International Economics

Lecture 41 - International Economics

Lecture 42 - International Economics

Lecture 43 - International Economics

NPTEL : Introduction to Logic (Humanities and Social Sciences)

Co-ordinators : Dr. A.V. Ravishankar Sarma

Lecture 1 - Identification of Arguments

Lecture 2 - Non-arguments

Lecture 3 - Types of Arguments: Deductive vs Inductive

Lecture 4 - Nature and Scope of Deductive and Inductive Arguments

Lecture 5 - Truth, Validity and Soundness

Lecture 6 - Strength of Inductive arguments, Counter example method

Lecture 7 - Toulminâ€™s Model of Argumentation

Lecture 8 - Identification of Formal and Informal Fallacies

Lecture 9 - Informal Fallacies: Fallacies of relevance

Lecture 10 - Fallacies of Weak Induction and Fallacies arising out of ambiguity in Language

Lecture 11 - Introduction and motivation for Syllogistic Logic

Lecture 12 - Aristotle theory of Syllogisms - 1

Lecture 13 - Syllogistic Poem, Reduction of Syllogisms

Lecture 14 - Syllogistic Poem, Reduction of Syllogisms

Lecture 15 - Nature and Scope of Propositional Logic

Lecture 16 - Syntax of Propositional Logic

Lecture 17 - Logical Connectives: Truth Tables

Lecture 18 - Truth Table Method: Validity, Consistency, Logical Equivalence

Lecture 19 - Semantic Tableaux Method for Propositional Logic

Lecture 20 - Knights and Knaves Puzzles

Lecture 21 - Semantic Tableaux Method: Further Examples

Lecture 22 - Natural Deduction Method

Lecture 23 - Natural Deduction: Examples

Lecture 24 - Conjunctive and Disjunctive Normal Forms

Lecture 25 - CNF, DNF and satisfiability and Validity

Lecture 26 - Resolution and refutation method

Lecture 27 - Resolution and refutation method: Examples

Lecture 28 - Axiomatic Propositional Logic

Lecture 29 - Hlbert Ackermann Axiomatic system

Lecture 30 - Proofs in the PM system

Lecture 31 - Hilbert and Ackermann System

Lecture 32 - Outlines of Predicate Logic

Lecture 33 - Outlines of Predicate Logic

Lecture 34 - Building blocks of Predicate Logic

Lecture 35 - Quantifiers, freedom, bondage

Lecture 36 - Translation in to predicate Logic

Lecture 37 - Semantics of Predicate Logic

Lecture 38 - Truth, satisfiability, validity in Predicate Logic

Lecture 39 - Formation Trees for wffâ€™s in predicate Logic

Lecture 40 - Semantic Tableaux Method for Predicate Logic

Lecture 41 - Semantic Tableaux method: Satisfiability, Validity

Lecture 42 - Natural Deduction in Predicate Logic

Lecture 43 - Important theorems in First order Logic

Lecture 44 - Limitations of first order logic and Introduction to the course

NPTEL : Population and Society (Humanities and Social Sciences)

Co-ordinators : Prof. A.K. Sharma

Lecture 1 - Introduction

Lecture 2 - Basics Concepts

Lecture 3 - Perspectives On Population

Lecture 4 - Indian Society

Lecture 5 - Social Change in India

Lecture 6 - India: A Developing Economy

Lecture 7 - Methodology

Lecture 8 - Primary and Secondry Data and Related Issues

Lecture 9 - Sources of Population Data

Lecture 10 - Participatory Rural Appraisal

Lecture 11 - Demographic Models - I

Lecture 12 - Demographic models - II

Lecture 13 - Contemporary Issues In Modelling Population Processes

Lecture 14 - World Population Growth

Lecture 15 - Demographic Transition in the Nineteenth and Twentieth Centuries

Lecture 16 - Demographic schism between Developed and Developing Countries and Future Prospects

Lecture 17 - History Of Growth

Lecture 18 - Population of India - II

Lecture 19 - Trends In Death and Birth Rates

Lecture 20 - Population projections,Migration and Future Prospects

Lecture 21 - Urbanization and Development

Lecture 22 - Urbanization in India

Lecture 23 - Theories Of urbanization and Development

Lecture 24 - Future Of Urbanization In India

Lecture 25 - Population Theories

Lecture 26 - Marxist theory Of Population

Lecture 27 - Demographic Transition Theory and Related Issues

Lecture 28 - Gandhian Theory Of population

Lecture 29 - Population Policy

Lecture 30 - Effectiveness Of population Policies

Lecture 31 - Family Planning Programme and Beyond

Lecture 32 - National Population Policy

Lecture 33 - The First Policy Statement

Lecture 34 - Subsequent Developments Leading To National Population Policy 2000

Lecture 35 - Ecological Degradation and Environmental Protection

Lecture 36 - Diffrences In Perception Between Developed and Developing Countries

Lecture 37 - Total Environment Impact and Beliefs

Lecture 38 - Emerging Issues In sociology Of Population

Lecture 39 - Population Issues In The framework of MDGs

Lecture 40 - Population Issues (Continued...)

NPTEL : Macro Economics (Humanities and Social Sciences)

Co-ordinators : Prof. Surajit Sinha

Lecture 1

Lecture 2

Lecture 3

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Lecture 11

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Lecture 13

Lecture 14

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Lecture 16

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Lecture 21

Lecture 22

NPTEL : Introduction to Sociology (Humanities and Social Sciences)

Co-ordinators : Prof. A.K. Sharma

Lecture 1 - What is sociology?

Lecture 2 - Sociological approaches

Lecture 3 - Nature of society: Individuals and groups

Lecture 4 - Cooperation and conflict

Lecture 5 - Family-I: Definition and classification of family

Lecture 6 - Family-II: Perspectives on family

Lecture 7 - State-I: Definition of state

Lecture 8 - State-II: State in India

Lecture 9 - State-III: The concept of power

Lecture 10 - State-IV: Functionalist and Marxist perspectives on power

Lecture 11 - Sociology of work-I: Need for work

Lecture 12 - Sociology of work-II: Social change and work

Lecture 13 - Sociology of work-III: Development and work

Lecture 14 - Sociology of work-IV: Capitalism and motivation for work

Lecture 15 - Religion-I: Social conditions and religious thought

Lecture 16 - Religion-II: Bases of religion

Lecture 17 - Religion-III: Forms of religious beliefs

Lecture 18 - What is sociology?

Lecture 19 - Religion-V: Religion and society

Lecture 20 - Religion-VI: Contributions of Marx and Weber

Lecture 21 - Education-I: Concept of education?

Lecture 22 - Education-II: Functions of education

Lecture 23 - Social stratification-I: Social inequality and stratification

Lecture 24 - Social stratification-II: Explanations of social stratification

Lecture 25 - Social stratification-III: Theories and facts

Lecture 26 - Social stratification-IV: Stratification in India

Lecture 27 - Deviance-I: Concept of deviance

Lecture 28 - Deviance-II: Perspectives on deviance

Lecture 29 - Deviance-III: Theories of deviance

Lecture 30 - Social change-I: Definition of social change

Lecture 31 - Social change-II: Theories of social change

Lecture 32 - Social change-III: Social change in industrial society

Lecture 33 - Social change-IV: Urbanization and related issues in social change

Lecture 34 - Population-I: Malthusian theory of population

Lecture 35 - Population-II: Population and Society

Lecture 36 - Perspectives in Sociology-I

Lecture 37 - Perspectives in Sociology-II

Lecture 38 - Social Problems and Theory

Lecture 39 - Sociological methods-I

Lecture 40 - Sociological methods-II: Ethnography

Lecture 41 - Sociological methods-III: Ethnography in India

NPTEL : Money and Banking (Humanities and Social Sciences)

Co-ordinators : Prof. Surajit Sinha

Lecture 1

Lecture 2

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Lecture 31

Lecture 32

Lecture 33

Lecture 34

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Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Human Adjustment Processes (Humanities and Social Sciences)

Co-ordinators : Prof. Braj Bhushan

Module-1 - Lecture-1 : Understanding Adjustment

Module-1 - Lecture-2 : Understanding Adjustment

Module-1 - Lecture-3 : Understanding Adjustment

Module-1 - Lecture-4 : Understanding Adjustment

Module-2 - Lecture-1 : Dimensions of Adjustment

Module-2 - Lecture-2 : Dimensions of Adjustment

Module-2 - Lecture-3 : Dimensions of Adjustment

Module-3 - Lecture-1 : Adjustment? Range of Reactions

Module-4 - Lecture-1 : Human adjustment process?II

Module-4 - Lecture-2 : Human adjustment process?II

Module-4 - Lecture-3 : Human adjustment process?II

Module-4 - Lecture-4 : Human adjustment process?II

Module-4 - Lecture-5 : Human adjustment process?II

Module-4 - Lecture-6 : Human adjustment process?II

Module-4 - Lecture-7 : Human adjustment process?II

Module-4 - Lecture-8 : Human adjustment process?II

Module-4 - Lecture-9 : Human adjustment process?II

Module-5 - Lecture-1 : Facets of human adjustment

Module-5 - Lecture-2 : Facets of human adjustment

Module-5 - Lecture-3 : Facets of human adjustment

Module-6 - Lecture-1 : Emotions & Adjustment

Module-6 - Lecture-2 : Emotions & Adjustment

Module-6 - Lecture-3 : Emotions & Adjustmen

Module-6 - Lecture-4 : Emotions & Adjustment

Module-7 - Lecture-1 : Facets of human adjustment: Stress, Resilience and Coping

Module-7 - Lecture-2 : Facets of human adjustment: Stress, Resilience and Coping

Module-7 - Lecture-3 : Facets of human adjustment: Stress, Resilience and Coping

Module-7 - Lecture-4 : Facets of human adjustment: Stress, Resilience and Coping

Module-7 - Lecture-5 : Facets of human adjustment: Stress, Resilience and Coping

Module-8 - Lecture-1 : Aggression

Module-8 - Lecture-2 : Aggression

Module-8 - Lecture-3 : Aggression

Module-8 - Lecture-4 : Aggression

Module-9 - Lecture-1 : Psychological disorders

Module-9 - Lecture-2 : Psychological disorders

Module-9 - Lecture-3 : Psychological disorders

Module-9 - Lecture-4 : Psychological disorders

Module-9 - Lecture-5 : Psychological disorders

Module-10 - Lecture-1 : Summing-up

Understanding Oneself

NPTEL : Selected Topics in Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Manas K Mandal, Prof. JBP Sinha, Prof. Alok Bajpai, Prof. Rakesh K. Gupta, Prof. Ramadhar Singh, Prof. Braj Bhushan, Prof. Vivek Benegal, Prof. Ajit Dalal, Prof. Girishwar Misra

Lecture 1 - Introduction Selected Topics in Psychology

Lecture 2 - Psychology: Emerging of a discipline

Lecture 3 - Psychology: Emerging of a discipline

Lecture 4 - Beginning, growth and decline of Western psychology in India

Lecture 5 - The core and context of Indian psychology

Lecture 6 - The indigenization of psychology in India

Lecture 7 - Weaving culture into psychology

Lecture 8 - Culture and Self: Implications for Social Behaviour

Lecture 9 - Cultural and organizational behaviour

Lecture 10 - How do similar attitudes determine attraction?

Lecture 11 - Why do similar attitudes determine attraction?

Lecture 12 - A beautiful mind? Perspective on brain , mind and it's challenges

Lecture 13 - Emotion and well?being

Lecture 14 - Mental health and illness - Part 1

Lecture 15 - Mental health and illness - Part 2

Lecture 16 - Folk Healing Traditions in India

Lecture 17 - To sleep or not

Lecture 18 - Issues and challenges in psychological assessment

Lecture 19 - Nontraditional research in behavioural sciences

Lecture 20 - What a surprise: My results are nonsignificant

Lecture 21 - Neuropsychology and cognitive neuroscience research

Lecture 22 - Functional MRI in psychology - Part 1

Lecture 23 - Functional MRI in psychology - Part 2

Lecture 24 - Side bias in human behaviour

Lecture 25 - Brain microstructural correlates of cognition in Cerebral Palsy

Lecture 26 - Brain microstructural correlates of cognition in vitamin B12 deficiency

Lecture 27 - The neuroscience of addictive behaviour

Lecture 28 - Who is at risk and why? The neurogenetics of vulnerability to addiction - Part 1

Lecture 29 - Who is at risk and why? The neurogenetics of vulnerability to addiction - Part 2

Lecture 30 - The gambler's lament: Behavioural addictions? gambling, internet and porn addictions

Lecture 31 - Art and the brain - Part 1

Lecture 32 - Art and the brain - Part 2

Lecture 33 - Technological advances in other areas and their impact on psychology

Lecture 34 - Positioning the state of psychology in India in the global scenario

Lecture 35 - Introduction Selected Topics in Psychology

NPTEL : NOC:Elements of Visual Representation (Humanities and Social Sciences)

Co-ordinators : Dr. Shatarupa Thakurta Roy

Lecture 1 - Visual Literacy

Lecture 2 - What is Art? Visual styles

Lecture 3 - Principle of Visual Communication

Lecture 4 - Elements of Visual Representation

Lecture 5 - Need of Visual Harmony, Aerial Perspective in Visual Representation

Lecture 6 - Visual Mediums Method and Material

Lecture 7 - Visual Arrangement: Figure ground relationship

Lecture 8 - Illusion of Space Overlapping and Vertical Location

Lecture 9 - Multiple point Perspective, Cubist form

Lecture 10 - Oriental Perspective, Isometric Projection

Lecture 11 - Unconventional Space, Visual Riddle

Lecture 12 - Perspective, Foreshortening and Amplification

Lecture 13 - Static Form

Lecture 14 - Impression of Movement

Lecture 15 - Movement by Repetition

Lecture 16 - Use of Multiple Image to Depict Motion

Lecture 17 - Principle of Op Art: Optical Movement

Lecture 18 - Asymmetry in Visual Narration

Lecture 19 - Scale and Space in Composition

Lecture 20 - Choosing the Right Scale

Lecture 21 - Natural Proportion

Lecture 22 - Ideal Proportion

Lecture 23 - Arbitrary and Mandatory Proportion

Lecture 24 - Form of Visual Paradox

Lecture 25 - Line as Line and Line as Shape

Lecture 26 - Character Specific Use of Line in Visual Representation

Lecture 27 - Implied, Psychic, Contour Line and Gesture Line

Lecture 28 - Line as Building Block

Lecture 29 - Line for Rendering: Value and Volume

Lecture 30 - Quality of Line in Visual Expression

Lecture 31 - Example of Unified Composition: Conceptual Harmony vs. Visual Harmony

Lecture 32 - Visual Continuity: Proximity, Repetition

Lecture 33 - Gestalt law of Universal Whole

Lecture 34 - Unity in Variation. Visual Climax and Harmony: Focal Point and Accents

Lecture 35 - Degree of Emphasis to Maintain Harmony: Visual Balance

Lecture 36 - Rhythm and Motion in Visual Representation Alternating and Progressing Arrangement

Lecture 37 - Visual Balance in Symmetry, Radial and Crystallographic Balance

Lecture 38 - Balance in Asymmetry

Lecture 39 - Visual Balance in Colour Combination, Conflicting Colours

Lecture 40 - Balance through Achromatic Value Distribution

Lecture 41 - Local, optical and Arbitrary colour

Lecture 42 - Colour in Digital Media Pigment and Light, Resolution

Lecture 43 - Rectilinear and Curvilinear Form

Lecture 44 - Volume and Surface Texture

Lecture 45 - Visual and Tactile Texture

Lecture 46 - Form, Texture and Pattern

Lecture 47 - Visual Analysis

Lecture 48 - Steps of Problem Solving

NPTEL : NOC:Practical English: Learning and Teaching (Humanities and Social Sciences)

Co-ordinators : Dr. Bhaskar Dasgupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

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Lecture 11

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Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Brief introduction to Psychology (Humanities and Social Sciences)

Co-ordinators : Braj Bhushan

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

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Lecture 21

Lecture 22

Lecture 23

Lecture 24

NPTEL : NOC:Psychiatry - An overview (Humanities and Social Sciences)

Co-ordinators : Mr. Alok Bajpai

Lecture 1 - Neuroanatomy

Lecture 2 - Neurophysiology

Lecture 3 - Imaging

Lecture 4 - Electrophysiology

Lecture 5 - Psychology

Lecture 6 - Mental Status Examination 1 & 2

Lecture 7 - Classificatory Systems

Lecture 8 - Investigation and Psychological Testing

Lecture 9 - Organic Syndromes

Lecture 10 - Schizophrenia

Lecture 11 - Mood Disorders

Lecture 12 - Anxiety Disorders

Lecture 13 - Obsessive Compulsive Disorder

Lecture 14 - Childhood Disorder Introduction

Lecture 15 - Autism

Lecture 16 - Learning Disability

Lecture 17 - ADHD

Lecture 18 - Personality Disorder

Lecture 19 - Sleep Disorder 1

Lecture 20 - Sleep Disorder 2

NPTEL : NOC:Introduction to Indian Art - An appreciation (Humanities and Social Sciences)

Co-ordinators : Prof.Soumik Nandy Majumdar

Lecture 1 - Geographical Expanse

Lecture 2 - Chronological Journey

Lecture 3 - Forms of Indian Architecture

Lecture 4 - Variations in Indian Sculpture

Lecture 5 - Formats of Indian Painting

Lecture 6 - Pre-historic art: Rock painting of Bhimbetka

Lecture 7 - Ancient Art: Indus Valley Civilization

Lecture 8 - Early Buddhist Art: Bharhut, Sanchi and Amaravati Stupa

Lecture 9 - Art of the Royal Dynasty: Kushana and Gupta period

Lecture 10 - Islamic Architecture: Sultanate and Mughal Period

Lecture 11 - Wonder from Classical period: Ajanta Caves

Lecture 12 - Narrative Art in Sculpture: Mamallapuram and Ellora

Lecture 13 - Narrative Art in Miniature Painting: Mughal and Rajput

Lecture 14 - Indigenous Art : Folk Traditions - 1

Lecture 15 - Indigenous Art : Folk Traditions - 2

Lecture 16 - End of Traditional Art - Advent of the British

Lecture 17 - Art patronized by the Colonial Rulers

Lecture 18 - Art for National Cause

Lecture 19 - Art in the post-independent India

Lecture 20 - Art Now - Trends in contemporary art

NPTEL : NOC:Basic Concepts of Modal Logic (Humanities and Social Sciences)

Co-ordinators : Dr. A.V. Ravishankar Sarma

Lecture 1 - What is logic? General Introduction

Lecture 2 - Propositional Logic : Syntax

Lecture 3 - Propositional Logic : Semantics

Lecture 4 - Semantic Tableaux Method for Propositional Logic: General Examples

Lecture 5 - Semantic Tableaux Method : Some Puzzles

Lecture 6 - Semantic Tableaux Method-3: More puzzles

Lecture 7 - Limitations of Classical Logic

Lecture 8 - Origin of Modal Logic : Historical Survey

Lecture 9 - Origin of Modal Logic : Strict Implication

Lecture 10 - Strict Implication

Lecture 11 - Strict Implication : Examples

Lecture 12 - Language of Normal Modal Logic

Lecture 13 - Language of Modal Logic, Modal Sentences - 1

Lecture 14 - Language of Modal Logic 2 : Syntax

Lecture 15 - Axiomatic Modal Logic : Some Proofs

Lecture 16 - Semantics of Modal Logic : Relational Structures

Lecture 17 - Kripke semantics for Modal Logic systems

Lecture 18 - Kripke semantics for Modal Logic : Some Examples

Lecture 19 - Kripke Semantics for Modal Logic : Examples

Lecture 20 - Semantic Tableaux method - I

Lecture 21 - Semantic Tableaux method - II

Lecture 22 - Possible worlds and Modal realism

Lecture 23 - Conditional logic introduction

Lecture 24 - Conditional logic C

Lecture 25 - Conditional logics: C, C+, S, C1, C2 and conclusion

NPTEL : NOC:Probability and Stochastic for Finance II (Humanities and Social Sciences)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Fundamentals of Interest Rates

Lecture 2 - Fixed Income Securities

Lecture 3 - Term Structure of Interest Rates - I

Lecture 4 - Optimization Models In Finance

Lecture 5 - Crash course on KKT Condition

Lecture 6 - Mean Variance Portfolio Optimization - I

Lecture 7 - Mean Variance Portfolio Optimization - II

Lecture 8 - Mean Variance Portfolio Optimization - III

Lecture 9 - Mean Variance Portfolio Optimization - IV

Lecture 10 - Last lecture on Portfolio Optimization

Lecture 11 - Capital Asset Pricing Model

Lecture 12 - The Binomial Model [Lox-Ross-Rubenstein Model]

Lecture 13 - The Binomial Method - II

Lecture 14 - Binomial Method - III (Multiperiod model)

Lecture 15 - Binomial model - IV

Lecture 16 - Girsanav's Theorem (Basic tool)

Lecture 17 - Girsanav's Theorem (Statement and proof)

Lecture 18 - Stock price under risk netral measure

Lecture 19 - The Black Scholes formula

Lecture 20 - Final Lecture

NPTEL : NOC:Introduction to Psychology (Humanities and Social Sciences)

Co-ordinators : Braj Bhushan

Lecture 1 - Major Areas of Psychology

Lecture 2 - Major Milestones in Psychology

Lecture 3 - Methods in Psychology

Lecture 4 - Schools of thoughts in Psychology

Lecture 5 - Sensory Mechanisms

Lecture 6 - External Factors in Perception

Lecture 7 - Theory of Signal Detection

Lecture 8 - Gestalt Principles

Lecture 9 - Form Perception

Lecture 10 - Role of Culture in Perception

Lecture 11 - Basic Concepts of Learning

Lecture 12 - Classical Conditioning

Lecture 13 - Concepts and Applications of Classical Conditioning

Lecture 14 - Operant Conditioning

Lecture 15 - Observational Learning

Lecture 16 - Cognitive Learning

Lecture 17 - Models of Memory

Lecture 18 - Short Term Memory - Storage and Retention

Lecture 19 - Long Term Memory - Episodic Memory

Lecture 20 - Long Term Memory - Autobiographical and Semantic Memory

Lecture 21 - Long Term Memory - Procedural Memory

Lecture 22 - Forgetting

Lecture 23 - Theories of Emotion - 1

Lecture 24 - Theories of Emotion - 2

Lecture 25 - Basic Emotions

Lecture 26 - Culture and Emotions

Lecture 27 - Musculature Analysis of Facial Expressions

Lecture 28 - Biological Basis of Emotion

Lecture 29 - Nature vs Nurture

Lecture 30 - Behavioural Genetics - I

Lecture 31 - Behavioural Genetics - II

Lecture 32 - Intelligence

Lecture 33 - Aptitude

Lecture 34 - Various Perspectives of Personality

Lecture 35 - Neo Freudian and Behaviourist Perspective

Lecture 36 - Behaviourist and Humanistic Perspective

Lecture 37 - Indian Perspective of Personality and Assessment of Personality

Lecture 38 - Psychometric tests of Personality Assessment

Lecture 39 - Lab Session 1

Lecture 40 - Lab Session 2

Lecture 41 - Lab Session 3

Lecture 42 - Lab Session 4

Lecture 43 - Lab Session 5

NPTEL : NOC:Folk and Minor Art in India (Humanities and Social Sciences)

Co-ordinators : Dr. Shatarupa Thakurta Roy

Lecture 1 - Changing Definition of Folk and Minor Art

Lecture 2 - Timelines and Regions: General Mapping

Lecture 3 - Traditional Roots: Elements and Principles

Lecture 4 - Timelessness: Primitive Connection

Lecture 5 - Evolution in Purpose: Ritualistic to Propagative

Lecture 6 - Contemporary Practice

Lecture 7 - Classification and Connections: Traditional Roots

Lecture 8 - Early Literary Resources

Lecture 9 - Mythical Associations

Lecture 10 - Idea of Nationalism and Modernism in the Context of Folk Art-I and II

Lecture 11 - Relevance of the Art Practice

Lecture 12 - Contextualization and Decontextualization

Lecture 13 - Concept of Communication for Social Purpose

Lecture 14 - Aesthetic Perspective

Lecture 15 - Secularity and Religious Plurality

Lecture 16 - Ethnographic perspective on the study of Folk Art and Culture

Lecture 17 - About the Exponents who brought the culture under the Limelight

Lecture 18 - Commonality and Congruity in the Diverse Content of Art

Lecture 19 - School of Art in Madhubani Painting

Lecture 20 - Art as a Feminine Preserve vs the Male painters of Madhubani

Lecture 21 - Yamapata, Pytkar and other art practice of Jharkhand: Yamapata by the Jadopatias, Sohari Painters and their Art

Lecture 22 - Patachitra of Bengal

Lecture 23 - Patachitra of Odisha

Lecture 24 - Continuum of the Practice: Ancient Centres, Contemporary Scenario, Method and Material - 1

Lecture 25 - Continuum of the Practice: Ancient Centres, Contemporary Scenario, Method and Material - 2

Lecture 26 - Continuum of the Practice: Ancient Centres, Contemporary Scenario, Method and Material - 3

Lecture 27 - Case study-1 : Gond Art

Lecture 28 - Case study-2 : Bengal Patachitra

Lecture 29 - Case study-3 : Madhubani Paintings

Lecture 30 - Characteristics of Contemporary Collection - Semiotic Analysis

Lecture 31 - Characteristics of Contemporary Collection - Thematic and Iconic Analysis

Lecture 32 - Characteristics of Contemporary Collection of Indian Folk and Minor Art

Lecture 33 - Thematic Change in Contemporary Collection of Indian Folk and Minor Art

Lecture 34 - Individual Expression in Contemporary Collection of Indian Folk and Minor Art

Lecture 35 - Cultural Condition: Colonial and Postcolonial Bengal - Part I

Lecture 36 - Cultural Condition: Colonial and Postcolonial Bengal - Part II

Lecture 37 - Contextualizing Folk idiom - Part I

Lecture 38 - Contextualizing Folk idiom - Part II

Lecture 39 - Contextualizing Folk idiom - Part III

Lecture 40 - Coexistence and Collaborations with Mainstream Art

Lecture 41 - Alternative Context: Place of Folk Art in Contemporary Lifestyle

Lecture 42 - Need of Paradigm Shift - I

Lecture 43 - Need of Paradigm Shift - II

Lecture 44 - Endnote

NPTEL : NOC:Developing Soft Skills and Personality (Humanities and Social Sciences)

Co-ordinators : Dr. T. Ravichandran

Lecture 1 - Introduction: A New Approach to Learning

Lecture 2 - Planning and Goal-Setting

Lecture 3 - Human Perceptions: Understanding People

Lecture 4 - Types of Soft Skills: Self-Management Skills

Lecture 5 - Aiming for Excellence: Developing Potential and Self-Actualisation

Lecture 6 - Need Achievement and Spiritual Intelligence

Lecture 7 - Conflict Resolution Skills: Seeking Win-Win Solution

Lecture 8 - Inter-Personal Conflicts: Two Examples

Lecture 9 - Inter-Personal Conflicts: Two Solutions

Lecture 10 - Types of Conflicts: Becoming a Conflict Resolution Expert

Lecture 11 - Types of Stress: Self-Awareness About Stress

Lecture 12 - Regulating Stress: Making the best out of Stress

Lecture 13 - Habits: Guiding Principles

Lecture 14 - Habits: Identifying Good and Bad Habits

Lecture 15 - Habits: Habit Cycle

Lecture 16 - Breaking Bad Habits

Lecture 17 - Using the Zeigarnik Effect for Productivity and Personal Growth

Lecture 18 - Forming Habits of Success

Lecture 19 - Communication: Significance of Listening

Lecture 20 - Communication: Active Listening

Lecture 21 - Communication: Barriers to Active Listening

Lecture 22 - Telephone Communication: Basic Telephone Skills

Lecture 23 - Telephone Communication: Advanced Telephone Skills

Lecture 24 - Telephone Communication: Essential Telephone Skills

Lecture 25 - Technology and Communication: Technological Personality?

Lecture 26 - Technology and Communication: Mobile Personality?

Lecture 27 - Topic: Technology and Communication: E-Mail Principles

Lecture 28 - Technology and Communication: How not to Send E-Mails!

Lecture 29 - Technology and Communication: Netiquette

Lecture 30 - Technology and Communication: E-Mail Etiquette

Lecture 31 - Communication Skills: Effective Communication1

Lecture 32 - Barriers to Communication: Arising out of Sender / ReceiverÂ's Personality

Lecture 33 - Barriers to Communication: Interpersonal Transactions

Lecture 34 - Barriers To Communication: Miscommunication

Lecture 35 - Non-Verbal Communication: Pre-Thinking Assessment - 1

Lecture 36 - Non-Verbal Communication: Pre-Thinking Assessment - 2

Lecture 37 - Nonverbal Communication: Introduction and Importance

Lecture 38 - Non-Verbal Communication: Issues and Types

Lecture 39 - Non-Verbal Communication: Basics and Universals

Lecture 40 - Non-Verbal Communication: Interpreting Non-Verbal Cues

Lecture 41 - Body Language: For Interviews

Lecture 42 - Body Language: For Group Discussions

Lecture 43 - Lecture 43

Lecture 44 - Presentation Skills: Becoming a Professional

Lecture 45 - Presentation Skills: The Role of Body Language

Lecture 46 - Presentation Skills: Using Visuals

Lecture 47 - Reading Skills: Effective Reading

Lecture 48 - Human Relations: Developing Trust and Integrity

NPTEL : NOC:How the Brain Creates Mind (Humanities and Social Sciences)

Co-ordinators : Alok Bajpai

Lecture 1 - Brain - 1

Lecture 2 - Brain - 2

Lecture 3 - Brain - 3

Lecture 4 - Electrical Activity In Brain - 1

Lecture 5 - Electrical Activity In Brain - 2

Lecture 6 - EEG

Lecture 7 - Dynamics - 1

Lecture 8 - Dynamics - 2

Lecture 9 - Dynamics - 3

Lecture 10 - Dynamics - 4

Lecture 11 - Cognition and Emotions - 1

Lecture 12 - Cognition and Emotions - 2 Edit Lesson

Lecture 13 - Cognition and Emotions - 3

Lecture 14 - Cognition and Emotions - 4

Lecture 15 - Consciousness

Lecture 16 - Sleep - 1

Lecture 17 - Sleep - 2

Lecture 18 - Sleep - 3

Lecture 19 - Future of Brain - 1

Lecture 20 - Future of Brain - 2

NPTEL : NOC:Understanding Design Thinking and People Centred Design (Humanities and Social Sciences)

Co-ordinators : Prof. Jhumkee Iyengar

Lecture 1 - Introduction to Design Thinking

Lecture 2 - The Need to be People Centered

Lecture 3 - People Centered Design Methodology

Lecture 4 - Examine and Reflect on the Problem

Lecture 5 - Reconsider and arrive at the Â‘rightÂ’ problem to solve

Lecture 6 - Research with Users and their Contexts

Lecture 7 - Question Framing and Conducting Research

Lecture 8 - User Stories and Themes

Lecture 9 - Personas

Lecture 10 - Insight Statements, Â‘How Might WeÂ’ Questions, Design Strategy Statement

Lecture 11 - Generating Ideas

Lecture 12 - Top Five Ideas

Lecture 13 - Bundle Ideas and Create a Concept

Lecture 14 - Scenarios and Storyboards

Lecture 15 - Rapid Prototyping

Lecture 16 - Importance of Testing with People

Lecture 17 - Testing your Design with People

Lecture 18 - Conducting the Usability Test

Lecture 19 - Record Results, Enhance, Retest and Refine Design

Lecture 20 - Create a Pitch for your Design

NPTEL : NOC:Enhancing Soft Skills and Personality (Humanities and Social Sciences)

Co-ordinators : Dr. T. Ravichandran

Lecture 1 - Introduction: Highlights of Developing SS Course - 1-24

Lecture 2 - Introduction: Highlights of Developing SS Course - 25-48

Lecture 3 - MIND-SET-1: Definitions and Types

Lecture 4 - MIND-SET-2: Learning Mindsets

Lecture 5 - MIND-SET-3: Secrets of Developing Growth Mindsets

Lecture 6 - Managing Time-1: Importance of Time and Understanding Perceptions of Time

Lecture 7 - Managing Time-2: Using Time Efficiently

Lecture 8 - Handling Delay-1: Understanding Procrastination

Lecture 9 - Handling Delay-2: Overcoming Procrastination

Lecture 10 - Assertiveness - 1: DonÂ't Say Â"YesÂ" to Make Others Happy!

Lecture 11 - Assertiveness - 2

Lecture 12 - Assertiveness - 3

Lecture 13 - Managing Negative Emotions

Lecture 14 - Channelizing Positive Emotions - 1

Lecture 15 - Channelizing Positive Emotions - 2

Lecture 16 - People Skills-1-What Makes Others Dislike You

Lecture 17 - People Skills-2-What Makes Others Like You - 1

Lecture 18 - People Skills-3:What Makes Others Like You - 2

Lecture 19 - People Skills-4-Being Attractive - 1

Lecture 20 - People Skills-5-Being Attractive - 2

Lecture 21 - English Skills: 1-Common Errors - 1

Lecture 22 - English Skills-2: Common Errors - 2

Lecture 23 - English Skills-3: Common Errors - 3

Lecture 24 - English Skills-4: Common Errors - 4

Lecture 25 - English Skills-5: Common Errors - 5

Lecture 26 - Significance of Humour in Communication - 1

Lecture 27 - Humour in the Workplace

Lecture 28 - Function of Humour in the Workplace

Lecture 29 - Money and Personality

Lecture 30 - Managing Money

Lecture 31 - Health and Personality

Lecture 32 - Managing Health-1 Importance of Exercise

Lecture 33 - Managing Health-2 Diet and Sleep

Lecture 34 - Love and Personality

Lecture 35 - Managing Love

Lecture 36 - Ethics and Etiquette

Lecture 37 - Business Etiquette

Lecture 38 - Managing Mind and Memory

Lecture 39 - Improving Memory

Lecture 40 - Care for Environment

NPTEL : NOC:Postcolonial Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Sayan Chattopadhyay

Lecture 1 - Introduction: What is Postcolonialism?

Lecture 2 - Commonwealth Literature

Lecture 3 - Colonial Discourse Analysis: Michel Foucault

Lecture 4 - Colonial Discourse Analysis: Edward Said

Lecture 5 - Joseph Conrad's Heart of Darkness

Lecture 6 - Colonialism: The African Perspective

Lecture 7 - Chinua Achebe's Things Fall Apart - I

Lecture 8 - Chinua Achebe's Things Fall Apart - II

Lecture 9 - Decolonisation and the Discourse of Nationalism

Lecture 10 - Sonnets of Henry Derozio

Lecture 11 - Raja Rao's Kanthapura - I

Lecture 12 - Raja Rao's Kanthapura - II

Lecture 13 - Critics of Nationalism: Rabindranath Tagore and Frantz Fanon

Lecture 14 - Homi Bhabha and the concept of Cultural Hybridity

Lecture 15 - Caribbean Poetry: Derek Walcott

Lecture 16 - Diasporic Literature: Selections from Jhumpa Lahiri's Interpreter of Maladies

Lecture 17 - Gayatri C. Spivak: Answering the question Â“Can the Subaltern Speak?Â”

Lecture 18 - Mahasweta Devi's Pterodactyl - I

Lecture 19 - Mahasweta Devi's Pterodactyl - II

Lecture 20 - Conclusion: Postcolonial Futures

NPTEL : NOC:Introducing Modern Western Art: Movements and Artists (Humanities and Social Sciences)

Co-ordinators : Prof.Soumik Nandy Majumdar

Lecture 1 - What is Modern Art?

Lecture 2 - Pre-history of Modern Art

Lecture 3 - Chronology of Modern Western Art

Lecture 4 - Beginning(s) of Modern Art Â– 1 (Romanticism and Realism)

Lecture 5 - Beginning(s) of Modern Art Â– 2 (Impressionism and Post - Impressionism)

Lecture 6 - Fauvism and Matisse

Lecture 7 - Cubism and Picasso

Lecture 8 - Futurism and Dada-ism

Lecture 9 - Surrealism

Lecture 10 - German Expressionism

Lecture 11 - Rodin Â– the precursor of Modern Sculpture

Lecture 12 - From Figuration to Abstract (Henry Moore and Brancusi)

Lecture 13 - Pure Abstract Sculpture (Constructivism and Minimalism)

Lecture 14 - Introspection and Innovations (Giacometti and Calder)

Lecture 15 - Outdoor Sculpture and Public Art

Lecture 16 - Abstract Painting (Picasso, Paul Klee, Mondrian)

Lecture 17 - Abstract Expressionism

Lecture 18 - Art and Optical Science: Op Art

Lecture 19 - Art and the Mass Culture: Pop Art

Lecture 20 - Contemporary Trends: Breaking the Barriers

NPTEL : NOC:Cognition, Transformation and Lives (Humanities and Social Sciences)

Co-ordinators : Alok Bajpai

Lecture 1 - Cognition, Emotion and Transformation

Lecture 2 - Self and Others

Lecture 3 - Human Cognition

Lecture 4 - Cognition and Human Behaviour

Lecture 5 - Human Emotions

Lecture 6 - Understanding Emotions

Lecture 7 - Stories from the Brain

Lecture 8 - Stories from the Brain (Continued...)

Lecture 9 - Humans and Madness

Lecture 10 - Humans and Madness (Continued...)

Lecture 11 - Vices and Virtues: Understanding Human Behaviour

Lecture 12 - Change and its Context

Lecture 13 - Can we transform?

Lecture 14 - Need for transformation

Lecture 15 - Process of Transformation

Lecture 16 - Biographical models of transformations

Lecture 17 - Biographical narrative of Gandhi

Lecture 18 - Gandhi's process of transformation

Lecture 19 - Transformation and Ethics

Lecture 20 - Transformation and Society

NPTEL : NOC:Visual Perception and Art - A Survey Across the Cultures (Humanities and Social Sciences)

Co-ordinators : Prof.Soumik Nandy Majumdar

Lecture 1 - Introductory Lecture

Lecture 2 - What is Visual Perception?

Lecture 3 - Visual Perception and Visual Reality

Lecture 4 - Visual Perception and Creativity - 1

Lecture 5 - Visual Perception and Creativity - 2

Lecture 6 - Child art

Lecture 7 - Pre-historic art

Lecture 8 - Folk art

Lecture 9 - Primitive art

Lecture 10 - Photography

Lecture 11 - Popular visual culture

Lecture 12 - Mimetic and Non-mimetic art

Lecture 13 - Traditional art: India

Lecture 14 - Traditional art: China and Japan

Lecture 15 - Realistic art of the West

Lecture 16 - Alternative realism

Lecture 17 - Breakthrough in Visual Perception

Lecture 18 - Abstract art - 1

Lecture 19 - Abstract art - 2

Lecture 20 - Contemporary art: Challenges of Visual

NPTEL : NOC:Introduction to Basic Cognitive Processes (Humanities and Social Sciences)

Co-ordinators : Prof. ARK Verma

Lecture 1 - Introduction to Cognitive Psychology

Lecture 2 - A Brief History of Cognitive Psychology

Lecture 3 - A Brief History of Cognitive Psychology (Continued...)

Lecture 4 - Foundational Assumptions of Cognitive Psychology

Lecture 5 - Foundations of Cognitive Psychology

Lecture 6 - Foundations of Cognitive Psychology

Lecture 7 - Approaches towards Cognitive Psychology

Lecture 8 - Modularity and Cognitive Neuropsychology

Lecture 9 - Basic Concepts in Cognitive Neuroscience

Lecture 10 - The Cerebral Cortex

Lecture 11 - Basics of Research Methods

Lecture 12 - Research Methods in Cognitive Psychology

Lecture 13 - Sensation and Perception

Lecture 14 - Psychophysics: Measuring Sensation

Lecture 15 - Signal Detection Theory

Lecture 16 - Physiology of Visual Perception

Lecture 17 - Representation in Perception

Lecture 18 - Approaches to Visual Perception - 1

Lecture 19 - Approaches to Visual Perception - 2

Lecture 20 - Approaches to Visual Perception - 3

Lecture 21 - Theories of Object Recognition

Lecture 22 - Perception and Action

Lecture 23 - Auditory Perception - I

Lecture 24 - Auditory Perception - II

Lecture 25 - Attention - I

Lecture 26 - Attention - II

Lecture 27 - Attention - III

Lecture 28 - Attention - IV

Lecture 29 - Memory - I

Lecture 30 - Memory - II

Lecture 31 - Memory - III

Lecture 32 - Memory - IV

Lecture 33 - Memory - V

Lecture 34 - Memory - VI

Lecture 35 - Memory - VII

Lecture 36 - Everyday Memory and Memory Errors

Lecture 37 - Disorders for Perception and Attention

Lecture 38 - Disorders of Memory

Lecture 39 - Summary and Q & A

NPTEL : NOC:Calculus of One Real Variable (Humanities and Social Sciences)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Introduction to Numbers

Lecture 2 - Countability and Uncountability

Lecture 3 - Examples of Irrational numbers

Lecture 4 - Functions

Lecture 5 - Limits of Functions - I

Lecture 6 - Limits of Functions - II

Lecture 7 - Continuous Functions

Lecture 8 - Intermediate Value Theorem

Lecture 9 - Maximum Value Theorem

Lecture 10 - Supremum and Infimum

Lecture 11 - Derivative of a Function

Lecture 12 - Rules of Differentiation

Lecture 13 - Maxima and Minima

Lecture 14 - Rolles Theorem and Lagrange Mean Value Theorem (MVT)

Lecture 15 - Monotonic Functions and Inverse Functions

Lecture 16 - Newtonâ€™s Method for solving Equations

Lecture 17 - Optimization Problems

Lecture 18 - Integration-I : In the style of Newton and Leibnitz

Lecture 19 - Integration-II : In the spirit of Newton and Leibnitz

Lecture 20 - Integration-III : Newton and Leibnitz Style

Lecture 21 - Integration theory of Riemann - I

Lecture 22 - Integration theory of Riemann - II

Lecture 23 - Integration Rule

Lecture 24 - Fundamental Theorem of Calculus (in Riemann style)

Lecture 25 - The Kurzweil-Henstock Integral (K-H Integral)

Lecture 26 - Calculating Indefinite Integrals

Lecture 27 - Improper Integral - I

Lecture 28 - Improper Integral - II

Lecture 29 - Application of Definite Integral - I

Lecture 30 - Application of definite Integral - II

Lecture 31 - Application of definite Integral - III

Lecture 32 - Application of definite Integral - III (Continued.....)

Lecture 33 - Numerical Integration - I

Lecture 34 - Numerical Integration - II

Lecture 35 - Sequences

Lecture 36 - Sequences (Continued...)

Lecture 37 - Infinite Series

Lecture 38 - infinite series (Continued...)

Lecture 39 - Taylors Theorem, other issues and end of the course - I

Lecture 40 - Taylors Theorem, other issues and end of the course - II

NPTEL : NOC:An Introduction to Microeconomics (Humanities and Social Sciences)

Co-ordinators : Dr. Vimal Kumar

Lecture 1 - What is Economics ?

Lecture 2 - Resources, Wants and Scarcity

Lecture 3 - Allocation, Command, Market and Mixed Economy

Lecture 4 - Individual

Lecture 5 - Rationality, Self Interest and Optimization

Lecture 6 - Branches of Economics

Lecture 7 - Introduction to Demand and Supply

Lecture 8 - Demand

Lecture 9 - Demand:Effect of Substitutes and Complements

Lecture 10 - Market Demand Function

Lecture 11 - Factors Affecting Demand

Lecture 12 - Supply and Market Supply

Lecture 13 - Supply: Effect of Substitutes and Complements

Lecture 14 - Factors Affecting Supply

Lecture 15 - Market Equilibrium

Lecture 16 - Few Examples

Lecture 17 - Application: Price Control

Lecture 18 - Consumer Surplus

Lecture 19 - Producer Surplus

Lecture 20 - Total Surplus

Lecture 21 - Effect of Price Control on Surplus

Lecture 22 - Implications of Market Equilibrium

Lecture 23 - Price Elasticity of Demand

Lecture 24 - Elastic, Inelastic and Unit- elastic Demand

Lecture 25 - Perfectly Elastic and Perfectly Inelastic Demand

Lecture 26 - More on Elasticity

Lecture 27 - Factors Affecting Price Elasticity of Demand

Lecture 28 - Effect of Taxation

Lecture 29 - Tax Imposed on Seller

Lecture 30 - Incidence of Tax

Lecture 31 - Incidence of Tax: Four Extremes

Lecture 32 - Incidence of Tax: Effect on Surplus

Lecture 33 - Towards Consumer Theory

Lecture 34 - Budget Line and Budget Set

Lecture 35 - Factors Affecting the Budget Line

Lecture 36 - Few Examples of Changes in Budget Line

Lecture 37 - Consumption Set

Lecture 38 - Convexity of Consumption Set

Lecture 39 - Describing Utility

Lecture 40 - Some Axioms

Lecture 41 - Preferences as a Mathematical Construct

Lecture 42 - Rationality in Real Life Vs. Rationality in Economics

Lecture 43 - More on Three Axioms of Rationality

Lecture 44 - Defining Utility Function

Lecture 45 - Ordinal Vs. Cardinal Utility

Lecture 46 - Properties of Preferences: Continuity

Lecture 47 - Indifference Set

Lecture 48 - Indifference Curve

Lecture 49 - Behavioural Assumption: More is Better

Lecture 50 - Properties of Preferences: Convexity

Lecture 51 - Marginal Rate of Substitution (MRS)

Lecture 52 - DMRS and Convexity: Example

Lecture 53 - Summary

Lecture 54 - Utility Maximization

Lecture 55 - Utility Maximization: tangency criterion

Lecture 56 - More on Utility Maximization

Lecture 57 - Utility Maximization: Example

Lecture 58 - Example Revisited

Lecture 59 - Marginal Utility Vs. Marginal Rate of Substitution (MRS)

Lecture 60 - Perfect Substitutes

Lecture 61 - Perfect Complements

Lecture 62 - An Example with Quasi Linear Preferences

Lecture 63 - Demand Revisited

Lecture 64 - Effect of Income on Quantity Demanded

Lecture 65 - Effect of Change in Price

Lecture 66 - Substitution Effect and Income Effect

Lecture 67 - Giffen Good

Lecture 68 - Expenditure Minimization as a Dual Problem of Utility Maximization

Lecture 69 - Marshallian and Hicksian Demand Function

Lecture 70 - Slutsky Equation

Lecture 71 - An Application: Subsidy Vs. Direct Benefit Transfer

Lecture 72 - Towards Producer Theory

Lecture 73 - Technology or Production Function

Lecture 74 - Isoquants

Lecture 75 - Few Axioms Related to Technology

Lecture 76 - Axioms/ Assumptions Continued

Lecture 77 - Production in Short Run

Lecture 78 - Average and Marginal Product of Labour (APL and MPL)

Lecture 79 - More on APL and MPL

Lecture 80 - Law of Diminishing Marginal Returns

Lecture 81 - Production in Long Run

Lecture 82 - MRTS: Few Examples

Lecture 83 - Decreasing MRTS

Lecture 84 - Elasticity of Substitution

Lecture 85 - Returns to Scale

Lecture 86 - Elasticity of Scale

Lecture 87 - Economic Terminology: Opportunity Cost

Lecture 88 - Economic Terminology: Sunk Cost

Lecture 89 - Economic Terminology: Economic Profit and Accounting Profit

Lecture 90 - Diminishing Marginal Product Vs. DMRTS

Lecture 91 - Returns to Scale through Graphs

Lecture 92 - Cost in Long Run

Lecture 93 - Cost Minimization

Lecture 94 - Cost Minimization: Few Examples

Lecture 95 - Cost Minimization: Cobb-Douglas Production Function

Lecture 96 - More on Cost Minimization

Lecture 97 - Cost Function in the Long Run

Lecture 98 - Cost in Short Run: TC, FC and VC

Lecture 99 - Cost in Short Run: MC

Lecture 100 - Shape of Cost Curves

Lecture 101 - Factor Demand Function

Lecture 102 - Output Expansion Path

Lecture 103 - Cost Revisited: Quasi Fixed Cost

Lecture 104 - Cobb-Douglas Function: Cost and Returns to Scale

Lecture 105 - Short Run Vs. Long Run Cost Minimization

Lecture 106 - Short Run Vs. Long Run Cost Minimization Through Graphs

Lecture 107 - Average Cost in Short Run Vs. Long Run

Lecture 108 - Short Run Marginal Cost Vs. Long Run Marginal Cost

Lecture 109 - Profit Maximization

Lecture 110 - Marginal Revenue

Lecture 111 - Profit Maximization in Short Run Through Graphs

Lecture 112 - Profit Maximization in Short Run Through Algebra and Calculus

Lecture 113 - Market Environment

Lecture 114 - Perfectly Competitive Market

Lecture 115 - Supply Curve

Lecture 116 - An example obtaining the short run supply function

Lecture 117 - Two Interpretation of Supply Function

Lecture 118 - Profit maximization implies cost minimization

Lecture 119 - Producerâ€™s Surplus Revisited

Lecture 120 - Profit Maximization and Returns to Scale

Lecture 121 - Short Run Supply Vs. Long Run Supply

Lecture 122 - Long Run Equilibrium and Supply Function

Lecture 123 - Introduction to Monopoly

Lecture 124 - Marginal Revenue of the Monopolist

Lecture 125 - Monopoly: Price Elasticity of the Demand and MR

Lecture 126 - Profit Maximization for the Monopolist

Lecture 127 - Inverse Elasticity Pricing Rule

Lecture 128 - Profit Maximization for the Monopolist through Graph

Lecture 129 - No Supply Function for Monopoly

Lecture 130 - Monopoly: Comparative Statics

Lecture 131 - Imposition of the Tax on the Monopolist

Lecture 132 - Welfare Effects of Monopoly Pricing

Lecture 133 - Price Discrimination

Lecture 134 - Monopoly: Example

Lecture 135 - Responses from Policy Makers

Lecture 136 - Introduction to Oligopoly

Lecture 137 - Nash Equilibrium

Lecture 138 - Cournot Model of Duopoly

Lecture 139 - Stackelberg Model of Duopoly

Lecture 140 - Bertrand Model of Duopoly

Lecture 141 - Market Environment: Comparison Table

NPTEL : NOC:Introduction to Advanced Cognitive Processes (Humanities and Social Sciences)

Co-ordinators : Prof. ARK Verma

Lecture 1 - Preface, Outline and Course Structure

Lecture 2 - Knowledge - I

Lecture 3 - Knowledge - II

Lecture 4 - Knowledge - III

Lecture 5 - Knowledge - IV

Lecture 6 - Knowledge - V

Lecture 7 - Visual Imagery - I

Lecture 8 - Visual Imagery - II

Lecture 9 - Cognitive Maps

Lecture 10 - Mental Imagery

Lecture 11 - Language: Introduction

Lecture 12 - Language: Historical Background

Lecture 13 - Evolution of Language

Lecture 14 - Language Acquisition - I

Lecture 15 - Language Acquisition - II

Lecture 16 - Language Comprehension - I

Lecture 17 - Language Comprehension - II

Lecture 18 - Language Production

Lecture 19 - Reading - I

Lecture 20 - Reading - II

Lecture 21 - Aphasia

Lecture 22 - Bilingualism

Lecture 23 - Reasoning and Decision Making - I

Lecture 24 - Reasoning and Decision Making - II

Lecture 25 - Reasoning and Decision Making - III

Lecture 26 - Problem Solving - I

Lecture 27 - Problem Solving - II

Lecture 28 - Problem Solving - III

Lecture 29 - Problem Solving - IV

Lecture 30 - Creativity

Lecture 31 - Cognition and Emotion - I

Lecture 32 - Cognition and Emotion - II

Lecture 33 - Cognition and Emotion - III

Lecture 34 - Cognition and Emotion - IV

Lecture 35 - Cognition and Emotion - V

Lecture 36 - Cognitive Development - I

Lecture 37 - Cognitive Development - II

Lecture 38 - Cognitive Development - III

Lecture 39 - Cognitive Development - IV

Lecture 40 - Summary and Conclusion

NPTEL : NOC:Introduction to Literary Theory (Humanities and Social Sciences)

Co-ordinators : Prof. Sayan Chattopadhyay

Lecture 1 - Introduction: What is Literary Theory?

Lecture 2 - Literature and Mimesis: Plato - I

Lecture 3 - Literature and Mimesis: Plato - II

Lecture 4 - Literature and Mimesis: Aristotle - I

Lecture 5 - Literature and Mimesis: Aristotle - II

Lecture 6 - Literature and the Sublime

Lecture 7 - Neoclassical Literary Theory

Lecture 8 - Literature and Romanticism - I

Lecture 9 - Literature and Romanticism - II

Lecture 10 - New Criticism

Lecture 11 - Formalism

Lecture 12 - Dialogism I

Lecture 13

Lecture 14 - Reader Response Theory I: The Phenomenological Tradition

Lecture 15 - Reader Response Theory II: Wolfgang Iser, Harold Bloom, and Stanley Fish

Lecture 16 - Structuralism I: Ferdinand de Saussure

Lecture 17 - Structuralism II: Claude LÃ©vi-Strauss

Lecture 18 - Poststructuralism I: Roland Barthes

Lecture 19 - Poststructuralism II: Jacques Derrida

Lecture 20 - Poststructuralism III: Michel Foucault

Lecture 21 - Marxist Literary Theory I: Marx and Brecht

Lecture 22 - Marxist Literary Theory II: Althusser and Gramsci

Lecture 23 - Marxist Literary Theory III: Raymond Williams

Lecture 24 - Literature and Psychoanalysis: Sigmund Freud - I

Lecture 25 - Literature and Psychoanalysis: Sigmund Freud - II

Lecture 26 - Literature and Psychoanalysis: Sigmund Freud - III

Lecture 27 - Literature and Psychoanalysis IV: Carl Jung

Lecture 28 - Literature and Psychoanalysis V: Jacques Lacan

Lecture 29 - Feminism and Literature I: Mary Wollstonecraft

Lecture 30 - Feminism and Literature II: Woolf and de Beauvoir

Lecture 31 - Feminism and Literature III: Gynocriticism, Ã‰criture Feminine, Judith Butler

Lecture 32 - Modernism and Postmodernism

Lecture 33 - Postcolonial Theory I: Edward Said

Lecture 34 - Postcolonial Theory II: Bhabha and Spivak

Lecture 35 - Conclusion

NPTEL : NOC:Development of Sociology in India (Humanities and Social Sciences)

Co-ordinators : Prof. Ashish Saxena

Lecture 1 - On Emergence and Growth of Sociology in India

Lecture 2 - On Emergence and Growth of Sociology in India

Lecture 3 - On Indigenization of Sociology

Lecture 4 - On Indigenization of Sociology

Lecture 5 - On Civilizational Perspective

Lecture 6 - On Civilizational perspective

Lecture 7 - On Indological perspective

Lecture 8 - On Indological perspective: A

Lecture 9 - On Marxian perspective

Lecture 10 - On Marxian perspective: A

Lecture 11 - Structural-functional perspective

Lecture 12 - Structural-functional perspective

Lecture 13 - On Environmental Perspective

Lecture 14 - On Environmental Perspective

Lecture 15 - On Gender perspective

Lecture 16 - On Gender perspective

Lecture 17 - Subaltern perspective

Lecture 18 - Subaltern perspective

Lecture 19 - On Dalit Perspective

Lecture 20 - On Dalit Perspective

NPTEL : NOC:Introduction to the Pyschology of Language (Humanities and Social Sciences)

Co-ordinators : Prof. ARK Verma

Lecture 1 - Introduction to Language

Lecture 2 - Basic Concepts in Psycholinguistics

Lecture 3 - Animal Communication

Lecture 4 - Evolution of Language

Lecture 5 - Language and Thought

Lecture 6 - Do children talk ? And How ?

Lecture 7 - The First Steps in Language Acquisition

Lecture 8 - Segmenting the speech stream

Lecture 9 - Learning Word - Meanings

Lecture 10 - Acquiring Morphological and Syntactic Knowledge

Lecture 11 - Speech Production - 1

Lecture 12 - Speech Production - 2

Lecture 13 - Speech Production - 3

Lecture 14 - Speech Comprehension - 1

Lecture 15 - Speech Comprehension - 2

Lecture 16 - Understanding Word Meaning

Lecture 17 - Word Meaning and Lexical Access

Lecture 18 - Lexical Access

Lecture 19 - Ambiguity and Representation of Meaning in the Brain

Lecture 20 - Meaning in the Brain

Lecture 21 - What is a sentence ?

Lecture 22 - Parsing Sentences - 1

Lecture 23 - Parsing Sentences - 2

Lecture 24 - Parsing Sentences - 3

Lecture 25 - Parsing Sentences - 4

Lecture 26 - Reading - 1

Lecture 27 - Theories of Reading

Lecture 28 - Cognitive Processes in Reading

Lecture 29 - Recognising Visual Words

Lecture 30 - Dyslexia

Lecture 31 - Neural Basis of Word Meaning

Lecture 32 - Neural Basis of Language Comprehension

Lecture 33 - Neural Basis of Language Comprehension

Lecture 34 - Neural Basis of Language Comprehension and Production

Lecture 35 - Aphasia

Lecture 36 - Bilingualism - 1

Lecture 37 - Bilingualism - 2

Lecture 38 - Bilingualism - 3

NPTEL : NOC:Population Studies (Humanities and Social Sciences)

Co-ordinators : Prof. A.K. Sharma

Lecture 1 - Introduction to Population Studies

Lecture 2 - Population Ecology / Geography

Lecture 3 - Population Growth

Lecture 4 - Population Growth and Development

Lecture 5 - Population Dynamics - 1

Lecture 6 - Population Dynamics - 2

Lecture 7 - Population Policies

Lecture 8 - Population Policy in India

Lecture 9 - Population and Family Welfare - 1

Lecture 10 - Population and Family Welfare - 2

Lecture 11 - Techniques of Population Analysis - 1

Lecture 12 - Techniques of Population Analysis - 2

Lecture 13 - Population and Society

Lecture 14 - Population and Society

Lecture 15 - Statistical Techniques in Population Studies - 1

Lecture 16 - Statistical Techniques in Population Studies - 2

Lecture 17 - Population Growth and Women - 1

Lecture 18 - Population Growth and Women - 2

Lecture 19 - Population Concepts and Aging - 1

Lecture 20 - Population Concepts and Aging - 2

NPTEL : NOC:Psychology of Everyday (Humanities and Social Sciences)

Co-ordinators : Alok Bajpai

Lecture 1 - Understanding Psychology

Lecture 2 - Psychology and Psychiatry

Lecture 3 - Understanding day-to-day behaviour - I

Lecture 4 - Understanding day-to-day behaviour - II

Lecture 5 - Revisiting normal-abnormal dilemma - I

Lecture 6 - Revisiting normal-abnormal dilemma - II

Lecture 7 - Revisiting normal-abnormal dilemma - III

Lecture 8 - Revisiting normal-abnormal dilemma - IV

Lecture 9 - Issues confronting the young adults - I and II

Lecture 10 - Issues confronting the young adults - III and IV

Lecture 11 - Mental health issues of adults - I and II

Lecture 12 - Mental health issues of adults - III

Lecture 13 - Mental health issues of adults - IV

Lecture 14 - Mental health issues of child and adolescents - I and II

Lecture 15 - Mental health issues of child and adolescents - III and IV

NPTEL : NOC:Introduction to Brain and Behaviour (Humanities and Social Sciences)

Co-ordinators : Prof. ARK Verma

Lecture 1 - A Brief History of Cognitive Neuroscience

Lecture 2 - A Brief History of Cognitive Neuroscience (Continued...)

Lecture 3 - Structure and Function of the Nervous System

Lecture 4 - Neuronal communication

Lecture 5 - An Overview of the Nervous System

Lecture 6 - The Cerebral Cortex

Lecture 7 - Methods in Cognitive Neuroscience

Lecture 8 - Studying the Damaged Brain

Lecture 9 - Structural Analysis of the Brain

Lecture 10 - Measuring Structure and Function Together in the Brain

Lecture 11 - Neuroscience of Sensation and Perception

Lecture 12 - Olfaction

Lecture 13 - Somatosensation

Lecture 14 - Vision

Lecture 15 - Moving beyond Sensation

Lecture 16 - Attention

Lecture 17 - Models of Attention

Lecture 18 - Neural Mechanisms of Attention

Lecture 19 - Mechanisms of Attention

Lecture 20 - Networks of Attention

Lecture 21 - Memory

Lecture 22 - Mechanisms of Memory

Lecture 23 - The Medial Temporal Lobe Memory System

Lecture 24

Lecture 25

Lecture 26 - Emotion

Lecture 27 - Categorizing Emotions

Lecture 28 - Emotions and Other Cognitive Processes

Lecture 29 - Emotions and other Cognitive Processes (Continued...)

Lecture 30 - Cognitive Control of Emotions

Lecture 31 - Cognitive Neuroscience of Language

Lecture 32 - Language in the Human Brain

Lecture 33 - Language Comprehension - I

Lecture 34 - Language Comprehension - II

Lecture 35 - Neural Models of Language

Lecture 36 - Neuroscience of Social Cognition

Lecture 37 - Theory of Mind: Understanding Otherâ€™s Mental States

Lecture 38 - Neural Correlates of Mental State Attribution

Lecture 39 - Autism and Mental State Attribution

Lecture 40 - Social Knowledge in Social Cognition

NPTEL : NOC:Modern Indian Art From the Colonial Period to the Present (Humanities and Social Sciences)

Co-ordinators : Prof.Soumik Nandy Majumdar

Lecture 1 - Overview of Modern Indian Art

Lecture 2 - Advent of the British Colonial Rule

Lecture 3 - Company Painting - A new genre in Indian Art

Lecture 4 - Kalighat Painting - from folk art to urban milieu

Lecture 5 - Raja Ravi Varma, Amrita Sher-Gil, Jamini Roy: In search of Indian Identity

Lecture 6 - Early Modern Indian Sculpture

Lecture 7 - Nationalism, Rabindranath Tagore and Bengal School

Lecture 8 - Calcutta - the happening center of modern Indian art

Lecture 9 - Santiniketan - the alternative modernism Nandalal and Benode Behari

Lecture 10 - Santiniketan - the alternative modernism Ramkinkar and Rabindranath

Lecture 11 - 1940s - a different social reality

Lecture 12 - Calcutta Groups and Bombay Progressive Artists Group

Lecture 13 - Post Independent Sculpture

Lecture 14 - Diversities in style and content : 1950s onward (I)

Lecture 15 - Diversities in style and content : 1950s onward (II)

Lecture 16 - Abstraction in modern Indian art

Lecture 17 - Neo figuration and the narrative trends

Lecture 18 - Folk Art and Modernism

Lecture 19 - Breaking the barriers: Unconventional mediums and ideas

Lecture 20 - Experiments Innovations: Past and Future

NPTEL : NOC:Introduction to Japanese Language and Culture (Humanities and Social Sciences)

Co-ordinators : Mrs.Vatsala Misra

Lecture 1 - Introduction to Japanese Scripts

Lecture 2 - Jikou Shoukai â€€â˜â“â†â€€â—â‚‡â†â‹â„

Lecture 3 - Dochira kara desu ka? â©â¡â‰â€€â‹â‰â€€â§â™â€€â‹ï¼Ÿ

Lecture 4 - Senmon wa nan desu ka? å°‚é–€â€€â¯â€€ãªâ“â€€â§â™â€€â‹ï¼Ÿ

Lecture 5 - Kore wa hon desu.â€€â“â‚Œâ€€â¯â€€æœ¬â€€â§â™â€,

Lecture 6 - Are wa nan desu ka? â‚â‚Œâ€€â¯â€€ï½•â€€â§â™â€€â‹ï¼Ÿ

Lecture 7 - Ikura desu ka? â„ãâ‰â€€â§â™â€€â‹ï¼Ÿ

Lecture 8 - Ima nan-ji desu ka?â€€ï»Šâ€€ï½•æ™‚â€€â§â™â€€â‹ï¼Ÿ

Lecture 9 - Kaigi wa roku-ji han kara desu.â€€ï¼šè°â€€â¯â€€å…æ™‚â€€åŠâ€€â‹â‰â€€â§â™â€,

Lecture 10 - Ashita TÅkyÅ e ikimasu.â€€æ˜Žæ—¥â€€æ±ãº¬â€€â¸â€€è¡Œãã¾ã™â€,

Lecture 11 - Watashi wa mainichi roku-ji ni okimasu.â€€ç§â¯â€€æ¯Žæ—¥â€€å…æ™‚â€€â«â€€âŠãã¾ã™â€,

Lecture 12 - Itsu Kanpur e kimashita ka? â„¤ã¤â€€â«ãƒ©ãƒ—ãƒ«â€€â¸â€€æ¥ã¾ã—ãŸâ€€â‹ï¼Ÿ

Lecture 13 - YÅ«binkyoku wa asoko ni arimasu.â€€æ¹¯ï¾¿å±€â€€â¯â€€â‚ãã“â€€â«â€€â‚ã‚Šã¾ã™â€,

Lecture 14 - Rao san wa doko ni imasu ka? ãƒ©ã‚ªâ€€â•ã‚“â€€â¯â€€â©ã“â€€â«â€€â„ã¾ã™â€€â‹ï¼Ÿ

Lecture 15 - Pikunikku e ikimashÅ.â€€ãƒ”ã‚¯ãƒ‹ãƒƒã‚¯â€€â¸â€€â„ã¾ã—ãã¾ã™â€,

Lecture 16 - Kesa pan to tamago o tabemashita. ä»Šæœâ€€ãƒ‘ãƒ³â€€â¨â€€ãŸã¾ã”â€€ã‚’â€€é£Ÿã¹ã¾ã—ãŸâ€,â€€

Lecture 17 - Depa-to no tonari no biru wa ginkÅ desu.â€€â§ãƒ‘ãƒ¼ãƒˆâ€€â®â€€â¨ãªã‚Šâ€€â®â€€ãƒ“ãƒ«â€€â¯â€€éŠ€è¡Œâ€€â§â™â€,

Lecture 18 - Taj hoteru wa ookii hoteru desu.â€€â‚¿ã‚¸â€€ãƒ›ãƒ†ãƒ«â€€â¯â€€å¤§ãã„â€€ãƒ›ãƒ†ãƒ«â€€â§â™â€,

Lecture 19 - Hoteru de nani o tabemashita ka?â€€ ãƒ›ãƒ†ãƒ«â€€â§â€€ãªãã«â€€â‚’â€€é£Ÿã¹ã¾ã—ãŸâ€€â‹ï¼Ÿ

Lecture 20 - TÅkyÅ wa Åki kute kirei desu.â€€æ±ãº¬â€€â¯â€€å¤§ãã¦ã€€ãã‚Œã„â€€â§â™â€,

Lecture 21 - Ko-hi- wa oishiku arimasen.â€€â‚³ãƒ¼ãƒ’ãƒ¼â€€â¯â€€ãŠã„ã—ãã€â‚ãŠã¾ã›ã“â€,

Lecture 22 - Hantai Kotoba (Opposites)

Lecture 23 - Watashi wa mainichi miruku o nomimasu.â€€ç§â¯â€€æ¯Žæ—¥â€€ãƒŸãƒ«ã‚¯â€€â‚’â€€é£²ã¿ã¾ã™â€,â€€

Lecture 24 - Watashi wa oniisan ni kamera o moratta.â€€ç§â¯â€€ãŠå…„ã•ã“â€€â«â€€â«ãƒ¡ãƒ©â€€â‚’â€€â‚,ã‚‰ã£ãŸâ€,

Lecture 25 - Nani o tabetai desu ka? ï½•â€€â‚’â€€é£Ÿã¹ãŸãã„â€€â§â™â€€â‹ï¼Ÿ

Lecture 26 - Nani o sashiagemasu ka?â€€ãªãã«â€€â‚’â€€â•ã—ã‚ã¾ã™â€€â‹ï¼Ÿ

Lecture 27 - Sensei wa watashi ni hon o kuremashita.â€€å…ˆç”Ÿâ€€â¯â€€ç§â€€â«â€€æœ¬â€€â‚’â€€ãã‚Œã¾ã—ãŸâ€,

Lecture 28 - Watashi wa pikunikku e ikitakunai.â€€ç§â¯â€€ãƒ”ã‚¯ãƒ‹ãƒƒã‚¯â€€â¸â€€è¡ŒãŸãã„ã„â€,

Lecture 29 - Chotto matte kudasai.â€€ã¡ã‚‡ã£ã¨â€€ã¾ã£ã¦ã€€ãã•ã„â€,

Lecture 30 - Ke-ki o tabete mite kudasai.â€€ã‚±ãƒ¼ã‚â€€â‚’â€€é£Ÿã¹ã¦â€€ã¿ã¦â€€ãã•ã„â€,

Lecture 31 - Heya ni nani ga arimasu ka?â€€éƒ¨å±‹â€€â«â€€ï½•â€€ãŒâ€€ã‚ã‚Šã¾ã™â€€â‹ï¼Ÿ

Lecture 32 - Nani o shite imasu ka?â€€ä½•â€€ã‚’â€€ã—ã¦ã„ã¾ã™ã€€ã‹ï¼Ÿ

Lecture 33 - TÅkyÅ ni sunde imasu.â€€ æ±ãº¬ã€€ã«ã€€ã™ã‚“ã§ã€€ã„ã¾ã™ã€‚

Lecture 34 - Kanji ga kakemasu.â€€æ¼¢å—â€€ãŒã€€ã‹ã‘ã¾ã™ã€‚

Lecture 35 - ImÅto wa ningyÅ o hoshigatte imasu.â€€ã„ã‚ã†ã¨ã€€ã¯ã€€ã«ã‚“ãŽã‚‡ã†ã€€ã‚’ã€€ã»ã—ãŒã£ã¦ã„ã¾ã™ã€‚

Lecture 36 - Watashi wa Aisukuri-mu ga daisuki desu. â€€ç§ã¯ã€€ã‚¢ã‚¹ã‚¯ãƒªãƒ¼ãƒ ã€€ãŒã€€å¤§ã•ãã€€ã§ã™ã€‚

Lecture 37 - Aisukuri-mu ga ke-ki yori suki desu.â€€ã‚¢ã‚¹ã‚¯ãƒªãƒ¼ãƒ ã€€ãŒã€€ã‚±ãƒｷã€€ã‚ˆã‚Šã€€å¥½ãã€€ã§ã™ã€‚

Lecture 38 - Kutsu o kai ni ikimasu.â€€ãã¤ã€€ã‚’ã€€ã‹ã„ã«ã€€ã„ãã¾ã™ã€‚

Lecture 39 - Ashita motto atsuku narimasu.â€€æ˜Žæ—¥ã€€ã‚ã£ã¨ã€€ã¤ãã€€ãªã‚Šã¾ã™ã€‚

Lecture 40 - Rainen TÅkyÅ e iku to omoimasu.â€€æ¥å¹´ã€€æ±ãº¬ã€€ã€€è¡Œãã€€ã¨ã€€æ€ã„ã¾ã™ã€‚

Lecture 41 - Pen de kaite mo ii desu ka.â€€ãƒšãƒ³ã€€ã§ã€€æ›¸ã„ã¦ã€€ã‚ã„ã„ã€€ã§ã™ã€€ã‹ï¼Ÿ

Lecture 42 - New Expressions

Lecture 43 - Revision

Lecture 44 - Kanji I

Lecture 45 - Kanji II

NPTEL : NOC:Applied Statistics and Econometrics (Humanities and Social Sciences)

Co-ordinators : Prof. Deep Mukherjee

Lecture 1 - Introduction to Statistics

Lecture 2 - Introduction to Econometrics

Lecture 3 - Organization and Presentation of Data

Lecture 4 - Summarizing Data through Descriptive Statistics

Lecture 5 - Discrete Random Variable and Probability Distribution

Lecture 6 - Continuous Random Variables and Probability Distribution

Lecture 7 - Normal Distribution

Lecture 8 - Introduction to Statistical Inference

Lecture 9 - Estimation - Part I

Lecture 10 - Estimation - Part II

Lecture 11 - Hypothesis Testing - Part I

Lecture 12 - Hypothesis Testing - Part II

Lecture 13 - Hypothesis Testing - Part III

Lecture 14 - Hypothesis Testing - Part IV

Lecture 15 - Relationship between Qualitative Variables

Lecture 16 - Relationship Between Quantitative Variables

Lecture 17 - Analysis of Variance

Lecture 18 - One Way ANOVA

Lecture 19 - Two Way ANOVA

Lecture 20 - Analysis of Covariance

Lecture 21 - Index Numbers - Part I

Lecture 22 - Index Numbers - Part II

Lecture 23 - Classical Time Series Analysis - Part I

Lecture 24 - Classical Time Series Analysis - Part II

Lecture 25 - Classical Linear Regression Model - Part I

Lecture 26 - Classical Linear Regression Model - Part II

Lecture 27 - Classical Linear Regression Model

Lecture 28 - Hypothesis Testing with CNLRM

Lecture 29 - More on Hypothesis Testing and Model Specification

Lecture 30 - Violations of CLRM Assumptions (Heteroskedasticity)

Lecture 31 - Violations of CLRM Assumptions (Autocorrelation and Multicollinearity)

Lecture 32 - Time Series Regression with Stationary Data

Lecture 33 - Time Series Regression with Non-Stationary Data

Lecture 34 - Regression with Dummy Explanatory Variable

Lecture 35 - Dummy Dependent Variable Models - Part I

Lecture 36 - Dummy Dependent Variable Models - Part II

Lecture 37 - Simultaneous Equations Model

Lecture 38 - Panel Data Regression

Lecture 39 - Program Evaluation

Lecture 40 - Data Analysis and Regression with R

Lecture 41 - Regression Involving Dummy Variables in R

Lecture 42 - Time Series Analysis in R

NPTEL : NOC:Literature and Coping Skills (Humanities and Social Sciences)

Co-ordinators : Prof. Ajit K Mishra

Lecture 1 - Existential Concerns - I

Lecture 2 - Existential Concerns - II

Lecture 3 - Emotional wellbeing - I

Lecture 4 - Emotional wellbeing - II

Lecture 5 - Personality - I

Lecture 6 - Personality - II

Lecture 7 - Simulation and higher order thinking

Lecture 8 - Empathy and emotional intelligence

Lecture 9 - Poetry therapy - I

Lecture 10 - Poetry therapy - II

Lecture 11 - Verbal imagery and healing - I

Lecture 12 - Verbal imagery and healing - II

Lecture 13 - Rhetoric and prosody - I

Lecture 14 - Rhetoric and prosody - II

Lecture 15 - Rhetoric and prosody - III

Lecture 16 - Rhetoric and prosody - IV

Lecture 17 - The psychology of fear and anxiety - I

Lecture 18 - The psychology of fear and anxiety - II

Lecture 19 - John Donne, â€˜Death be not Proud

Lecture 20 - Robert Frost, The Road not Taken

Lecture 21 - Feeling Weird, Losing Touch - I

Lecture 22 - Feeling Weird, Losing Touch - II

Lecture 23 - Alfred Lord Tennyson, Break, Break, Break

Lecture 24 - John Keats, Ode on Melancholy

Lecture 25 - Unclaimed Experiences - I

Lecture 26 - Unclaimed Experiences - II

Lecture 27 - Maya Angelou, Still I Rise

Lecture 28 - Elizabeth Murphy, The Night That Changed Everything

Lecture 29 - Love, Heartbreak, and Healing - I

Lecture 30 - Love, Heartbreak, and Healing - II

Lecture 31 - Robert Browning, The Last Ride Together

Lecture 32 - Derek Walcott, The Fist

Lecture 33 - The Culture of Escape: Elusion or Illusion? - I

Lecture 34 - The Culture of Escape: Elusion or Illusion? - II

Lecture 35 - Charles Baudelaire, Be Drunk

Lecture 36 - Charles Bukowski, The Suicide Kid

Lecture 37 - Mimetic Desire and the Possessed Body - I

Lecture 38 - Mimetic Desire and the Possessed Body - II

Lecture 39 - Carol Ann Duffy, The Diet

Lecture 40 - Marty McConnell, Instructions for a Body

NPTEL : NOC:Indian Economy: Some Contemporary Perspectives (Humanities and Social Sciences)

Co-ordinators : Prof. Wasim Ahmad

Lecture 1 - Indian Economy - Economic Planning - 1

Lecture 2 - Indian Economy - Economic Planning - 2

Lecture 3 - Indian Economy - Economic Planning - 3

Lecture 4 - Indian Economy - Economic Planning - 4

Lecture 5 - Indian Economy - Economic Planning - 5

Lecture 6 - Indian Economy - Economic Planning - 6

Lecture 7 - Indian Economy - Economic Planning - 7

Lecture 8 - Indian Economy - Economic Planning - 8

Lecture 9 - Indian Economy - Agriculture Policy - 1

Lecture 10 - Indian Economy - Agriculture Policy - 2

Lecture 11 - Indian Economy - Agriculture Policy - 3

Lecture 12 - Indian Economy - Agriculture Policy - 4

Lecture 13 - Indian Economy - Industrial Policy - 1

Lecture 14 - Indian Economy - Industrial Policy - 2

Lecture 15 - Indian Economy - Industrial Policy - 3

Lecture 16 - Indian Economy - Industrial Policy - 4

Lecture 17 - Indian Economy - Service Sector Policy - 1

Lecture 18 - Indian Economy - Service Sector Policy - 2

Lecture 19 - Indian Economy - Financial Sector - 1

Lecture 20 - Indian Economy - Financial Sector - 2

Lecture 21 - Indian Economy - Financial Sector - 3

Lecture 22 - Indian Economy - Financial Sector - 4

Lecture 23 - Indian Economy - Financial Sector - 5

Lecture 24 - Indian Economy - Financial Sector - 6

Lecture 25 - Indian Economy - Indian Banking Crisis - 1

Lecture 26 - Indian Economy - Indian Banking Crisis - 2

Lecture 27 - Indian Economy - Indian Banking Crisis - 3

Lecture 28 - Indian Economy - Financial Inclusion

Lecture 29 - Indian Economy - Monetary Policy - 1

Lecture 30 - Indian Economy - Monetary Policy - 2

Lecture 31 - Indian Economy - Monetary Policy - 3

Lecture 32 - Indian Economy - Monetary Policy - 4

Lecture 33 - Indian Economy - Monetary Policy - 5

Lecture 34 - Indian Economy - Fiscal Policy - 1

Lecture 35 - Indian Economy - Fiscal Policy - 2

Lecture 36 - Indian Economy - India and WTO - 1

Lecture 37 - Indian Economy - India and WTO - 2

Lecture 38 - Indian Economy - India and WTO - 3

Lecture 39 - Indian Economy - India's Economic Outlook (2020-21)

Lecture 40 - Indian Economy - Union Budget (2021-22)

NPTEL : NOC:Japani Bhasha - Saral Swaroop (Humanities and Social Sciences)

Co-ordinators : Prof. Vatsala Misra

Lecture 1 - Japanese scripts

Lecture 2 - Watashi wa Tanaka desu

Lecture 3 - Dochira kara desu ka?

Lecture 4 - Pen wa watashi no desu

Lecture 5 - Watashi mo gakusei desu

Lecture 6 - Nan sai desu ka?

Lecture 7 - Ikura desu ka?

Lecture 8 - Irasshaimase

Lecture 9 - Nan-ji desu ka?

Lecture 10 - Kyou wa getsuyoubi desu

Lecture 11 - Doko desu ka?

Lecture 12 - Tanjoubi wa itsu desu ka?

Lecture 13 - Nan-ji ni okimasu ka?

Lecture 14 - Tokyo e ikimasu

Lecture 15 - Expressions

Lecture 16 - Itsu Nihon ni kimashita ka?

Lecture 17 - Hon wa asoko ni arimasu

Lecture 18 - Yuubinkyouku wa hon-ya no tonari ni arimasu

Lecture 19 - Nan nin imasu ka?

Lecture 20

Lecture 21 - Ashita kurabu e ikimasen ka?

Lecture 22 - Kocha wa oishii desu

Lecture 23 - Iroiro na hito ni aimashita

Lecture 24 - Tanaka san onegaishimasu

Lecture 25 - Tanaka san irashshaimasu ka?

Lecture 26 - Tokyo wa ookikute kirei na machi desu

Lecture 27 - Pa-ti wa tanoshikatta desu

Lecture 28 - Raigetsu Amerika e ikimasu

Lecture 29 - Verbs 1

Lecture 30 - Verbs 2

Lecture 31 - Imouto ni kamera o agemashita

Lecture 32 - Sensei ni pen o sashiagemashita

Lecture 33 - Tomodachi wa hana o kuremashita

Lecture 34 - Hawaii e ikitakunai desu

Lecture 35 - Nanika tabetai desu ka?

Lecture 36 - Dokoemo ikitakunai desu

Lecture 37 - Chotto matte kudasai

Lecture 38 - Mata irashite kudasai

Lecture 39 - Omiyage o tsutsumanaide kudasai

Lecture 40 - Watashi wa aisukurimu ga suki desu

Lecture 41 - Nihongo no jishou ga hoshii desu

Lecture 42 - Rainen kuni e kaeru tsumori desu

Lecture 43 - Hikouki to shinkansen to dochira no houga hayai desu ka?

Lecture 44 - Kurasu no naka de dare ga ichiban kashikoi desu ka?

Lecture 45 - Kore wa tanaka san no jishou da to omoimasu

Lecture 46 - Kasa wa eigo de nan to iimasu ka?

Lecture 47 - Watashi ha Nihongo ga yomemasen

Lecture 48 - Watashi wa kanji o kaku koto ga dekimasu

Lecture 49 - Sonna koto iwanaide kudasai

Lecture 50 - Watashiwa kuruma o unten suru toki ongaku o kikimasu

Lecture 51 - Kanji o kaku koto ga dekimasu

Lecture 52 - Shousetsu o yomu tame ni toshoukan e ikimasu

Lecture 53 - Shashin o totte mo ii desu ka?

Lecture 54 - Mainichi kaisha ni ikanakereba narimasen

Lecture 55 - Tanaka san wa yoku hatarakimasu

NPTEL : NOC:Introduction to Japanese Language and Culture-II (Humanities and Social Sciences)

Co-ordinators : Prof. Vatsala Misra

Lecture 1 - Kore wa watashi no hon desu (This is my book)

Lecture 2 - Ima nan ji desu ka? (What is the time now?)

Lecture 3 - Hon wa tsukue no ue ni arimasu (The book is on the table)

Lecture 4 - Ashita kurabu e ikimasen ka? (Will you please come to the club tomorrow?)

Lecture 5 - Kodoma-tachi wa ima asonde imasu (Children are playing now)

Lecture 6 - Kodomotachi wa asonde kara benkyou shimasu (Children will study after playing)

Lecture 7 - Douzo meshiagatte kudasai (Please eat it)

Lecture 8 - Tabete mite kudasai (Please eat and see)

Lecture 9 - Koko de tabenaide kudasai (Please do not eat here)

Lecture 10 - Hitori de ikimasu ka? (Will you go alone?)

Lecture 11 - Irasshaimase ! (Welcome !)

Lecture 12 - Shiken wa dou deshita ka? (How was the exam?)

Lecture 13 - Tomodachi wa tanjoubi ni hana o kuremashita (My friend gave me flowers on my birthday)

Lecture 14 - Tomodachi wa ke-ki o tsukutte kuremashita (My friend made a cake and gave it to me)

Lecture 15 - Kimura to moushimasu (I am Kimura)

Lecture 16 - O-genki desu ka ? (How are you ?)

Lecture 17 - Kare wa 'happyou wa ashita desu' to iimashita (He said, 'the presentation is tomorrow)

Lecture 18 - Tanaka to iu hito ni aimashita (I met a person called Tanaka)

Lecture 19 - Tomodachi ga kuru to omoimasu (I think my friend will come)

Lecture 20 - Watashi wa hitori de ikemasu (I can go alone)

Lecture 21 - Ikka-getsu de dekimasu (I can do it in one mouth)

Lecture 22 - Kare wa Indo no shuukan no koto o yoku shitte imasu (He know a lot about Indian customs)

Lecture 23 - Aisatsu (Greetings)

Lecture 24 - Aisatsu (Greetings)

Lecture 25 - Chokore-to yori aisukuri-mu ga suki desu (I like ice cream more than chocolate)

Lecture 26 - Dochira ga suki desu ka ? (Which do you like ?)

Lecture 27 - Mira san asobi ni irashite kudasai (Mira san please visit us)

Lecture 28 - Houmon (Visiting)

Lecture 29 - Pen de kaite mo ii desu ka ? (Can I write with a pen?)

Lecture 30 - Konakute mo ii desu ka ? (Is is alright if I do not come ?)

Lecture 31 - Nani mo tabetakunai desu (I do not want to eat anything)

Lecture 32 - Watashi wa eiwa jiten ga hoshii desu (I want an English-Japanese dictionary)

Lecture 33 - Rainen kekkon suru tsumori desu (I intend to get married next year)

Lecture 34 - Soto wa kuraku narimashita (It has become dark outside)

Lecture 35 - Kyuujitai and Shinjitai

Lecture 36 - Nihon e itta koto ga arimasu (I have been to Japan)

Lecture 37 - Minikui ahiru no ko - I (Ugly duckling - I)

Lecture 38 - Minikui ahiru no ko - II (Ugly duckling - II)

Lecture 39 - Working in Japan

Lecture 40 - Haru ni naru to sakura ga saku (When it is spring cherry blossoms will bloom)

Lecture 41 - Mira wa konai kamoshirenai (Mira may not come)

Lecture 42 - Okane ga attara uchi o kaimasu (If I have money I will buy a house)

NPTEL : NOC:Indian Art: Materials, Techniques and Artistic Practices (Humanities and Social Sciences)

Co-ordinators : Prof. Rajarshi Sengupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

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Lecture 59

Lecture 60

NPTEL : NOC:à¤ªà¥à¤°à¤®à¥à¤– à¤¹à¤¿à¤‚à¤¦à¥€ à¤•à¤¹à¤¾à¤¨à¤¿à¤¯à¤¾à¤, à¤”à¤° à¤à¤¾à¤°à¤¤à¥€à¤¯ à¤¸à¤®à¤¾à¤œ
(Humanities and Social Sciences)

Co-ordinators : Prof. Shri Prakash Shukla

Lecture 1 - à¤‰à¤¸à¤¨à¥‡ à¤•à¤¹à¤¾ à¤¥à¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤…à¤‚à¤¤à¤°à¥à¤µà¤¸à¥à¤¤à¥

Lecture 2 - à¤‰à¤¸à¤¨à¥‡ à¤•à¤¹à¤¾ à¤¥à¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤¶à¤¿à¤²à¥à¤ª à¤¯à¥‹à¤œà¤¨à¤¾

Lecture 3 - à¤‚à¤¦à¤—à¤¤à¤¿' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤à¤¾à¤µà¤ª à¤ªà¤•à¥à¤·

Lecture 4 - à¤‚à¤¦à¤—à¤¤à¤¿' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥‚à¥,à¤ª à¤¯à¥‹à¤œà¤¨à¤¾

Lecture 5 - à¤¶à¤°à¤£à¤¦à¤¾à¤¤à¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤…à¤‚à¤¤à¤°à¥à¤µà¤¸à¥à¤¤à¥

Lecture 6 - à¤¶à¤°à¤£à¤¦à¤¾à¤¤à¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤°à¥,à¤ª à¤ªà¤•à¥à¤·

Lecture 7 - à¤®à¤²à¤¬à¥‡ à¤•à¤¾ à¤®à¤¾à¤²à¤¿à¤•' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤…à¤‚à¤¤à¤°à¥à¤µà¤¸à¥à¤¤à¥

Lecture 8 - à¤®à¤²à¤¬à¥‡ à¤•à¤¾ à¤®à¤¾à¤²à¤¿à¤•' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¶à¤¿à¤²à¥à¤ªà¤—à¤¤ à¤®à¤¹à¤¤à¥à¤µ

Lecture 9 - à¤ªà¤¤à¥à¤¨à¥€' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¤à¤¾à¤µ à¤ªà¤•à¥à¤·

Lecture 10 - à¤ªà¤¤à¥à¤¨à¥€' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤°à¥,à¤ª à¤ªà¤•à¥à¤·

Lecture 11 - à¤µà¤¾à¤ªà¤¸à¥€' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤…à¤‚à¤¤à¤°à¥à¤µà¤¸à¥à¤¤à¥

Lecture 12 - à¤µà¤¾à¤ªà¤¸à¥€' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¶à¤¿à¤²à¥à¤ª à¤ªà¤•à¥à¤·

Lecture 13 - à¤œà¤¿à¤‚à¤¦à¤—à¥€ à¤”à¤° à¤œà¥‹à¤‚à¤•' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¤à¤¾à¤µ à¤ªà¤•à¥à¤·

Lecture 14 - à¤œà¤¿à¤‚à¤¦à¤—à¥€ à¤”à¤° à¤œà¥‹à¤‚à¤•' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¶à¤¿à¤²à¥à¤ªà¤—à¤¤ à¤®à¤¹à¤¤à¥à¤µ

Lecture 15 - à¤¬à¤¦à¤¬à¥,' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¤à¤¾à¤µ à¤ªà¤•à¥à¤·

Lecture 16 - à¤¬à¤¦à¤¬à¥,' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤•à¤²à¤¾ à¤ªà¤•à¥à¤·

Lecture 17 - à¤šà¥€à¤« à¤•à¥€ à¤¦à¤¾à¤µà¤¤' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¤à¤¾à¤µ à¤ªà¤•à¥à¤·

Lecture 18 - à¤šà¥€à¤« à¤•à¥€ à¤¦à¤¾à¤µà¤¤' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤°à¥,à¤ª à¤ªà¤•à¥à¤·

Lecture 19 - à¤˜à¤‚à¤Ÿà¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¥€ à¤…à¤‚à¤¤à¤°à¥à¤µà¤¸à¥à¤¤à¥

Lecture 20 - à¤˜à¤‚à¤Ÿà¤¾' à¤•à¤¹à¤¾à¤¨à¥€ à¤•à¤¾ à¤¶à¤¿à¤²à¥à¤ªà¤—à¤¤ à¤®à¤¹à¤¤à¥à¤µ

NPTEL : NOC:Computer Aided Decision Systems - Industrial Practices using Big Analytics (Humanities and Social Sciences)

Co-ordinators : Prof. Deepu Philip, Prof. Amandeep Singh Oberoi

Lecture 1 - Introduction to Decision Support Systems (DSS)

Lecture 2 - Characteristics and Capabilities of DSS

Lecture 3 - Misconception and Components of DSS

Lecture 4 - Decision Process

Lecture 5 - Overview of Database Management Systems

Lecture 6 - Introduction to Modelbase Management Systems

Lecture 7 - Introduction to User Interface System

Lecture 8 - Principles of Graphical User Interface

Lecture 9 - Introduction to Database

Lecture 10 - Reasons behind using DBMS

Lecture 11 - Concepts and Architecture of Database Systems

Lecture 12 - Entity Relationship

Lecture 13 - Entity Relationship Diagrams

Lecture 14 - Translation of ER Diagram to DB

Lecture 15 - Database Normalization

Lecture 16 - More SQL Commands

Lecture 17 - Big Data: An Overview

Lecture 18 - Big Data Analytics Team

Lecture 19 - Big Data Analytics Lifecycle - Phase 1

Lecture 20 - Big Data Analytics Lifecycle - Phase 2

Lecture 21 - Big Data Analytics Lifecycle - Phase 3 and 4

Lecture 22 - Big Data Analytics Lifecycle - Phase 5 and 6

Lecture 23 - Big Data Analytics Tools and Software - Part 1

Lecture 24 - Big Data Analytics Tools and Software - Part 2

Lecture 25 - Big Data Analytics Tools and Software - Part 3

Lecture 26 - Big Data Analytics Tools and Software - Part 4

Lecture 27 - Big Data Analytics Lifecycle - Case Study

Lecture 28 - Introduction to Industrial Internet of Things (IIoT)

Lecture 29 - Structure of BDA in IIoT

Lecture 30 - BDA in IIoT, Gas Pipeline Case Study

Lecture 31 - BDA in IIoT, RR Engine Case Study

Lecture 32 - DSS in CAD/CAM

Lecture 33 - Assembly Tree

Lecture 34 - BDA in Computer Aided Design

Lecture 35 - Product Data Exchange - Part 1

Lecture 36 - Product Data Exchange - Part 2

Lecture 37 - DSS in CAM - Part 1

Lecture 38 - DSS in CAM - Part 2

Lecture 39 - DSS in Additive Manufacturing

Lecture 40 - Usability and User Interface Design

Lecture 41 - Usability Problems and Usability Design Process

Lecture 42 - Usability Principles

Lecture 43 - HTML as a User Interface Language - 1

Lecture 44 - HTML as a User Interface Language - 2

Lecture 45 - Introduction to PHP

Lecture 46 - Basic Components of PHP

Lecture 47 - More on PHP: Hypertext PreProcessor (PHP)

Lecture 48 - MySQL and PHP - The Backend of Decision Support Systems

Lecture 49 - Forms and PHP - Design of Interactive and Dynamic Applications

Lecture 50 - An Introduction to Networking

Lecture 51 - Data Visualization - Part 1

Lecture 52 - Data Visualization - Part 2

Lecture 53 - Summarizing the Course

NPTEL : NOC:Introductory Rural Sociology: Continuity and Change (Humanities and Social Sciences)

Co-ordinators : Prof. Ashish Saxena

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

NPTEL : NOC:Threads of Visual Exploration: Textiles and Allied Practices (Humanities and Social Sciences)

Co-ordinators : Prof. Rajarshi Sengupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Moral Thinking: An Introduction to Values and Ethics (Humanities and Social Sciences)

Co-ordinators : Prof. Vineet Sahu

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

NPTEL : NOC:Psychology Of Bilingualism and Multilingualism (Humanities and Social Sciences)

Co-ordinators : Prof. Ark Verma

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

NPTEL : NOC:Sociology and Sanitation: An Introduction (Humanities and Social Sciences)

Co-ordinators : Prof. Ashish Saxena

Lecture 1 - Sanitation Practices in a Historical Perspective

Lecture 2 - Sociology in Sanitation: Definition, Scope and Strategies

Lecture 3 - Perspectives on Sociology of Sanitation

Lecture 4 - Research Methodology in Sociology of Sanitation

Lecture 5 - Social Science Concepts Applicable to Sanitation Practices

Lecture 6 - Forms of Sanitation and their Social Implications

Lecture 7 - Social Movements and Societal Sanitation

Lecture 8 - Ramifications of Cultural Practices : Caste and Sanitation in Rural and Urban India

Lecture 9 - Interventions of Public and Private Agencies on Sanitation in India: An Overview

Lecture 10 - Toilet as a Tool of Change: Exemplifying Sulabh International Social Service Organization

NPTEL : NOC:Business Japanese and Business Manner (Humanities and Social Sciences)

Co-ordinators : Prof. Vatsala Misra, Prof. Yumiko Furuichi

Lecture 1 - è‡ªå·±ç´¹ä»‹/ Self-introduction in business environment - Part I

Lecture 2 - Practice and Shitsumon corner(è‡ªå·±ç´¹ä»‹/ Self-introduction in business environment) - Part II

Lecture 3 - ãƒ“ã‚¸ãƒ¹å´é¢ã§ã®æŒ¨æ‹¶ / Greetings in Business Environment - Part I

Lecture 4 - Practice and Shitsumon corner(ãƒ“ã‚¸ãƒ¹å´é¢ã§ã®æŒ¨æ‹¶ / Greetings in Business Environment) - Part II

Lecture 5 - ãƒ“ã‚¸ãƒ¹å´é¢ã§ã¾é ¼ã‚ã™ã‚‹/ Requests in Business Environment - Part I

Lecture 6 - Practice and Shitsumon corner(ãƒ“ã‚¸ãƒ¹å´é¢ã§ã¾é ¼ã‚ã™ã‚‹/ Requests in Business Environment) - Part II

Lecture 7 - è¨±å¯ ã‚ ã‚‚ã‚‰ã†/ Ask and refuse permission - Part I

Lecture 8 - Practice and Shitsumon corner(è¨±å¯ ã‚ ã‚‚ã‚‰ã†/ Ask and refuse permission) - Part II

Lecture 9 - é›»è©±ä¿œå¯¾ / Attending the phone - Part I

Lecture 10 - Practice and Shitsumon corner(é›»è©±ä¿œå¯¾ / Attending the phone) - Part II

Lecture 11 - é›»è©±ï¼šä¼è¨€ / Telephone messages - Part I

Lecture 12 - Practice and Shitsumon corner(é›»è©±ï¼šä¼è¨€ / Telephone messages) - Part II

Lecture 13 - ä¼šè° / Formal Meetings - Part I

Lecture 14 - Practice and Shitsumon corner(ä¼šè° / Formal Meetings) - Part II

Lecture 15 - ãƒ¡ãƒ¼ãƒ«ã®æ›¸ãæ–¹ / How to write an Email - Part I

Lecture 16 - Practice(ãƒ¡ãƒ¼ãƒ«ã®æ›¸ãæ–¹ / How to write an Email) - Part II

Lecture 17 - åŸºæœ¬ã®ãƒ¡ãƒ¼ãƒ«ã®æ›¸ãæ–¹ / Writing Basic Emails and Shitsumon corner

Lecture 18 - å±¥æ´æ›¸ã®æ›¸ãæ–¹ / How to write a CV

NPTEL : NOC:Threads of Visual Exploration: Textiles and Allied Practices - Part II (Humanities and Social Sciences)

Co-ordinators : Prof. Rajarshi Sengupta

Lecture 1 - Introduction to Yarn and Fabric Dyeing

Lecture 2 - History of Yarn and Fabric Dyeing in India

Lecture 3 - History of Yarn and Fabric Dyeing and its Relevance

Lecture 4 - Demonstrations - Week 1

Lecture 5 - Variety of Block Printed Textiles and Woodblock Making in the Indian Subcontinent

Lecture 6 - History of Woodblock Making and Printing: Material Evidence

Lecture 7 - Woodblock Making and Block Printing in Southeastern India

Lecture 8 - Demonstrations - Week 2

Lecture 9 - Histories and Centres of Dye and Mordant Painting in India

Lecture 10 - Dye Painted Textiles: Temple Cloth, Utilitarian Textiles and Artistic Expressions

Lecture 11 - Demonstrations - Week 3

Lecture 12 - Reflections on Sustainability - I

Lecture 13 - Reflections on Sustainability - II

Lecture 14 - Reflections on Sustainability - III

Lecture 15 - Reflections on Sustainability - IV

Lecture 16 - Interviews

NPTEL : NOC:Technology Transfer through Joint Venture (Humanities and Social Sciences)

Co-ordinators : Prof. Indrajit Dube

Lecture 1 - Forms of Strategic Alliance

Lecture 2 - Negotiations and Contractual Aspect

Lecture 3 - Risks and Opportunities

Lecture 4 - Regulatory Issues

Lecture 5 - Implication on Stakeholders

Lecture 6 - Joint Venture [JV] Options

Lecture 7 - Types of Joint Venture [JV]

Lecture 8 - Issues Frequently Arise During JV Negotiation

Lecture 9 - Key Compliance

Lecture 10 - Governing Laws in Cross-Border Transaction

Lecture 11 - Formation of Joint Venture Agreement

Lecture 12 - Governance Issues in Joint Venture

Lecture 13 - Business Plan in Joint Venture

Lecture 14 - Shareholder Agreement in Joint Venture

Lecture 15 - Specific Issues of Share Transfer in Joint Venture

Lecture 16 - Preparation for SPV

Lecture 17 - Formation of SPV

Lecture 18 - Disclosure to be made by SPV

Lecture 19 - Risk Management and SPV

Lecture 20 - Offset and SPV

NPTEL : NOC:Legal Compliance for Incorporating Startup (Humanities and Social Sciences)

Co-ordinators : Prof. Indrajit Dube

Lecture 1 - Why we need a business form for startup

Lecture 2 - How to choose appropriate business form for startup

Lecture 3 - Comparative Analysis of Incorporation Requirement

Lecture 4 - Comparative Analysis of Compliance Cost

Lecture 5 - Other Formalities to Comply

Lecture 6 - Law relating to Partnership and Deed

Lecture 7 - Law relating to LL.P

Lecture 8 - How to Incorporate LL.P

Lecture 9 - Law relating to Co-operative

Lecture 10 - How to Incorporate Co-operative

Lecture 11 - Law Relating to One Person Company

Lecture 12 - Law Relating to Pvt. Ltd. Company

Lecture 13 - Law Relating to Pub. Ltd. Compnay

Lecture 14 - Law Relating to Non-Profit Company

Lecture 15 - How to Incorporate these Companies

Lecture 16 - How to Capitalize the Business

Lecture 17 - Raising fund through Private Equity and Venture Capital

Lecture 18 - Raising fund from Financial Institution

Lecture 19 - Types of Instruments for raising the fund

Lecture 20 - Issue of the Instruments

NPTEL : NOC:Soft Skill Development (Humanities and Social Sciences)

Co-ordinators : Prof. Priyadarshi Patnaik, Prof. V.N. Giri, Prof. D. Suar

Lecture 1 - Understanding the Communicative Environment Â– I

Lecture 2 - Understanding the Communicative Environment Â– II

Lecture 3 - What to listen for and why

Lecture 4 - When to speak and how

Lecture 5 - Staring and Sustaining a Conversation

Lecture 6 - What to Present and How - Part I

Lecture 7 - What to Present and How - Part II

Lecture 8 - Multimedia Presentation : Understanding the Basics

Lecture 9 - Communication Styles

Lecture 10 - Speaking in Groups

Lecture 11 - The World of Visual Culture I

Lecture 12 - Visual Perception

Lecture 13 - The Aural : Its relevance and Impact

Lecture 14 - The Body and the Way It Communicates

Lecture 15 - The Face, Its Expressions and What It Says

Lecture 16 - Building Relationships

Lecture 17 - Understanding Group Dynamics - I

Lecture 18 - Understanding Group Dynamics - II

Lecture 19 - Groups, Conflicts and their Resolution

Lecture 20 - Social Network, Media and Extending Our Identity

Lecture 21 - How Emotionally Mature Are You

Lecture 22 - Improving Your Emotional Intelligence

Lecture 23 - Empathy

Lecture 24 - Intrapersonal Communication

Lecture 25 - Change Tolerance

Lecture 26 - Creativity : What Does It Mean

Lecture 27 - Creativity : A Detailed Exploration

Lecture 28 - Creativity : Activities Applied

Lecture 29 - Creativity at Workplace

Lecture 30 - Creativity, Critical Thinking and Problem Solving

Lecture 31 - Motivating Oneself

Lecture 32 - The Art of Persuasion - I

Lecture 33 - The Art of Persuasion - II

Lecture 34 - From Persuasion to Negotiation

Lecture 35 - Leadership and Motivating Others

Lecture 36 - Managing Time

Lecture 37 - Managing Stress

Lecture 38 - Resilience

Lecture 39 - Work - Life Balance

Lecture 40 - Applying Soft Skills to Workplace

NPTEL : NOC:Symbolic Logic (Humanities and Social Sciences)

Co-ordinators : Prof. Chhanda Chakraborti

Lecture 1 - Introduction

Lecture 2 - Propositions, Arguments, Components, Basic Characteristics

Lecture 3 - Recognizing arguments, Diagramming logic flow

Lecture 4 - Types of arguments, Deductive, Inductive, different norms to assess arguments

Lecture 5 - Concepts of Validity Soundness, Consistency

Lecture 6 - History of Symbolic Language

Lecture 7 - Propositional Logic: Syntax

Lecture 8 - Connectives, Scope of Connectives

Lecture 9 - Truth-functional Connectives, Propositional Variables, Propositional Constants

Lecture 10 - Symbolization with Connectives

Lecture 11 - Propositional Logic: Semantics Basics of a Truth Table

Lecture 12 - Using Truth Table: Tautology, Contradiction, Contingent Propositions

Lecture 13 - Using Truth Table: Testing Arguments for Validity and Invalidity

Lecture 14 - Shorter Truth Table

Lecture 15 - Using Truth Table: Testing a Set of Propositions for consistency and inconsistency, and for logical equivalence

Lecture 16 - Introduction to Truth Trees

Lecture 17 - Truth Tree Rules and their Application

Lecture 18 - More on Truth-Tree Recovery of Partial Truth - Values

Lecture 19 - Using the Truth Trees

Lecture 20 - More on Truth Trees

Lecture 21 - Formal Proof of Validity

Lecture 22 - Valid Argument Forms:

Lecture 23 - How to Apply the Rules of Inference in a Proof

Lecture 24 - Understanding the Rules

Lecture 25 - Proofs with All Rules

Lecture 26 - Completeness : What it is

Lecture 27 - Indirect Proof

Lecture 28 - Conditional Proof

Lecture 29 - More on Conditional Proof

Lecture 30 - More on Derivations

Lecture 31 - Limitation of Propositional Logic

Lecture 32 - Basic 4 Types of Categorical Propositions

Lecture 33 - Understanding Logical Relations in Standard Form Categorical Propositions

Lecture 34 - Translating Non-Standard Propositions into Standard Form Categorical Propositions

Lecture 35 - Validity and Invalidity of Syllogisms

Lecture 36 - First Order Predicate Logic

Lecture 37 - Quantifiers

Lecture 38 - Scope of a Quantifier Edit Lesson

Lecture 39 - Multiple Quantifiers

Lecture 40 - Understanding Overlapping Quantifiers Sharing Predicates and Scope

NPTEL : NOC:Introduction on Intellectual Property to Engineers and Technologists (Humanities and Social Sciences)

Co-ordinators : Prof. Tapas Kumar Bandyopadhyay

Lecture 1 - Basic of Intellectual Property

Lecture 2 - Introduction to Law

Lecture 3 - Theories of IP

Lecture 4 - Different Forms of IP

Lecture 5 - Different Forms of IP and Applicability of Theory

Lecture 6 - Patent Basic

Lecture 7 - Patent Ability Criteria

Lecture 8 - Non-Patentable Invention

Lecture 9 - Prier-Art Search

Lecture 10 - Patent Filing Procedure

Lecture 11 - Patent Prosecution

Lecture 12 - Patent Prosecution (Continued...)

Lecture 13 - International Patent

Lecture 14 - Patent Infringement

Lecture 15 - Patent Management

Lecture 16 - Utility Model Protection

Lecture 17 - Copyright Basic

Lecture 18 - Copy Right Registration

Lecture 19 - Copyright Infringement and Fair Use

Lecture 20 - Copyright in Digital Media

Lecture 21 - Industrial Design Basic

Lecture 22 - Industrial Design Registration

Lecture 23 - Utility Patent Vs Industrial Design

Lecture 24 - Trademark Basic

Lecture 25 - Trademark Registration

Lecture 26 - Tradmark and Internet

Lecture 27 - Certification Mark and Collective Mark

Lecture 28 - Geographical Indication

Lecture 29 - Economics of GI Edit Lesson

Lecture 30 - Trademark Vs GI Trademark Managment

Lecture 31 - IC Layout Design and Basic

Lecture 32 - IC Layout Design Registration

Lecture 33 - Trade- Secret and Basic

Lecture 34 - Trade-Secret Protection

Lecture 35 - Patent Vs Trade-Secret

Lecture 36 - Plant Variety Protection

Lecture 37 - Bio-diversity

Lecture 38 - Comparative Analysis

Lecture 39 - IP Management

Lecture 40 - Case - Study on IP Management

NPTEL : NOC:Globalization and Culture (Humanities and Social Sciences)

Co-ordinators : Prof. Anjali Gera Roy

Lecture 1 - Globalization Definition

Lecture 2 - Global Flows and New Media and Technologies

Lecture 3 - Globalization and Nation

Lecture 4 - Rise of Global Capitalism

Lecture 5 - Cultural Imperialism

Lecture 6 - Global Monocultures

Lecture 7 - Birth of Asian Kool

Lecture 8 - Bhangra Reinvention

Lecture 9 - Disorienting Bhangra

Lecture 10 - The Body of Dance

Lecture 11 - World Music I - Tabla

Lecture 12 - World Music II - Qawwali

Lecture 13 - World Music III - Baul

Lecture 14 - Is Chutney the New Rage

Lecture 15 - Bollywood Song and Dance

Lecture 16 - Planet Bollywood

Lecture 17 - Bollywood at Large

Lecture 18 - Bollywood Assemblages - Part I

Lecture 19 - Bollywood Assemblages - Part II

Lecture 20 - Bollywood's Soft Power

Lecture 21 - Travels of Dastan

Lecture 22 - Scripting the Nation

Lecture 23 - Cracking the Nation

Lecture 24 - Narrating and Interrogating the Nation

Lecture 25 - Cosmopolitans the Borderless World

Lecture 26 - Orientalism

Lecture 27 - Yoga, Meditation, Gurus

Lecture 28 - Beatles, Ravi Shankar and Sitar

Lecture 29 - Orientalizing India

Lecture 30 - Neoorientalism

Lecture 31 - The Birth of Indo-Chic

Lecture 32 - Henna, Bindi, Saris and Bangles

Lecture 33 - The Taste of Curry

Lecture 34 - Global News

Lecture 35 - News as Infortainment

Lecture 36 - Global Media Cultures

Lecture 37 - Cultural Imperialism

Lecture 38 - Contraflows in Global Media

Lecture 39 - Contraflows in News and Entertainment

NPTEL : NOC:Qualitative Research Methods (Humanities and Social Sciences)

Co-ordinators : Prof. Aradhna Malik

Lecture 1 - Introduction

Lecture 2 - The Qualitative Researcher

Lecture 3 - Quantitative vs. Qualitative Research

Lecture 4 - History of Qualitative Research

Lecture 5 - The Process of Qualitative Research

Lecture 6 - Dominant Paradigms of Qualitative Research

Lecture 7 - Interpretivist Thinking

Lecture 8 - Verstehen

Lecture 9 - Constructivism

Lecture 10 - Properties of Constructions

Lecture 11 - Constructivism-Sub Paradigms

Lecture 12 - Criticisms of Interpretivism and Constructivism

Lecture 13 - Critical Theory

Lecture 14 - Characteristics of Critical Theory

Lecture 15 - Critiques of Critical Theory

Lecture 16 - Introduction to Qualitative Inquiry

Lecture 17 - Qualitative Research Design

Lecture 18 - Qualitative Research Design (Continued...)

Lecture 19 - Ethnography

Lecture 20 - Autoethnography

Lecture 21 - Case Studies

Lecture 22 - Case Studies (Continued...)

Lecture 23 - Analyzing Interpretive Practice

Lecture 24 - Analyzing Interpretive Practice (Continued...)

Lecture 25 - Grounded Theory

Lecture 26 - Grounded Thoery (Continued...)

Lecture 27 - Participatory Action Research

Lecture 28 - Participatory Action Research (Continued...)

Lecture 29 - Observation

Lecture 30 - Interviewing

Lecture 31 - Interviewing (Continued...)

Lecture 32 - Interpretation of Documents and Material Culture

Lecture 33 - Autoethnography, Personal Narrative and Reflexivity

Lecture 34 - Analyzing Visual Data

Lecture 35 - Analyzing Talk and Text

Lecture 36 - Data Management and Analysis Methods

Lecture 37 - Data Management and Analysis Methods (Continued...)

Lecture 38 - Software and Qualitative Research

Lecture 39 - The Problem of Criteria

Lecture 40 - Interpretation

Lecture 41 - Writing

Lecture 42 - Writing (Continued...)

Lecture 43 - Understanding Social Programs through Evaluation

Lecture 44 - Understanding Social Programs through Evaluation (Continued...)

Lecture 45 - IInfluencing the Policy Progress with Qualitative Research

Lecture 46 - Conclusion

NPTEL : NOC:Emotional Intelligence (Humanities and Social Sciences)

Co-ordinators : Prof. Rabindra Kumar Pradhan

Lecture 1 - Introduction to EI and Related Concepts

Lecture 2 - Introduction to EI and Related Concepts (Continued...)

Lecture 3 - Introduction to EI and Related Concepts (Continued...)

Lecture 4 - Introduction to EI and Related Concepts (Continued...)

Lecture 5 - Introduction to Intelligence

Lecture 6 - Meaning, Nature, Scope, Types of Intelligence

Lecture 7 - Measurement of Intelligence

Lecture 8 - Applications

Lecture 9 - Discovery of Emotional Intelligence

Lecture 10 - Meaning, Nature Theory

Lecture 11 - Measurement of EI

Lecture 12 - Difference Between EQ and IQ

Lecture 13 - EQ Assessment

Lecture 14 - EQ and Empathy

Lecture 15 - EQ and Resilience

Lecture 16 - EQ and Health and Wellbeing

Lecture 17 - EQ Map

Lecture 18 - EQ Map (Continued...)

Lecture 19 - EQ Map (Continued...)

Lecture 20 - EQ Map (Continued...)

Lecture 21 - Emotional Intelligence in Education

Lecture 22 - Evaluation of EQ for Students

Lecture 23 - EI New Vision for Learning

Lecture 24 - EQ Skills for Students Success

Lecture 25 - EI in Health and Well Being

Lecture 26 - EI in Health and Well Being (Continued...)

Lecture 27 - EI and Cultural Adjustment

Lecture 28 - EI at Work

Lecture 29 - Emotional Intelligence and Happiness Positive Psychology

Lecture 30 - Emotional Intelligence and Happiness Positive Psychology (Continued...)

Lecture 31 - Emotional Intelligence and Happiness Positive Psychology (Continued...)

Lecture 32 - Emotional Intelligence and Happiness Positive Psychology (Continued...)

Lecture 33 - Emotional Intelligence and Leadership

Lecture 34 - Emotional Intelligence an Leadership (Continued...)

Lecture 35 - Emotional Intelligence an Leadership (Continued...)

Lecture 36 - Emotional Intelligence an Leadership (Continued...)

Lecture 37 - Culture and Emotion

Lecture 38 - Role of EI

Lecture 39 - Cultural Intelligence

Lecture 40 - Emotional Intelligence for Cross Cultural Adaptability

NPTEL : NOC:Speaking Effectively (Humanities and Social Sciences)

Co-ordinators : Prof. Anjali Gera Roy

Lecture 1 - Introduction, The Art of Speakihg

Lecture 2 - Encoding Meaning Using Verbal and Nonverbal Symbols

Lecture 3 - Encoding Meaning Using Verbal Symbols

Lecture 4 - The Power of words

Lecture 5 - Cross Cultural Factors in Communication Verbal and Nonverbal

Lecture 6 - Metacommunication: Nature, Function and Types of Nonverbal Communication - I

Lecture 7 - Metacommunication: Nature, Function and Types of Nonverbal Communication - II

Lecture 8 - How to Improve Body Language I - Eye Communication, Facial Expression, Gesture Posturee

Lecture 9 - How to Improve Body Language I - Dress and Appearance Paralanguage

Lecture 10 - Role Plays and Activities

Lecture 11 - Politics of English

Lecture 12 - Concept of Standard Language

Lecture 13 - Sounds of English: Vowels

Lecture 14 - Sounds of English: Diphthongs and Consonants

Lecture 15 - Stress and Rhythm

Lecture 16 - Speaking Voice

Lecture 17 - Speaking Delivery

Lecture 18 - How to Improve Voice

Lecture 19 - How to Improve Delivery

Lecture 20 - Conversation Skills

Lecture 21 - Conversation Skills (Continued...)

Lecture 22 - Conversation Skills (Continued...)

Lecture 23 - Conversation Skills (Continued...)

Lecture 24 - Conversation Skills (Continued...)

Lecture 25 - Planning a Presentation

Lecture 26 - How to Get Over Your Fear of Speaking and Take Control

Lecture 27 - Delivering a Presentation

Lecture 28 - Language of Presentation

Lecture 29 - Analysis of a Presentation

Lecture 30 - How to Lead a Meeting

Lecture 31 - How to Contribute Effectively to a Meeting

Lecture 32 - How to Speak Effectively in Meetings

Lecture 33 - Meetings, Behaviour and Roles

Lecture 34 - Role Play: Meeting

Lecture 35 - Different Kind of Interviews

Lecture 36 - Preparing for an Interview

Lecture 37 - How to Face an Interview

Lecture 38 - How to Speak in an Interview

Lecture 39 - Role Play

NPTEL : NOC:Great Experiments in Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Rajlakshmi Guha

Lecture 1 - History and Origin of Psychology

Lecture 2 - Establishing Psychology as a Science

Lecture 3 - Establishing Psychology as a Science (Continued...)

Lecture 4 - A New Psychology

Lecture 5 - Structuralism and Beyond

Lecture 6 - Herman Ebbinghaus on Memory

Lecture 7 - Reconstruction of an Automobile Destruction - An Example of the Interactin between Language and Memory

Lecture 8 - Emotionality and Perceptual Defence

Lecture 9 - Festinger's Cognitive Dissonance Theory

Lecture 10 - Milgram's Study on Obedience

Lecture 11 - Case Studies and Experiments in Clinical and Health Psychology

Lecture 12 - Obsessive Compulsive Disorder

Lecture 13 - A Case of Multiple Personality

Lecture 14 - The Story of Dibs

Lecture 15 - On Being Sane in Insane Places

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

NPTEL : NOC:Human Resource Development (Humanities and Social Sciences)

Co-ordinators : Prof. K. B. L. Srivastava

Lecture 1 - Introduction to HRD

Lecture 2 - Introduction to HRD (Continued...)

Lecture 3 - Introduction to HRD (Continued...)

Lecture 4 - Introduction to HRD (Continued...)

Lecture 5 - Introduction to HRD (Continued...)

Lecture 6 - The Context of HRD

Lecture 7 - The Context of HRD (Continued...)

Lecture 8 - The Context of HRD (Continued...)

Lecture 9 - The Context of HRD (Continued...)

Lecture 10 - The Context of HRD (Continued...)

Lecture 11 - HRD Process - I

Lecture 12 - HRD Process - I (Continued...)

Lecture 13 - HRD Process - I (Continued...)

Lecture 14 - HRD Process - I (Continued...)

Lecture 15 - HRD Process - I (Continued...)

Lecture 16 - HRD Process - II

Lecture 17 - HRD Process - II (Continued...)

Lecture 18 - HRD Process - II (Continued...)

Lecture 19 - HRD Process - II (Continued...)

Lecture 20 - HRD Process - II (Continued...)

Lecture 21 - Coaching

Lecture 22 - Coaching (Continued...)

Lecture 23 - Coaching (Continued...)

Lecture 24 - Coaching (Continued...)

Lecture 25 - Coaching (Continued...)

Lecture 26 - Mentoring

Lecture 27 - Mentoring (Continued...)

Lecture 28 - Mentoring (Continued...)

Lecture 29 - Mentoring (Continued...)

Lecture 30 - Mentoring (Continued...)

Lecture 31 - Employee Counseling and Wellbeing

Lecture 32 - Employee Counseling and Wellbeing (Continued...)

Lecture 33 - Employee Counseling and Wellbeing (Continued...)

Lecture 34 - Employee Counseling and Wellbeing (Continued...)

Lecture 35 - Employee Counseling and Wellbeing (Continued...)

Lecture 36 - Competency Mapping Approach to HRD

Lecture 37 - Competency Mapping Approach to HRD (Continued...)

Lecture 38 - Competency Mapping Approach to HRD (Continued...)

Lecture 39 - Competency Mapping Approach to HRD (Continued...)

Lecture 40 - Competency Mapping Approach to HRD (Continued...)

Lecture 41 - Career Planning and Development

Lecture 42 - Career Planning and Development (Continued...)

Lecture 43 - Career Planning and Development (Continued...)

Lecture 44 - Career Planning and Development (Continued...)

Lecture 45 - Career Planning and Development (Continued...)

Lecture 46 - Intellectual Capital Management

Lecture 47 - Intellectual Capital Management (Continued...)

Lecture 48 - Intellectual Capital Management (Continued...)

Lecture 49 - Intellectual Capital Management (Continued...)

Lecture 50 - Intellectual Capital Management (Continued...)

Lecture 51 - HRD, Organizational Learning, and Learning Organization

Lecture 52 - HRD, Organizational Learning, and Learning Organization (Continued...)

Lecture 53 - HRD, Organizational Learning, and Learning Organization (Continued...)

Lecture 54 - HRD, Organizational Learning, and Learning Organization (Continued...)

Lecture 55 - HRD, Organizational Learning, and Learning Organization (Continued...)

Lecture 56 - Diversity, HRD Ethics, and Future of HRD

Lecture 57 - Diversity, HRD Ethics, and Future of HRD (Continued...)

Lecture 58 - Diversity, HRD Ethics, and Future of HRD (Continued...)

Lecture 59 - Diversity, HRD Ethics, and Future of HRD (Continued...)

Lecture 60 - Diversity, HRD Ethics, and Future of HRD (Continued...)

NPTEL : NOC:Educational Leadership (Humanities and Social Sciences)

Co-ordinators : Prof. Atasi Mohanty

Lecture 1 - Educational Management and Leadership

Lecture 2 - Key Challenges for Educational Leaders

Lecture 3 - Key Challenges for Educational Leaders (Continued...)

Lecture 4 - Key Challenges for Educational Leaders (Continued...)

Lecture 5 - Key Challenges for Educational Leaders (Continued...)

Lecture 6 - Professional Development and The Reflective Practitioner

Lecture 7 - Professional Development and The Reflective Practitioner (Continued...)

Lecture 8 - Professional Development and The Reflective Practitioner (Continued...)

Lecture 9 - Professional Development and The Reflective Practitioner (Continued...)

Lecture 10 - Professional Development and The Reflective Practitioner (Continued...)

Lecture 11 - Professional Ethics and Values in Teaching

Lecture 12 - Professional Ethics and Values in Teaching (Continued...)

Lecture 13 - Professional Ethics and Values in Teaching (Continued...)

Lecture 14 - Emotional Intelligence and Educational Leadership

Lecture 15 - Emotional Intelligence and Educational Leadership (Continued...)

Lecture 16 - Emotional Intelligence and Educational Leadership (Continued...)

Lecture 17 - Emotional Intelligence and Educational Leadership (Continued...)

Lecture 18 - Managing Diversity and Inclusion

Lecture 19 - Managing Diversity and Inclusion (Continued...)

Lecture 20 - Managing Diversity and Inclusion (Continued...)

Lecture 21 - Managing Diversity and Inclusion (Continued...)

Lecture 22 - Managing Diversity and Inclusion (Continued...)

Lecture 23 - Educational Research and Pedagogy

Lecture 24 - Educational Research and Pedagogy (Continued...)

Lecture 25 - Educational Research and Pedagogy (Continued...)

Lecture 26 - Educational Research and Pedagogy (Continued...)

Lecture 27 - Educational Research and Pedagogy (Continued...)

Lecture 28 - Innovative Pedagogy and Technology for Learning

Lecture 29 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 30 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 31 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 32 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 33 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 34 - Innovative Pedagogy and Technology for Learning (Continued...)

Lecture 35 - Turnaround Leadership and Educational Entrepreneurship

Lecture 36 - Turnaround Leadership and Educational Entrepreneurship (Continued...)

Lecture 37 - Turnaround Leadership and Educational Entrepreneurship (Continued...)

Lecture 38 - Turnaround Leadership and Educational Entrepreneurship (Continued...)

Lecture 39 - New Normal Education

Lecture 40 - New Normal Education (Continued...)

Lecture 41 - New Normal Education (Continued...)

Lecture 42 - New Normal Education (Continued...)

Lecture 43 - New Normal Education (Continued...)

Lecture 44 - Adult learning/Andragogy

Lecture 45 - Adult learning/Andragogy (Continued...)

Lecture 46 - Adult learning/Andragogy (Continued...)

Lecture 47 - Adult learning/Andragogy (Continued...)

Lecture 48 - Adult learning/Andragogy (Continued...)

Lecture 49 - National Education Policy 2020

Lecture 50 - National Education Policy 2020 (Continued...)

Lecture 51 - National Education Policy 2020 (Continued...)

Lecture 52 - National Education Policy 2020 (Continued...)

Lecture 53 - National Education Policy 2020 (Continued...)

Lecture 54 - Education and UNESCO Sustainable Development Goals

Lecture 55 - Education and UNESCO Sustainable Development Goals (Continued...)

Lecture 56 - Education and UNESCO Sustainable Development Goals (Continued...)

Lecture 57 - Education and UNESCO Sustainable Development Goals (Continued...)

Lecture 58 - Education and UNESCO Sustainable Development Goals (Continued...)

NPTEL : NOC:Strategic Performance Management (Humanities and Social Sciences)

Co-ordinators : Prof. Kbl Srivastava

Lecture 1 - Introduction to Performance management

Lecture 2 - Aim and purpose of performance management

Lecture 3 - Characteristics of an effective PM system

Lecture 4 - Performance Management Process

Lecture 5 - Role of PM in employee development and identification of Key performance areas

Lecture 6 - Understanding performance planning

Lecture 7 - Strategic Planning and performance

Lecture 8 - Strategic planning and performance - 2

Lecture 9 - Strategic planning and performance - 3

Lecture 10 - Strategy and performance alignment

Lecture 11 - Performance dimensions: Task and context

Lecture 12 - Behavior, result and trait approach system

Lecture 13 - Measuring behavior and results

Lecture 14 - Measurement system

Lecture 15 - Collecting information in performance management

Lecture 16 - Implementing PM System

Lecture 17 - Implementing PMS (2)

Lecture 18 - Self appraisal

Lecture 19 - Managing team performance

Lecture 20 - 360 degree appraisal

Lecture 21 - Performance Management Skill

Lecture 22 - Performance Management and Employee Development

Lecture 23 - Coaching for performance improvement

Lecture 24 - Coaching process,analysis and techniques

Lecture 25 - Coching skills for managers and evaluation

Lecture 26 - Performance Review

Lecture 27 - Performance Review (Continued...)

Lecture 28 - Performance review Discussion

Lecture 29 - Performance Analysis

Lecture 30 - Use of performance management data for HR decision making

Lecture 31 - Potential Appraisal 1

Lecture 32 - Potential Appraisal 2

Lecture 33 - Reward system 1

Lecture 34 - Reward system 2

Lecture 35 - Performance Management and Legal System

Lecture 36 - PMS in Indian Organisations

Lecture 37 - Culture and Performance Management

Lecture 38 - Technology and Performance Management

Lecture 39 - PMS in Select Indian Companies

Lecture 40 - Future of Performance Management

NPTEL : NOC:Introduction to Basic Spoken Sanskrit (Humanities and Social Sciences)

Co-ordinators : Prof. Anuradha Choudry

Lecture 1 - Introduction

Lecture 2 - The Sounds of Sanskrit: Its Alphabet

Lecture 3 - Sentence Construction and its underlying logic

Lecture 4 - Introduction of Self and Others

Lecture 5 - Basic Verbs and Some Conjugations

Lecture 6 - Introduction to the Genitive (6th) Case

Lecture 7 - Counting and Reading the Time

Lecture 8 - Plural of Pronouns and Nouns

Lecture 9 - Conjugation of Basic Verbs in the Plural

Lecture 10 - Introduction to the Locative (7th) Case

Lecture 11 - Days of the Week, Months, Future Tense

Lecture 12 - Past Tense and More Verbs

Lecture 13 - Introduction to the Accusative (2nd) Case

Lecture 14 - Continuation of the Accusative (2nd) Case

Lecture 15 - Introduction to the Instrumental (3rd) Case

Lecture 16 - Continuation of the Instrumental (3rd) Case

Lecture 17 - Introduction to the Ablative (5th) Case

Lecture 18 - Introduction to the Dative (4th) Case

Lecture 19 - Introduction to the Vocative (8th) Case

Lecture 20 - Overview and Conclusion

NPTEL : NOC:Water, Society and Sustainability (Humanities and Social Sciences)

Co-ordinators : Prof. Jenia Mukherjee

Lecture 1 - Setting the Context

Lecture 2 - Beyond Hydrology

Lecture 3 - Socio Hydrology

Lecture 4 - Political Ecology of Water

Lecture 5 - Hydrosocial

Lecture 6 - Critical Physical Geography (CPG)

Lecture 7 - The South Asian Context

Lecture 8 - Water Harvesting and Water Use Techniques in Ancient India - 1

Lecture 9 - Water Harvesting and Water Use Techniques in Ancient India - 2

Lecture 10 - Water Harvesting and Water Use Techniques in Ancient India - 3

Lecture 11 - Water Technology in Medieval India - 1

Lecture 12 - Water Technology in Medieval India - 2

Lecture 13 - Colonial Hydrology

Lecture 14 - Dams and Development in Contemporary India

Lecture 15 - The Farakka Barrage Project: Historical and Technical Details

Lecture 16 - The FarakkaBarrage Project: Socio-environmental Implicationss

Lecture 17 - Urban Waters: Historical and Political Ecological Perspectives

Lecture 18 - Peri-urban Water Justice in the Global South

Lecture 19 - Transforming Trajectories of Blue Infrastructures of Kolkata

Lecture 20 - Discussion and Conclusion

NPTEL : NOC:Employment Communication A Lab based course (Humanities and Social Sciences)

Co-ordinators : Prof. Seema Singh

Lecture 1 - Introduction to Employment Communication - A Lab based Course

Lecture 2 - Communication - An Introduction

Lecture 3 - Communication Skills at the Workplace

Lecture 4 - Verbal Communication - Introduction

Lecture 5 - Verbal Communication (Continued...)

Lecture 6 - Non-verbal Communication - Introduction

Lecture 7 - Non-verbal Communication - Conclusion

Lecture 8 - Inter Cultural Communication - Introduction

Lecture 9 - Inter Cultural Communication - Conclusion

Lecture 10 - Practice Session 0

Lecture 11 - Body Language - Introduction

Lecture 12 - Body Language - Conclusion

Lecture 13 - Listening Skills - Introduction

Lecture 14 - Listening Skills - Conclusion

Lecture 15 - Practice Session 1

Lecture 16 - Body Language

Lecture 17 - Introduction to the Employment Process

Lecture 18 - Listening Skills

Lecture 19 - Introduction to CV Writing

Lecture 20 - Samples of Good CVs and Cover Letter

Lecture 21 - The Cover Letter

Lecture 22 - CV Writing Lab Session - I

Lecture 23 - CV Writing Lab Session - II

Lecture 24 - Fundamentals of Group Discussions (GDs)

Lecture 25 - Strategies for Success in GDs

Lecture 26 - Group Discussions Lab - Practice Session I

Lecture 27 - Group Discussions Lab - Practice Session II

Lecture 28 - Group Discussions Lab - Practice Session III

Lecture 29 - Group Discussions Lab - Practice Session IV

Lecture 30 - Interviewing for Employment

Lecture 31 - Preparing for the Personal Interview

Lecture 32 - PI Practice Session - I

Lecture 33 - PI Practice Session - II

Lecture 34 - PI Practice Session - III

Lecture 35 - PI Practice Session - IV

Lecture 36 - Tackling Questions during Personal Interviews (PIs)

Lecture 37 - Success in Personal Interviews (PIs)

Lecture 38 - Life Skills Lab and Student Speak

Lecture 39 - Life Skills

Lecture 40 - Course Wrap Up

NPTEL : NOC:Intermediate Level of Spoken Sanskrit (Humanities and Social Sciences)

Co-ordinators : Prof. Anuradha Choudry

Lecture 1 - Introduction to the devanÄgarÄ« script: vará¹‡amÄlÄ or alphabet

Lecture 2 - Introduction to the devanÄgarÄ« script: combining consonants

Lecture 3 - Revision and practice of vibhakti - declension forms: masculine words

Lecture 4 - Revision and practice of vibhakti - declension forms: feminine words

Lecture 5 - Revision and practice of vibhakti - declension forms: neuter words

Lecture 6 - Revision and practice of vibhakti - declension forms: first and second person pronouns in the singular

Lecture 7 - Introduction to the first and second person pronouns in the plural forms - Part 1

Lecture 8 - Revision and practice of the first and second person pronouns in the plural - Part 2

Lecture 9 - Introduction of the first person pronoun in the dual form - Part 1

Lecture 10 - Introduction of the first person pronoun in the dual form - Part 2

Lecture 11 - Introduction of the second person pronoun in the dual form - Part 1

Lecture 12 - Introduction of the second person pronoun in the dual form - Part 2

Lecture 13 - Third person pronouns and nouns (m/f) in the plural - Part 1

Lecture 14 - Third person pronouns and nouns (m/f) in the plural - Part 2

Lecture 15 - Third person pronouns and nouns (m/f) in the plural - Part 3

Lecture 16 - Third person pronouns and nouns (m/n/f) in the plural - Part 4

Lecture 17 - Third person pronouns and nouns (m/n/f) in the plural - Part 5

Lecture 18 - Revision and Exercises: third person pronouns and nouns (m/n/f) in the plural

Lecture 19 - Third person pronouns and nouns (m/n/f) in the dual - Part 1

Lecture 20 - Third person pronouns and nouns (m/n/f) in the dual - Part 2

Lecture 21 - Third person pronouns and nouns (m/n/f) in the dual - Part 3

Lecture 22 - Third person pronouns and nouns (m/n/f) in the dual - Part 4

Lecture 23 - Third person pronouns and nouns (m/n/f) in the dual - Part 5

Lecture 24 - Revision of the third person pronouns and nouns (m/n) in the dual - Part 1

Lecture 25 - Revision of the third person pronouns and nouns (f) in the dual - Part 2

Lecture 26 - Introduction to the verb conjugations in the kriyÄtipatti-lá¹›á¹… (the conditional)

Lecture 27 - Introduction to the verb conjugations in the vidhi-liá¹… (the optative)

Lecture 28 - Introduction to the conjugation of â€˜asâ€™ (to be) from the adÄdigaá¹‡a (2nd group) in the various tenses and moods

Lecture 29 - Introduction to the conjugation of the verb â€˜dÄâ€™ (to give) from the juhotyÄdigaá¹‡a (3rd group) in the various tenses and moods

Lecture 30 - Introduction to the conjugation of the verb â€˜divâ€™ (to shine, to sport) and â€˜vidâ€™ (to know) from the divÄdigaá¹‡a (4th group)

Lecture 31 - Introduction to the conjugation of the verb â€˜Å›ruâ€™ (to hear) from the svÄdigaá¹‡a (5th group) in the various tenses and moods

Lecture 32 - Introduction to the conjugation of the verb from the ká¹› (to do) from the tanÄdigaá¹‡a (8th group) in the various tenses and moods

Lecture 33 - Introduction to the conjugation of the verb 'mil' (to meet) from the tudÄdigaá¹‡a (6th group) in the various tenses and moods

Lecture 34 - Introduction to the conjugation of the verb 'bhuj' (to protect) from the rudhÄdigaá¹‡a (7th group) in the various tenses and moods

Lecture 35 - Introduction to the conjugation of the verb â€˜jÃ±Äâ€™ (to know) from the kryÄdigaá¹‡a (9th group) in the various tenses and moods

Lecture 36 - Introduction of nouns (m) ending with â€˜uâ€™ and â€˜iâ€™ in the three vacanas

Lecture 37 - Introduction of nouns (n) ending with â€˜uâ€™ and â€˜iâ€™ in the three vacanas

Lecture 38 - Introduction of nouns (f) ending with â€˜uâ€™ and â€˜iâ€™ in the three vacanas

Lecture 39 - Introduction of nouns (m) ending with â€˜inâ€™ and of nouns (n/f) ending with â€˜nâ€™ in the three vacanas

Lecture 40 - Introduction of nouns (m/n/f) ending with â€˜tâ€™ in the three vacanas

Lecture 41 - Introduction of nouns (m/f/n) ending with â€˜á¹›â€™ in the three vacanas

Lecture 42 - Introduction to the svarasandhi

Lecture 43 - Introduction to the visargasandhi

Lecture 44 - Introduction to the vyaÃ±janasandhi

Lecture 45 - Summary and Conclusion

NPTEL : NOC:Entrepreneurship and IP strategy (Humanities and Social Sciences)

Co-ordinators : Prof. Gouri Gargate

Lecture 1 - Introduction

Lecture 2 - What is an entrepreneurship ?

Lecture 3 - What do you understand by IP ?

Lecture 4 - Whether entrepreneurship and IP related? What is role of IP straegy in entrepreneurship?

Lecture 5 - Case study I - IT industry

Lecture 6 - Innovation, invention and creativity

Lecture 7 - Types of innovation

Lecture 8 - Innovation, market and IP

Lecture 9 - Open innovation and IP

Lecture 10 - Case Study II - Biotechnology

Lecture 11 - Trademark - Definition

Lecture 12 - Trademark - Types

Lecture 13 - Trademark - Registration

Lecture 14 - Trademark infringement

Lecture 15 - Case study III - Textile industry

Lecture 16 - Patent - introduction

Lecture 17 - Patent infringement

Lecture 18 - Patent strategies - I

Lecture 19 - Patent strategies - II

Lecture 20 - Capsule version

Lecture 21 - Copyright - Definition and subject matter

Lecture 22 - Copyright and related rights

Lecture 23 - Copyright registration and entrepreneurship

Lecture 24 - Copyright infringement

Lecture 25 - Case study IV - Film industry

Lecture 26 - Industrial Design- Definition, concept

Lecture 27 - Industrial Designs Act - Key features

Lecture 28 - Industrial Design-Business

Lecture 29 - Industrial Design infringement

Lecture 30 - Case study V - Automobile industry

Lecture 31 - IP strategy for start-up and MSME

Lecture 32 - IP transaction - introduction

Lecture 33 - IP valuation, bank loan, insurance

Lecture 34 - Success story and business model of a few start-ups

Lecture 35 - Case Study VI - Agriculture

Lecture 36 - Incubators, research parks

Lecture 37 - Various Government policies

Lecture 38 - Various Government policies

Lecture 39 - Capsule revision

Lecture 40 - Am I ready to venture my start up? (Course applicability)

NPTEL : NOC:Urbanization and Environment (Humanities and Social Sciences)

Co-ordinators : Prof. Jenia Mukherjee

Lecture 1 - Setting the Context

Lecture 2 - The Anthropocene

Lecture 3 - The Nine Planetary Boundaries Framework

Lecture 4 - The Capitalocene

Lecture 5 - The Urbanocene

Lecture 6 - COVID 19, Urban Informality and Environment

Lecture 7 - Sanitary Cities: Urban, Environment and Modernity in the West

Lecture 8 - Networked Cities: Path-dependent Consequences

Lecture 9 - From Sanitary to Sustainable Cities

Lecture 10 - How sustainable? Critical analysis of contemporary urban models

Lecture 11 - Historical Pasts

Lecture 12 - Colonial Urbanization

Lecture 13 - Limits and Legacies of Colonial Urbanization

Lecture 14 - The Post-independence Scenario: Planned Cities and Renewal Missions

Lecture 15 - Smart Cities

Lecture 16 - Smart Cities: Critique and Contestations

Lecture 17 - Fantasy Cities? Understanding Limits of Smart, Eco and Green Doctrines

Lecture 18 - Fantasy Cities? Understanding Limits of Smart, Eco and Green Doctrines Case (Continued...)

Lecture 19 - Fantasy Cities? Understanding Limits of Smart, Eco and Green Doctrines Case (Continued...)

Lecture 20 - Urban Environmental History: The US Part I: Context and Themes

Lecture 21 - Urban Environmental History: The US Part II: More Thematic Variations and Global

Lecture 22 - Urban Environmental History: Europe Part I: Context and Themes

Lecture 23 - Urban Environmental History: Europe Part II: Recent Advances

Lecture 24 - Urban Environmental History: South Asia [SAUEH] Part I.A: The Prelude: Inception

Lecture 25 - Urban Environmental History: South Asia [SAUEH] Part I.B: (More) Nuanced Narratives

Lecture 26 - Urban Environmental History: South Asia [SAUEH] Part II: Trends and Trajectories

Lecture 27 - Urban Environmental History: South Asia [SAUEH] Part II: Trends and Trajectories (Continued...)

Lecture 28 - Urban Political Ecology Part I: Emergence and Development

Lecture 29 - Urban Political Ecology Part II: (More) Recent Advances

Lecture 30 - Urban Political Ecology Part III: Internal Debates and New Political Possibilities

Lecture 31 - Urban Political Ecology: The Indian Context Part I: Themes and Concepts

Lecture 32 - Urban Political Ecology: The Indian Context Part II: (More) Recent Advances

Lecture 33 - Historical Urban Political Ecology (HUPE): Blue Infrastructures of Kolkata

Lecture 34 - Urban Environmentalisms

Lecture 35 - Urban Environmentalisms: Case Study 1: The Adi Ganga Bachao Andolan

Lecture 36 - Urban Environmentalisms: Case Study 2: Protests to Protect the EKW

Lecture 37 - Translocal Learning for Water Justice: Peri-urban Pathways in India, Tanzania and ...

Lecture 38 - Informing Urban Disaster Studies using Comparative Urban Environmentalism

Lecture 39 - Urban Environmental Heritage: Insights from Bengalâ€™s Mini-Europe

Lecture 40 - The Way Forward

NPTEL : NOC:Advanced Level of Spoken Sanskrit (Humanities and Social Sciences)

Co-ordinators : Prof. Anuradha Choudry

Lecture 1 - Course Overview and Revision of Sentence formation

Lecture 2 - Understanding the concepts of à¤•à¤¾à¤°à¤•à¤®à¥ and à¤µà¤¿à¤à¤•à¥à¤¤à¤¿à¤ƒ

Lecture 3 - Revision of Masculine nouns (à¤ªà¥à¤‚à¤²à¤¿à¤™à¥à—à¤‚à¥à¤¬à¤¨à¥à¤¤à¤¾à¤ƒ) and some verbs (à¤¤à¤¿à¤™à¤¨à¥à¤¤à¤¾à¤ƒ).

Lecture 4 - Revision of Masculine nouns (à¤ªà¥à¤²à¥à¤²à¤¿à¤™à¥à—à¤‚à¥à¤¬à¤¨à¥à¤¤à¤¾à¤ƒ) and some verb forms (à¤¤à¤¿à¤™à¤¨à¥à¤¤à¤¾à¤ƒ)

Lecture 5 - Revision of Feminine nouns (à¤‚à¥à¤¤à¥à¤°à¥€à¤²à¤¿à¤™à¥à—à¤‚à¥à¤¬à¤¨à¥à¤¤à¤¾à¤ƒ) and some verb forms (à¤¤à¤¿à¤™à¤¨à¥à¤¤à¤¾à¤ƒ)

Lecture 6 - Neuter nouns (à¤¨à¤ªà¥à¤‚à¤•à¤²à¤¿à¤™à¥à—à¤‚à¥à¤¬à¤¨à¥à¤¤à¤¾à¤ƒ) and some verb forms (à¤¤à¤¿à¤™à¤¨à¥à¤¤à¤¾à¤ƒ)

Lecture 7 - Revision of à¤µà¤°à¥à¤£à¤®à¤¾à¤²à¤¾, à¤®à¤¾à¤¹à¥‡à¤¶à¥à¤µà¤°à¤‚à¥.à¤¤à¥à¤°à¤¾à¤£à¤¿, vibrational effect of à¤µà¤°à¥à¤£à¤¾à¤ƒ

Lecture 8 - Revision of à¤‰à¤ªà¤‚à¤°à¥à—à¤¾à¤ƒ and their applications

Lecture 9 - Revision of à¤‚à¥à¤µà¤°à¤‚à¤¨à¥à¤§à¤¿à¤ƒ with à¤‚à¥.à¤¤à¥à¤°à¤¾à¤£à¤¿

Lecture 10 - Revision of à¤µà¥à¤¯à¤žà¥à¤œà¤¨à¤‚à¤¨à¥à¤§à¤¿à¤ƒ with à¤‚à¥.à¤¤à¥à¤°à¤¾à¤£à¤¿ and practice - Part 1

Lecture 11 - Revision of à¤µà¥à¤¯à¤žà¥à¤œà¤¨à¤‚à¤¨à¥à¤§à¤¿à¤ƒ with à¤‚à¥.à¤¤à¥à¤°à¤¾à¤£à¤¿ and practice - Part 2

Lecture 12 - Revision of à¤µà¤¿à¤‚à¤°à¥à¤—à¤‚à¤¨à¥à¤§à¤¿à¤ƒ with à¤¨à¤¿à¤¯à¤®à¤¾à¤ƒ and practice

Lecture 13 - Understanding the 10 à¤—à¤£à¤¾à¤ƒ - Part 1

Lecture 14 - Understanding the 10 à¤—à¤£à¤¾à¤ƒ - Part 2

Lecture 15 - Understanding the à¥§à¥¦ à¤²à¤•à¤¾à¤°à¤¾à¤ƒ in à¤ªà¤°à¤‚à¥à¤®à¥ˆà¤ªà¤¦à¥€ and in à¤†à¤¤à¥à¤®à¤¨à¥‡à¤ªà¤¦à¥€

Lecture 16 - Overview of à¤‚à¥à¤¬à¤¨à¥à¤¤à¤¾à¤ƒ (Nouns), à¤¤à¤¿à¤™à¤¨à¥à¤¤à¤¾à¤ƒ (Verbs), à¤…à¤µà¥à¤¯à¤¯à¤¾à¤¨à¤¿ (Indeclinables) and à¤µà¤¾à¤šà¥à¤¯à¤®à¥ ...

Lecture 17 - Introduction and practice of à¤µà¤¾à¤šà¥à¤¯à¤®à¥ - à¤•à¤°à¥à¤¤à¥ƒà¤µà¤¾à¤šà¥à¤¯à¤®à¥, à¤•à¤°à¥à¤®à¤µà¤¾à¤šà¥à¤¯à¤®à¥, à¤à¤¾à¤µà¤µà¤¾à¤šà¥à¤¯à¤®à¥

Lecture 18 - à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤¨à¤¾à¤°à¥,à¤ªà¤£à¤®à¥: Elaboration of the concept of à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤ƒ

Lecture 19 - à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤¨à¤¾à¤°à¥,à¤ªà¤£à¤®à¥: Elaboration of the concept of à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤ƒ (Continued...)

Lecture 20 - à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤¨à¤¾à¤°à¥,à¤ªà¤£à¤®à¥: Elaboration of the concept of à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤ƒ (Continued...)

Lecture 21 - à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤¨à¤¾à¤°à¥,à¤ªà¤£à¤®à¥: Elaboration of the concept of à¤µà¥ƒà¤¤à¥à¤¤à¤¿à¤ƒ (Continued...)

Lecture 22

Lecture 23 - Practice of à¤‚à¤®à¤¾à¤‚à¤ƒ /compound word

Lecture 24 - Introduction and Practice of à¤…à¤µà¥à¤¯à¤¯à¤ªà¥à¤°à¤•à¤°à¤£à¤®à¥ / Indeclinables

Lecture 25 - Introduction to the concept of à¤…à¤¨à¥à¤µà¤¯à¤ƒ with practice

Lecture 26 - The concept of à¤…à¤¨à¥à¤µà¤¯à¤ƒ with practice

Lecture 27 - Course summary

NPTEL : NOC:Education for Sustainable Development (Humanities and Social Sciences)

Co-ordinators : Prof. Atasi Mohanty

Lecture 1 - Introduction

Lecture 2 - Sustainable Development Goals

Lecture 3 - Sustainable Development Goals (Continued...)

Lecture 4 - Sustainable Development Goals (Continued...)

Lecture 5 - Education for Sustainable Development

Lecture 6 - Education for Sustainable Development (Continued...)

Lecture 7 - Education for Sustainable Development (Continued...)

Lecture 8 - Education for Sustainable Development (Continued...)

Lecture 9 - Education for Sustainable Development (Continued...)

Lecture 10 - Education for Sustainable Development (Continued...)

Lecture 11 - ESD and Global Citizenship

Lecture 12 - ESD and Global Citizenship (Continued...)

Lecture 13 - ESD and Global Citizenship (Continued...)

Lecture 14 - ESD for Technical and Vocational Education / Training

Lecture 15 - ESD for Technical and Vocational Education / Training (Continued...)

Lecture 16 - ESD for Technical and Vocational Education / Training (Continued...)

Lecture 17 - ESD for Technical and Vocational Education / Training (Continued...)

Lecture 18 - ESD for Sustainable Healthcare

Lecture 19 - ESD for Sustainable Healthcare (Continued...)

Lecture 20 - ESD for Sustainable Healthcare (Continued...)

Lecture 21 - ESD for Sustainable Healthcare (Continued...)

Lecture 22 - ESD for Sustainable Healthcare (Continued...)

Lecture 23 - ESD for Sustainable Healthcare (Continued...)

Lecture 24 - ESD for Food Security

Lecture 25 - ESD for Food Security (Continued...)

Lecture 26 - ESD for Food Security (Continued...)

Lecture 27 - ESD for Food Security (Continued...)

Lecture 28 - ESD for Food Security (Continued...)

Lecture 29 - Sustainable and Clean Energy

Lecture 30 - Sustainable and Clean Energy (Continued...)

Lecture 31 - Sustainable and Clean Energy (Continued...)

Lecture 32 - Sustainable and Clean Energy (Continued...)

Lecture 33 - Sustainable and Clean Energy (Continued...)

Lecture 34 - Sustainable and Clean Energy (Continued...)

Lecture 35 - Sustainable Education

Lecture 36 - Sustainable Education (Continued...)

Lecture 37 - Sustainable Education (Continued...)

Lecture 38 - Sustainable Education (Continued...)

Lecture 39 - Sustainable Education (Continued...)

Lecture 40 - Sustainable Education (Continued...)

Lecture 41 - Sustainable Education (Continued...)

Lecture 42 - Sustainable Education (Continued...)

Lecture 43 - Sustainable Education (Continued...)

Lecture 44 - Sustainable Education (Continued...)

Lecture 45 - Sustainable Education (Continued...)

Lecture 46 - Sustainable Leadership

Lecture 47 - Sustainable Leadership (Continued...)

Lecture 48 - Sustainable Leadership (Continued...)

Lecture 49 - Sustainable Leadership (Continued...)

Lecture 50 - Sustainable Leadership (Continued...)

Lecture 51 - Sustainable Leadership (Continued...)

Lecture 52 - Sustainable Leadership (Continued...)

Lecture 53 - Sustainable Leadership (Continued...)

Lecture 54 - Sustainable Cities and Communities

Lecture 55 - Sustainable Cities and Communities (Continued...)

Lecture 56 - Sustainable Consumption and Production

Lecture 57 - Sustainable Consumption and Production (Continued...)

Lecture 58 - ESD for Global Partnership

Lecture 59 - ESD for Global Partnership (Continued...)

Lecture 60 - Sustainable Happiness

Lecture 61 - Sustainable Happiness (Continued...)

NPTEL : NOC:Elements of Literature and Creative Communication (Humanities and Social Sciences)

Co-ordinators : Prof. H.S. Komalesha

Lecture 1 - Elements of Literature and Creative communication

Lecture 2 - Literature and its relevance

Lecture 3 - A Multidimensional Engagement with Literature

Lecture 4 - How to read and appreciate Literature?

Lecture 5 - Literature - Learner's Perspective

Lecture 6 - Ways of Reading .1

Lecture 7 - Forms and Genres of Literature

Lecture 8 - Feminist Literary Criticism

Lecture 9 - Marxist Literary Criticism

Lecture 10 - Postcolonial Literary Criticism

Lecture 11 - Tracing the Roots of Poetry

Lecture 12 - Origins of Poetry

Lecture 13 - Poetry and its Tributaries - 1

Lecture 14 - Poetry and its Tributaries - 2

Lecture 15 - Reflecting on poetry and its forms (Quiz)

Lecture 16 - Elements of Poetry - 1

Lecture 17 - Elements of Poetry - 2

Lecture 18 - English Poetry: An Overview. Old English to Elizabethan

Lecture 19 - English Poetry: An Overview. Elizabethan to Metaphysical

Lecture 20 - English Poetry: An Overview. 17th centure onwards

Lecture 21 - Indian English Poetry: The Beginnings

Lecture 22 - Arun Kolatkar and the Bombay Circle of Poets

Lecture 23 - Kamala Das

Lecture 24 - Confessional Poetry of Kamala Das

Lecture 25 - AK Ramanujan

Lecture 26 - Contemporary World poetry

Lecture 27 - Hafez: The Poet for Life

Lecture 28 - Date with European Poetry

Lecture 29 - Second date with European Poetry

Lecture 30 - American poetry

Lecture 31 - Introduction to Fiction

Lecture 32 - Elements of Fiction - 1

Lecture 33 - Elements of Fiction - 2

Lecture 34 - Fiction and its Branches - 1

Lecture 35 - Fiction and its Branches - 2

Lecture 36 - Tools of the Trade: Narrative Techniques in Fiction

Lecture 37 - Tools of the Trade: Narrative Techniques in Fiction

Lecture 38 - Animal Farm - 1

Lecture 39 - Animal Farm - 2

Lecture 40 - Animal Farm: A Critical Exploration

Lecture 41 - Introducing Short Fiction

Lecture 42 - Origin and Development of Short Fiction

Lecture 43 - Borges and the Book of Sand

Lecture 44 - Two Stories and Three Cheers

Lecture 45 - Quiz on Short Fiction

Lecture 46 - Introduction to Drama

Lecture 47 - Elements of Drama

Lecture 48 - Drama and its types

Lecture 49 - Comedy: Drama and its Types

Lecture 50 - Dramatic Devices: Tricks and Tactics that make Theatre Tick

Lecture 51 - Aristotle and the Dramatic Art

Lecture 52 - A Snapshot of Western Drama

Lecture 53 - Modern Drama

Lecture 54 - A Doll's House

Lecture 55 - A Critical Dismantling of Dolls House

Lecture 56 - Indian Drama

Lecture 57 - Modern Indian Drama

Lecture 58 - Hayavadana

Lecture 59 - Hayavadana: a critical perspective

Lecture 60 - A Quiz

NPTEL : NOC:Training and Development (Humanities and Social Sciences)

Co-ordinators : Prof. Susmita Mukhopadyay, Prof. Sangeeta Sahney, Prof. S.Srinivasan

Lecture 1 - Employees Training and Development

Lecture 2 - Employee and Employer Relationship

Lecture 3 - Employment Contract

Lecture 4 - Employee as a Human Capital

Lecture 5 - Employees Training and Organizational Excellence

Lecture 6 - Strategic Training

Lecture 7 - Strategic Training and Its Process

Lecture 8 - Strategic Training Model

Lecture 9 - Learning, Training and Development from Change Model Perspective

Lecture 10 - Training as a Function of Human Resources Management

Lecture 11 - Concept and Importance of Training Need Assessment

Lecture 12 - Steps and Process of Training Need Assessment

Lecture 13 - When to Conduct TNA

Lecture 14 - Techniques Used in Need Assessment

Lecture 15 - Competency in Need Assessment

Lecture 16 - Concept, Types and Importance of Learning

Lecture 17 - Learning Theories

Lecture 18 - Transfer of Training

Lecture 19 - Factors Affecting Transfer of Training

Lecture 20 - Theories of Transfer of Training

Lecture 21 - Concept and Importance of Programme and Training Programme

Lecture 22 - Training Programme Design

Lecture 23 - Steps/Process of Programme Design

Lecture 24 - Basic Consideration for Programme Design

Lecture 25 - Documentation in Designing Training Program

Lecture 26 - Defining Evaluation

Lecture 27 - Training Evaluation

Lecture 28 - Training evaluation process

Lecture 29 - Tools and Techniques of Training Evaluation

Lecture 30 - Training Evaluation Design

Lecture 31 - Training Methods

Lecture 32 - Presentation Methods

Lecture 33 - Hands-on-training methods

Lecture 34 - Group Building Methods

Lecture 35 - Implication of Traditional Training Methods

Lecture 36 - Technology Based Training: Concept, Types and Importance

Lecture 37 - Computer Based Training

Lecture 38 - Social Media

Lecture 39 - Learning Management System (LMS)

Lecture 40 - Choosing a New Technology for Training

Lecture 41 - Employees Development

Lecture 42 - Career Development and Training

Lecture 43 - Development Planning System

Lecture 44 - Approaches to Employee Development

Lecture 45 - Interpersonal Relationship, Succession Planning

Lecture 46 - Social Responsibility

Lecture 47 - Legal Aspects of Social Responsibility

Lecture 48 - Managing Diversity in Training

Lecture 49 - Career Challenges

Lecture 50 - Meeting the Needs of Older Workers

Lecture 51 - Future of Training and Development

Lecture 52 - Future Trends of Trainersâ€™ Skills and Competencies

Lecture 53 - Emphasis for Future Training and Development

Lecture 54 - Trends of New Technology Used in Training

Lecture 55 - Training Partnership and Outsourcing

Lecture 56 - Train the Trainers

Lecture 57 - Concept of Disruption

Lecture 58 - Disruption in Creativity and Innovation

Lecture 59 - Implication of Digital Disruption in Training and Learning

Lecture 60 - Managing Disruptive Trainees

Lecture 61 - Managing Disruptive Trainees (Continued...)

Lecture 62 - Managing Disruption in Organizations through Training c

Lecture 63 - Some Examples/Cases

Lecture 64 - Some Examples/Cases (Continued...)

Lecture 65 - Some Examples/Cases (Continued...)

NPTEL : NOC:Sociology and Resource Management (Humanities and Social Sciences)

Co-ordinators : Prof. Amrita Sen, Prof. Archana Patnaik

Lecture 1 - Categorizing Resources Governed under Different Property Regimes

Lecture 2 - Common Pool Resource Management

Lecture 3 - Tragedy of The Commons

Lecture 4 - Institutional Analysis and Development (IAD) Framework

Lecture 5 - Institutional Analysis and Development (IAD) Framework (Continued...)

Lecture 6 - Common Pool Resource Management

Lecture 7 - Community Control of Natural Resources and Man-Made Resource

Lecture 8 - Debates on Intellectual Property Rights

Lecture 9 - The internet, Opensource and the commons

Lecture 10 - Agricultural biotechnology, opensource and commons

Lecture 11 - Natural resources and urban ecological commons in the city

Lecture 12 - Urban Common and social ownership

Lecture 13 - Ecological Commons and Sustainable City Planning

Lecture 14 - Rethinking environmental justice in cities

Lecture 15 - Urban Commons and Political Ecology

Lecture 16 - Rights-based approaches to natural resources

Lecture 17 - Reformistic legislations on resource management

Lecture 18 - Case studies from specific rights-based resource management policies

Lecture 19 - Critiques of decentralisation and participatory resource management

Lecture 20 - Problems of Access and Distribution in Resource Management of Water

NPTEL : NOC:Urban Sociology (Humanities and Social Sciences)

Co-ordinators : Prof. Archana Patnaik, Prof. Amrita Sen

Lecture 1 - Overview

Lecture 2 - Sociological Theories of Urbanization and Key Concepts

Lecture 3 - Globalization, technology and the Growth of Cities

Lecture 4 - Urban Infrastructure and Governance

Lecture 5 - Urbanization in the Global South: Approaches of Understanding

Lecture 6 - Indian context and informality: Cities and slums

Lecture 7 - Urban Development and Sustainability in India

Lecture 8 - Major Policies of urban India

Lecture 9 - Gentrification, migration, inequality and urban social stratification in India.

Lecture 10 - Recent developments and emerging theories

Lecture 11 - Smart cities - global perspective and Indian perspective

Lecture 12 - Social Interactions in Publicspaces

Lecture 13 - Community, SmartCitizenship and the Digital Divide

Lecture 14 - Urban Commons

Lecture 15 - Urban Greens

Lecture 16 - Community and Identity

Lecture 17 - Gender Race and the City - Part I

Lecture 18 - Gender Race and the City - Part II

Lecture 19 - Natural and (Un)Natural Disaster in the City

Lecture 20 - Urban Subcultures

NPTEL : NOC:Management of Fixed Income Securities (Humanities and Social Sciences)

Co-ordinators : Prof. Jitendra Mahakud

Lecture 1 - Introduction to Fixed Income Securities

Lecture 2 - Risks in Fixed Income Securities Investments

Lecture 3 - Bond Valuation - I

Lecture 4 - Bond Valuation - II

Lecture 5 - Bond Price Relations

Lecture 6 - Bond Returns - I

Lecture 7 - Bond Returns - II

Lecture 8 - Bond Returns - III

Lecture 9 - Bond Returns - IV

Lecture 10 - Level of Interest Rate Determination - I

Lecture 11 - Level of Interest Rate Determination - II

Lecture 12 - Level of Interest Rate Determination - III

Lecture 13 - The Term Structure of Interest Rates - I

Lecture 14 - The Term Structure of Interest Rates - II

Lecture 15 - The Term Structure of Interest Rates - III

Lecture 16 - The Term Structure of Interest Rates - IV

Lecture 17 - The Term Structure of Interest Rates - V

Lecture 18 - The Term Structure of Interest Rates - VI

Lecture 19 - The Term Structure of Interest Rates - VII

Lecture 20 - The Term Structure of Interest Rates - VIII

Lecture 21 - Determination of Theoretical Spot Rate and Forward Yield Curves

Lecture 22 - Interest Rate Risk

Lecture 23 - Bond Duration

Lecture 24 - Bond Convexity

Lecture 25 - Default Risk

Lecture 26 - Short-Term Government Bond Markets

Lecture 27 - Long-Term Government Bond Markets

Lecture 28 - Issuance and Trading Mechanism of Government Securities

Lecture 29 - Short-Term Corporate Bond Markets

Lecture 30 - Medium and Long-term Corporate Bond Markets

Lecture 31 - Issuance and Trading Mechanism of Corporate Securities

Lecture 32 - Municipal Bonds - I

Lecture 33 - Municipal Bonds - II

Lecture 34 - Debt Securities of Commercial Banks

Lecture 35 - International Bonds

Lecture 36 - Bonds with Embedded Options

Lecture 37 - Binomial Valuation of Callable Bonds - I

Lecture 38 - Binomial Valuation of Callable Bonds - II

Lecture 39 - Binomial Valuation of Puttable and Sinking-Fund Bonds

Lecture 40 - Binomial Valuation of Convertible Bonds

Lecture 41 - Estimation of Binomial Trees - I

Lecture 42 - Estimation of Binomial Trees - II

Lecture 43 - Estimation of Binomial Trees - III

Lecture 44 - Estimation of Binomial Trees - IV

Lecture 45 - Estimation of Binomial Trees - V

Lecture 46 - Bond Investment Strategies - I

Lecture 47 - Bond Investment Strategies - II

Lecture 48 - Bond Investment Strategies - III

Lecture 49 - Bond Investment Strategies - IV

Lecture 50 - Bond Investment Strategies - V

Lecture 51 - Mortgage Backed Securities - I

Lecture 52 - Mortgage Backed Securities - II

Lecture 53 - Mortgage Backed Securities - III

Lecture 54 - Mortgage Backed Securities - IV

Lecture 55 - Mortgage Backed Securities - V

Lecture 56 - Fixed Income Securities Derivatives - I

Lecture 57 - Fixed Income Securities Derivatives - II

Lecture 58 - Fixed Income Securities Derivatives - III

Lecture 59 - Fixed Income Securities Derivatives - IV

Lecture 60 - Fixed Income Securities Derivatives - V

NPTEL : NOC:Petroleum Economics and Management (Humanities and Social Sciences)

Co-ordinators : Prof. Anwesha Aditya

Lecture 1 - Relevance and Syllabus

Lecture 2 - Role of Oil

Lecture 3 - Energy and Sustainability

Lecture 4 - North-South conflict, Way to future

Lecture 5 - Introduction

Lecture 6 - Analysis of demand

Lecture 7 - Determinants of demand

Lecture 8 - Analysis of supply

Lecture 9 - Equilibrium

Lecture 10 - Elasticity

Lecture 11 - Revenue and price elasticity of demand

Lecture 12 - Petroleum rents and petroleum taxes

Lecture 13 - Welfare analysis

Lecture 14 - Government Intervention - I

Lecture 15 - Government Intervention - II

Lecture 16 - Introduction

Lecture 17 - Movement of oil price

Lecture 18 - Sector wise use of oil

Lecture 19 - Oil Price Movements 2010-15/16

Lecture 20 - Oil Price since 2018

Lecture 21 - Oil price in the recent times

Lecture 22 - Structure of OPEC

Lecture 23 - Cartel

Lecture 24 - Role of OPEC in explaining oil price

Lecture 25 - Role of Saudi Arabia

Lecture 26 - Petroleum as a depleting resource

Lecture 27 - Can depletion explain price development ?

Lecture 28 - Cost performance of global oil industry and Oil Spills

Lecture 29 - Structural change and resource discovery

Lecture 30 - Theory of Production: A brief overview

Lecture 31 - Production Possibility Frontier

Lecture 32 - Labour Demand

Lecture 33 - Theoretical model - I

Lecture 34 - Theoretical Framework - II

Lecture 35 - Country Experiences

Lecture 36 - Market structure

Lecture 37 - Oligopoly and Market structure

Lecture 38 - Introduction to Game Theory - I

Lecture 39 - Introduction to Game Theory - II

Lecture 40 - Nash Equilibirum

Lecture 41 - Competition versus collusion

Lecture 42 - Collusive Oligopoly: Price Leadership

Lecture 43 - Price Leadership Dominant Firm Model - I

Lecture 44 - Price Leadership Dominant Firm Model - II

Lecture 45 - Cartel

Lecture 46 - Intemporal Allocation and Utility

Lecture 47 - Optimum Choice of a Consumer: Problem of Utility Maximisation

Lecture 48 - Optimal Division of Natural Resources

Lecture 49 - Hotelling's rule

Lecture 50 - Intertemporally Optimal Prices: Some observations

Lecture 51 - Model of Economic Growth - I

Lecture 52 - Model of Economic Growth - II

Lecture 53 - Discovery of Natural Resources

Lecture 54 - Model of Economic growth with uncertainty

Lecture 55 - Exchange Rate and its Determination

Lecture 56 - Oil Price Shock

Lecture 57 - BoP Crisis of the Indian Economy in 1991

Lecture 58 - Crisis and efficiency of exchange rate policies

Lecture 59 - Concluding Remarks - I

Lecture 60 - Concluding Remarks - II

NPTEL : NOC:The Science of Happiness and Wellbeing (Humanities and Social Sciences)

Co-ordinators : Prof. Priyadarshi Patnaik, Prof. Manas K Mandal

Lecture 1 - Introduction: Why Happiness Matters and How We Will Go About Exploring It

Lecture 2 - Can We Define Happiness?

Lecture 3 - Happiness and Wellbeing : Do Cultures and Environments Call the Shorts!

Lecture 4 - Doing Happiness' - Philosophical and existential questions, and responses

Lecture 5 - Happiness - antecedents and implications

Lecture 6 - Basic Issues

Lecture 7 - Myths and Misconceptions

Lecture 8 - Happiness - the unanswered questions

Lecture 9 - Evolution of Happiness

Lecture 10 - Belief and Gene

Lecture 11 - Empathy

Lecture 12 - Happiness and Morality

Lecture 13 - Exploring the self and the other

Lecture 14 - Pro-sociality and happiness - Generosity, give and take

Lecture 15 - Pro-sociality and happiness - Virtuesand strengths

Lecture 16 - Relationship - Connected and happy

Lecture 17 - Networking and its relevance for happiness and wellbeing

Lecture 18 - Money and Happiness

Lecture 19 - How does optimism affect happiness?

Lecture 20 - Sharing and Belonging

Lecture 21 - Happiness and body language

Lecture 22 - Failure and Resilience

Lecture 23 - Innovation and Happiness

Lecture 24 - Conflicts and Stress

Lecture 25 - Stress and Coping

Lecture 26 - Reconnecting happiness: beyond pandemic

Lecture 27 - Meditation and Mindfulness: An Overview

Lecture 28 - Meditation and Mindfulness: Practice Toolkit

Lecture 29 - Creativity, Intuition and Flow

Lecture 30 - Can we really not be creative and happy?

Lecture 31 - Emotional intelligence

Lecture 32 - Happiness at work

Lecture 33 - Nudging and Decision-making

Lecture 34 - Can we measure happiness? The case of cities and states

Lecture 35 - Happiness and leadership habits

Lecture 36 - Measurement of Happiness

Lecture 37 - Consumerism, happiness and wellbeing

Lecture 38 - Technology and happiness

Lecture 39 - Doing research on happiness: Connecting dots

Lecture 40 - Summing up: Social innovation and project ideas for social transformation

NPTEL : NOC:Environmental Science (Humanities and Social Sciences)

Co-ordinators : Dr. Samik Chowdhury, Dr. Sudha Goel

Lecture 1 - Major Environmental Concerns and Pollution

Lecture 2 - Population Growth Models

Lecture 3 - Resource Consumption and Pollution

Lecture 4 - Measuring Environmental Impacts - the IPAT Model and Ecological Footprint

Lecture 5 - Measuring - Earth Overshoot Day, Energy Performance Index and Lifecycle Assessment

Lecture 6 - Principles of Sustainable Development

Lecture 7 - Principles of Sustainable Development (Sustainable Development Goals)

Lecture 8 - Principles of Sustainable Development (Achieving SDGs and Sustainability Indices)

Lecture 9 - Principles of Sustainable Development (Case Study I: Sustainable Urbanization)

Lecture 10 - Principles of Sustainable Development (Case Study II: Green Buildings)

Lecture 11 - Air Pollution (Definition, Causes, Sources and Types)

Lecture 12 - Air Pollution (Influence of Meteorology)

Lecture 13 - Air Pollution (Local Effects and Mitigation Measures)

Lecture 14 - Air Pollution (Regional Issues and Mitigation Measures)

Lecture 15 - Air Pollution (Global Issues and Mitigation Measures, Indoor Air Quality)

Lecture 16 - Climate Change (Definition and Evidence)

Lecture 17 - Climate Change (Causes and Determinants)

Lecture 18 - Climate Change (Projections and Related Impacts)

Lecture 19 - Climate Change (Mitigation Options)

Lecture 20 - Climate Change (Adaption and Policy Responses)

Lecture 21 - Renewable Energy - I (Overview)

Lecture 22 - Renewable Energy - I (Solar Energy - I)

Lecture 23 - Renewable Energy - I (Solar Energy - II)

Lecture 24 - Renewable Energy - I (Solar Energy - III)

Lecture 25 - Renewable Energy - I (Wind Energy)

Lecture 26 - Renewable Energy - II (Geothermal Energy)

Lecture 27 - Renewable Energy - II (Ocean Energy - I)

Lecture 28 - Renewable Energy - II (Ocean Energy - II)

Lecture 29 - Renewable Energy - II (Hydropower)

Lecture 30 - Renewable Energy - II (Bioenergy)

Lecture 31 - Circular Economy (Introduction to the Concept)

Lecture 32 - Circular Economy (Circular Economy Strategies - I)

Lecture 33 - Circular Economy (Circular Economy Strategies - II)

Lecture 34 - Circular Economy (Circular Business Models)

Lecture 35 - Circular Economy (Industrial Symbiosis)

Lecture 36 - Hydrologic cycle, sources of water and water pollution

Lecture 37 - Water Quality Parameters - General

Lecture 38 - Water Quality Parameters - Oxygendemanding wastes and Microbial

Lecture 39 - Nitrogen species in rivers and the DO Sag Curve

Lecture 40 - NGT, WQI and reuse and recycling of wastewater

Lecture 41 - Importance and Integrated Solid Waste Management

Lecture 42 - Sources of MSW, MSW Generation Rates and Composition

Lecture 43 - MSW Composition and Collection

Lecture 44 - MSW Treatment and Disposal

Lecture 45 - E-Waste Management

Lecture 46 - Sound, noise and its characteristics

Lecture 47 - Audiometry

Lecture 48 - Effects of noise

Lecture 49 - Noise rating systems and modeling

Lecture 50 - Noise control and regulations

Lecture 51 - Fundamentals of Ecology - I

Lecture 52 - Fundamentals of Ecology - II

Lecture 53 - Fundamentals of Ecology - III

Lecture 54 - Soil Pollution - I

Lecture 55 - Soil Pollution - II

Lecture 56 - The Environmental Movement and its global and local impacts

Lecture 57 - Environmental Law and Rules in India

Lecture 58 - Important legal judgments pertaining to the Environment

Lecture 59 - NGT and its important judgments

Lecture 60 - Rapid Environmental Impact Assessment - A case study of the River Ib Barrage

NPTEL : NOC:Psychology of Learning (Humanities and Social Sciences)

Co-ordinators : Dr. Atasi Mohanty

Lecture 1 - Psychology of Learning

Lecture 2 - Psychology of Learning (Continued...)

Lecture 3 - Psychology of Learning (Continued...)

Lecture 4 - Psychology of Learning (Continued...)

Lecture 5 - Psychology of Learning (Continued...)

Lecture 6 - Major Theories of Learning

Lecture 7 - Major Theories of Learning (Continued...)

Lecture 8 - Major Theories of Learning (Continued...)

Lecture 9 - Major Theories of Learning (Continued...)

Lecture 10 - Major Theories of Learning (Continued...)

Lecture 11 - Memory and Cognition

Lecture 12 - Memory and Cognition (Continued...)

Lecture 13 - Memory and Cognition (Continued...)

Lecture 14 - Memory and Cognition (Continued...)

Lecture 15 - Memory and Cognation (Continued...)

Lecture 16 - Thinking and Cognition

Lecture 17 - Thinking and Cognition (Continued...)

Lecture 18 - Thinking and Cognition (Continued...)

Lecture 19 - Thinking and Cognition (Continued...)

Lecture 20 - Thinking and Cognition (Continued...)

Lecture 21 - Motivation of Learning

Lecture 22 - Motivation of Learning (Continued...)

Lecture 23 - Motivation of Learning (Continued...)

Lecture 24 - Motivation of Learning (Continued...)

Lecture 25 - Motivation of Learning (Continued...)

Lecture 26 - Emotional Intelligence and Learning

Lecture 27 - Emotional Intelligence and Learning (Continued...)

Lecture 28 - Emotional Intelligence and Learning (Continued...)

Lecture 29 - Emotional Intelligence and Learning (Continued...)

Lecture 30 - Emotional Intelligence and Learning (Continued...)

Lecture 31 - Learning and Instruction

Lecture 32 - Learning and Instruction (Continued...)

Lecture 33 - Learning and Instruction (Continued...)

Lecture 34 - Learning and Instruction (Continued...)

Lecture 35 - Learning and Instruction (Continued...)

Lecture 36 - Learning and Pedagogy

Lecture 37 - Learning and Pedagogy (Continued...)

Lecture 38 - Learning and Pedagogy (Continued...)

Lecture 39 - Learning and Pedagogy (Continued...)

Lecture 40 - Learning and Pedagogy (Continued...)

Lecture 41 - Psychology of E-Learning

Lecture 42 - Psychology of E-Learning (Continued...)

Lecture 43 - Psychology of E-Learning (Continued...)

Lecture 44 - Psychology of E-Learning (Continued...)

Lecture 45 - Psychology of E-Learning (Continued...)

Lecture 46 - Effective Learning: Assessment and Feedback

Lecture 47 - Effective Learning: Assessment and Feedback (Continued...)

Lecture 48 - Effective Learning: Assessment and Feedback (Continued...)

Lecture 49 - Effective Learning: Assessment and Feedback (Continued...)

Lecture 50 - Effective Learning: Assessment and Feedback (Continued...)

Lecture 51 - Learning for Sustainability

Lecture 52 - Learning for Sustainability (Continued...)

Lecture 53 - Learning for Sustainability (Continued...)

Lecture 54 - Learning for Sustainability (Continued...)

Lecture 55 - Learning for Sustainability (Continued...)

Lecture 56 - Learning for Sustainability

Lecture 57 - Learning for Sustainability (Continued...)

Lecture 58 - Learning for Sustainability (Continued...)

Lecture 59 - Learning for Sustainability (Continued...)

Lecture 60 - Learning for Sustainability (Continued...)

NPTEL : NOC:Introduction to Language and Linguistics (Humanities and Social Sciences)

Co-ordinators : Dr. Dripta Piplai (Mondal), Dr. Bornini Lahiri

Lecture 1 - How do we define language?

Lecture 2 - What is knowledge of language?

Lecture 3 - How is Human communication unique?

Lecture 4 - Universal properties of language

Lecture 5 - What do we do in Linguistics?

Lecture 6 - Transdisciplinary Approach to Linguistics

Lecture 7 - Rules of Language

Lecture 8 - Competence and Performance, Langue and Parole

Lecture 9 - Universal Grammar

Lecture 10 - Faculty of Language

Lecture 11 - Introduction to Phonetics

Lecture 12 - More about Phonetics

Lecture 13 - Introduction to IPA

Lecture 14 - Introduction to Phonology

Lecture 15 - More about Phonology

Lecture 16 - Introducing Morphology

Lecture 17 - Morpheme, Morph and Allomorph

Lecture 18 - Types of Morpheme

Lecture 19 - Morphological Processes

Lecture 20 - More about Morphological Process

Lecture 21 - Morphological Typology

Lecture 22 - Introducing Syntax

Lecture 23 - Syntactic Categories and Subcategories

Lecture 24 - Constituents and Phrase Structures Rules

Lecture 25 - More about Trees

Lecture 26 - Different parts of a tree

Lecture 27 - From Transformation to GB Theory

Lecture 28 - Introducing Minimalism

Lecture 29 - Introducing Semantics

Lecture 30 - Lexical Semantics

Lecture 31 - Introducing Pragmatics

Lecture 32 - Language and Script

Lecture 33 - Defining Computational Linguistics

Lecture 34 - An Introduction to Corpus Linguistics

Lecture 35 - Introducing Linguistic Typology

Lecture 36 - More about Linguistic Typology

Lecture 37 - Typology through Indian Languages

Lecture 38 - Language Families of India

Lecture 39 - More about Language Families of India

Lecture 40 - India as a Linguistic Area

Lecture 41 - Introducing Sociolinguistics

Lecture 42 - Language Maintenance and Language Shift

Lecture 43 - Multilingualism and Varieties of Language

Lecture 44 - Language, Dialect and Standardization

Lecture 45 - Standard Language Ideology

Lecture 46 - Language Variation

Lecture 47 - Language Change

Lecture 48 - Language and Identity

Lecture 49 - Language Endangerment

Lecture 50 - Different Aspects of Language Endangerment

Lecture 51 - Language Documentation

Lecture 52 - Language Documentation and Revitalization

Lecture 53 - A Discussion on Field Linguistics

Lecture 54 - Language Teaching

Lecture 55 - More about Language Teaching

Lecture 56 - Sociolinguistics and language teaching

Lecture 57 - Language Policy

Lecture 58 - Endangered Languages and its Revitization through Classroms

Lecture 59 - Summing up

Lecture 60 - Summing up

NPTEL : NOC:Philosophy and Critical Thinking (Humanities and Social Sciences)

Co-ordinators : Prof. Gyan Prakash

Lecture 1 - Introduction

Lecture 2 - Branches of Philosophy

Lecture 3 - Philosophy and other Subjects

Lecture 4 - History of Western Philosophy

Lecture 5 - Pre Socrates-Philosopher

Lecture 6 - Pre Socrates-Philosopher

Lecture 7 - Socrates

Lecture 8 - Plato

Lecture 9 - Aristotle

Lecture 10 - Rene Descartes

Lecture 11 - Rene Descartes

Lecture 12 - Rene Descartes

Lecture 13 - Benedict Spinoza

Lecture 14 - Benedict Spinoza

Lecture 15 - John Lock

Lecture 16 - John Lock

Lecture 17 - Hume

Lecture 18 - Hume

Lecture 19 - Critical argument against empiricism

Lecture 20 - Ethics

Lecture 21 - Branches of Ethics

Lecture 22 - Virtue Ethics

Lecture 23 - Hedonism

Lecture 24 - Utilitarianism

Lecture 25 - Mill on happiness

Lecture 26 - Immanuel Kant

Lecture 27 - Immanuel Kant

Lecture 28 - Immanuel Kant

Lecture 29 - Indian Philosophy

Lecture 30 - Indian Philosophy

Lecture 31 - Indian Philosophy

Lecture 32 - Indian Philosophy

Lecture 33 - Indian Philosophy

Lecture 34 - Sankara's philosophy

Lecture 35 - Sankara's philosophy

Lecture 36 - Sankara's philosophy

Lecture 37 - Sankara's philosophy

Lecture 38 - Sankara's philosophy

Lecture 39 - Ramanuja's Philosophy

Lecture 40 - Ramanuja's Philosophy

Lecture 41 - Ramanuja's Philosophy

Lecture 42 - Ramanuja's Philosophy

Lecture 43 - Vedanta Philosophy

Lecture 44 - Buddhist Philosophy

Lecture 45 - Buddhist Philosophy

Lecture 46 - Buddhist Philosophy

Lecture 47 - Buddhist Philosophy

Lecture 48 - Buddhist Philosophy

Lecture 49 - Samkhya Philosophy

Lecture 50 - Samkhya Philosophy

Lecture 51 - Samkhya Philosophy

Lecture 52 - Samkhya Philosophy

Lecture 53 - Samkhya Philosophy

Lecture 54 - The Jaina Philosophy

Lecture 55 - The Jaina Philosophy

Lecture 56 - The Jaina Philosophy

Lecture 57 - The Jaina Philosophy

Lecture 58 - The Jaina Philosophy

NPTEL : NOC:Sustainable Happiness (Humanities and Social Sciences)

Co-ordinators : Prof. Atasi Mohanty

Lecture 1 - Introduction

Lecture 2 - Sustainability and Happiness

Lecture 3 - Sustainability and Wellbeing

Lecture 4 - Sustainable Happiness Theory

Lecture 5 - Sustainable Happiness Process

Lecture 6 - Introduction

Lecture 7 - Positive Education

Lecture 8 - Predictors of Happiness

Lecture 9 - Contemplative Learning

Lecture 10 - ESD and Sustainable Learning

Lecture 11 - Introduction - Sustainable Happiness at Workplace

Lecture 12 - Work Culture

Lecture 13 - Work Culture and Emotional Intelligence at Work

Lecture 14 - Emotional Intelligence at Work (Continued...)

Lecture 15 - Sustainable Competences

Lecture 16 - Definition Sustainable Organisations

Lecture 17 - Corporate Sustainability

Lecture 18 - Sustainability policies and practices

Lecture 19 - Role of Technology in Sustainability

Lecture 20 - Building Resilient Organizations

Lecture 21 - Need for Sustainable Leadership

Lecture 22 - Competencies of Sustainable Leaders

Lecture 23 - Sustainable Lifestyle, Work-life balance and Wellbeing practices

Lecture 24 - Transforming Self and Other

Lecture 25 - Transforming Self and other (Continued...)

Lecture 26 - Positive Character Strengths

Lecture 27 - Positive and Creative Organizations

Lecture 28 - Nurturing Talent and Career Growth

Lecture 29 - Nudging

Lecture 30 - Habits of Mind and Life Skills

Lecture 31 - Introduction to Sustainable Wellbeing

Lecture 32 - Good Health and Wellbeing

Lecture 33 - Sustainable Learning and Education

Lecture 34 - Green Creativity and Responsible Innovation

Lecture 35 - Consumers' Sustainability Demands and Trends

Lecture 36 - Education for Sustainable Development

Lecture 37 - ESD for Social Transformation

Lecture 38 - ESG for Value Creation

Lecture 39 - ESG for Sustainable Wellbeing

Lecture 40 - ESG and Inner Development Goals

NPTEL : NOC:Logistics and Supply Chain Management (Humanities and Social Sciences)

Co-ordinators : Prof. Vikas Thakur

Lecture 1 - Introduction to Logistics: Design and Management

Lecture 2 - Logistics Stakeholders and Modern Logistics Concepts

Lecture 3 - Manufacturing Logistics: National and International Scenario

Lecture 4 - Storage and Warehousing

Lecture 5 - Logistics Services Providers

Lecture 6 - E-Logistics

Lecture 7 - International Logistics

Lecture 8 - International Logistics

Lecture 9 - Logistics Key Performance Indicators (KPIs)

Lecture 10 - Tools for Improving Logistics Efficiency

Lecture 11 - Tools for Improving Logistics Efficiency (Continued...)

Lecture 12 - Reverse Logistics

Lecture 13 - Reverse Logistics (Continued...)

Lecture 14 - Green Logistics

Lecture 15 - Lean Logistics

Lecture 16 - Lean Logistics (Continued...)

Lecture 17 - Lean Logistics (Continued...)

Lecture 18 - Trends in Logistics

Lecture 19 - Trends in Logistics (Continued...)

Lecture 20 - Logistics vs SCM

Lecture 21 - Fundamentals of Supply Chain Management (SCM)

Lecture 22 - SC Operations: Manufacturing versus Service SC

Lecture 23 - Principle Streams of Supply Chain

Lecture 24 - Principle Streams of Supply Chain

Lecture 25 - Objectives of Supply Chain Networks

Lecture 26 - Supply Chain Uncertainty and Processes

Lecture 27 - Supply Chain Operational Views

Lecture 28 - Supply Chain Models and Modelling Systems

Lecture 29 - Supply Chain Drivers

Lecture 30 - Supply Chain Drivers

Lecture 31 - upply Chain Impellers and Value Chain

Lecture 32 - Strategic Supply Chain Management

Lecture 33 - Strategic Supply Chain Management (Continued...)

Lecture 34 - Achieving Supply Chain Strategic Fit

Lecture 35 - Achieving Supply Chain Strategic Fit (Continued...)

Lecture 36 - Make or Buy Decision

Lecture 37 - Strategic Sourcing

Lecture 38 - Vendor Rating

Lecture 39 - Supply Chain Coordination

Lecture 40 - Supply Chain Performance: Balanced Scorecard Approach

Lecture 41 - Supply Chain Performance: Balanced Scorecard Approach (Continued...)

Lecture 42 - Importance of Distribution in Supply Chain

Lecture 43 - Designing Distribution Networks in Supply Chain

Lecture 44 - Facility Location Planning

Lecture 45 - Demand Forecasting

Lecture 46 - Capacity Planning

Lecture 47 - Sequencing and Scheduling

Lecture 48 - Transportation Management

Lecture 49 - Transportation Problem Programming

Lecture 50 - Transportation Problem Programming

Lecture 51 - Assignment Problem Programming

Lecture 52 - Inventory Management

Lecture 53 - Inventory Management (Continued...)

Lecture 54 - Supply Chain Digitalization: 21st Century Supply Chain

Lecture 55 - Smart Supply Chains

Lecture 56 - Robust and Resilient Supply Chain Design

Lecture 57 - 21st Century Supply Chain

Lecture 58 - Sustainable Supply Chain

Lecture 59 - Emergency Supply Chain

Lecture 60 - Assets Management in Supply Chain

NPTEL : NOC:Tools and Technologies of Language Documentation (Humanities and Social Sciences)

Co-ordinators : Prof. Bornini Lahiri, Prof. Dripta Piplai

Lecture 1 - Introduction

Lecture 2 - Language Endangerment

Lecture 3 - Introducing Language Shift and Ethnolinguistic Vitality

Lecture 4 - More about Language Shift

Lecture 5 - Linguistic diversity, biodiversity and wellbeing

Lecture 6 - Assessing Language Vitality

Lecture 7 - Language Documentation

Lecture 8 - Language attitude and vitality

Lecture 9 - Evaluating Language Attitude

Lecture 10 - Designing Questionnaire - Part 1

Lecture 11 - Designing Questionnaire - Part 2

Lecture 12 - Documenting Oral Literature - Part 1

Lecture 13 - Documenting Oral Literature - Part 2

Lecture 14 - How to collect Ethnolinguistic Data?

Lecture 15 - Methods for Remote Data Collection

Lecture 16 - Metadata and Other related information

Lecture 17 - Different Approaches of Language Documentation

Lecture 18 - Challenges in the Indian field - Part 1

Lecture 19 - Challenges in the Indian field - Part 2

Lecture 20 - Best Practices in the Field: Dos and Don'ts

Lecture 21 - Issues related to Ethics

Lecture 22 - Sapirâ€“Whorf hypothesis

Lecture 23 - Fieldwork Conversations: Challenges, Precautions and Solutions

Lecture 24 - Language documentation and the problem of standardization

Lecture 25 - Script and Language

Lecture 26 - Data Processing and IPA

Lecture 27 - IPA Transcription - Part I

Lecture 28 - IPA Transcription - Part II

Lecture 29 - IPA Transcription with Field Data

Lecture 30 - Glossing Rules

Lecture 31 - Language Revitalization

Lecture 32 - Creating Dictionaries

Lecture 33 - Writing Grammar

Lecture 34 - Creating pedagogical material

Lecture 35 - More about the use of pedagogical material

Lecture 36 - Language Technology for Endangered Languages

Lecture 37 - Case Studies of Language Documentation from India

Lecture 38 - Language Documentation Across the World

Lecture 39 - Conclusion

Lecture 40 - Summing up

NPTEL : Aspects of Western Philosophy (Humanities and Social Sciences)

Co-ordinators : Dr. Sreekumar Nellickappilly

Lecture 1 - Greek Philosophy: Ionians, Pythagoras, Parmenides, Heraclitus and Democritus

Lecture 2 - Sophists, Socrates; philosophy of man; relativism and subjectivism; the idea of good

Lecture 3 - Platos idealism: theory of ideas

Lecture 4 - Plato: theory of knowledge, method of dialectic; theory of soul

Lecture 5 - Aristotles criticism of Platonic idealism and the concepts of Form and Matter

Lecture 6 - Aristotles theory of causation; potentiality and actuality

Lecture 7 - Medieval philosophy: St. Augustine and the Problem of evil; St. Thomas Aquinass concepts of faith and reason; proofs for the existence of God.

Lecture 8 - Modern Philosophy: mail characteristic features; renaissance and scientific revolution; rationalism and empiricism: main features.

Lecture 9 - Descartes: the method in philosophy; the concepts of doubt and indubitable knowledge.

Lecture 10 - Descartes: the mind-body dualism; the concept of God and proofs for Gods existence

Lecture 11 - Spinoza: the concepts of Substance, attributes and modes.

Lecture 12 - Spinozas pantheism-God and nature

Lecture 13 - Leibniz: Monadology; the mind-body problem revisited; concept of God; the concept of pre-established harmony

Lecture 14 - The empiricism of John Locke: ideas and their classification; refutation of innate ideas

Lecture 15 - John Locke: theory of knowledge; concept of substance; the primary and secondary qualities

Lecture 16 - Berkeley: the refutation of the distinction between primary and secondary qualities, immaterialism

Lecture 17 - Berkeleys critique of abstract ideas, esse est percipi, the problem of solipsism; God and self

Lecture 18 - Hume : Impressions and ideas, knowledge concerning relations of ideas and knowledge concerning matters of fact, induction and causality.

Lecture 19 - The external world and the self, personal identity, rejection of metaphysics, scepticism, reason and the passions.

Lecture 20 - Critical Philosophy: characteristic features; kantd objectives: the classification of judgements, possibility of synthetic a priori judgements, the Copernican revolution

Lecture 21 - Kant: forms of sensibility, categories of understanding; the process of knowledge acquisition; phenomenon and noumenon,

Lecture 22 - The Ideas of Reason-soul, God and world as a whole; antinomies; rejection of speculative metaphysics.

Lecture 23 - Kants ethics; freedom and immortality, problems with Kant.

Lecture 24 - Hegel : The conception of Geist (spirit), the dialectical method, concepts of being, non-being and becoming,

Lecture 25 - Absolute idealism; consciousness, self consciousness and reason.

Lecture 26 - Karl Marx: historical materialism; the significance of the proletariat; the base structure-superstructure division.

Lecture 27 - Nietzsche : Critique of western culture, religion and morality; will to power; the idea of superman.

Lecture 28 - Linguistic turn in British philosophy: Russells logical atomism and the refutation of idealism.

Lecture 29 - Wittgenstein : early Wittgensteins conception of language and reality; the picture theory of meaning

Lecture 30 - Later Wittgensteins conception of language games and forms of life; meaning and use.

Lecture 31 - Logical positivism; against metaphysics and a scientific conception of philosophy; the limitation of logical positivism

Lecture 32 - Husserl : Phenomenology and the methods of reduction; the principle of intentionality.

Lecture 33 - Phenomenological reduction, eidetic reduction and transcendental reduction; transcendental subjectivity; the pure subject.

Lecture 34 - Heidegger : phenomenological hermeneutics; concept of Being; man as being-in-the-world; destruction of the western intellectual tradition.

Lecture 35 - Authentic and inauthentic existence; Truth as disclosure

Lecture 36 - Existentialism: main features; existence precedes essence; freedom and responsibility; finiteness and situatedness of human existence

Lecture 37 - Sartres conception of human existence; man is condemned to be free; rejection of essentialism

Lecture 38 - The concept of being-in-itself, being-for-itself and being-for-others

Lecture 39 - Postmodernism: major trends and chief characteristic features; conceptions of human subject; different postmodern approaches

Lecture 40 - Deconstruction, feminism, discourse theory etc.

NPTEL : Contemporary Literature (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Introduction to Drama

Lecture 2 - Harold Pinter

Lecture 3 - The Dumb Waiter

Lecture 4 - The Dumb Waiter (Continued...)

Lecture 5 - Six Degrees of Separation

Lecture 6 - Six Degrees of Separation

Lecture 7 - Six Degrees of Separation

Lecture 8 - Six Degrees of Separation

Lecture 9 - Six Degrees of Separation

Lecture 10 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 11 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 12 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 13 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 14 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 15 - Tom Stoppard - Dogg's Hamlet, Cahoot's Macbeth

Lecture 16 - Arthur Miller Clara

Lecture 17 - Arthur Miller Clara

Lecture 18 - Arthur Miller Clara

Lecture 19 - Albert Camus The Fall

Lecture 20 - Albert Camus The Fall

Lecture 21 - Albert Camus The Fall

Lecture 22 - Girish Karnad - Nagamandala

Lecture 23 - Girish Karnad - Nagamandala

Lecture 24 - Girish Karnad - Nagamandala

Lecture 25 - Short Story - Salman Rushdie's

Lecture 26 - Short Story2 - Hanif Kureishi's

Lecture 27 - Modernism Post

Lecture 28 - Kazuo Ishiguro - Remains of the Day

Lecture 29 - Kazuo Ishiguro - Remains of the Day

Lecture 30 - Kazuo Ishiguro - Remains of the Day

Lecture 31 - Kazuo Ishiguro - Remains of the Day

Lecture 32 - Michael Ondaatje - The English Patient

Lecture 33 - Michael Ondaatje - The English Patient

Lecture 34 - Michael Ondaatje - The English Patient

Lecture 35 - Asian-American Writing

Lecture 36 - Amy Tan's - The Joy Luck Club

Lecture 37 - Amy Tan's - The Joy Luck Club

Lecture 38 - Amy Tan's - The Joy Luck Club

Lecture 39 - Poetry

Lecture 40 - Poetry

NPTEL : History of Economic Theory (Humanities and Social Sciences)

Co-ordinators : Prof. S.S. SivaKumar

Lecture 1 - The Socio-Economic Role of Scarcity and Uncertainty

Lecture 2 - The Process of Construction of Knowledge

Lecture 3 - The Roles of Faith and Experience

Lecture 4 - From Orphism to the Milesians in ancient Greece

Lecture 5 - Pythagoras and Heraclitus

Lecture 6 - From Parmenides to the atomists

Lecture 7 - From the ancient Greece to the emergence of Feudalism

Lecture 8 - Feudalism and the growth of the Church

Lecture 9 - The age of Faith: Europe until the crusades

Lecture 10 - The beginnings of modernity

Lecture 11 - Scholasticism and St.Thomas

Lecture 12 - Transformation of Europe towards modernity

Lecture 13 - Birth of political economy: mercantilism

Lecture 14 - The debate over mercantilism: Hume and Cantillon

Lecture 15 - A postscript to mercantilism: Hume and James Stewart

Lecture 16 - â€˜Natural Orderâ€™ and the market: Quesney and Galiani

Lecture 17 - Smith: the Invisible Hand

Lecture 18 - Smith: Growth theory, long run equilibrium and Institutions

Lecture 19 - Ricardo-Malthus debate

Lecture 20 - Ricardian economics and more

Lecture 21 - Equilibrium of the market: from Say to Walras

Lecture 22 - More on Equilibrium: Cournot, Dupuit, Gossen, von Thunen

Lecture 23 - Socialists and Marx

Lecture 24 - The economics of Marx

Lecture 25 - Marx as an ideologue of revolution

Lecture 26 - Arrival of modern universals in Economics: Neo classical school

Lecture 27 - Economic Theory at the time arrival of Keynes

Lecture 28 - The centrality of the idea of efficiency in the study of market

Lecture 29 - Keynesian Revolution: Macroeconomics

Lecture 30 - Keynesian economics

Lecture 31 - Economics of Institutions

Lecture 32 - Transaction cost and Economic Anthropology approaches

Lecture 33 - Evolutionary Economics: the idea of change as evolution

Lecture 34 - From Schumpeter to neo Schumpetarian evolutionism

Lecture 35 - The social construction of knowledge: Case of Economics

Lecture 36 - The social construction of knowledge: Adaptation and Revolution

NPTEL : Indian Philosophy (Humanities and Social Sciences)

Co-ordinators : Dr. Satya Sundar Sethy

Lecture 1 - Introduction to Indian Philosophy

Lecture 2 - A Brief Discussion on the Vedas & the Upanishads

Lecture 3 - The CÄrvÄka School - I

Lecture 4 - The CÄrvÄka School - II

Lecture 5 - The SÄá¹…khya School - I

Lecture 6 - The SÄá¹…khya School - II

Lecture 7 - The SÄá¹…khya School - III

Lecture 8 - The SÄá¹…khya School - IV

Lecture 9 - The SÄá¹…khya School - V

Lecture 10 - The SÄá¹…khya School - VI

Lecture 11 - The Yoga School - I

Lecture 12 - The Yoga School - II

Lecture 13 - The Yoga School - III

Lecture 14 - The Yoga School - IV

Lecture 15 - The NyÄya School - I

Lecture 16 - The NyÄya School - II

Lecture 17 - The NyÄya School - III

Lecture 18 - The NyÄya School - IV

Lecture 19 - The NyÄya School - V

Lecture 20 - The NyÄya School - VI

Lecture 21 - The NyÄya School - VII

Lecture 22 - The NyÄya School - VIII

Lecture 23 - The NyÄya School - IX

Lecture 24 - Buddhism - I

Lecture 25 - Buddhism - II

Lecture 26 - Buddhism - III

Lecture 27 - Buddhism - IV

Lecture 28 - Buddhism - V

Lecture 29 - Jainism - I

Lecture 30 - Jainism - II

Lecture 31 - Jainism - III

Lecture 32 - The VaiÅ›eá¹£ika School - I

Lecture 33 - The VaiÅ›eá¹£ika School - II

Lecture 34 - The VaiÅ›eá¹£ika School - III

Lecture 35 - The VaiÅ›eá¹£ika School - IV

Lecture 36 - The VaiÅ›eá¹£ika School - V

Lecture 37 - The VaiÅ›eá¹£ika School - VI

Lecture 38 - The MimÄnsÄ School - I

Lecture 39 - The MimÄnsÄ School - II

Lecture 40 - The MimÄnsÄ School - III

Lecture 41 - The MimÄnsÄ School - IV

Lecture 42 - The MimÄnsÄ School - V

NPTEL : Better Spoken English (Humanities and Social Sciences)

Co-ordinators : Prof. Shreesh Chaudhary

Lecture 1 - Introduction

Lecture 2 - Student Presentations - I

Lecture 3 - Feedback on Presentations - I

Lecture 4 - Stage Manners

Lecture 5 - Tempo of Speech

Lecture 6 - Some Reasons for Mishearing

Lecture 7 - Topics for Presentations - II

Lecture 8 - Message

Lecture 9 - Tables, Charts, Graphs

Lecture 10 - Power Point Slides

Lecture 11 - Criteria for Evaluation

Lecture 12 - Student Presentations - II

Lecture 13 - Feedback on Presentation - II

Lecture 14 - Topics for Presentation - III

Lecture 15 - On â€œSaying â€˜Please!â€™ â€

Lecture 16 - English Rhythm - I

Lecture 17 - English Rhythm - II

Lecture 18 - Phrasal Pause in English - I

Lecture 19 - Phrasal Pause in English - II

Lecture 20 - Units of Time, Weight, Distance

Lecture 21 - Stress in English - I

Lecture 22 - Stress in English - II

Lecture 23 - Stress in English - III

Lecture 24 - Stress in English - IV

Lecture 25 - Stress in English - V

Lecture 26 - Stress in English - VI

Lecture 27 - Student Presentations - III

Lecture 28 - Student Presentations - III

Lecture 29 - Student Presentations - III (Continued...)

Lecture 30 - Feedback on Presentations - III

Lecture 31 - Some Non-standard Sounds

Lecture 32 - Some â€œDifficultâ€ Sounds in English

Lecture 33 - Some â€œVowelâ€ Sounds in English

Lecture 34 - Some â€œConsonantsâ€ in English

Lecture 35 - Student Presentations - IV

Lecture 36 - Student Presentations - IV

Lecture 37 - Student Presentations - IV (Continued...)

Lecture 38 - Final Tips

NPTEL : Introduction to Film Studies (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Course Overview

Lecture 2 - Cinema & Semiotics

Lecture 3 - Cinema & Semiotics (Continued...)

Lecture 4 - Plot in Cinema

Lecture 5 - Plot in Cinema (Continued...)

Lecture 6 - Character as a plot element

Lecture 7 - Editing in Cinema

Lecture 8 - Realism in Cinema

Lecture 9 - Colour : Theory & Practice

Lecture 10 - Intertextuality

Lecture 11 - Intertextuality (Continued...)

Lecture 12 - Intertextuality (Continued...)

Lecture 13 - Cinema & Modernism

Lecture 14 - Cinema and Modernism (Continued...)

Lecture 15 - The French Masters

Lecture 16 - The French Masters (Continued...)

Lecture 17 - The French Masters (Continued...)

Lecture 18 - Canonical Text

Lecture 19 - Canonical Text (Continued...)

Lecture 20 - Canonical Text (Continued...)

Lecture 21 - The Academy Awards

Lecture 22 - Classic Hollywood

Lecture 23 - Classic Hollywood (Continued...)

Lecture 24 - Classic Hollywood (Continued...)

Lecture 25 - Case study

Lecture 26 - Stars as Icons

Lecture 27 - Cinema and the Counterculture Movement

Lecture 28 - Italian cinema

Lecture 29 - Japanese Cinema

Lecture 30 - Auteur Theory in the USA

Lecture 31 - Auteur Theory in the USA (Continued...)

Lecture 32 - New Hollywood

Lecture 33 - New Hollywood (Continued...)

Lecture 34 - New Hollywood (Continued...)

Lecture 35 - New Hollywood (Continued...)

Lecture 36 - Cinema and Genres

Lecture 37 - Cinema and Genres (Continued...)

Lecture 38 - Postmodernism and Cinema

Lecture 39 - Postmodernism & Cinema (Continued...)

Lecture 40 - The Western

NPTEL : Introduction to Modern Linguistics (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar, Prof. Shreesh Chaudhary

Lecture 1 - Introduction

Lecture 2 - Design Features of Language - 1

Lecture 3 - Design Features of Language - 2

Lecture 4 - Design Features of Language - 3

Lecture 5 - Design Features of Language - 4

Lecture 6 - Design Features of Language - 5

Lecture 7 - Production of Speech Sounds

Lecture 8 - Organs of Articulation

Lecture 9 - Functions of Vocal Cords

Lecture 10 - Production of Speech Sounds, Cardinal Vowels

Lecture 11 - English Vowels

Lecture 12 - Diphthong

Lecture 13 - Production of Consonants

Lecture 14 - Consonants

Lecture 15 - Consonants-2

Lecture 16 - Review : Production of Speech Sounds

Lecture 17 - What is Phonology

Lecture 18 - Phonemes & Allophones

Lecture 19 - Phonological Phenomena

Lecture 20 - Syllable Template

Lecture 21 - Syllable

Lecture 22 - Syllable - Based Generalization

Lecture 23 - Syllable - Based Generalization

Lecture 24 - Morphology

Lecture 25 - Units of Word Formation

Lecture 26 - Affixation

Lecture 27 - Syntax: An Introduction

Lecture 28 - Syntax: An Introduction (Continued...)

Lecture 29 - Syntax: X-bar Theory

Lecture 30 - Syntax: X-bar Theory (Continued...)

Lecture 31 - Syntax: Phrase Structure (Compliment and Adjuncts)

Lecture 32 - Syntax: Argument Selection

Lecture 33 - Syntax: Structure of an IP and Thematic Relations

Lecture 34 - Syntax: Structure of an IP and Thematic Relations (Continued...)

Lecture 35 - Syntax: Structure of an IP and Thematic Relations (Continued...)

Lecture 36 - Syntax: Case Assignment

Lecture 37 - Syntax: Exceptional Case Marking

Lecture 38 - Word Formation-3

Lecture 39 - Discourse

Lecture 40 - Discourse..

Lecture 41 - Concluding Remarks

NPTEL : Principles and Parameters in Natural Language (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar

Lecture 1 - Introduction of the Course

Lecture 2 - What is linguistics? What is Language?

Lecture 3 - Language and Arbitrariness, Language and Dialect

Lecture 4 - E vs I Language, Language as a rule governed system

Lecture 5 - Language Faculty, Language in Human Mind

Lecture 6 - How do we learn language?

Lecture 7 - Language Acquisition

Lecture 8 - Innateness: Some Essential Concepts

Lecture 9 - Structure of Language at the Level of Sounds

Lecture 10 - Sounds (Vocal Apparatus)

Lecture 11 - Places and Manners of Articulation

Lecture 12 - Word Formation/Phonotactic Rules

Lecture 13 - Rules of Word Formation (Singular-Plural)

Lecture 14 - Sentence: An Introduction

Lecture 15 - Making of a Sentence (Components)

Lecture 16 - Grammaticality and Acceptability

Lecture 17 - Subject and Verb in a Sentence

Lecture 18 - Sentence: Objects and Verbs

Lecture 19 - Phrase Structure

Lecture 20 - X-Bar Theory

Lecture 21 - Specifier and Complement

Lecture 22 - Complements and Adjuncts

Lecture 23 - VP Components

Lecture 24 - Categorial Selections, Selectional Restrictions on verbs

Lecture 25 - Thematic Relations

Lecture 26 - Case

Lecture 27 - Morphological and Abstract Case

Lecture 28 - Structural Case

Lecture 29 - Exceptional Case Marking

Lecture 30 - Movement

Lecture 31 - Motivations for Movement

Lecture 32 - Questions and Movement

Lecture 33 - Guest Lecture: Generative Grammar by Professor B. N. Patnaik

Lecture 34 - Passives and NP Movement

Lecture 35 - NP Movement and Raising

Lecture 36 - Binding Theory and NP Interpretations

Lecture 37 - Principles of Binding Theory

Lecture 38 - Constraints on Movements

Lecture 39 - Structure of Language and Negation

Lecture 40 - Negation and Negative Polarity Items

Lecture 41 - Structure, Language, Cognition and Pragmatics

NPTEL : NOC:Literary Criticism and Literary Theory (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Introduction & Course Overview - Lecture 1 - Part A

Lecture 2 - Introduction & Course Overview - Lecture 1 - Part B

Lecture 3 - Key terms and Concepts - 1 - Lecture 2

Lecture 4 - Key terms and Concepts - 2 - Lecture 3

Lecture 5 - Key terms and Concepts - 3 - Lecture 4

Lecture 6 - Classical Theory - Lecture 5 - Part C

Lecture 7 - Classical Theory - Lecture 5 - Part A

Lecture 8 - Classical Theory - Lecture 5 - Part B

Lecture 9 - Classical Theory - Lecture 6 - Part A

Lecture 10 - Neoclassicism - Lecture 6 - Part B

Lecture 11 - Romanticism - Early Romanticism - Lecture 7 - Part A

Lecture 12 - Romanticism - Romanticism - Lecture 7 - Part C

Lecture 13 - Romanticism - Romanticism - Lecture 7 - Part D

Lecture 14 - Romanticism - Early Romanticism - Lecture 7 Part B

Lecture 15 - Late 19th Century - Lecture 9 - Late 19th century

Lecture 16 - Lecture 10 A - Marxism

Lecture 17 - Lecture 10 B - Marxism

Lecture 18 - Twentieth Century Criticism - Lecture 11 A - Formalism

Lecture 19 - Twentieth Century Criticism - Lecture 11 B - New criticism

Lecture 20 - Psychoanalysis and Psychoanalytic Criticism - PART A

Lecture 21 - Psychoanalysis and Psychoanalytic Criticism - PART B

Lecture 22 - Psychoanalysis and Psychoanalytic Criticism - PART C

Lecture 23 - Structuralism - Lecture 12 Part A structuralism

Lecture 24 - Structuralism - Lecture 12 Part B structuralism

Lecture 25 - Archetypal Criticism - Lecture 13 - Archetypal Criticism

Lecture 26 - Post Structuralism - Part A

Lecture 27 - Post Structuralism - Part B

Lecture 28 - Post Colonialism - Part A

Lecture 29 - New Historicism and Cultural Materialism - Part A

Lecture 30 - New Historicism and Cultural Materialism - Part B

Lecture 31 - Reader Response criticism

Lecture 32 - Semiotics theory - PART A

Lecture 33 - Semiotics theory - PART B

Lecture 34 - Film studies - Part A

Lecture 35 - Film studies - Part B

Lecture 36 - Postmodernism - Part A

Lecture 37 - Postmodernism - Part B

Lecture 38 - Ecocriticism - Part A

Lecture 39 - Ecocriticism - Part B

Lecture 40 - Post theory - Part A

Lecture 41 - Post theory - Part B

NPTEL : NOC:Language and Mind (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar

Lecture 1 - On Language - What is language

Lecture 2 - On Language - How do we learn language

Lecture 3 - On Language - Learning language

Lecture 4 - On Language - Acquiring language

Lecture 5 - On Language - Language evolution

Lecture 6 - Language in Mind - Language and language learning

Lecture 7 - Language in Mind - Language in mind

Lecture 8 - Language in Mind - Grammar

Lecture 9 - Language in Mind - Language and human mind

Lecture 10 - Language in Mind - Mechanism of sound production

Lecture 11 - Patterns in Sounds and Words - Consonants

Lecture 12 - Patterns in Sounds and Words - Features of sounds

Lecture 13 - Patterns in Sounds and Words - Words

Lecture 14 - Patterns in Sounds and Words - Words II

Lecture 15 - Patterns in Sounds and Words - Words III

Lecture 16 - Words and Sentences - Words IV

Lecture 17 - Words and Sentences - Words V

Lecture 18 - Words and Sentences - Structure of a sentence

Lecture 19 - Words and Sentences - Nature of sentences and phrases

Lecture 20 - Words and Sentences - Syntax

Lecture 21 - Grammar - Structure of sentence (agreement)

Lecture 22 - Grammar - Sentence (categories and phrase)

Lecture 23 - Grammar - Sentence (phrase structure)

Lecture 24 - Grammar - Sentence (X bar and IP)

Lecture 25 - Grammar - Sentence (inflectional phrase)

Lecture 26 - Advanced Grammar - Sentence (compliment and adjunct)

Lecture 27 - Advanced Grammar - Sentence (restrictions)

Lecture 28 - Advanced Grammar - Sentence (semantic relations)

Lecture 29 - Advanced Grammar - Sentence (case)

Lecture 30 - Advanced Grammar - Sentence (movement)

Lecture 31 - Levels of Representation and Principles of Grammar - CP and displacement

Lecture 32 - Levels of Representation and Principles of Grammar - Sentence (CP in subject and object position)

Lecture 33 - Levels of Representation and Principles of Grammar - Sentence (passivization and NP movement)

Lecture 34 - Levels of Representation and Principles of Grammar - Sentence (referential expressions)

Lecture 35 - Levels of Representation and Principles of Grammar - Sentence (binding)

Lecture 36 - Language and Cognition - Sentence Dependencies: Compound verbs and negation

Lecture 37 - Language and Cognition - Language and cognition

Lecture 38 - Language and Cognition - Language, cognition and computers

Lecture 39 - Language and Cognition - Language and computers: resolving ambiguity

Lecture 40 - Language and Cognition - Language and mind: a summary

NPTEL : NOC:Film Appreciation (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Introduction

Lecture 2 - Key Concepts: Part-1

Lecture 3 - Key Concepts: Part-2

Lecture 4 - Lecture: Film Theory

Lecture 5 - Lecture: Genre Theory

Lecture 6 - Lecture: German Expressionism

Lecture 7 - Lecture: Italian Neo-Realism

Lecture 8 - Lecture: French New Wave

Lecture 9 - Lecture: Spanish Cinema

Lecture 10 - Lecture: British New Wave

Lecture 11 - Lecture: Chinese Cinema

Lecture 12 - Action Cinema

Lecture 13 - Lecture: Deewar

Lecture 14 - Melodrama

Lecture 15 - Formalism in Cinema

Lecture 16 - The Language of Cinema

Lecture 17 - Devdas

Lecture 18 - City Cinema

Lecture 19 - The Semiotics of Cinema

Lecture 20 - Raging Bull

Lecture 21 - Robert Bresson

Lecture 22 - Studio Cinema: Part-1

Lecture 23 - Studio Cinema: Part-2

Lecture 24 - New Hollywood Cinema: Part-1

Lecture 25 - New Hollywood Cinema: Part-2

Lecture 26 - History of Hindi Cinima: Part-1

Lecture 27 - History of Hindi Cinima: Part-2

Lecture 28 - History of Hindi Cinema: Part-3

Lecture 29 - Ideology in Cinema

Lecture 30 - Character in Cinema

Lecture 31 - Mythological Cinema in India

Lecture 32 - The Cinema of Satyajit Ray

Lecture 33 - Hindi Film Music

Lecture 34 - The Hollywood musicals

Lecture 35 - African cinema

Lecture 36 - Iranian cinema

Lecture 37 - Canadian Cinema

Lecture 38 - Eastern European Cinema

Lecture 39 - European Cinema Hungary, Sweden, Greece

Lecture 40 - Postmodernism and cinema

Lecture 41 - Mall towns in cinema

Lecture 42 - Film sequels, remakes and cult films

Lecture 43 - Parallel Cinema From India

NPTEL : NOC:Appreciating Carnatic Music (Humanities and Social Sciences)

Co-ordinators : Dr. Lakshmi Sreeram

Lecture 1 - The Body of Music

Lecture 2 - Music everywhere finding the classical

Lecture 3 - Classical Music Art Music

Lecture 4 - Music through Melody & Music through Harmony

Lecture 5 - Musical Material A Hard Look

Lecture 6 - Musical material Mo2

Lecture 7 - Carnatic Music as Raga Music

Lecture 8 - Understanding Raga - Part I

Lecture 9 - Understanding Raga - Part II (Raga and Swara)

Lecture 10 - Understanding Raga - Part III A Glimpse into Gamaka (Ornamentation) and Phraseology

Lecture 11 - Swara in the Sanskrit Textual Tradition

Lecture 12 - Sruti in Sanskrit Textual tradition

Lecture 13 - Tambura

Lecture 14 - Gamaka I

Lecture 15 - Gamaka II

Lecture 16 - Gamaka III

Lecture 17 - Gamakas IV

Lecture 18 - Raga and Phraseology

Lecture 19 - Raga - some basic expectations

Lecture 20 - A string of Ragas and a teaser

Lecture 21 - Raga in the textual tradition

Lecture 22 - Classification of Ragas I

Lecture 23 - Classification of Ragas II

Lecture 24 - Mela system of classifying raga-s

Lecture 25 - Generating the 72 mela-s

Lecture 26 - Application of 72 mela

Lecture 27 - Katapayadi Naming the 72 melas

Lecture 28 - Vivadi I

Lecture 29 - Vivadi II

Lecture 30 - Raga - Circles and Triangles

Lecture 31 - Laya: temporal discipline in music.

Lecture 32 - Tala an Introduction to the Concept

Lecture 33 - More on Tala and laya

Lecture 34 - Aspects of Tala - I

Lecture 35 - Aspects of Tala - II

Lecture 36 - Aspects of Tala - III

Lecture 37 - Aspects of IV

Lecture 38 - Composition in Carnatic Music

Lecture 39 - Varnam - An Introduction

Lecture 40 - Varnam and laya intricacies

Lecture 41 - Kriti the premier compositional form in Carnatic music

Lecture 42 - Kriti some basic features

Lecture 43 - Precursors to the Kriti

Lecture 44 - Bhakti and Carnatic Music: Metaphor, World view and Yearning in Carnatic compositions.

Lecture 45 - Tanjavur and the Carnatic Trinity

Lecture 46 - Tyagaraja, the Vaggeyakara

Lecture 47 - Tyagaraja and His Many Moods -I

Lecture 48 - Tyagaraja and His Many Moods II

Lecture 49 - Muthuswami Dikshitar an overview

Lecture 50 - Muthuswami Dikshitar the Sanskirt Scholar and Advaitin

Lecture 51 - Muthuswami Dikshitar Some Other Aspects of his Work.

Lecture 52 - Syama Sastri

Lecture 53 - Tamil Composers before the trinity

Lecture 54 - Post trinity Composers

Lecture 55 - Swathi Tirunal - the Versatile Royal Composer

Lecture 56 - The Romance of Padam and Javali

Lecture 57 - Tillana

Lecture 58 - Improvisation in Carnatic Music - Alapana

Lecture 59 - ALAPANA : Style and Aesthetics

Lecture 60 - Neraval and Swaraprastara

Lecture 61 - TANAM

Lecture 62 - An expostion of Balagopala,a kriti in the rega Bhairavi with alapana, neraval and swaraprastara followed by tani Avartanam

Lecture 63 - Accompaniment in Carnatic Music - The Violin

Lecture 64 - Percussive Accompaniment - the Mridangam

Lecture 65 - Subsidiary Accompaniment - Interaction Among Accompanists

Lecture 66 - Percussion MRIDANGAM

Lecture 67 - Percussion KANJIRA

Lecture 68 - Percussion Ghatam

Lecture 69 - Percussion Morsing

Lecture 70 - Percussion Korvai and Thani Avartanam

Lecture 71 - The Typical carnatic Concert And Ragam Tanam Pallavi - RTP

Lecture 72 - Performing arts, drama

Lecture 73 - Dance and music

Lecture 74 - Raga-Concept and Presentation in Carnatic and Hindustani Music

NPTEL : NOC:Infrastructure Economics (Humanities and Social Sciences)

Co-ordinators : Prof.Nalin Bharti

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

NPTEL : NOC:Language and Society (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar

Lecture 1 - Introduction to language and society

Lecture 2 - Language and India

Lecture 3 - Language and a language

Lecture 4 - Language, dialect and variety

Lecture 5 - Dialect and standard language

Lecture 6 - How do children learn language?

Lecture 7 - First language acquisition

Lecture 8 - Critical period and SLA

Lecture 9 - Sounds and words

Lecture 10 - Sentence

Lecture 11 - India as a linguistic area

Lecture 12 - Language variation

Lecture 13 - Language and culture

Lecture 14 - Language and power- politics

Lecture 15 - Indian english

Lecture 16 - Fluidity and continuum

Lecture 17 - Language in education

Lecture 18 - Language and scholastic achievement

Lecture 19 - Language and language teaching

Lecture 20 - Concluding remarks

NPTEL : NOC:Issues in Bioethics (Humanities and Social Sciences)

Co-ordinators : Dr. Sreekumar Nellickappilly

Lecture 1 - Module 1 - Unit 1 - Overview of Bioethics

Lecture 2 - Module 1 - Unit 2 - Historical Evolution of Bioethics-I

Lecture 3 - Module 1 - Unit 3 - Historical Evolution of Bioethics-II

Lecture 4 - Module 1 - Unit 4 - Historical Evolution of Bioethics-III

Lecture 5 - Module 1 - Unit 5 - Bioethics Today: Culture, Democracy and Law

Lecture 6 - Module 2 - Unit 1 - Ethical theories and Bioethical Issues

Lecture 7 - Module 2 - Unit 2 - Other ethical theories

Lecture 8 - Module 2 - Unit 3 - Hedonistic Approaches in Ethical Theories

Lecture 9 - Module 2 - Unit 4 - Deontological Approach

Lecture 10 - Module 2 - Unit 5 - Priniciple-Based Theories

Lecture 11 - Module 3 - Unit 1 - Challenges to the Person of the Individual

Lecture 12 - Module 3 - Unit 2 - Challenges to Dignity and the Human Rights Approach in Bioethics

Lecture 13 - Module 3 - Unit 3 - Problems in Resource Allocation

Lecture 14 - Module 3 - Unit 4 - End of Life Issues

Lecture 15 - Module 3 - Unit 5 - Ethics of Care, Gender Concerns and Feminist Perspectives

Lecture 16 - Module 4 - Unit 1 - Technological Advancements and Bioethical concerns

Lecture 17 - Module 4 - UNIT 2 - The challenges posed by Genetic Engineering and Gener Therapy Not Started

Lecture 18 - Module 4 - Unit 3 - The challenges posed by Epidemic Threats

Lecture 19 - Module 4 - Unit 4 - Religious Traditions and Contemporary Bioethics

Lecture 20 - Module 4 - Unit 5 - Towards a Phronetic Bioethics

NPTEL : NOC:Technical English for Engineers (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - An Introduction to the Course

Lecture 2 - Parts of Speech - Nouns

Lecture 3 - Parts of Speech - Preposition and Noun Phrases

Lecture 4 - Countable and Uncountable Nouns

Lecture 5 - Reading (Identifying main ideas) and Listening

Lecture 6 - What is a Sentence

Lecture 7 - What is a Sentence (Continued...)

Lecture 8 - Subject Verb Agreement

Lecture 9 - Articles

Lecture 10 - Verbs

Lecture 11 - Comparatives

Lecture 12 - Modals and Voices

Lecture 13 - Passive Voice (Continued...)

Lecture 14 - Tenses

Lecture 15 - Tenses (Continued...)

Lecture 16 - Effective Speaking

Lecture 17 - Formal Presentation

Lecture 18 - Punctuation

Lecture 19 - Punctuation (Continued...)

Lecture 20 - Reading Â– SQW3R Method and Note-taking

Lecture 21 - Phrasal Verbs

Lecture 22 - Collocation

Lecture 23 - Word Formation

Lecture 24 - Understanding the text organization

Lecture 25 - Writing Emails

Lecture 26 - Academic Writing and Linking Words

Lecture 27 - Paragraph Writing

Lecture 28 - Describing/Explaining Processes

Lecture 29 - Essay Writing

Lecture 30 - Essay Writing and Formal Letters

Lecture 31 - Letter Writing and Usage

Lecture 32 - Understanding the Mechanics of Publishable Essays

Lecture 33 - Writing Publishable Essays and Usage

Lecture 34 - Report

Lecture 35 - Everyday Usage

Lecture 36 - Writing a Statement of Purpose

Lecture 37 - CV/Resume and Cover Letters

Lecture 38 - Conclusion

NPTEL : NOC:Health Research Fundamentals (Humanities and Social Sciences)

Co-ordinators : Dr. P GaneshKumar, Dr. P. Manickam, Dr. Prabhdeep Kaur, Dr. Tarun Bhatnagar, Dr. R Ramakrishnan, Dr. Manoj V Murhekar, Dr. Sanjay Mehendale

Lecture 1 - Introduction to Health Research

Lecture 2 - Formulating research question, hypothesis and objectives

Lecture 3 - Literature review

Lecture 4 - Measurement of disease frequency

Lecture 5 - Descriptive study designs

Lecture 6 - Analytical study designs

Lecture 7 - Experimental study designs: Clinical trials

Lecture 8 - Validity of epidemiological studies

Lecture 9 - Qualitative research methods: An overview

Lecture 10 - Measurement of study variables

Lecture 11 - Sampling methods

Lecture 12 - Calculating sample size and power

Lecture 13 - Selection of study population

Lecture 14 - Study plan and project management

Lecture 15 - Designing data collection tools

Lecture 16 - Principles of data collection

Lecture 17 - Data management

Lecture 18 - Overview of data analysis

Lecture 19 - Ethical framework for health research

Lecture 20 - Conducting clinical trials

Lecture 21 - Preparing a concept paper for research projects

Lecture 22 - Elements of a protocol for research studies

NPTEL : NOC:American Literature and Culture (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Lecture 1 - Introduction to the course on American Literature and Culture

Lecture 2 - Lecture 2 - Henry James : Introduction

Lecture 3 - Lecture 3 - Henry James : The Portrait of a Lady

Lecture 4 - Lecture 4 - Henry James : The Portrait of a Lady (Chapter 1-20)

Lecture 5 - Lecture 5 - Henry James : The Portrait of a Lady (Chapter 1-20 continued)

Lecture 6 - Lecture 6 - Henry James : The Portrait of a Lady (Chapter 1-20 continued)

Lecture 7 - Lecture 7 - Henry James : The Portrait of a Lady (Chapter 21-35)

Lecture 8 - Lecture 8a - Henry James : The Portrait of a Lady (Chapter 21-34)

Lecture 9 - Lecture 8b - Henry James : The Portrait of a Lady (Chapter 35)

Lecture 10 - Lecture 9a - Theodore Dreiser : An American Tragedy- Introduction

Lecture 11 - Lecture 9b - Theodore Dreiser : An American Tragedy

Lecture 12 - Lecture 10a - Theodore Dreiser : An American Tragedy

Lecture 13 - Lecture 10b - Theodore Dreiser : An American Tragedy

Lecture 14 - Lecture 10c - Theodore Dreiser : An American Tragedy

Lecture 15 - Lecture 11 - Herman Melville : Moby Dick

Lecture 16 - Lecture 12 - Herman Melville : Moby Dick

Lecture 17 - Lecture 12a - Herman Melville : A brief overview

Lecture 18 - Lecture 13a - Short Story

Lecture 19 - Lecture 13b - Flannery O'Connor : A brief overview

Lecture 20 - Lecture 14 - Flannery O'Connor

Lecture 21 - Lecture 15 - Ernest Hemingway : A brief overview

Lecture 22 - Lecture 16 - Ernest Hemingway : The Sun also Rises

Lecture 23 - Lecture 17 - Ernest Hemingway : The Sun also Rises

Lecture 24 - Lecture 18 - Ernest Hemingway : The Sun also Rises

Lecture 25 - Lecture 19 - Ernest Hemingway : The Sun also Rises

Lecture 26 - Lecture 20 - F. Scott Fitzgerald : A brief overview

Lecture 27 - Lecture 21 - Romanticism

Lecture 28 - Lecture 22 - Edgar Allen Poe : Annabel Lee

Lecture 29 - Lecture 23 - American Drama

Lecture 30 - Lecture 24 - Lillian Hellman

Lecture 31 - Lecture 25 - Lillian Hellman : The Children's Hour

Lecture 32 - Lecture 26 - Lillian Hellman : The Children's Hour

Lecture 33 - Lecture 27 - Lillian Hellman : The Children's Hour

Lecture 34 - Lecture 28 - Arthur Miller : The Dramatist, his life and works

Lecture 35 - Lecture 29 - Arthur Miller : A View From The Bridge

Lecture 36 - Lecture 30 - Arthur Miller : A View From The Bridge

Lecture 37 - Lecture 31 - Arthur Miller : A View From The Bridge

Lecture 38 - Lecture 32 - Eugene O'Neill : An Introduction

Lecture 39 - Lecture 33 - Eugene O'Neill : Desire Under the Elms

Lecture 40 - Lecture 34 - Edith Wharton : An Introduction

Lecture 41 - Lecture 35 - Edith Wharton : Age Of Innocence

Lecture 42 - Lecture 36 - Edith Wharton : The Age of Innocence

Lecture 43 - Lecture 37 - Edith Wharton : The Age of Innocence

Lecture 44 - Lecture 38 - Christopher Hitchens : Jewish Power, Jewish Peril

Lecture 45 - Lecture 39 - Hart Crane : The Bridge

NPTEL : NOC:Economics of IPR (Humanities and Social Sciences)

Co-ordinators : Prof.Nalin Bharti

Lecture 1 - Introduction to IPR - Historical Overview from GATT to WTO

Lecture 2 - Why IPR Matters

Lecture 3 - Application of IPR in the Global World

Lecture 4 - Economic Perspective on IPR

Lecture 5 - Types of IPR Its introduction and objectives

Lecture 6 - Globalization of IPR

Lecture 7 - Economics of Copyright

Lecture 8 - Economics of Patent

Lecture 9 - Economics of Trademarks

Lecture 10 - Economics of Trade Secrets

Lecture 11 - Economics of Industrial Design

Lecture 12 - Issues in Contemporary Patent

Lecture 13 - Critical Issues in Copyright and Related Rights

Lecture 14 - Issues in Traditional Knowledge

Lecture 15 - Plant Varieties Protection and Biotechnology

Lecture 16 - Commercialization of Intellectual Property and Unfair Competition

Lecture 17 - Disputes related to Patent in WTO

Lecture 18 - Disputes related to copyright, etc. in WTO

Lecture 19 - IP and Development

Lecture 20 - Summarizing the course

NPTEL : NOC:Applied Linguistics (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar

Lecture 1 - Introduction

Lecture 2 - Language

Lecture 3 - Language in Society

Lecture 4 - Acquisition

Lecture 5 - Vocal Apparatus

Lecture 6 - Places and Manners of Articulation

Lecture 7 - Word Formation Phonotactic Rules

Lecture 8 - Rules of Word Formation

Lecture 9 - Sentences- an introduction

Lecture 10 - Components of a Sentence

Lecture 11 - Grammaticality and Acceptability

Lecture 12 - Subject and Verb in a sentence

Lecture 13 - Sentence : Objects and Verbs

Lecture 14 - Application of linguistic structure in social theory

Lecture 15 - Second Language Acquisition

Lecture 16 - Language and Multilingualism

Lecture 17 - Language, Culture and Cognition

Lecture 18 - Classroom discussion on Language, Culture and Cognition

Lecture 19 - Language and Gender

Lecture 20 - Language, Media and Network society

Lecture 21 - Language Teaching

Lecture 22 - Language Teaching Methods - I

Lecture 23 - Language Teaching Methods - II

Lecture 24 - Materials and Assessment in Teaching Language

Lecture 25 - Disability and Learning Disorder

Lecture 26 - Language Development and Specific Difficulties

Lecture 27 - Dyslexia: A Developmental Phenomenon or a Disorder

Lecture 28 - Specific Learning Difficulties

Lecture 29 - Language and Computers

Lecture 30 - Language, Computers and Applications

Lecture 31 - Language and Education

Lecture 32 - Language and Application

NPTEL : NOC:English Language for Competitive Exams (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - What is Reading Comprehension?

Lecture 2 - Literature and reading comprehension

Lecture 3 - Scientific passages and reading comprehension

Lecture 4 - Analyze a task - 1

Lecture 5 - Analyze a task - 2

Lecture 6 - Reading - Comprehending Scientific Passages

Lecture 7 - Comprehending Literary Passages - 1

Lecture 8 - Comprehending Literary Passages - 2

Lecture 9 - Academic writing

Lecture 10 - Text - Completion

Lecture 11 - Analogy

Lecture 12 - Writing : Long Essays

Lecture 13 - Writing : Long Essays (Continued...)

Lecture 14 - Listening

Lecture 15 - Writing : Imaginative Essays

Lecture 16 - Listening for Specific Information

Lecture 17 - Reading Comprehension

Lecture 18 - (Lecture Missing)

Lecture 19 - Reading Comprehension: Long Passages

Lecture 20 - Verbal Analogy and Vocabulary

Lecture 21 - Vocabulary: Word Families and Confusable Words

Lecture 22 - Vocabulary: word origins and confusable words

Lecture 23 - Vocabulary: Text Completion - Part 1

Lecture 24 - Vocabulary: Text Completion - Part 2

Lecture 25 - Vocabulary: Text Completion - Part 3

Lecture 26 - Vocabulary: Synonyms, Meanings and Confusable Words

Lecture 27 - Text Completion

Lecture 28 - Text Completion (Continued...)

Lecture 29 - Analogy and Text Completion

Lecture 30 - Text Completion (Continued...)

Lecture 31 - Text Completion - Part 4

Lecture 32 - Names and Vocabulary

Lecture 33 - Latin Terms in English Vocabulary

Lecture 34 - Greek Mythology and Vocabulary

Lecture 35 - Green Names and Foreign Words

Lecture 36 - Vocabulary Practice Test

Lecture 37 - Analogy

Lecture 38 - Foreign Words and Names

Lecture 39 - Suffixes and Reference Words

Lecture 40 - Uncommon Words - Part 1

Lecture 41 - Uncommon Words - Part 2

Lecture 42 - More Uncommon Words

Lecture 43 - More Uncommon Words (Continued...)

Lecture 44 - Vocabulary and Analogy

Lecture 45 - Vocabulary: Mixed Bag

Lecture 46 - Subject-Verb Agreement and Sentence Correction

Lecture 47 - Sentence Correction

Lecture 48 - Conditional Clauses, Prepositions and Reported Speech

Lecture 49 - Clauses

Lecture 50 - Modifiers, Active Voice and Passive Voice

Lecture 51 - Gerunds and Infinitives

Lecture 52 - Coordinators and Conjunctions - Part 1

Lecture 53 - Coordinators and Conjunctions - Part 2

Lecture 54 - Grammar: Words and Expressions

Lecture 55 - Grammar: Phrasal Verbs

Lecture 56 - Punctuation

Lecture 57 - Punctuation (Continued...)

Lecture 58 - Revision - Vocabulary

Lecture 59 - Revision - Subject verb agreement

Lecture 60 - Read and Revise

NPTEL : NOC:Ethics (Humanities and Social Sciences)

Co-ordinators : Dr. Sreekumar Nellickappilly

Lecture 1 - Ethics and Morals: Introductory Remarks

Lecture 2 - Different Approaches to Ethics

Lecture 3 - Historical Perspectives: Agent-Centric Moral Theory of the East and the West

Lecture 4 - Medieval and Modern Moral Theories

Lecture 5 - Socratic Framework in Morla Philosophy

Lecture 6 - Eudaimonism to Divine Command

Lecture 7 - Divine Command Theory and the Euthyphro Dilemma

Lecture 8 - Different Types of Ethical Theory

Lecture 9 - Thomas Hobbes: Morality as Contract

Lecture 10 - Contractarianism

Lecture 11 - Contractarianism and its Moral Implications

Lecture 12 - Introduction to Deontological Approaches

Lecture 13 - Kantian Deontologism

Lecture 14 - Egoism and its Ethical Implications

Lecture 15 - Motivational and Ethical Hedonism

Lecture 16 - Utilitarianism and its Moral Position

Lecture 17 - The Individual and the Whole: The Ethics of Social Relations

Lecture 18 - Critique of Moral Absolutism: Nietzsche and his Reevaluation of Morals

Lecture 19 - Existentialism and Ethics

Lecture 20 - Ethics in the Present Age

NPTEL : NOC:The Renaissance and Shakespeare (Humanities and Social Sciences)

Co-ordinators : Prof. Shormishtha Panja

Lecture 1 - The Renaissance An Introduction - Part-1

Lecture 2 - The Renaissance An Introduction - Part-2

Lecture 3 - Shakespeare's Life and Times

Lecture 4 - Shakespeare's, William Shakespeare The Merchant of Venice performance

Lecture 5 - Shakespeare's, William Shakespeare The Merchant of Venice Panel Discussion

Lecture 6 - Othello Part-1

Lecture 7 - Othello Part-2

Lecture 8 - Lecture on A Midsummer Night's Dream

Lecture 9 - A Midsummer Night's Dream Performance

Lecture 10 - A Midsummer Night's Dream Panel Discussion

Lecture 11 - Shakespeare's History Plays

Lecture 12 - Lecture on Macbeth

Lecture 13 - Shakespeare's Romances or The Last Plays

Lecture 14 - Twelfth Night

Lecture 15 - Whose Shakespeares?? Colonial Encounters/Post Colonial Negotiations

Lecture 16 - Global Shakespeare

Lecture 17 - Global Shakespeare (Continued...)

NPTEL : NOC:Literature for Competitive Exams (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - An Overview of the History of English Literature

Lecture 2 - An Overview of the History of English Literature (Continued...)

Lecture 3 - Landmarks of the English literature

Lecture 4 - The Novel: An Overview

Lecture 5 - Landmarks in the English History

Lecture 6 - The Elizabethan Age

Lecture 7 - The Elizabethan Period (Part 1)

Lecture 8 - Key Figures of the Renaissance and the Elizabethan Age

Lecture 9 - 17 and early 18th century landmark events and literature

Lecture 10 - Literature and major events in 18 and 19 century

Lecture 11 - 18 and 19 century European masters

Lecture 12 - The English Poets

Lecture 13 - The Romantic Period

Lecture 14 - The English Romanticism

Lecture 15 - The English Poets (Continued...)

Lecture 16 - New Criticism

Lecture 17 - The American Romanticism

Lecture 18 - American Literature

Lecture 19 - Henry James

Lecture 20 - American literature: Practice Test

Lecture 21 - The American Novel

Lecture 22 - American Drama and Poetry

Lecture 23 - American Drama

Lecture 24 - American poets and Dramatists

Lecture 25 - Practice Test (Continued...)

Lecture 26 - Indian Writing in English: Novel and Poetry

Lecture 27 - Postcolonialism

Lecture 28 - Asian American Writing

Lecture 29 - South Asian Writing in English

Lecture 30 - World Literature

Lecture 31 - World Literature (Continued...)

Lecture 32 - Goethe Faust

Lecture 33 - Goethe Faust (Continued...)

NPTEL : NOC:History of English Language and Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Introduction : Literary History

Lecture 2 - Locating the Starting Points : The Anglo-Saxon Period

Lecture 3 - Old English period : Anglo-Saxon period

Lecture 4 - Middle English Period : English Before Chaucer

Lecture 5 - The Age of Chaucer

Lecture 6 - Middle English period after Chaucer

Lecture 7 - Middle English period after Chaucer

Lecture 8 - The Development of English Language - Tracing the Origins and Early Influences

Lecture 9 - The Development of English Language - Old English to Middle English

Lecture 10 - Introducing the Elizabethan Era - The English Reformation

Lecture 11 - The Elizabethan Age : The Beginning Of a Golden Era

Lecture 12 - Elizabethan Age : English Drama Before Shakespeare

Lecture 13 - The Emergence of Elizabethan 'Romantic' Drama

Lecture 14 - The University Wits : A Prelude to Shakespeare

Lecture 15 - The University Wits : A Prelude to Shakespeare-

Lecture 16 - William Shakespeare : The Man, the Dramatist and an Age

Lecture 17 - William Shakespeare : An Overview of his Drama

Lecture 18 - Elizabethan Theatre

Lecture 19 - Elizabethan Poetry and Prose

Lecture 20 - The Jacobean Age

Lecture 21 - The Jacobean Age (Continued...)

Lecture 22 - Jacobean Drama

Lecture 23 - Did Women Have a Renaissance?

Lecture 24 - The Caroline Period / The Age of Milton and The Interregnum

Lecture 25 - The Caroline Period / The Age of Milton and The Interregnum (Continued...)

Lecture 26 - The Age of Milton : Prose and Poetry

Lecture 27 - Changes in Language : Early Modern English

Lecture 28 - Early Modern English (Continued...)

Lecture 29 - The Age of Restoration

Lecture 30 - The Age of Dryden

Lecture 31 - The Restoration Drama

Lecture 32 - The Age of Pope / The Augustan Age

Lecture 33 - The Age of Pope : Prose (Perodicals,Essays and The Rise Of the Novel)

Lecture 34 - The Age of Pope : Prose (Perodicals,Essays and The Rise Of Novel) (Continued...)

Lecture 35 - The Age of Pope Conclusion

Lecture 36 - Scottish Enlightenment of the 18th Century

Lecture 37 - The Age of Johnson (1745 - 1798)

Lecture 38 - The Age of Johnson (Continued...)

Lecture 39 - The Rise of the Novel

Lecture 40 - The Rise of the Novel

Lecture 41 - The Rise of the Novel (Continued...)

Lecture 42 - The Rise of the Woman Writer in the 18th Century

Lecture 43 - The Revival of Romance

Lecture 44 - The Revival of Romance (Continued...)

Lecture 45 - The Revival of Romance

Lecture 46 - The Age of Romanticism: Introduction

Lecture 47 - The Age of Wordsworth

Lecture 48 - Age of Wordsworth (Continued...)

Lecture 49 - Age of Wordsworth (Continued...)

Lecture 50 - Prose in the age of Romanticism

Lecture 51 - Drama in the age of Romanticism

Lecture 52 - Novel in the age of Romanticism

Lecture 53 - Women writers in the Romantic age

Lecture 54 - The Age of Tennyson : Victorian Era

Lecture 55 - The Age of Tennyson : Victorian Poetry

Lecture 56 - The Age of Tennyson : Victorian Poetry (Continued...)

Lecture 57 - The Age of Tennyson : Victorian Poetry (Continued...)

Lecture 58 - Prose in the Victorial Age

Lecture 59 - Drama in the Victorian Age

Lecture 60 - Victorian Novel and the Late Victorian Period

Lecture 61 - The Age of Tennyson : Victorian Poetry (New)

Lecture 62 - Towards Modernism

Lecture 63 - Modernist Literature

Lecture 64 - Modernist Poetry

Lecture 65 - Modernist Prose and Fiction

Lecture 66 - Post-1945: Post-Modern Age

Lecture 67 - The Age of Restoration (New)

Lecture 68 - The Age of Tennyson: Victorial Poetry (New)

NPTEL : NOC:Patent Drafting for Beginners (Humanities and Social Sciences)

Co-ordinators : Prof. Feroze Ali

Lecture 1 - PDB-What are Inventions?

Lecture 2 - Background

Lecture 3 - Field of Invention

Lecture 4 - Prior Art

Lecture 5 - Patent Classification

Lecture 6 - Technical Advance

Lecture 7 - What are not inventions

Lecture 8 - Why People Invent

Lecture 9 - How Inventions Look

Lecture 10 - Where to Look for Inventions

Lecture 11 - How to Catch an Invention

Lecture 12 - Getting a working disclosure

Lecture 13 - Searching with the disclosure

Lecture 14 - Outcome of search

Lecture 15 - What is a Patentability Search

Lecture 16 - Reasons for Ordering a Patentability Search

Lecture 17 - When a Patentability Search is Not Required

Lecture 18 - How to Order a Patentability Search

Lecture 19 - Limits of Patentability Search

Lecture 20 - Patentability Search Report

Lecture 21 - How to pitch an invention

Lecture 22 - Identifying the inventive concept

Lecture 23 - Problem Solution Statement

Lecture 24 - Problem-Solution to Claim

Lecture 25 - How to Search for a Granted Patent

Lecture 26 - Provisions relating to claim

Lecture 27 - Some Exceptions to patentability

Lecture 28 - Structure of Claims

Lecture 29 - Preamble

Lecture 30 - Transition

Lecture 31 - Body

Lecture 32 - Form and Punctuation of Claims

Lecture 33 - Omnibus Claims

Lecture 34 - Structural and Functional Definitions

Lecture 35 - Cooperation

Lecture 36 - Types of Claims

Lecture 37 - Dependent claims

Lecture 38 - Apparatus Claims

Lecture 39 - Methods or Process Claims

Lecture 40 - Claim Drafting Best Practices

Lecture 41 - Claims Drafting What to Avoid

Lecture 42 - How to Download Copy of Patent Specification

Lecture 43 - Amendment to Claims

Lecture 44 - Claim Analysis Combo Pen with Marker

Lecture 45 - Introduction to Specification Drafting

Lecture 46 - Enabling Disclosure

Lecture 47 - Best method

Lecture 48 - Parts of the specification

Lecture 49 - Background and Summary

Lecture 50 - Detailed description

Lecture 51 - Parts of the Application

Lecture 52 - Evolution of Patent Specifications

Lecture 53 - Live Session

NPTEL : NOC:Business English Communication (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Reading Comprehension - 1

Lecture 2 - Reading Comprehension - 2

Lecture 3 - Reading Comprehension - 3

Lecture 4 - Reading Comprehension - 4

Lecture 5 - Reading Comprehension - 5

Lecture 6 - Vocabulary - 1

Lecture 7 - Vocabulary - 2

Lecture 8 - Vocabulary - 3

Lecture 9 - Vocabulary - 4

Lecture 10 - Vocabulary - 5

Lecture 11 - Grammar (subject verb agreement)

Lecture 12 - Grammar (Tenses)

Lecture 13 - Grammar (Clauses, Gerund and Infinitives, Coordinating conjunctions)

Lecture 14 - Grammar (Prepositions, Reported Speech, Active Voice and Passive Voice)

Lecture 15 - Grammar (Punctuations and Types of sentences: simple, compound and complex)

Lecture 16 - Writing (Emails and Memos)

Lecture 17 - Writing (Official letters and Presentation scripts)

Lecture 18 - Writing (Different business writing genres)

Lecture 19 - Writing (Business writing and vocabulary for specific situations)

NPTEL : NOC:Postmodernism in Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Introduction Part - 1

Lecture 2 - Introduction Part - 2

Lecture 3 - Introduction Part - 3

Lecture 4 - The Genealogy of Postmodernism

Lecture 5 - The Genealogy of Postmodernism : Locating the starting points

Lecture 6 - The Death of the author and it's Postmodern implications

Lecture 7 - The Death of the author and it's Postmodern implications (Continued...)

Lecture 8 - The Death of the author and it's Postmodern implications (Continued...)

Lecture 9 - What is an Author ?

Lecture 10 - What is an Author ? (Continued...)

Lecture 11 - Postmodern Theories and Frameworks : An Outline

Lecture 12 - Lyotard's Postmodern condition : Challenging Metanarratives

Lecture 13 - Lyotard's Postmodern condition : Challenging Metanarratives (Continued...)

Lecture 14 - Baudrillard,Hyperreality and Postmodern representations

Lecture 15 - Baudrillard,Hyperreality and Postmodern representations (Continued...)

Lecture 16 - Derrida,Deconstruction and Postmodern texts

Lecture 17 - Derrida,Deconstruction and Postmodern texts (Continued...)

Lecture 18 - Derrida,Deconstruction and Postmodern texts (Continued...)

Lecture 19 - Intertextuality,Kristeva and the study of Postmodern Texts

Lecture 20 - Postmodern Feminism : Gender and Performativity

Lecture 21 - Formulation of the Postmodern : Deleuze and Guattari

Lecture 22 - Minor Literature' and Postmodern Narratives

Lecture 23 - Critiques of Postmodernism : A Marxist Perspective

Lecture 24 - Critiques of Postmodernism

Lecture 25 - Feminism and Postmodernism

Lecture 26 - Situating the Postcolonial in the Postmodern

Lecture 27 - Homi K.Bhabha : The Postmodern and the Postcolonial

Lecture 28 - Is the Post-in Postmodernism the Post-in Postcolonial? : Understanding Appiah

Lecture 29 - Can the Subaltern Speak? : Deconstructing the Postcolonial

Lecture 30 - Reading Postmodern-Postcolonial Fiction

Lecture 31 - Hyperreality in Delillo's Postmodernist Fiction : A Discussion of White Noise

Lecture 32 - The Garden of Forking Paths : Postmodernist short fiction

Lecture 33 - The Garden of Forking Paths : Postmodernist short fiction (Continued...)

Lecture 34 - Postmodern Fiction by women : Reading Atwood's The Edible Woman

Lecture 35 - Postmodern Fiction by women : Reading Atwood's The Handmaid's Tale

Lecture 36 - Reading Postmdern Fiction : Slaughterhouse-Five b Kurt Vonnegut

Lecture 37 - Reading Postmdern Fiction : The French Lieutenant's Woman by John Fowles

Lecture 38 - Postmodern Writings : Features,trends and some departures

Lecture 39 - Postmodern Writings : Situating Pynchon and the Beat Generation

Lecture 40 - Postmodern literature today : Some concluding thoughts

NPTEL : NOC:Indian Fiction in English (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Indian Fiction in English - Introduction

Lecture 2 - Rushdie and Indian Writing

Lecture 3 - Situating 'fiction' in the history of Indian Writing in English

Lecture 4 - Indian Writing in English: A Background

Lecture 5 - Introducing Indian Fiction in English

Lecture 6 - The Critical Tradition of Indian Fiction in English

Lecture 7 - The rise of novel in regional languages: Indulekha

Lecture 8 - Rajmohan's Wife to Kanthapura

Lecture 9 - Kanthapura, Mythmaking and Gandhi

Lecture 10 - Mahatma and Indian novels in English

Lecture 11 - Waiting for the Mahatma - Part I

Lecture 12 - Waiting for the Mahatma - Part II

Lecture 13 - Indian Fiction in English: 1950s and 1960s

Lecture 14 - Heat and Dust

Lecture 15 - The Strange Case of Billy Biswas

Lecture 16 - Cry, the Peacock

Lecture 17 - Midnight's children: An introduction

Lecture 18 - Reading Midnight's Children

Lecture 19 - Salman Rushdie in Indian Fiction in English

Lecture 20 - Midnight's Children

Lecture 21 - Zelaldinus: A Masque

Lecture 22 - Trotter Nama

Lecture 23 - Shadow Lines

Lecture 24 - Reading the Shadow Lines

Lecture 25 - Caste in Indian English Fiction

Lecture 26 - Caste in Untouchable

Lecture 27 - Reading The God of Small Things - I

Lecture 28 - Reading The God of Small Things - II

Lecture 29 - Other Representations of Caste in IE fiction

Lecture 30 - All About H.Hatterr

Lecture 31 - Rich Like Us

Lecture 32 - Partition novels

Lecture 33 - White Tiger

Lecture 34 - Notes on the New Indian Novel in English

Lecture 35 - Riot: A Novel by Shashi Tharoor

Lecture 36 - English, August by Upamanyu Chatterjee

Lecture 37 - The Hungry Tide by Amitav Ghosh

Lecture 38 - Remains of the Feast

Lecture 39 - Writings in English from the Northeast: Reading Temsula Ao

Lecture 40 - The writings of Ruskin Bond

Lecture 41 - Inheritance of Loss by Kiran Desai

Lecture 42 - Indian Fiction in English - Positioning Literary Studies

Lecture 43 - New Writings in Contemporary Indian Fiction in English

Lecture 44 - Graphic Novel in India

Lecture 45 - The city in Indian English Fiction

Lecture 46 - Postcoloniality and its Challenges

Lecture 47 - Commomwealth literature does not exist

NPTEL : NOC:Introduction to Cultural Studies (Humanities and Social Sciences)

Co-ordinators : Prof. Avishek Parui

Lecture 1 - Introduction to Course

Lecture 2 - Different Interpretations Of Culture (Marxism)

Lecture 3 - Edward Saidâ€™s Orientalism

Lecture 4 - Homi Bhabaâ€™s The Other Question

Lecture 5 - The Other Question (Continued...)

Lecture 6 - Goerge Orwellâ€™s Shooting An Elephant - Part - I

Lecture 7 - Goerge Orwellâ€™s Shooting An Elephant - Part - II

Lecture 8 - Goerge Orwellâ€™s Shooting An Elephant - Part - III

Lecture 9 - The Post Modern Condition (Lyotard) - Part I

Lecture 10 - The Post Modern Condition (Lyotard) - Part II

Lecture 11 - The Post Modern Condition (Lyotard) - Part III

Lecture 12 - The Post Modern Condition (Lyotard) - Part IV

Lecture 13 - Fanon - Black Skin,White Masks - Part - I

Lecture 14 - Fanon - Black Skin,White Masks - Part - II

Lecture 15 - Fanon - Black Skin,White Masks - Part - III

Lecture 16 - Fanon - Black Skin,White Masks - Part - IV

Lecture 17 - Fanon - Black Skin,White Masks - Part - V

Lecture 18 - Judith Butler - Gender Trouble I

Lecture 19 - Judith Butler - Gender Trouble II

Lecture 20 - Judith Butler - Gender Trouble III

Lecture 21 - Judith Butler - Gender Trouble IV

Lecture 22 - Judith Butler - Gender Trouble V

Lecture 23 - Judith Butler - Gender Trouble VI

Lecture 24 - Judith Butler - Gender Trouble VII

Lecture 25 - Culture Studies: A Recap

Lecture 26 - Hannah Arendt - The Human Condition 1

Lecture 27 - Hannah Arendt - The Human Condition 2

Lecture 28 - Hannah Arendt - The Human Condition 3

Lecture 29 - Foucault - What Is An Author 1

Lecture 30 - Foucault - What Is An Author 2

Lecture 31 - Foucault - What Is An Author 3

Lecture 32 - Foucault - What Is An Author 4

Lecture 33 - Foucault - What Is An Author 5

Lecture 34 - Foucault - What Is An Author 6

Lecture 35 - Ian Hacking - The Social Construction Of What 1

Lecture 36 - Ian Hacking - The Social Construction Of What 2

Lecture 37 - Ian Hacking - The Social Construction Of What 3

Lecture 38 - Ian Hacking - The Social Construction Of What 4

Lecture 39 - Ian Hacking - The Social Construction Of What 5

Lecture 40 - Bell Hooks- Understanding Patriarchy 1

Lecture 41 - Bell Hooks- Understanding Patriarchy 2

Lecture 42 - Bell Hooks- Understanding Patriarchy 3

Lecture 43 - Bell Hooks- Understanding Patriarchy 4

Lecture 44 - Bell Hooks- Understanding Patriarchy 5

Lecture 45 - Bell Hooks- Understanding Patriarchy 6

Lecture 46 - Introduction To Cultural Studies - Summary

Lecture 47 - Dick Hebdige-Subculture The Meaning Of Style 1

Lecture 48 - Dick Hebdige-Subculture The Meaning Of Style 2

Lecture 49 - Dick Hebdige-Subculture The Meaning Of Style 3

Lecture 50 - Dick Hebdige-Subculture The Meaning Of Style 4

Lecture 51 - Catherine Belsey Critical Practice 1

Lecture 52 - Catherine Belsey Critical Practice 2

Lecture 53 - Catherine Belsey Critical Practice 3

Lecture 54 - Stuart Hall - Questions On Cultural Identity 1

Lecture 55 - Stuart Hall - Questions On Cultural Identity 2

Lecture 56 - Slavoj Zizek - Welcome To The Desert Of The Real Ii

Lecture 57 - Slavoj Zizek - Welcome To The Desert Of The Real Ii

Lecture 58 - Introduction to Cultural Studies - Summary and Conclusion

NPTEL : NOC:Intellectual Property (Humanities and Social Sciences)

Co-ordinators : Prof. Feroze Ali

Lecture 1 - Week 1 summary

Lecture 2 - An Introduction to Intellectual Property

Lecture 3 - What are Rights?

Lecture 4 - What is Property in IPR?

Lecture 5 - Meaning of Intellectual in IPR

Lecture 6 - Characteristics of IP

Lecture 7 - Defining IPR

Lecture 8 - Kinds of IPRs and their Duration

Lecture 9 - Rights Granted by IP

Lecture 10 - The Origin of Intellectual Property - Part 1

Lecture 11 - The Origin of Intellectual Property - Part 2

Lecture 12 - Growth of Intellectual Property

Lecture 13 - Learning Intellectual Property

Lecture 14 - Intangible Economy

Lecture 15 - The traits Intangibility

Lecture 16 - Policy Challenges in an Intangible Economy

Lecture 17 - Novartis Case

Lecture 18 - Novartis Standard

Lecture 19 - Definition of Start-up

Lecture 20 - Subject Matter

Lecture 21 - Patents in India

Lecture 22 - To file or not to file a patent

Lecture 23 - When and how to file a patent

Lecture 24 - Who can apply for a patent

Lecture 25 - Requirements of a patent application

Lecture 26 - Types of patent application

Lecture 27 - Mercedes Benz TV Commercial Patents

Lecture 28 - Patent Prosecution: Publication, Examination, Grant - Part 1

Lecture 29 - Patent Prosecution: Publication, Examination, Grant - Part 2

Lecture 30 - Rights, Assignment and Licenses - Part 1

Lecture 31 - Rights, Assignment and Licenses - Part 2

Lecture 32 - Opposition to Patents

Lecture 33 - Infringement of Patent

Lecture 34 - Defences to Patent Infringement

Lecture 35 - Intellectual Property Appellate Board

Lecture 36 - Declaratory Suits

Lecture 37 - Limitations of Patent Rights - Compulsory License

Lecture 38 - Limitations of Patent Rights - Govt Use

Lecture 39 - Trade Marks

Lecture 40 - Case Study - Frozen Desserts

Lecture 41 - Amul Advertisement

Lecture 42 - Kwality Wallâ€™s Advertisement

Lecture 43 - International Arrangements

Lecture 44 - Trade marks in India

Lecture 45 - What can be protected?

Lecture 46 - Registration of Trade Mark

Lecture 47 - Rights and Defences

Lecture 48 - Introduction to Copyright

Lecture 49 - Origin and Evolution of Copyright

Lecture 50 - Copyright in India

Lecture 51 - Criteria of Protection

Lecture 52 - Subject matter

Lecture 53 - Rights and Infringement

Lecture 54 - Educational Exceptions

Lecture 55 - Confidential Information Introduction

Lecture 56 - Confidential Information Requirements

Lecture 57 - Geographical Indications

Lecture 58 - Designs

Lecture 59 - Enforcement of IP

Lecture 60 - Infringement

Lecture 61 - Remedies

Lecture 62 - Alternate Dispute Resolution

Lecture 63 - Compulsory Licenses

Lecture 64 - Managing IP

Lecture 65 - Case Study Dolby

Lecture 66 - Case Study Disney

Lecture 67 - Case Study AstraZeneca

Lecture 68 - IP and Competition

Lecture 69 - Valuing IP

Lecture 70 - Universities and IP

Lecture 71 - Publish or Patent

Lecture 72 - Managing IP at Universities

Lecture 73 - Indian Universities and Patents

Lecture 74 - IP in Creative and Entertainment Industries

Lecture 75 - Piracy in the Film Industry

Lecture 76 - Government's Role in Fostering IP System

Lecture 77 - Teaching Intellectual Property

Lecture 78 - Q and A - Discussion

NPTEL : NOC:Short Fiction in Indian Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Divya.A

Lecture 1 - Plotting the Story world of In the Flood by Thakazhi Sivasankara Pillai

Lecture 2 - Plotting the Story world of In the Flood by Thakazhi Sivasankara Pillai

Lecture 3 - Narrative Patterns in In the Flood

Lecture 4 - Narrative Patterns in In the Flood

Lecture 5 - Narrative point of View and Setting in In the Flood

Lecture 6 - Close reading Kamala Das Summer Vacation

Lecture 7 - Close reading Kamala Das Summer Vacation

Lecture 8 - Summer Vacation Overview

Lecture 9 - Plotting Tagore's Story Kabuliwala (1892)

Lecture 10 - Plotting Tagore's Story Kabuliwala

Lecture 11 - Plotting the Spatiality of Tagore's Kabuliwala

Lecture 12 - Plotting the spatiality of Tagore's Kabuliwala

Lecture 13 - Realism,Gender in Tagore's Kabuliwala

Lecture 14 - How to write an Effective Paragraph

Lecture 15 - Plotting downfall in Khuswant Singh's Karma

Lecture 16 - Plotting downfall in Khuswant Singh's Karma

Lecture 17 - Narrative aspects in Khuswant Singh's Karma

Lecture 18 - Khuswant Singh's Karma Overview

Lecture 19 - Plotting Sundara Ramaswamy's Reflowering

Lecture 20 - Reading the Plot for themes in Sundara Ramaswamy's Reflowering

Lecture 21 - Reading the Plot for themes in Sundara Ramaswamy's Reflowering (Continued...)

Lecture 22 - Narrative Devices in Sundara Ramaswamy's Reflowering

Lecture 23 - Plotting Sundara Ramaswamy's Reflowering Overview

Lecture 24 - Short Genre and Premchand's The Chess Players

Lecture 25 - Short Story Genre and Premchand's The Chess Players

Lecture 26 - Short Story Structure and Premchand's The Chess Players

Lecture 27 - The Chess Players Overview

Lecture 28 - Psychological Climax in Premchand's The Shroud

Lecture 29 - Psychological Climax in Premchand's The Shroud (Continued...)

Lecture 30 - Psychological Climax in Premchand's The Shroud (Continued...)

Lecture 31 - Premchand's The Shroud

Lecture 32 - The Shroud Overview

Lecture 33 - Patriarchal Culture in A Kitchen in the Corner of the House - I

Lecture 34 - Patriarchal Culture in A Kitchen in the Corner of the House - II

Lecture 35 - Patriarchal Culture in Ambai's A Kitchen in the Corner of the House - I

Lecture 36 - Patriarchal Culture in Ambai's A Kitchen in the Corner of the House - II

Lecture 37 - Patriarchal Culture in Ambai's A Kitchen in the Corner of the House - III

Lecture 38 - Catharsis in Mulk Raj Anand's The Price of Bananas - I

Lecture 39 - Catharsis in Mulk Raj Anand's The Price of Bananas - II

Lecture 40 - Catharsis in Mulk Raj Anand's The Price of Bananas - III

Lecture 41 - Catharsis in Mulk Raj Anand's The Price of Bananas - Overview

Lecture 42 - Short Fiction in Indian Literature - vignesh - 12

Lecture 43 - Hidden Fractures in Ruskin Bond's The Blue Umbrella - II

Lecture 44 - Hidden Fractures in Ruskin Bond's The Blue Umbrella - III

Lecture 45 - Hidden Fractures in Ruskin Bond's The Blue Umbrella - Overview

Lecture 46 - Plotting and Ideology in RK Narayan's A Horse and Two Goats - I

Lecture 47 - Plotting and Ideology in RK Narayan's A Horse and Two Goats - Overview

Lecture 48 - Plotting and Ideology in RK Narayan's A Horse and Two Goats - Overview

Lecture 49 - Childhood anxiety at Play in Anita Desai's Games at Twilight - I

Lecture 50 - Childhood anxiety at Play in Anita Desai's Games at Twilight - II

Lecture 51 - Childhood anxiety at Play in Anita Desai's Games at Twilight - III

Lecture 52 - Childhood anxiety at Play in Anita Desai's Games at Twilight - Overview

Lecture 53 - Short Fiction In Indian Literature - Overview I

Lecture 54 - Short Fiction In Indian Literature - Overview II

NPTEL : NOC:The Nineteenth-Century English Novel (Humanities and Social Sciences)

Co-ordinators : Prof. Divya.A

Lecture 1 - The Nineteenth Century Novel

Lecture 2 - The Nineteenth Century Novel (Continued...)

Lecture 3 - The Nineteenth Century Novel (Continued...)

Lecture 4 - Jane Austen's Persuasion Chapters 1-6

Lecture 5 - Jane Austen's Persuasion

Lecture 6 - Persuasion, Chapter 7-12

Lecture 7 - Austen's Persuasion, Chapter 7-12

Lecture 8 - Austen's Persuasion, Chapter 7-12 (Continued...)

Lecture 9 - Persuasion Vol.II, Chapters 13-18

Lecture 10 - Persuasion Vol.II, Chapters 13-18 (Continued...)

Lecture 11 - Persuasion Vol.II, Chapters 13-18 (Continued...)

Lecture 12 - Persuasion Vol.II, Chapters 13-18 (Continued...)

Lecture 13 - Persuasion, Volume II, Chapters 19-24

Lecture 14 - Persuasion, Volume II, Chapters 19-24 (Continued...)

Lecture 15 - Persuasion, Volume II, Chapters 19-24 (Continued...)

Lecture 16 - Persuasion, Volume II, Chapters 19-24 (Continued...)

Lecture 17 - Jane Austen Seminar

Lecture 18 - Dicken's A Tale of Two Cities, Book I

Lecture 19 - A Tale of Two Cities Book I ; Chapters 4-6

Lecture 20 - Tale of Two Cities Book I : Chapters 4-6

Lecture 21 - Dicken's A Tale of Two Cities Book II : Chapters 1-3

Lecture 22 - Dicken's A Tale of Two Cities Book II : Chapters 3

Lecture 23 - Dicken's A Tale of Two Cities Book II : Chapters 4-6

Lecture 24 - Dicken's A Tale of Two Cities Book II : Chapters 6-9

Lecture 25 - Dicken's A Tale of Two Cities Book II : Chapters 9-12

Lecture 26 - Dicken's A Tale of Two Cities Book II : Chapters 10-12

Lecture 27 - Dickens' A Tale of Two Cities Book II : Chapters 13-15

Lecture 28 - Dickens' A Tale of Two Cities Book II : Chapters 13-15 (Continued...)

Lecture 29 - Dickens' A Tale of Two Cities Book II : Chapters 15-18

Lecture 30 - Dickens' A Tale of Two Cities Book II : Chapters 16-18

Lecture 31 - Dickens' A Tale of Two Cities : Chapters 19-21

Lecture 32 - Dickens' A Tale of Two Cities : Chapters - 21

Lecture 33 - Dickens' A tale of Two Cities Book II : Chapters 22 - 24

Lecture 34 - Dickens' A tale of Two Cities Book II : Chapters 22 - 24 (Continued...)

Lecture 35 - Dickens' A tale of Two Cities Book III : Chapters 1 - 3

Lecture 36 - Dickens' A tale of Two Cities Book III : Chapters 2 - 3

Lecture 37 - Dickens' A Tale of Two cities Book III : Chapters 7 - 9

Lecture 38 - Dickens' A Tale of Two cities Book III : Chapters 8 - 12

Lecture 39 - Dickens' A Tale of Two cities Book III : Chapters 10 - 12

Lecture 40 - Dickens' A Tale of Two cities Book III : Chapters 13

Lecture 41 - Dickens' A Tale of Two cities Book III : Chapters 14

Lecture 42 - Dickens' A Tale of Two cities Book III : Chapters 15

Lecture 43 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 1

Lecture 44 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 2

Lecture 45 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 3

Lecture 46 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 4

Lecture 47 - R.L.Stevenson, The Strange Case of Dr. Jekyll and Mr Hyde key Themes and Incident, Chapters 1-4

Lecture 48 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 5

Lecture 49 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 5 (Continued...)

Lecture 50 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapter 6

Lecture 51 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapters 8-10

Lecture 52 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapters 8.

Lecture 53 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapters 9

Lecture 54 - The Strange Case of Dr. Jekyll and Mr Hyde, Chapters 10

Lecture 55 - Themes and Contexts in R.L.Stevenson, The Strange Case of Dr. Jekyll and Mr Hyde

Lecture 56 - Discussion on Narrative Points of View

Lecture 57 - Discussion on Gender, Class and History

NPTEL : NOC:Feminist Writings (Humanities and Social Sciences)

Co-ordinators : Prof. Avishek Parui

Lecture 1 - Understanding Patriarchy - Part 1

Lecture 2 - Understanding Patriarchy - Part 2

Lecture 3 - Understanding Patriarchy - Part 3

Lecture 4 - Understanding Patriarchy - Part 4

Lecture 5 - Understanding Patriarchy - Part 5

Lecture 6 - The Fly - Part 1

Lecture 7 - The Fly - Part 2

Lecture 8 - The Fly - Part 3

Lecture 9 - Tickets, Please! - Part 1

Lecture 10 - Tickets, Please! - Part 2

Lecture 11 - Tickets, Please! - Part 3

Lecture 12 - The Cyborg Manifesto - Part 1

Lecture 13 - The Cyborg Manifesto - Part 2

Lecture 14 - The Cyborg Manifesto - Part 3

Lecture 15 - The Cyborg Manifesto - Part 4

Lecture 16 - The Cyborg Manifesto - Part 5

Lecture 17 - The Goblin Market - Part 1

Lecture 18 - The Goblin Market - Part 2

Lecture 19 - The Goblin Market - Part 3

Lecture 20 - The Goblin Market - Part 4

Lecture 21 - The Goblin Market - Part 5

Lecture 22 - Tulips - Part 1

Lecture 23 - Tulips - Part 2

Lecture 24 - The Yellow Wallpaper - Part 1

Lecture 25 - The Yellow Wallpaper - Part 2

Lecture 26 - The Yellow Wallpaper - Part 3

Lecture 27 - The Yellow Wallpaper - Part 4

Lecture 28 - The Second Sex - Part 1

Lecture 29 - The Second Sex - Part 2

Lecture 30 - The Second Sex - Part 3

Lecture 31 - The Second Sex - Part 4

Lecture 32 - The Second Sex - Part 5

Lecture 33 - The Iraqi Nights

Lecture 34 - Gender Trouble - Part 1

Lecture 35 - Gender Trouble - Part 2

Lecture 36 - Gender Trouble - Part 3

Lecture 37 - Gender Trouble - Part 4

Lecture 38 - A Temporary Matter - Part 1

Lecture 39 - A Temporary Matter - Part 2

Lecture 40 - A Temporary Matter - Part 3

Lecture 41 - A Temporary Matter - Part 4

Lecture 42 - A Temporary Matter - Part 5

Lecture 43 - Remains of the Feast - Part 1

Lecture 44 - Remains of the Feast - Part 2

Lecture 45 - Remains of the Feast - Part 3

Lecture 46 - Feminist Theory and Criticism

Lecture 47 - The Narratology of the graphic: Exploring the contemporary Graphic novel

Lecture 48 - Angela Carter: Fairytale Sexuality and the Deconstruction of myth

Lecture 49 - Interactive Session - 1

Lecture 50 - Interactive Session - 2

Lecture 51 - Feminist Writings and Feminism Today

NPTEL : NOC:Introduction to World Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Reading World Literature

Lecture 2 - Epic of Gilgamesh

Lecture 3 - Beowulf : The Anglo - Saxon narratie poem

Lecture 4 - The Lusiads by Luis De Camoes

Lecture 5 - Challenges and Possibilities for World Literature by Kathleen Shields

Lecture 6 - The Garden of Forking Paths by Borges - Part I

Lecture 7 - The Garden of Forking Paths by Borges - Part II

Lecture 8 - A Rose for Emily by William Faulkner - Part I

Lecture 9 - A Rose for Emily by William Faulkner - Part II

Lecture 10 - Sonnet 130 by Shakespeare and Love Sonnet XVI by Neruda

Lecture 11 - Song of Lawino by Okot p' Bitek

Lecture 12 - Tortures by Wislawa Szymborska

Lecture 13 - Spivak, Gayatri Chakravorty The Politics of translation

Lecture 14 - Othello - 1

Lecture 15 - Othello - 2

Lecture 16 - Othello - 3

Lecture 17 - Doll's House

Lecture 18 - Yellow Wallpaper

Lecture 19 - Toba Tek Singh

Lecture 20 - Oroonoko - I

Lecture 21 - Oroonoko - II

Lecture 22 - Poetics Of Aristotle - I

Lecture 23 - Poetics Of Aristotle - II

Lecture 24 - Longinus on the Subline - I

Lecture 25 - Longinus on the Subline - II

Lecture 26 - Errata in MC

Lecture 27 - From Errata to MC

Lecture 28 - The Third and the final Continent - I

Lecture 29 - The Third and the final Continent - II

Lecture 30 - Balthazar's Marvellous Afternoon - I by Marquez

Lecture 31 - Balthazar's Marvellous Afternoon - II

Lecture 32 - The Wasteland - I

Lecture 33 - The Wasteland - II

Lecture 34 - The Wall by Sartre - I

Lecture 35 - The Wall by Sartre - II

Lecture 36 - The Applicant

Lecture 37 - Everyday Use

Lecture 38 - Catcher in the Rye - I

Lecture 39 - Catcher in the Rye - II

Lecture 40 - Stage'ing Protests

Lecture 41 - DR Faustus

Lecture 42 - In A Grove

Lecture 43 - Metamorphosis - I

Lecture 44 - Metamorphosis - II

Lecture 45 - Diary Of a Madman

Lecture 46 - Solid Objects

Lecture 47 - Dawn of the New Indian Novel in English

Lecture 48 - Bartleby The Scrivener

Lecture 49 - The Great Gatsby - I

Lecture 50 - The Great Gatsby - II

NPTEL : NOC:Managing Intellectual Property in Universities (Humanities and Social Sciences)

Co-ordinators : Prof. Feroze Ali

Lecture 1 - An Introduction to Intellectual Property

Lecture 2 - What are Rights ?

Lecture 3 - What is Property in IPR ?

Lecture 4 - Meaning of Intellectual in IPR

Lecture 5 - Characteristics of IP

Lecture 6 - Defining IPR

Lecture 7 - Kinds of IPRs and their Duration

Lecture 8 - Rights Granted by IP

Lecture 9 - The Origin of Intellectual Property - Part 1

Lecture 10 - The Origin of Intellectual Property - Part 2

Lecture 11 - Growth of Intellectual Property

Lecture 12 - Learning Intellectual Property

Lecture 13 - Patents in India

Lecture 14 - Who can Apply for a Patent

Lecture 15 - Requirements of a Patent Application

Lecture 16 - Types of Patent Application

Lecture 17 - Trade Marks

Lecture 18 - Trademarks in India

Lecture 19 - What can be Protected

Lecture 20 - Introduction to Copyrights

Lecture 21 - Origin and Evolution of Copyrights

Lecture 22 - Copyrights in India

Lecture 23 - Geographical Indications

Lecture 24 - Designs

Lecture 25 - The Enterpreneurial University

Lecture 26 - Universities and IP

Lecture 27 - Publish or Patent

Lecture 28 - Managing IP at Universities

Lecture 29 - Indian Universities and Patents

Lecture 30 - Why People Invent

Lecture 31 - How Inventions Look

Lecture 32 - Where to Look for Inventions

Lecture 33 - How to Catch an Invention

Lecture 34 - Getting a working disclosure

Lecture 35 - Searching with the disclosure

Lecture 36 - Outcome of search

Lecture 37 - What is a Patentability Search

Lecture 38 - Reasons for Ordering a Patentability Search

Lecture 39 - When a Patentability Search is Not Required

Lecture 40 - How to Order a Patentability Search

Lecture 41 - Limits of Patentability Search

Lecture 42 - Patentability Search Report

Lecture 43 - Setting up IP Center - Part 1

Lecture 44 - Setting up IP Center - Part 2

NPTEL : NOC:English Literature of the Romantic Period, 1798-1832 (Humanities and Social Sciences)

Co-ordinators : Prof. Pramod K Nayar

Lecture 1 - Publishing, Literacy and Reading - I

Lecture 2 - Publishing, Literacy and Reading - II Literacy, Reading and the Audience

Lecture 3 - Empire

Lecture 4 - Empire - II

Lecture 5 - Science

Lecture 6 - European Romanticism Sensibility

Lecture 7 - Dissent and Revolution

Lecture 8 - The Debate on Rights

Lecture 9 - Nature and the Environment

Lecture 10 - The Self and Imagination

Lecture 11 - Fiction of the Romantic Period

Lecture 12 - Jane Austen

Lecture 13 - Criticism: Coleridge and Wordsworth

Lecture 14 - The Historical Novel

Lecture 15 - The Gothic Novel

Lecture 16 - Romantic Poetry 1 - William Blake (1757-1827)

Lecture 17 - Romantic Poetry 1 - Romanticism and sentiment - Introduction: Sensibility and Passion

Lecture 18 - Romantic Poetry 1 - Sensibility and Passion

Lecture 19 - Romantic Poetry 2 - William Wordsworth (1770-1850)

Lecture 20 - English Romantic Poetry 1:Samuel Taylor Coleridge

Lecture 21 - Introduction: Nature and the Environment

Lecture 22 - Wordsworth

Lecture 23 - Coleridge

Lecture 24 - Shelley

Lecture 25 - Keats and Byron

Lecture 26 - Romantic Poetry 3 - Aesthetics Introduction: Sublime and Picturesque Aesthetics

Lecture 27 - Romantic Poetry 3 - Visual arts and the Romantics

Lecture 28 - Romantic Poetry 3 - Aesthetics Wordsworth

Lecture 29 - Romantic Poetry 3 - Aesthetics Blake

Lecture 30 - Romantic Poetry 3 - Aesthetics Shelley

Lecture 31 - Romantic Poetry 4 - Politics Introduction Gender and Class

Lecture 32 - Romantic Poetry 4 - Politics: Race, Empire, Tyranny

Lecture 33 - Romantic Poetry 4 - Politics Abolitionist Poetry

Lecture 34 - Romantic Poetry 4 - Politics Wordsworth and Shelley

Lecture 35 - Romantic Poetry 4 - Politics John Clare

Lecture 36 - Romantic Literature - Empire and Orientalism Introduction 1: Romanticism, the Empire and the Other

Lecture 37 - Romantic Literature - Empire and Orientalism Introduction 2: Romanticism, the Empire and the Other

Lecture 38 - Romantic Literature - Empire and Orientalism 3 Prose: Thomas de Quincey

Lecture 39 - Romantic Literature - Empire and Orientalism 4 Byron

Lecture 40 - Romantic Literature - Empire and Orientalism 5 Felicia Hemans

NPTEL : NOC:Appreciating Linguistics: A Typological Approach (Humanities and Social Sciences)

Co-ordinators : Prof. Anindita

Lecture 1 - Language and Linguistics

Lecture 2 - Introductory concepts

Lecture 3 - Goals of the course

Lecture 4 - Introduction to Language Typology

Lecture 5 - Linguistics as a discipline

Lecture 6 - History of Linguistics

Lecture 7 - Introduction to Morphology - Part 1

Lecture 8 - Introduction to Morphology - Part 2

Lecture 9 - Morphology (Continued...)

Lecture 10 - Simple Compound and Complex Words

Lecture 11 - Morphology - Prefixes, Suffixes and Infixes

Lecture 12 - Introduction to Neologism

Lecture 13 - Word formation rules and Neologism - Part 1

Lecture 14 - Word formation rules and Neologism - Part 2

Lecture 15 - Lexical Typology: An Introduction

Lecture 16 - Lexical Typology (Continued...)

Lecture 17 - Lexical Typology: Generalizations (Kinship terms and Personal Pronouns)

Lecture 18 - Lexical Typology: Generalizations (Numerals)

Lecture 19 - Lexical Typology: Generalizations (Antonymic Adjectives)

Lecture 20 - Typology of Affixes

Lecture 21 - Morphological Typology: A Cross Linguistic Study - Part 1

Lecture 22 - Morphological Typology: A Cross Linguistic Study - Part 2

Lecture 23 - Morphological Typology: Generalizations

Lecture 24 - Morphological Typology: Generalizations continued - Part 1

Lecture 25 - Morphological Typology: Generalizations continued - Part 2

Lecture 26 - Introduction to Phonetics - Part 1

Lecture 27 - Introduction to Phonetics - Part 2

Lecture 28 - Introduction to Phonetics and Speech sounds - Part 1

Lecture 29 - Introduction to Phonetics and Speech sounds - Part 2

Lecture 30 - Phonological typology - Part 1

Lecture 31 - Phonological typology - Part 2

Lecture 32 - Introduction to Allophones

Lecture 33 - Introduction to Syntax - Part 1

Lecture 34 - Introduction to Syntax - Part 2

Lecture 35 - Syntactic Structures

Lecture 36 - Prescriptive vs Descriptive approach

Lecture 37 - Introduction to PS rules

Lecture 38 - Deep Structure and Surface Structure

Lecture 39 - Tree diagrams and X - bar structures

Lecture 40 - Movement and Recursion

Lecture 41 - Syntactic Typology - Part 1

Lecture 42 - Syntactic Typology - Part 2

Lecture 43 - Syntactic Typology - Part 3

Lecture 44 - Semantic Typology - Part 1

Lecture 45 - Semantic Typology - Part 2

Lecture 46 - Semantic Typology - Part 3

Lecture 47 - Semantic Typology - Part 4

Lecture 48 - Goals of Language Typology - Part 1

Lecture 49 - Goals of Language Typology - Part 2

Lecture 50 - Pragmatics: An introduction - Part 1

Lecture 51 - Pragmatics: An introduction - Part 2

Lecture 52 - Pragmatics: An introduction - Part 3

Lecture 53 - Pragmatic Typology

Lecture 54 - Typology of language change

Lecture 55 - History of the development Articles

Lecture 56 - Language Change : Word order

Lecture 57 - Word Order Typology - Part 1

Lecture 58 - Word Order Typology - Part 2

Lecture 59 - Word Order Typology - Part 3

Lecture 60 - Typology and word change: Child language Aquisition - Part 1

Lecture 61 - Typology and word change: Child language Aquisition - Part 2

Lecture 62 - Typology and word change: Child language Aquisition - Part 3

Lecture 63 - Typology and Universals

Lecture 64 - Typology and Universals (Continued...)

Lecture 65 - Conclusion

NPTEL : NOC:Inclusion and Technology Design (Humanities and Social Sciences)

Co-ordinators : Prof. Bidisha

Lecture 1 - Introduction: Inclusive Digital Societies

Lecture 2 - Missing Women in Tech: Why Lack of Female Technologists Matters for Technology Design and Development?

Lecture 3 - Are Technologies Gender Neutral?

Lecture 4 - ICTs and Gender: Field Concerns and Project Management Approaches for Technology Design

Lecture 5 - The Political Nature of Technology Design

Lecture 6 - Accessibility Fundamentals

Lecture 7 - Accessibility Fundamentals: Disabilities, Guidelines, and Laws

Lecture 8 - Accessibility Fundamentals: Disabilities, Guidelines, and Laws

Lecture 9 - Designing an Assistive Technology Ecosystem: STEM Education for the Visually Impaired

Lecture 10 - Inclusion in Designing ICT for Development Projects: Who Should Matter - Part 1

Lecture 11 - ICTs in Agricultural Markets: Are they Inclusive

Lecture 12 - Inclusion in Designing ICT for Development Projects: Who Should Matter - Part 2

Lecture 13 - Digital Labour, Platforms and the Future of Work

Lecture 14 - Assignment Video: Design Jam

Lecture 15 - Assignment Examples Video: Students Presentations

NPTEL : NOC:Energy Economics and Policy (Humanities and Social Sciences)

Co-ordinators : Prof. Shyamasree Dasgupta

Lecture 1 - Energy as an Economic Resource - Introduction

Lecture 2 - Energy as an Economic Resource - Classification of Energy Resource

Lecture 3 - Energy as an Economic Resource - Measurement of Energy

Lecture 4 - Energy as an Economic Resource - Energy Accounting

Lecture 5 - Energy as an Economic Resource - Problem Discussion on Module 1

Lecture 6 - Energy Demand - Part I - Basic concepts in Economics

Lecture 7 - Energy Demand - Part I - Descriptive Analysis of Energy Demand

Lecture 8 - Energy Demand - Part I - Decomposition Analysis and Parametric Approach

Lecture 9 - Energy Demand - Part II - Demand Side Management

Lecture 10 - Energy Demand - Part II - Load Management

Lecture 11 - Energy Demand - Part II - Demand Side Management - Energy Efficiency

Lecture 12 - Energy Demand - Part II - Rebound Effect

Lecture 13 - Energy Supply - Part I - Supply Behaviour of a Producer

Lecture 14 - Energy Supply - Part I - Energy Investment

Lecture 15 - Energy Supply - Part I - Economics of Non-renewable Resources

Lecture 16 - Energy Supply - Part II - Economics of Renewable Energy Supply Setting the context

Lecture 17 - Energy Supply - Part II - Economics of Renewable Energy Supply - Part 1

Lecture 18 - Energy Supply - Part II - Economics of Renewable Energy Supply - Part 2

Lecture 19 - Energy Supply - Part II - Economics of Electricity Supply

Lecture 20 - Energy Market - Prefect Competition as a Market Form

Lecture 21 - Energy Market - Why Energy Market is not Perfectly Competitive?

Lecture 22 - Energy Market - Market Failure and Monopoly

Lecture 23 - Energy Market - Oil Market: Pre OPEC Era - I

Lecture 24 - Energy Market - Oil Market: Pre OPEC Era - II

Lecture 25 - Energy Market - Oil Market: OPEC

Lecture 26 - Special Topics on Energy - Energy Security

Lecture 27 - Special Topics on Energy - Energy Access

Lecture 28 - Special Topics on Energy - Energy, Environment and Climate Change

NPTEL : NOC:The Victorian Gothic Short Story (Humanities and Social Sciences)

Co-ordinators : Prof. Divya.A

Lecture 1 - THE GOTHIC - Literary Genre

Lecture 2 - Charles Dickens 'THE SIGNAL - MAN' - I - Close reading and the anxieties of the age

Lecture 3 - Charles Dickens 'THE SIGNAL - MAN' - II - Close reading and the anxieties of the age

Lecture 4 - Charles Dickens 'THE SIGNAL - MAN' - III - Close reading and the anxieties of the age

Lecture 5 - Charles Dickens 'THE SIGNAL - MAN' - IV - Close Reading and the anxieties of the age

Lecture 7 - Rudyard Kipling - My own true ghost story

Lecture 8 - Imperial Gothic - Major Characteristics

Lecture 9 - Rudyard Kipling 'My own true ghost story' - Close reading for implications of the imperial Gothic - I

Lecture 10 - Rudyard Kipling 'My own true ghost story' - Close reading for implications of the imperial Gothic - II

Lecture 12 - Arthur Conan Doyle - The Red-Headed League - I

Lecture 13 - Arthur Conan Doyle - The Red-Headed League - II

Lecture 14 - Arthur Conan Doyle - The Red-Headed League - III

Lecture 15 - Arthur Conan Doyle 'The Red-Headed League' - A Conversation

Lecture 16 - Arthur Conan Doyle 'The Red-Headed League' - Summary and Interview of the Author

Lecture 17 - H.G. WELLS 'THE RED ROOM' - Close Reading And Its Implications

Lecture 18 - H.G. WELLS 'THE RED ROOM' - Victorian Gothic

Lecture 19 - H.G. WELLS 'THE RED ROOM' - Close Reading And Its Ideological Implications

NPTEL : NOC:German-II (Humanities and Social Sciences)

Co-ordinators : Prof. Milind Brahme

Lecture 1 - Was mochten Sie dieses Semester machen?

Lecture 2 - Wiederholung : Dativ und Prapositionen

Lecture 3 - Wir lernen das Perfekt

Lecture 4 - Wir uben das Perfekt

Lecture 5 - Was hast du in den Ferien gemacht ?

Lecture 6 - Farben und Kleidung

Lecture 7 - Wir lernen PrÃ¤positionen

Lecture 8 - Wir Ã¼ben PrÃ¤positionen

Lecture 9 - PrÃ¤positionen Akkusativ oder Dativ?

Lecture 10 - Was bringt mir der Postbote?

Lecture 11 - Gesundheit: Was fehlt Ihnen?

Lecture 12 - Jeder fÃ¼r sich

Lecture 13 - Reflexiv - Akkusativ oder Dativ ?

Lecture 14 - Lektion 1 und Witze und Faust

Lecture 15 - Lektion 2, PrÃ¤teritum von Modalverben, Ordinalzahlen

Lecture 16 - Lektion 2; Detour -- Was ist Geschichte ? | Basic Tenses

Lecture 17 - Was hast du nach der Schule gemacht?

Lecture 18 - Lektion 3: Welche Medien hast du gestern benutzt?

Lecture 19 - Komparativ und Superlativ

Lecture 20 - dass-SÃ¤tze

Lecture 21 - Wir wiederholen Komparativ und Superlativ

Lecture 22 - Imperativ mit 'du' und 'ihr'

Lecture 23 - Wir machen Lektion 5

Lecture 24 - Adjektivdeklination

Lecture 25 - Lektion 6 | Verkehr und Verkehrsmittel

Lecture 26 - Welche Verkehrsmittel benutzt du ? | Indirekte FragesÃ¤tze

Lecture 27 - Lektion 6 -- Aufgaben 4 und 6

Lecture 28 - Lektion 7 -- Es geht ums Lernen

Lecture 29 - Was hast du wann gelernt?

Lecture 30 - Probleme beim Lernen | Verben mit dem Dativ

Lecture 31 - Welche Probleme hast du beim Lernen ?

Lecture 32 - Perfekt von untrennbaren Verben | Wie lÃ¶se ich meine Probleme beim Lernen ?

Lecture 33 - RatschlÃ¤ge mit sollten | Sprache und Berufe | Wir lesen vor. (Lektion 7)

Lecture 34 - Exkurs ins Absurde! | Generationenprojekte (Lektion 7)

Lecture 35 - Generationenprojekte - wir hÃ¶ren die Texte

Lecture 36 - Welche Sportart mÃ¶chtest du ausprobieren? | deshalb, trotzdem

Lecture 37 - Wiederholung Lektion 7 | Wir machen mit â€‹Lektion 8 weiter.

Lecture 38 - WofÃ¼r entscheiden sich Sandra und Conny ? | Fragewort WO + PrÃ¤position

Lecture 39 - Alles Ã¼ber FragewÃ¶rter: mit und ohne PrÃ¤positionen

Lecture 40 - Eine Stadt entdecken | Wir beginnen Lektion 9

Lecture 41 - Lektion 9 | Interessante HÃ¤user und Wohnungen

Lecture 42 - Lektion 9 | Die lieben Nachbarn

Lecture 43 - Lektion 9 | HÃ¶fliche Bitte | wenn und als

Lecture 44 - Lektion 9 | Wir Ã¼ben als und wenn. | SÃ¤tze und Wortgruppen

Lecture 45 - Die Deutschen und ihre Haustiere

Lecture 46 - Wir beginnen Lektion 10 | Der Superlativ

Lecture 47 - Welche/r/s und Was fÃ¼r ein/e...

Lecture 48 - Lektion 10 | etwas, man, niemand, jemand...

Lecture 49 - Der Relativsatz | Wir machen Lektion 10 zu Ende

Lecture 50 - Wir machen Lektion 11. | K 2 - Verben und W-Fragen mit PrÃ¤positionen

Lecture 51 - Lektion 12 | Wir sind mit unserem Kurs fertig!

NPTEL : NOC:German-I (Humanities and Social Sciences)

Co-ordinators : Prof. Milind Brahme

Lecture 1 - Herzlich willkommen!

Lecture 2 - Wie ist dein Name ?

Lecture 3 - Ich trinke gern Kaffee

Lecture 4 - Wir konjugieren die Verben

Lecture 5 - A bit of history and ZAHLEN

Lecture 6 - Verben, W-Fragen, Ja-Nein Fragen, Imperativ

Lecture 7 - das Alphabet, die Woche, das Jahr

Lecture 8 - Was sind deine Hobbys ? Formular ausfullen

Lecture 9 - Mein Lehrbuch | Meine personlichen Daten

Lecture 10 - Mein Arbeitsbuch

Lecture 11 - Wir beginnen Lektion 3

Lecture 12 - Wir lesen Lektion 3

Lecture 13 - Kein | Unregelmabige Verben | Ein Lied

Lecture 14 - Wer ist das? | ich-mein; du-dein

Lecture 15 - Lektion 4 Guten Appetit!

Lecture 16 - Das Essen | Some revision

Lecture 17 - mag oder mÃ¶chte | der Akkusativ

Lecture 18 - Ein Lesetext | die Uhr

Lecture 19 - die Uhrzeit | trennbare Verben

Lecture 20 - Familie und Possessiv

Lecture 21 - Wir machen Lektion 6 | Ordinalzahlen

Lecture 22 - Wie feierst du deinen Geburtstag?

Lecture 23 - der Akkusativ | ein WÃ¼rfelspiel

Lecture 24 - das Kaffeehaus |die Kneipe |der Biergarten

Lecture 25 - Lektion 6: Freizeitprogramm

Lecture 26 - Sprache, BundeslÃ¤nder, StÃ¤dte | Wir beginnen Lektion 7

Lecture 27 - Akkusativ-Dativ | Annika im BÃ¼ro | Wir machen Kaffee

Lecture 28 - Lektion 7 -- formeller Brief

Lecture 29 - Wie lernst du Deutsch ? Wir hÃ¶ren ein deutsches Lied

Lecture 30 - Wir lernen die PrÃ¤positionen

Lecture 31 - HÃ¶rverstÃ¤ndnis | Wir beginnen Lektion 8

Lecture 32 - Lektion 8 -- Haus-Wohnung-MÃ¶bel-GerÃ¤te

Lecture 33 - Extra Lektion on Modal Verbs

Lecture 34 - Eine E-Mail schreiben | Eine Wohnung beschreiben

Lecture 35 - Warum ist die Miete so hoch ? | Vorteile und Nachteile

Lecture 36 - Die neue Wohnung -- Was ist wo ? | WechselprÃ¤positionen

Lecture 37 - gefallen, gehÃ¶ren, passen, schmecken

Lecture 38 - Lektion 9 | Wir lernen das Perfekt

Lecture 39 - Lektion 9 | Wir Ã¼ben das Perfekt

Lecture 40 - Was hast du in den Ferien gemacht ?

Lecture 41 - Lektion 9 | Die Jobsuche

Lecture 42 - Lektion 9 | TelefongesprÃ¤che

Lecture 43 - Im Kaufhaus | Welche/Diese

Lecture 44 - Lektion 11 | Korper und Gesundheit

Lecture 45 - Gesund und munter | Wir machen Lektion 11 zu Ende

Lecture 46 - Ab in den Urlaub | Wir machen Lektion 12

NPTEL : NOC:Disability Studies: An Introduction (Humanities and Social Sciences)

Co-ordinators : Prof. Hemachandran Karah

Lecture 1 - Disability Definition: An Evolving Phenomenon

Lecture 2 - Medical Model of Disability

Lecture 3 - Social Model of Disability - Part 1

Lecture 4 - Social Model of Disability - Part 2

Lecture 5 - Stigma: A Universal Phenomenon

Lecture 6 - Stigma and Disability: What can we learn?

Lecture 7 - Ableism - Part 1

Lecture 8 - Ableism - Part 2

Lecture 9 - Disability Activism

Lecture 10 - Models of Disability Activism

Lecture 11 - Dependency

Lecture 12 - Interdependence

Lecture 13 - Blindness

Lecture 14 - Blindness as metaphor

Lecture 15 - Eugenics

Lecture 16 - Disability Pride

Lecture 17 - Disability Resilience

Lecture 18 - Disability Passing: The musings of the blue Jackal

Lecture 19 - Coming out: A performance in disability inhabitation

Lecture 20 - Assistive Technology: An interview with Prof. Madhusudan Rao

Lecture 21 - Disability and Ethnography: An Interview with Prof. James Staple

Lecture 22 - Schizophrenia: A Personal Account - An interview with Reshma Valliappan

Lecture 23 - Autism and the Indian Family: An interview with Dr. Shubhangi Vaidhya

Lecture 24 - Dyslexia and the Modern University: An Interview with Prof. Tanya Titchkosky

Lecture 25 - Gender and Disability: Interviews with Prof. Anita Ghai

Lecture 26 - Gender and Disability: Interviews with Prof. Nandini Ghosh

Lecture 27 - Lennard Davis, hemachandran karah, normal, normalcy, disability studies

Lecture 28 - The Normal and its End: Part 2

Lecture 29 - Literary Disability Studies: An Interview with Dr. Shilpa Anand

Lecture 30 - What is Deaf Culture? An Interview with Dr. Michele Friedner

Lecture 31 - Disability and Life Writing

Lecture 32 - Disability and Metaphor

Lecture 33 - Conclusion

NPTEL : Introduction to Film Studies (2019) (Humanities and Social Sciences)

Co-ordinators : Dr. Aysha Iqbal Viswamohan

Lecture 1 - Course Overview - Part 1

Lecture 2 - Course Overview - Part 2

Lecture 3 - Cinema and Semiotics - Part 1

Lecture 4 - Cinema and Semiotics - Part 2

Lecture 5 - Cinema and Semiotics - Seven (1995) - Part 1

Lecture 6 - Cinema and Semiotics - Seven (1995) - Part 2

Lecture 7 - Plot in Cinema - Part 1

Lecture 8 - Plot in Cinema - Part 2

Lecture 9 - Plot in CInema - 7 primary types of plot

Lecture 10 - Plot in Cinema - Conflict as a Plot Element

Lecture 11 - Character as a Plot Element - Part 1

Lecture 12 - Character as a Plot Element - Part 2

Lecture 13 - Editing in Cinema - (Montage, Jumpcut) - Part 1

Lecture 14 - Editing in Cinema - (Montage, Jumpcut) - Part 2

Lecture 15 - Realism in Cinema - Part 1

Lecture 16 - Realism in Cinema - Part 2

Lecture 17 - Colour: Theory and Practice - Part 1

Lecture 18 - Colour: Theory and Practice - Part 2

Lecture 19 - Intertextuality - Casablanca (1942) - Part 1

Lecture 20 - Intertextuality - Casablanca (1942) - Part 2

Lecture 21 - Intertextuality - Blade Runner (1982) - Part 1

Lecture 22 - Intertextuality - Blade Runner (1982) - Part 2

Lecture 23 - Intertextuality - The Matrix (1999) - Part 1

Lecture 24 - Intertextuality - The Matrix (1999) - Part 2

Lecture 25 - Cinema and Modernism - Part 1

Lecture 26 - Cinema and Modernism - Part 2

Lecture 27 - Cinema and Modernism - Part 3

Lecture 28 - Guest Lecture by Sudhish Kamath (Film Critic and Film Maker)

Lecture 29 - The French Masters - Jean Renoir - Part 1

Lecture 30 - The French Masters - Jean Renoir - Part 2

Lecture 31 - The French Masters - Robert Bresson - Part 1

Lecture 32 - The French Masters - Robert Bresson - Part 2

Lecture 33 - The French Masters - Robert Bresson - Part 3

Lecture 34 - What is a Canon?

Lecture 35 - Canonical Text - Citizen Kane (1941) - Part 1

Lecture 36 - Canonical Text - Citizen Kane (1941) - Part 2

Lecture 37 - Canonical Text - The Godfather (1972/1974) Part 1

Lecture 38 - Canonical Text - The Godfather (1972/1974) Part 2

Lecture 39 - Canonical Text - The Godfather (1972/1974) Part 3

Lecture 40 - Canonical Text - The Godfather (1972/1974) Part 4

Lecture 41 - The Academy Awards Case Study - My Left Foot (1989) and Daniel Day-Lewis Method Acting - Part 1

Lecture 42 - The Academy Awards Case Study - My Left Foot (1989) and Daniel Day-Lewis Method Acting - Part 2

Lecture 43 - Classic Hollywood - HayÃ¢â‚¬â„¢s Code, Studio Years, Major Filmmakers - Part 1

Lecture 44 - Classic Hollywood - HayÃ¢â‚¬â„¢s Code, Studio Years, Major Filmmakers - Part 2

Lecture 45 - Classic Hollywood - Major Filmmakers, Melodrama - Part 1

Lecture 46 - Classic Hollywood - Major Filmmakers, Melodrama - Part 2

Lecture 47 - Classic Hollywood - Major Filmmakers, Melodrama - Part 3

Lecture 48 - Classic Hollywood - Major Filmmakers, Melodrama - Part 4

Lecture 49 - German Expressionism, Film Noir Case Study: Laura (1944) and Neo Noir Case Study: Taxi Driver (1976) - Part 1

Lecture 50 - German Expressionism, Film Noir Case Study: Laura (1944) and Neo Noir Case Study: Taxi Driver (1976) - Part 2

Lecture 51 - Stars as Icons, Case Study of the Stardom of James Dean and Fandoms - Part 1

Lecture 52 - Stars as Icons, Case Study of the Stardom of James Dean and Fandoms - Part 2

Lecture 53 - Cinema and the Counterculture Movement - Beat Generation, Woodstock Nation, Easy Rider (1968) - Part 1

Lecture 54 - Cinema and the Counterculture Movement - Beat Generation, Woodstock Nation, Easy Rider (1968) - Part 2

Lecture 55 - Italian Cinema - Part 1

Lecture 56 - Italian Cinema - Part 2

Lecture 57 - Japanese Cinema - Part 1

Lecture 58 - Japanese Cinema - Part 2

Lecture 59 - Auteur Theory in the USA - Part 1

Lecture 60 - Auteur Theory in the USA - Part 2

Lecture 61 - Auteur Theory in the USA - Part 3

Lecture 62 - Auteur Theory in the USA - Part 4

Lecture 63 - New Hollywood - Part 1

Lecture 64 - New Hollywood - Part 2

Lecture 65 - New Hollywood - Part 3

Lecture 66 - New Hollywood - Part 4

Lecture 67 - New Hollywood - Part 5

Lecture 68 - New Hollywood - Part 6

Lecture 69 - New Hollywood - Part 7

Lecture 70 - New Hollywood - Part 8

Lecture 71 - Cinema and Genres - Part 1

Lecture 72 - Cinema and Genres - Part 2

Lecture 73 - Cinema and Genres - Part 3

Lecture 74 - Cinema and Genres - Part 4

Lecture 75 - Postmodernism and Cinema - Part 1

Lecture 76 - Postmodernism and Cinema - Part 2

Lecture 77 - Postmodernism and Cinema - Part 3

Lecture 78 - Postmodernism and Cinema - Part 4

Lecture 79 - The Western - Part 1

Lecture 80 - The Western - Part 2

NPTEL : NOC:Literary Criticism (From Plato to Leavis) (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Introduction

Lecture 2 - Aristotle's Poetics - Session 1

Lecture 3 - Aristotle's Poetics - Session 2

Lecture 4 - Aristotle's Poetics - Session 3

Lecture 5 - Longinus' Sublimity, Genius, Art

Lecture 6 - Longinus' On the Sublime - Session 2

Lecture 7 - Longinus' On the Sublime - Session 3

Lecture 8 - Scott James' The First Romantic Critic

Lecture 9 - Philip Sidney's - An Apology for Poetry - Session 1

Lecture 10 - Philip Sidney's - An Apology for Poetry - Session 2

Lecture 11 - Philip Sidney's - An Apology for Poetry - Session 3

Lecture 12 - Philip Sidney's - An Apology for Poetry - Session 4

Lecture 13 - The Foundations of Western Philosophy

Lecture 14 - Horace's Ars Poetica

Lecture 15 - John Dryden's 'Preface to The Fables'

Lecture 16 - Critical Importance of Aphra Behn

Lecture 17 - Samuel Johnson's Preface to Shakespeare - Session 1

Lecture 18 - Samuel Johnson's Preface to Shakespeare - Session 2

Lecture 19 - Samuel Johnson's Preface to Shakespeare - Session 3

Lecture 20 - Samuel Johnson's Preface to Shakespeare - Session 4

Lecture 21 - Wordsworth's 'Preface to Lyrical Ballads'

Lecture 22 - Coleridge's 'Biographia Literaria' (Chapter 13 and 14)

Lecture 23 - Shelley's A Defence of Poetry - Part 1

Lecture 24 - Shelley's A Defence of Poetry - Part 2

Lecture 25 - Shelley's A Defence of Poetry - Part 3

Lecture 26 - Shelley's A Defence of Poetry - Part 4

Lecture 27 - Introduction to Peter Barry's Literary Theory

Lecture 28 - Mary Wollstonecraft's A Vindication of the Rights of Women

Lecture 29 - Edgar Allan Poe's The Poetic Principle - Part 1

Lecture 30 - Edgar Allan Poe's The Poetic Principle - Part 2

Lecture 31 - Leo Tolstoy's What is Art?

Lecture 32 - Matthew Arnold's Study of Poetry

Lecture 33 - Matthew Arnold's Sweetness and Light

Lecture 34 - Russian Formalism

Lecture 35 - Henry James 'The Art of Fiction' (Session 1)

Lecture 36 - T.S. Eliot's 'Tradition and Individual Talent'

Lecture 37 - T.S. Eliot's 'Tradition and Individual Talent' (Session 2)

Lecture 38 - Virginia Woolf's 'Modern Fiction'

Lecture 39 - Virginia Woolf's 'Modern Fiction' (Session 2)

Lecture 40 - Virginia Woolf's 'A Room of One's Own'

Lecture 41 - Virginia Woolf's 'A Room of One's Own' (Session 1)

Lecture 42 - Virginia Woolf's 'A Room of One's Own' (Session 2)

Lecture 43 - Virginia Woolf's 'A Room of One's Own' (Session 3)

Lecture 44 - Rene Wellek's The New Criticism: Pro and Contra

Lecture 45 - Walter Benjamin's The Work of Art in the Age of Mechanical Reproduction - 1

Lecture 46 - Walter Benjamin's The Work of Art in the Age of Mechanical Reproduction - 2

Lecture 47 - Walter Benjamin's The Work of Art in the Age of Mechanical Reproduction - 3

Lecture 48 - Walter Benjamin's The Work of Art in the Age of Mechanical Reproduction - 4

Lecture 49 - Walter Benjamin's The Storyteller

Lecture 50 - FR Leavis

Lecture 51 - FR Leavis's 'The Great Tradition' (Session 1)

Lecture 52 - FR Leavis's 'The Great Tradition' (Session 2)

Lecture 53 - FR Leavis's 'The Great Tradition' (Session 3)

NPTEL : NOC:Twentieth Century Fiction (Humanities and Social Sciences)

Co-ordinators : Prof. Avishek Parui

Lecture 1 - The Postmaster - Part 1

Lecture 2 - The Postmaster - Part 2

Lecture 3 - The Postmaster - Part 3

Lecture 4 - The Fly - 1

Lecture 5 - The Fly - 2

Lecture 6 - Heart of Darkness - Part 1

Lecture 7 - Heart of Darkness - Part 2

Lecture 8 - Heart of Darkness - Part 3

Lecture 9 - Heart of Darkness - Part 4

Lecture 10 - Heart of Darkness - Part 5

Lecture 11 - Heart of Darkness - Part 6

Lecture 12 - Heart of Darkness - Part 7

Lecture 13 - Heart of Darkness - Part 8

Lecture 14 - Heart of Darkness - Part 9

Lecture 15 - Love Song of J. Alfred Prufrock - Part 1

Lecture 16 - Love Song of J. Alfred Prufrock - Part 2

Lecture 17 - Love Song of J. Alfred Prufrock - Part 3

Lecture 18 - Preludes - Part 1

Lecture 19 - Preludes - Part 2

Lecture 20 - The Wasteland - Part 1

Lecture 21 - The Wasteland - Part 2

Lecture 22 - The Wasteland - Part 3

Lecture 23 - The Wasteland - Part 4

Lecture 24 - Araby - Part 1

Lecture 25 - Araby - Part 2

Lecture 26 - Araby - Part 3

Lecture 27 - Solid Objects - Part 1

Lecture 28 - Solid Objects - Part 2

Lecture 29 - Solid Objects - Part 3

Lecture 30 - Mrs. Dalloway - Part 1

Lecture 31 - Mrs. Dalloway - Part 2

Lecture 32 - Mrs. Dalloway - Part 3

Lecture 33 - Mrs. Dalloway - Part 4

Lecture 34 - Mrs. Dalloway - Part 5

Lecture 35 - Mrs. Dalloway - Part 6

Lecture 36 - Mrs. Dalloway - Part 7

Lecture 37 - Mrs. Dalloway - Part 8

Lecture 38 - Mrs. Dalloway - Part 9

Lecture 39 - Ulysses - Part 1

Lecture 40 - Ulysses - Part 2

Lecture 41 - Ulysses - Part 3

Lecture 42 - Ulysses - Part 4

Lecture 43 - Ulysses - Part 5

Lecture 44 - Summary

Lecture 45 - Ulysses - Part 6

Lecture 46 - Ulysses - Part 7

Lecture 47 - Ulysses - Part 8

Lecture 48 - Ulysses - Part 9

Lecture 49 - Toba Tek Singh - Part 1

Lecture 50 - Toba Tek Singh - Part 2

Lecture 51 - Toba Tek Singh - Part 3

Lecture 52 - Toba Tek Singh - Part 4

Lecture 53 - Toba Tek Singh - Part 5

Lecture 54 - Mrs. Dalloway - Part 10

Lecture 55 - Modernist Poetry

Lecture 56 - The Chess Players - Part 1

Lecture 57 - The Chess Players - Part 2

Lecture 58 - The Chess Players - Part 3

Lecture 59 - The Chess Players - Part 4

Lecture 60 - Conclusion

Lecture 61 - Modernist Fiction

NPTEL : NOC:Modern Indian Writing in Translation (Humanities and Social Sciences)

Co-ordinators : Prof. Divya.A

Lecture 1 - Hunger Of Stones

Lecture 2 - Hunger Of Stones (Continued...)

Lecture 3 - Translation (Introduction); Nagamandala and Hunger of Stones

Lecture 4 - Introduction to Literature in Translation in India

Lecture 5 - The Blue Light - Part 1

Lecture 6 - The Blue Light - Part 2

Lecture 7 - The Blue Light - Part 3

Lecture 8 - Gold From the Grave - Part 1

Lecture 9 - Gold From the Grave - Part 2

Lecture 10 - Gold From the Grave - Part 3

Lecture 11 - Toba Tek Singh - Part 1

Lecture 12 - Toba Tek Singh - Part 2

Lecture 13 - Toba Tek Singh - Part 3

Lecture 14 - Crossing the Ravi - Part 1

Lecture 15 - Crossing the Ravi - Part 2

Lecture 16 - Writing Effective Paragraph

Lecture 17 - Stench of Kerosene - Part 1

Lecture 18 - Stench of Kerosene - Part 2

Lecture 19 - Stench of Kerosene - Part 3

Lecture 20 - Stench of Kerosene - Part 4

Lecture 21 - The Man Who Could Not Sleep - Part 1

Lecture 22 - The Man Who Could Not Sleep - Part 2

Lecture 23 - The Man Who Could Not Sleep - Part 3

Lecture 24 - The Man Who Could Not Sleep - Part 4

Lecture 25 - Nagamandala - Part 1

Lecture 26 - Nagamandala - Part 2

Lecture 27 - Nagamandala - Part 3

Lecture 28 - Nagamandala - Part 4

Lecture 29 - Nagamandala - Part 5

Lecture 30 - Nagamandala - Part 6

Lecture 31 - Nagamandala - Part 7

Lecture 32 - Tamarind History - Part 1

Lecture 33 - Tamarind History - Part 2

Lecture 34 - Tamarind History - Part 3

Lecture 35 - Tamarind History - Part 4

Lecture 36 - Tamarind History - Part 5

Lecture 37 - Tamarind History - Part 6

Lecture 38 - Tamarind History - Part 7

Lecture 39 - Indian poetry - Part 1

Lecture 40 - Indian poetry - Part 2

Lecture 41 - Indian poetry - Part 3

Lecture 42 - Indian poetry - Part 4

Lecture 43 - Indian poetry - Part 5

Lecture 44 - Indian poetry - Part 6

NPTEL : NOC:Introduction to Political Ideologies: Contexts, Ideas and Practices (Humanities and Social Sciences)

Co-ordinators : Prof. Arvind Sivaramakrishnan

Lecture 1 - Fascism Introduction and Main Ideas

Lecture 2 - Fascism - problems. The Hindu right and Nazism

Lecture 3 - Ordinary people's part in fascism. A worked example

Lecture 4 - Background and forms of conservatism

Lecture 5 - Main ideas and main problems in conservatism

Lecture 6 - Short recap. Politics in a conservative society. India survey evidence

Lecture 7 - Worked example

Lecture 8 - Introduction. Main ideas with examples

Lecture 9 - Forms of the liberal state

Lecture 10 - Forms of liberalism

Lecture 11 - Multiculturalism

Lecture 12 - Main problems in liberalism

Lecture 13 - Return to editingBiography. Main concepts lecture 1

Lecture 14 - Marx main concepts lecture 2

Lecture 15 - Contradictions, cyclical crises in capitalism. Problems in Marx

Lecture 16 - Marx - worked examples older and current

Lecture 17 - Historical background; global appeal, recent revival; Catalonia; Occupy

Lecture 18 - Anarchism main ideas and examples. The MondragÃ³n Corporation

Lecture 19 - Mutualism; syndicalism; anarchocapitalism

Lecture 20 - Evaluating anarchism - debates and examples

Lecture 21 - Intro, historical background leading to the present

Lecture 22 - Feminism - main concepts, with examples

Lecture 23 - Feminism and other ideologies

Lecture 24 - Intersectionality and Intersectionality - worked examples

Lecture 25 - Human environmental impact and forms of response. Ecological concepts. Examples and selected consequences

Lecture 26 - Ecologism - main concepts, with examples

Lecture 27 - Ecologism and politics

Lecture 28 - Ecologism today. Conceptual problems - the idea of nature. Natural capital - worked example

Lecture 29 - Poststructuralism; Derrida and Foucault; background and explanation. Political engagement

Lecture 30 - Postmodernism; challenge to and contrast with modernism; wide impact. Postmodern theory. Criticisms. The Sokal Hoax

Lecture 31 - Recap on problems in Derrida and Foucault. Postmodernist theory. Worked example 1

Lecture 32 - Postsructuralism and postmodernism worked examples 2 and 3

Lecture 33 - Definitions. Theocracy - main themes, main problems, with examples

Lecture 34 - Fundamentalism - contexts for emergence, types of fundamentalism, rejection of modernity, Manichaean vision. Problems

Lecture 35 - Worked examples

Lecture 36 - Definitions - technocracy and managerialism. Outline of technocracy - long history. Main problems - examples. Plato's analogy

Lecture 37 - Managerialism - self-conception; efficiency; claim to expertise; problems and failures - conceptual and empirical; examples

Lecture 38 - Technocracy and managerialism - worked examples

Lecture 39 - Nationalism - introduction

Lecture 40 - Nationalism - main themes. The nation; community or organic community; self-determination; identity

Lecture 41 - Identity politics. Forms of nationalism. Nationalism and colonialism

Lecture 42 - Nationalism - conceptual problems. Brexit

Lecture 43 - Worked examples

Lecture 44 - Republicanism and Citizenship Introduction

Lecture 45 - Citizenship as substantive membership of the polity

Lecture 46 - Republicanism and Citizenship problems and conclusion. Worked examples

NPTEL : NOC:Feminism: Concepts and Theories (Humanities and Social Sciences)

Co-ordinators : Prof. Mathangi Krishnamurthy

Lecture 1 - Feminism: Introduction

Lecture 2 - Vocabulary

Lecture 3 - Vocabulary (Continued...)

Lecture 4 - Feminism is for everybody : Passionate Politics - bell hooks

Lecture 5 - Key Concepts: Conceptual Literacy

Lecture 6 - Key Concepts: Reading from the Text

Lecture 7 - Key Concepts: Equality

Lecture 8 - Key Concepts: Difference

Lecture 9 - Key Concepts: Choice

Lecture 10 - Key Concepts: Care

Lecture 11 - Care: Case Studies and Reading

Lecture 12 - Key Concepts: Time

Lecture 13 - Key Concepts: Experience

Lecture 14 - Key Concepts: Space and Place

Lecture 15 - Feminist Theory: The First Wave

Lecture 16 - Feminist Theory: The Second and Third Wave

Lecture 17 - The Feminist Body - Part I

Lecture 18 - The Feminist Body - Part II

Lecture 19 - Feminism in India: Trajectory and Concerns - Part 1

Lecture 20 - Feminism in India: Trajectory and Concerns - Part 2

Lecture 21 - Feminism in India: Summary of Guest Lecture

Lecture 22 - Feminism of Work and Labor - I

Lecture 23 - Feminism of Work and Labor - II

Lecture 24 - Feminism and Affective/ Emotional Labor

Lecture 25 - Female Impersonators in Parsi Theatre

Lecture 26 - Feminism and Film

Lecture 27 - Feminisms: Fourth Wave, Popular Culture and Social Media - Part - I - Session - 01

Lecture 28 - Feminisms: Fourth Wave, Popular Culture and Social Media - Part - I - Session - 02

Lecture 29 - Feminisms: Fourth Wave, Popular Culture and Social Media - Part - II -Texts

Lecture 30 - Title: Introduction to Queer Theory - Part I

Lecture 31 - Title: Introduction to Queer Theory - Part II

Lecture 32 - Learnings And Conclusions

Lecture 33 - Summary - Weeks 1-4

Lecture 34 - Summary - Weeks 5-11

Lecture 35 - Final exam structure and suggestions

NPTEL : NOC:Poetry (Humanities and Social Sciences)

Co-ordinators : Prof. S P Dhanavel

Lecture 1 - The Relevance of Poetry

Lecture 2 - Approaching Poetry

Lecture 3 - Functions of Poetry

Lecture 4 - Forms of Poetry

Lecture 5 - Poetic Devices

Lecture 6 - The Music of Poetry

Lecture 7 - Geoffrey Chaucer (c. 1343-1400)

Lecture 8 - The Prologue

Lecture 9 - Elizabethan Poetry

Lecture 10 - Sir Thomas Wyatt

Lecture 11 - Henry Howard: The Earl of Surrey

Lecture 12 - Sir Philip Sidney

Lecture 13 - Edmund Spenser (1552-1559)

Lecture 14 - Michael Drayton (1563-1631)

Lecture 15 - Samuel Daniel (1563-1619)

Lecture 16 - William Shakespeare (1564-1616)

Lecture 17 - Metaphysical Poetry

Lecture 18 - John Donne - 1

Lecture 19 - John Donne - 2

Lecture 20 - George Herbert

Lecture 21 - Henry Vaughan

Lecture 22 - Andrew Marvell

Lecture 23 - John Milton - 1

Lecture 24 - John Milton - 2

Lecture 25 - Neo-Classical and Pre-Romantic Poetry

Lecture 26 - John Dryden - 1

Lecture 27 - John Dryden - 2

Lecture 28 - Alexander Pope - 1

Lecture 29 - Alexander Pope - 2

Lecture 30 - Thomas Gray

Lecture 31 - William Collins

Lecture 32 - William Blake

Lecture 33 - Romantic Poetry

Lecture 34 - William Wordsworth - 1

Lecture 35 - William Wordsworth - 2

Lecture 36 - Samuel Taylor Coleridge

Lecture 37 - John Keats

Lecture 38 - Percy Bysshe Shelley

Lecture 39 - Victorian Poetry

Lecture 40 - Alfred, Lord Tennyson

Lecture 41 - Robert Browning

Lecture 42 - Elizabeth Barrett Browning

Lecture 43 - Matthew Arnold

Lecture 44 - Gerard Manley Hopkins

Lecture 45 - Modernist Poetry

Lecture 46 - William Butler Yeats

Lecture 47 - T S Eliot - 1

Lecture 48 - T S Eliot - 2

Lecture 49 - Wilfred Owen

Lecture 50 - Dylan Thomas

Lecture 51 - American Poetry

Lecture 52 - Robert Frost

Lecture 53 - Wallace Stevens

Lecture 54 - William Carlos Williams

Lecture 55 - A R Ammons

Lecture 56 - Langston Hughes

Lecture 57 - Feminist Poetry

Lecture 58 - Maya Angelou

Lecture 59 - Adrienne Rich

Lecture 60 - Sylvia Plath

Lecture 61 - P. K. Page

Lecture 62 - Judith Wright

Lecture 63 - Contemporary British Poetry

Lecture 64 - Seamus Heaney

Lecture 65 - Carol Ann Duffy

Lecture 66 - Simon Armitage

Lecture 67 - Indian Poetry in English

Lecture 68 - Nissim Ezekiel

Lecture 69 - Kamala Das

Lecture 70 - A K Ramanujan

Lecture 71 - Jayanta Mahapatra

Lecture 72 - Discussion-1 - Part 1

Lecture 73 - Discussion-1 - Part 2

Lecture 74 - Discussion-2 - Part 1

Lecture 75 - Discussion-2 - Part 2

Lecture 76 - Outro to Poetry - Conclusion

NPTEL : NOC:The Popular Gothic Novel (Humanities and Social Sciences)

Co-ordinators : Prof. Divya.A

Lecture 1 - Introduction: Key Novel

Lecture 2 - Gothic Elements; Gothic Sublime.

Lecture 3 - Introduction: Gothic Terror and Horror

Lecture 4 - Gothic Forebonding; Affinity with the French Revolution; Types of Gothic Fiction

Lecture 5 - Gothic and identities, Empire, Contemporary Anxieties

Lecture 6 - Ann Radcliffe, The Mystries of Udolpho: The Castle of Motif

Lecture 7 - Gothic Castle, Gothic Energy, Gothic Sensibility

Lecture 8 - Reading the Gothic Novel; Gothic and Family

Lecture 9 - Gothic Domesticity and Patriarchy

Lecture 10 - Gothic and Travel, Marriage, Discussion Questions

Lecture 11 - The Gothic Contexts

Lecture 12 - Plotting the Gothic

Lecture 13 - Feminine Silence and Marginality

Lecture 14 - Gothic Landscape

Lecture 15 - Historical and Literary Contexts

Lecture 16 - Gothic Parody

Lecture 17 - Gothic Terrors and the Education of Catherine Morland

Lecture 18 - Gothic Reading and Mentor Figures

Lecture 19 - Gothic Parody and Female Gothic

Lecture 20 - Parodying the Gothic Villain

Lecture 21 - Introduction to Emily Bronte and Wuthering Heights

Lecture 22 - Gothic terror, Fantasy and Violence

Lecture 23 - Gothic Transgressions

Lecture 24 - Gothic Displacement: Family, Childhood and Confinement

Lecture 25 - Gothic Displacement: The conflict between children and parental authority

Lecture 26 - Introduction to Charlotte Bronte, and the plot of Jane Eyre

Lecture 27 - Gothic Plot and Imperial Gothic

Lecture 28 - Gothic Subtexts; Madness and Femininity

Lecture 29 - Gothic Rebellion and Symbols: Thornfield Hall and Bertha Mason

Lecture 30 - Gothic Rebellion, The Domestic and the Colony

Lecture 31 - Introduction to the Christmas Ghost Story and Charles Dickens

Lecture 32 - The Gothic Plot, Spectrality, and Commodity

Lecture 33 - The Dark Narrative; The Ghostly Children

Lecture 34 - Gothic City: the City of Spectress

Lecture 35 - Gothic Structure and The Consciousness

Lecture 36 - Introduction to Dracula, Literary Contexts and Gothic Monsters

Lecture 37 - Gothic Sexuality, Tradition, and Metaphors

Lecture 38 - Gothic Transformations and Narrative Roles

Lecture 39 - Gothic Symbolisms: Vampirism and residuum

Lecture 40 - The Urban Gothic, New Woman and Gothic Monsters

Lecture 41 - Introduction to the author; the novel; literary Contexts

Lecture 42 - Plotting and the Female Gothic

Lecture 43 - Imperial Gothic

Lecture 44 - Legacies of Empire and Gothic

Lecture 45 - Imperial Gothic, and the Orient

Lecture 46 - Introduction to Doyle and conrtexts

Lecture 47 - Gothic Plot

Lecture 48 - Anxieties of the Past and the Future

Lecture 49 - Gothic tropes, landscape and cultural anxieties

Lecture 50 - Gothic Crime and Mythical Subtexts

Lecture 51 - Gothic Evil

Lecture 52 - Introduction to Oscar Wilde; Literary Contexts; Plot of the novel

Lecture 53 - Aesthetic Gothic

Lecture 54 - Aestheticism and Degeneracy

Lecture 55 - Gothic Art and Morality

Lecture 56 - Gothic Setting

Lecture 57 - Gothic Setting (Continuation...)

Lecture 58 - Dicken's Realist Gothic 'Bleak House' Women's Writing

Lecture 59 - Lectuer Overview

Lecture 60 - Lectuer Overview

Lecture 61 - Overview of Frankenstein and Jane Eyre

Lecture 62 - Lectuer Overview

NPTEL : NOC:Classical Sociological Theory (Humanities and Social Sciences)

Co-ordinators : Prof. R. Santhosh

Lecture 1 - Sociology an Overview

Lecture 2 - Sociological perspective

Lecture 3 - C Wrigh Mill's Socioloigcal Imagination

Lecture 4 - Thinking Sociologically: Zygmunt Bauman

Lecture 5 - Emergence of Sociology: The, socio-political, economic and intellectual context

Lecture 6 - Enlightenment

Lecture 7 - Emegernce of nation-state and French Revolution

Lecture 8 - Industrial revolution and the rise of capitalism

Lecture 9 - Discussion with Dr. Roland Part - 1

Lecture 10 - Discussion with Dr. Roland Part - 2

Lecture 11 - Clasical Thinkers of Sociology

Lecture 12 - Auguste Comte

Lecture 13 - Herbert Spencer

Lecture 14 - Marx Durkheim and Weber

Lecture 15 - Factory scene from Modern Times

Lecture 16 - Karl Marx Life

Lecture 17 - Intellectual Influence

Lecture 18 - Historical Materialism

Lecture 19 - Marxian theory of social Change

Lecture 20 - Theory of Capitalism - 1

Lecture 21 - Theory of Capitalism - 2

Lecture 22 - Karl Marx and Alienation

Lecture 23 - Karl Marx and Religion

Lecture 24 - Marx on Democracy, and Colonialism

Lecture 25 - Marx - An Appraisal

Lecture 26 - Emile Durkheim; Life and Intellectual Influences

Lecture 27 - The Rules of the Sociological Method

Lecture 28 - Division of Labour (1893)

Lecture 29 - Division of Labour (Continued...)

Lecture 30 - Suicide (1897)

Lecture 31 - Elementary forms of Religious Life (1912)

Lecture 32 - Durkheim on Education, Colonialism and Democracy

Lecture 33 - Durkheim An Assessment

Lecture 34 - Max Weber: Life and Intellectual Influences

Lecture 35 - Weberâ€™s Methodology of the Social Sciences

Lecture 36 - Rationalization and social action

Lecture 37 - Rationalization and Authority

Lecture 38 - The Protestant Ethic and Spirit of Capitalism

Lecture 39 - MODERN RATIONAL CAPITALISM

Lecture 40 - Bureaucracy

Lecture 41 - Social Stratification: Calss, Status Group, and Party

Lecture 42 - Comparative Religion and Disenchantment

Lecture 43 - Weber on democracy and colonialism

Lecture 44 - Critical Assessment

Lecture 45 - Ferdinand Tonnies (1885-1936)

Lecture 46 - George Simmel (1858 - 1918)

Lecture 47 - Social Differentiation and Conflict

Lecture 48 - Simmel on Philosophy of Money

Lecture 49 - Mind, Self and Society

Lecture 50 - George Herbert Mead

Lecture 51 - Mead on Self

Lecture 52 - Mead on Society

Lecture 53 - Perkins Gilman and the gender question

Lecture 54 - Dubois and question of race

Lecture 55 - Classical Sociological Theory and Modernity: A Recap

Lecture 56 - Subsequent Development of Sociological Theory: Structural Functionalism

Lecture 57 - Conflict Theory

Lecture 58 - Interactionist Perspective

Lecture 59 - Theoretical orientations and methodologies

Lecture 60 - Conclusion

NPTEL : NOC:Basics of Language Science (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh Kumar

Lecture 1 - Introduction

Lecture 2 - Goals and Objectives

Lecture 3 - Fundamentals of the Course

Lecture 4 - Language and Linguistics

Lecture 5 - Aspects of Language

Lecture 6 - Language of Continuum

Lecture 7 - I-Language and E-Language

Lecture 8 - Language Acquisition

Lecture 9 - Learning and Acquisition

Lecture 10 - Structure of Language (Sounds)

Lecture 11 - Vocal Apparatus and Salient Features of Sounds

Lecture 12 - Places and Manners of Articulations of Sounds

Lecture 13 - Phonotactic Rules and Word Formation

Lecture 14 - Making of a Word: Rules and Constraints

Lecture 15 - What Makes a Sentence?

Lecture 16 - Components of a Sentence

Lecture 17 - Grammaticality vs Acceptability

Lecture 18 - Subject and Predicate

Lecture 19 - Verb and Object

Lecture 20 - Phrase Structure

Lecture 21 - X Bar Theory

Lecture 22 - Specifier and Complement

Lecture 23 - Complements and Adjuncts

Lecture 24 - Components of a Verb Phrase

Lecture 25 - Categories and Selectional Restrictions on Verbs

Lecture 26 - Thematic Relations

Lecture 27 - Concept of Case in Natural Language

Lecture 28 - Morphological and Abstract Case

Lecture 29 - Structural Case

Lecture 30 - Exceptional Case Marking

Lecture 31 - Movement (Displacement of Constituents) in Natural Language

Lecture 32 - Motivation for Movement of Language Constituents

Lecture 33 - Movement of Constituents in Interrogative Sentences

Lecture 34 - Displacement of Noun Phrases in Passive Constructions

Lecture 35 - NP Movement and Raising of Constituents

Lecture 36 - Noun Phrase Interpretations in Binding Theory

Lecture 37 - Principles of Binding Theory

Lecture 38 - Constraints on Displacement of Constituents

Lecture 39 - Negation in the Structure of Language

Lecture 40 - Negation and Negative Polarity Items in Natural Language

Lecture 41 - Understanding Cognition and Pragmatics in the Structure of Language

NPTEL : NOC:Globalization: Theoretical Perspectives (Humanities and Social Sciences)

Co-ordinators : Prof. R. Santhosh

Lecture 1 - Introduction to the Course

Lecture 2 - Globalization - Key Debates - 1

Lecture 3 - Globalization - Key Debates - 2

Lecture 4 - What is Globalization?

Lecture 5 - Globalization - Major Players

Lecture 6 - Cultural Globalization

Lecture 7 - Cultural Globalization - Introduction II

Lecture 8 - The Clash of Civilizations?

Lecture 9 - The Cultural Construction of Neoliberal Globalization

Lecture 10 - McDonaldization thesis by George Ritzer

Lecture 11 - Arjun Appadurai

Lecture 12 - Arjun Appadurai - II

Lecture 13 - Production of Localities - Arjun Appadurai

Lecture 14 - Appadurai on Violence

Lecture 15 - Rooted Cosmopolitanism: Emerging From a Rivalry of Distinctions

Lecture 16 - Globalization and modernity debate

Lecture 17 - Globalization and modernity: Anthony Giddens the consequences of modernity

Lecture 18 - Globalization and modernity: Anthony Giddens the consequences of modernity (Continued...)

Lecture 19 - Globalization and modernity: Anthony Giddens the consequences of modernity (Continued...)

Lecture 20 - Giddens : Consequences of Modernity Globalization : Key Thinkers by William Jones

Lecture 21 - Giddens and the 'runaway world'

Lecture 22 - David Harvey : Conditions of Postmodernity

Lecture 23 - Reflexive Modernity : Ulrich Beck -1

Lecture 24 - Continuation of Reflexive Modernity : Ulrich Beck - 1

Lecture 25 - Continuation of Reflexive Modernity : Ulrich Beck - 1

Lecture 26 - Space, time, place and flows David Harvey, Saskia Sassen and Manuel Castells

Lecture 27 - Time-Space Compression: David Harvey

Lecture 28 - Saskia Sassen and Spatiality

Lecture 29 - The city: localizations of the global: Saskia Sassen

Lecture 30 - Manuel Castells: Introduction

Lecture 31 - Manuel Castells: Theory of Space and Flows

Lecture 32 - Manuel Castells: Time of Flows

Lecture 33 - Castells : Information Age

Lecture 34 - Globalized Space Centres Cities - Solly Benjamin

Lecture 35 - Globalized Space Centres Cities - Solly Benjamin

Lecture 36 - Ulrich Beck- The Nation-state and Globalizaation - Part I

Lecture 37 - Ulrich Beck- The Nation-state and Globalizaation - Part II

Lecture 38 - Ulrich Beck- The Risk Society - Part I

Lecture 39 - Ulrich Beck- The Risk Society - Part II

Lecture 40 - Ulrich Beck- The Risk Society - Part III

Lecture 41 - Anti-Globalization: The Empire Thesis - Part I

Lecture 42 - Anti-Globalization: The Empire Thesis - Part II

Lecture 43 - Globalization and its Discontents: Joseph Stigiliz

Lecture 44 - Imaginations of Alternate Globalization - Part I

Lecture 45 - Imaginations of Alternate Globalization - Part II

Lecture 46 - Globalization and the Environment

Lecture 47 - Media and Global Culture

Lecture 48 - Religion and Globalization - Part I

Lecture 49 - Religion and Globalization - Part II

Lecture 50 - Religion and Globalization - Part III

Lecture 51 - The Modernity of caste and the Market Economy - Part I

Lecture 52 - The Modernity of caste and the Market Economy - Part II

Lecture 53 - Gender, Dowry and the Migration System of Indian IT professionals

Lecture 54 - Employment, Exclusion and 'Merit' in the Indian IT Industry

Lecture 55 - Medical Tourism in India: Progress or Predicament?

Lecture 56 - Globalisation, Class and Work in India

Lecture 57 - The New Middle class and Employment

Lecture 58 - Consuming Goa: Tourist site as Dispensable Space

Lecture 59 - The regional identity politics of India's new land wars: Land, Food and Popular Mobilisation in Goa and West Bengal

Lecture 60 - Conclusion

NPTEL : NOC:Towards an Ethical Digital Society: From Theory to Practice (Humanities and Social Sciences)

Co-ordinators : Prof. Bidisha Chaudhuri

Lecture 1 - Ethics: What, Why and Why not?

Lecture 2 - Technology And Ethics: To Do Good Or To Do No Harm?

Lecture 3 - Centralized Technology, Localized Services: A Case For Selective Inclusion?

Lecture 4 - Smart Cities And Equity

Lecture 5 - Data Or An Anti-Politics Machine?

Lecture 6 - Data, Democracy and Justice

Lecture 7 - Ai And Ethics, Governance, Policy: Landscape And Roadmap

Lecture 8 - On A Materialist Conception Of AI And Ethics

Lecture 9 - Keynote - Technology And Ethics: An Economist's Ruminations

Lecture 10 - Poster Presentations

NPTEL : NOC:Literary and Cultural Disability Studies: An Exploration (Humanities and Social Sciences)

Co-ordinators : Prof. Hemachandran Karah

Lecture 1 - Introduction to Module 1: Disability and the Problem of Canon

Lecture 2 - Introduction to LCDS - Part 1

Lecture 3 - Introduction to LCDS - Part 2

Lecture 4 - Autobiography and Disability: A Review via the writings of Ved Mehta

Lecture 5 - Themes of Attachments, Blindness and Infrastructures of Care in Mehtas Intimate Worlds

Lecture 6 - Introduction to Module 2: Disability and Literary Criticism

Lecture 7 - Conversation with Ms. Deepa Kiran

Lecture 8 - Conversation with Dr. Sona Hill Kazemi

Lecture 9 - Introduction to Module 3: Disability and the Multilingual Question

Lecture 10 - Interview with Prof. Amy Shuman

Lecture 11 - Conversation with Prof Ato Quayson: Aesthetic Nervousness and Disability

Lecture 12 - Conversation with Prof. Chithra

Lecture 13 - Introduction to Module 4: Disability and Interdisciplinarity respectively

Lecture 14 - Studying the Notion of Trauma via Cynthia Ozicks Short Story The Shawl

Lecture 15 - Critique of Trauma via Cynthia Ozick's The Shawl

Lecture 16 - Metamorphosis: A Story of Human Predicament

Lecture 17 - Metamorphosis: A Critique of the Politics of Abandonment

Lecture 18 - Anjali: A Watershed Moment in Care Ethics - Part 1

Lecture 19 - Anjali: A Filmic begin in Integration and Inclusion - Part 2

Lecture 20 - Tradition and Individual Madness

Lecture 21 - The Mark On The Wall (Continued...)

Lecture 22 - Intellectual Statism: The Problem of Reality and Magical Realism

Lecture 23 - Busting Fictional and Cognitive Monochromatism

Lecture 24 - Kubla Khan By Samuel Taylor Coleridge: A Classroom Discussion

Lecture 25 - The Most Popular Story Of Christopher Boone, A Fictional Aspergic Detective

Lecture 26 - Neurotypicality, Yet Another Catchment Area of the Bestsellers

Lecture 27 - Introduction To Deaf Ways Of Living As A Linguistic Minority - Part 1

Lecture 28 - Introduction To Deaf Ways Of Living As A Linguistic Minority - Part 2

Lecture 29 - Demonstration Of The Workings Of ISL; Its Beauty And Diversity - Part 1

Lecture 30 - Demonstration Of The Workings Of ISL; Its Beauty And Diversity - Part 2

Lecture 31 - Sign Vocabulary and the Dictionary of ISL - Part 1

Lecture 32 - Sign Vocabulary and the Dictionary of ISL - Part 2

Lecture 33 - Talk By Prof. Tanmoy Bhattacharya on Sign Language and Linguistics - Part 1

Lecture 34 - Talk By Prof. Tanmoy Bhattacharya on Sign Language and Linguistics - Part 2

Lecture 35 - Teaching Science for Deaf Children: A Personal Experience

Lecture 36 - The Theme Culture Of Hearing In Thirukural, A Classical Tamil Book of Couplets

Lecture 37 - Governmentality

Lecture 38 - Governmentality and Disability Studies: A Special Connection

Lecture 39 - Data, Disability, and Census: An Indian Experience

Lecture 40 - Medical Education And Disability

Lecture 41 - Design, Accommodation, and Disability

Lecture 42 - Medical Humanities and Disability

Lecture 43 - Making Paper Pumpkins Work for DS: Towards a Moral Politics of Vulnerability

NPTEL : NOC:Trauma and Literature (Humanities and Social Sciences)

Co-ordinators : Prof. Avishek Parui

Lecture 1 - General Overview

Lecture 2 - Manto's Toba Tek Singh - Part 1

Lecture 3 - Manto's Toba Tek Singh - Part 2

Lecture 4 - Manto's Toba Tek Singh - Part 3

Lecture 5 - Manto's Thanda Gosht

Lecture 6 - Mansfield's The Fly - Part 1

Lecture 7 - Mansfield's The Fly - Part 2

Lecture 8 - Mansfield's The Fly - Part 3

Lecture 9 - Woolf's Mrs. Dalloway - Part 1

Lecture 10 - Woolf's Mrs. Dalloway - Part 2

Lecture 11 - Woolf's Mrs. Dalloway - Part 3

Lecture 12 - Woolf's Mrs. Dalloway - Part 4

Lecture 13 - Woolf's Mrs. Dalloway - Part 5

Lecture 14 - Woolf's Mrs. Dalloway - Part 6

Lecture 15 - Woolf's Mrs. Dalloway - Part 7

Lecture 16 - Malabou's The New Wounded - Part 1

Lecture 17 - Malabou's The New Wounded - Part 2

Lecture 18 - Malabou's The New Wounded - Part 3

Lecture 19 - Malabou's The New Wounded - Part 4

Lecture 20 - Malabou's The Ontology of the Accident - Part 1

Lecture 21 - Malabou's The Ontology of the Accident - Part 2

Lecture 22 - Malabou's The Ontology of the Accident - Part 3

Lecture 23 - Malabou's The Ontology of the Accident - Part 4

Lecture 24 - Malabou's The Ontology of the Accident - Part 5

Lecture 25 - Malabou's The Ontology of the Accident - Part 6

Lecture 26 - Malabou's The Ontology of the Accident - Part 7

Lecture 27 - Malabou's The Ontology of the Accident - Part 8

Lecture 28 - Heller's Catch-22 - Part 1

Lecture 29 - Heller's Catch-22 - Part 2

Lecture 30 - Heller's Catch-22 - Part 3

Lecture 31 - Heller's Catch-22 - Part 4

Lecture 32 - Heller's Catch-22 - Part 5

Lecture 33 - Heller's Catch-22 - Part 6

Lecture 34 - Heller's Catch-22 - Part 7

Lecture 35 - Heller's Catch-22 - Part 8

Lecture 36 - Heller's Catch-22 - Part 9

Lecture 37 - Butalia's The Other Side of Silence - Part 1

Lecture 38 - Butalia's The Other Side of Silence - Part 2

Lecture 39 - Butalia's The Other Side of Silence - Part 3

Lecture 40 - Butalia's The Other Side of Silence - Part 4

Lecture 41 - Butalia's The Other Side of Silence - Part 5

Lecture 42 - Butalia's The Other Side of Silence - Part 6

Lecture 43 - Butalia's The Other Side of Silence - Part 7

Lecture 44 - Dangarembga's Nervous Conditions - Part 1

Lecture 45 - Dangarembga's Nervous Conditions - Part 2

Lecture 46 - Dangarembga's Nervous Conditions - Part 3

Lecture 47 - Dangarembga's Nervous Conditions - Part 4

Lecture 48 - Dangarembga's Nervous Conditions - Part 5

Lecture 49 - Dangarembga's Nervous Conditions - Part 6

Lecture 50 - Vonnegut's Slaughterhouse-five - Part 1

Lecture 51 - Vonnegut's Slaughterhouse-five - Part 2

Lecture 52 - Vonnegut's Slaughterhouse-five - Part 3

Lecture 53 - Vonnegut's Slaughterhouse-five - Part 4

Lecture 54 - Vonnegut's Slaughterhouse-five - Part 5

Lecture 55 - Toni Morrison's Beloved - Part 1

Lecture 56 - Toni Morrison's Beloved - Part 2

Lecture 57 - Toni Morrison's Beloved - Part 3

Lecture 58 - Toni Morrison's Beloved - Part 4

Lecture 59 - Toni Morrison's Beloved - Part 5

Lecture 60 - Toni Morrison's Beloved - Part 6

Lecture 61 - Carruth's Unclaimed Experience - Part 1

Lecture 62 - Carruth's Unclaimed Experience - Part 2

Lecture 63 - Carruth's Unclaimed Experience - Part 3

Lecture 64 - Ann Whitehead's Trauma Fiction - Part 1

Lecture 65 - Ann Whitehead's Trauma Fiction - Part 2

NPTEL : NOC:Twentieth Century American Drama (Humanities and Social Sciences)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Introductory Lectuer

Lecture 2 - Eugene O'Neil's The Emperor Jones - Part 1

Lecture 3 - Eugene O'Neil's The Emperor Jones - Part 2

Lecture 4 - Eugene O'Neil's The Emperor Jones - Part 3

Lecture 5 - Eugene O'Neil's The Emperor Jones - Part 4

Lecture 6 - Arthur Miller's Death of a Salesman - Part 1

Lecture 7 - Arthur Miller's Death of a Salesman - Part 2

Lecture 8 - Arthur Miller's Death of a Salesman - Part 3

Lecture 9 - Arthur Miller's Death of a Salesman - Part 4

Lecture 10 - Arthur Miller's Death of a Salesman - Part 5

Lecture 11 - Arthur Miller's Death of a Salesman - Part 6

Lecture 12 - Arthur Miller's Death of a Salesman - Part 7

Lecture 13 - Arthur Miller's Death of a Salesman - Part 8

Lecture 14 - Arthur Miller's Death of a Salesman - Part 9

Lecture 15 - Arthur Miller's All My Sons - Part 1

Lecture 16 - Arthur Miller's All My Sons - Part 2

Lecture 17 - Arthur Miller's All My Sons - Part 3

Lecture 18 - Arthur Miller's All My Sons - Part 4

Lecture 19 - Arthur Miller's All My Sons - Part 5

Lecture 20 - Arthur Miller's All My Sons - Part 6

Lecture 21 - Arthur Miller's All My Sons - Part 7

Lecture 22 - You Can't Take it with You - Part 1

Lecture 23 - You Can't Take it with You - Part 2

Lecture 24 - You Can't Take it with You - Part 3

Lecture 25 - You Can't Take it with You - Part 4

Lecture 26 - The Glass Menagerie - Part 1

Lecture 27 - The Glass Menagerie - Part 2

Lecture 28 - The Glass Menagerie - Part 3

Lecture 29 - The Glass Menagerie - Part 4

Lecture 30 - Albee's Who's Afraid of Virginia Woolf - Part 1

Lecture 31 - Albee's Who's Afraid of Virginia Woolf - Part 2

Lecture 32 - Albee's Who's Afraid of Virginia Woolf - Part 3

Lecture 33 - Albee's Who's Afraid of Virginia Woolf - Part 4

Lecture 34 - Albee's Who's Afraid of Virginia Woolf - Part 5

Lecture 35 - Albee's The Zoo Story - Part 1

Lecture 36 - Albee's The Zoo Story - Part 2

Lecture 37 - Albee's The Zoo Story - Part 3

Lecture 38 - Albee's The Zoo Story - Part 4

Lecture 39 - Albee's The Zoo Story - Part 5

Lecture 40 - Hansberry's Day in the Sun - Part 1

Lecture 41 - Hansberry's Day in the Sun - Part 2

Lecture 42 - Hansberry's Day in the Sun - Part 3

Lecture 43 - Hansberry's Day in the Sun - Part 4

Lecture 44 - Hansberry's Day in the Sun - Part 5

Lecture 45 - Post World War II American Theatre: A Historical Perspective

Lecture 46 - American Theatre in Context: 1945- Present - Part 1

Lecture 47 - American Theatre in Context: 1945- Present - Part 2

Lecture 48 - American Theatre in Context: 1945- Present - Part 3

Lecture 49 - August Wilson's The Piano Lesson - Part 1

Lecture 50 - August Wilson's The Piano Lesson - Part 2

Lecture 51 - August Wilson's The Piano Lesson - Part 3

Lecture 52 - August Wilson's The Piano Lesson - Part 4

Lecture 53 - August Wilson's The Piano Lesson - Part 5

Lecture 54 - August Wilson's The Piano Lesson - Part 6

Lecture 55 - August Wilson's The Piano Lesson - Part 7

Lecture 56 - August Wilson's The Piano Lesson - Part 8

Lecture 57 - Modern American Drama 1945-2000: Redefining the Centre

NPTEL : NOC:Fundamental Concepts in Sociolinguistics (Humanities and Social Sciences)

Co-ordinators : Prof. Om Prakash

Lecture 1 - Course Introduction

Lecture 2 - Language as a System

Lecture 3 - Design Features

Lecture 4 - Linguistic Relativity

Lecture 5 - Language and Culture

Lecture 6 - Language and Gender

Lecture 7 - Behaviourist paradigm in language acuquisition

Lecture 8 - Innateness Hypothesis [Generative Paradigm] in Language Acquisition

Lecture 9 - Key Concepts in Language Acquisition Lad, Ug, and poverty Stimulus

Lecture 10 - Linguistic Competence

Lecture 11 - Communicative Competence

Lecture 12 - Critical Period Hypothesis

Lecture 13 - Dialects

Lecture 14 - Speech Community

Lecture 15 - Diglossia

Lecture 16 - Systemic Functions of Language

Lecture 17 - SPEAKING Model

Lecture 18 - Register and Style

Lecture 19 - Bilingualism - Part I

Lecture 20 - Bilingualism - Part II

Lecture 21 - Code Mixing and Switching

Lecture 22 - Language Hybridity Case of Hindi-English Mixing

Lecture 23 - Pidgin and Creole

Lecture 24 - Creolization Process and birth of a Language

Lecture 25 - Mixing and Switching: Creative Outcome of Bi/Multilingual Mind

Lecture 26 - Language Policy and Planning

Lecture 27 - Types of Language Planning

Lecture 28 - Official Languages of India

Lecture 29 - The Process of Standardization

Lecture 30 - Three Language Formula

Lecture 31 - The Eighth Schedule

Lecture 32 - Mother Tongue

Lecture 33 - Linguistic Diversity of India

Lecture 34 - Schedule and Non-Schedule Languages Census of India 2011

Lecture 35 - Multilingualism in India

Lecture 36 - Language and Education Policy

Lecture 37 - English in India

Lecture 38 - Emergence of Sociolinguistics As An Independent Discipline

Lecture 39 - Language and Variations

Lecture 40 - William Labov Martha's Vineyard Island Study

Lecture 41 - William Labov Social Stratification of English in New York City (1966)

Lecture 42 - Observers Paradox and Sociolinguistic Variable

Lecture 43 - Dell Hymes and His Work

Lecture 44 - Basil Bernstein and His Work

Lecture 45 - John J. Gumperz and His Work

Lecture 46 - Joshua Fishman and His Work

Lecture 47 - Uriel Weinriech and his work

Lecture 48 - Susan Ervin M Tripp and her work

Lecture 49 - Charlse A Ferguson and his Work

Lecture 50 - William Bright and his work

Lecture 51 - Allen D Grimshaw and his work

Lecture 52 - MAK Halliday and His Work

Lecture 53 - MAK Halliday and His Work

Lecture 54 - Signific Studies in Language Variation

Lecture 55 - Indian English

Lecture 56 - Multilingual Societies and Multilingual Discourse

Lecture 57 - Language Endangerment

Lecture 58 - Linguistic Identity and Language Movements

Lecture 59 - Liguistic Identity and language Movements in India

Lecture 60 - Ferdinand de Saussure and his Influence

Lecture 61 - Saussureâ€™s Key Concepts

Lecture 62 - 20th Century Theoretical Developments in Linguistics

Lecture 63 - Varieties of Language

Lecture 64 - Linguistic Landscape

Lecture 65 - Linguistic Allegiance, Identity, and Socialization in Digital Space

Lecture 66 - Recapitulating Language Acquistion

Lecture 67 - Review and Concluding Remarks

Lecture 68 - Significance of Culture in Language Learning/Teaching

NPTEL : NOC:Literature and Life (Humanities and Social Sciences)

Co-ordinators : Prof. S P Dhanavel

Lecture 1 - What is literature ?

Lecture 2 - What is Life ?

Lecture 3 - The Relationship between Literature and Life

Lecture 4 - Approaches to Literature and Life

Lecture 5 - Essay

Lecture 6 - Poetry

Lecture 7 - Drama

Lecture 8 - The Novel and the Short Story

Lecture 9 - Abdul Kalams When I Failed

Lecture 10 - Chetan Bhagats My Stupid Suicide Plan

Lecture 11 - R K Narayans Toasted English

Lecture 12 - Amishs Why I Write

Lecture 13 - George Orwells Politics and the English Language

Lecture 14 - William Zinssers Writing English as a Second Language

Lecture 15 - Joan Didions Why I Write

Lecture 16 - Virginia Woolfs The Death of the Moth

Lecture 17 - William Wordsworths Resolution and Independence

Lecture 18 - H W Longfellows A Psalm of Life

Lecture 19 - W H Davies Leisure

Lecture 20 - Robert Frosts Mending Wall

Lecture 21 - Emily Dickinsons A Narrow Fellow in the Grass

Lecture 22 - Kamala Dass Words

Lecture 23 - Louise GlÃ¼cks The Mountain

Lecture 24 - Sujata Bhatts Search for My Tongue

Lecture 25 - Girish Karnads Tughlaq: An Introduction

Lecture 26 - Characters and Characterization in Karnads Tughlaq

Lecture 27 - Sources, Structure, Form, Themes, and Techniques in Tughlaq

Lecture 28 - Irony, Humor and Symbol in Tughlaq

Lecture 29 - Tughlaq: Further Analysis

Lecture 30 - Anton Chekhovs The Bear

Lecture 31 - The Bear: An Analysis

Lecture 32 - J M Synges Riders to the Sea

Lecture 33 - Riders to the Sea: An Analysis

Lecture 34 - Aravind Adigas The White Tiger: An Introduction

Lecture 35 - Characters and Characterization in Aravind Adigas The White Tiger

Lecture 36 - Themes and Techniques in Aravind Adigas The White Tiger

Lecture 37 - Literary Devices in The White Tiger

Lecture 38 - Aravind Adigas The White Tiger: Further Analysis

Lecture 39 - Guy de Maupassants The Dispenser of Holy Water

Lecture 40 - Katherine Mansfields A Cup of Tea

Lecture 41 - Heinrich Bolls Action Will Be Taken

Lecture 42 - Joao Guimaraes Rosas The Third Bank of the River

Lecture 43 - G G Joshi's The Letter

Lecture 44 - Ruskin Bond's The Boy Who Broke the Bank

Lecture 45 - Anjana Appachana's Sharmaji

Lecture 46 - Isaac Asimovs True Love

Lecture 47 - Discussion 1 - Prose

Lecture 48 - Discussion 2 - Poetry

Lecture 49 - Discussion 3 - Drama

Lecture 50 - Discussion 4 - Novel

NPTEL : NOC:German - III (Humanities and Social Sciences)

Co-ordinators : Prof. Milind Brahme

Lecture 1 - GUTE REISE. Reisen, Ferien und Urlaub

Lecture 2 - Infinitiv mit zu

Lecture 3 - Wir lernen das Verb lassen

Lecture 4 - Das Verb lassen / Ãœber eine Reise sprechen und schreiben

Lecture 5 - Wir Machen Lektion 1 Zu Ende

Lecture 6 - Wir Sprechen Ãœber Vorlieben Und Abneigungen

Lecture 7 - Mein Lieblingsurlaub

Lecture 8 - Wir beginnen mit Kapitel 2

Lecture 9 - Kapitel 2. Wir Lernen Die Konnektoren -- Weil, Deshalb, Obwohl Und Trotzdem

Lecture 10 - Der Genitiv

Lecture 11 - Der Genitiv -- Die PrÃ¤positionen wegen und trotz -- Wir machen Lektion 2 zu Ende

Lecture 12 - Wir machen Lektion 3.

Lecture 13 - Das PrÃ¤teritum

Lecture 14 - Technik im Alltag

Lecture 15 - Die PrÃ¤positionen vor, nach und wÃ¤hrend.

Lecture 16 - Neue Technologien - Eine Meinung

Lecture 17 - Wir Ã¼ben Konnektoren. Wir beginnen mit Lektion 4

Lecture 18 - Wir machen mit Lektion 4 weiter

Lecture 19 - Wir lernen das PrÃ¤teritum und den Konjunktiv 2

Lecture 20 - Verben mit PrÃ¤positionen - Lektion 4

Lecture 21 - Wir machen Lektion 4 zu Ende

Lecture 22 - Was bedeutet GlÃ¼ck fÃ¼r mich?

Lecture 23 - Umweltfreundlich? Wir machen Lektion 5

Lecture 24 - GlÃ¼cklich sein und umweltfreundlich leben. Lektion 5: Komparativ und Superlativ

Lecture 25 - Wir wiederholen Adjektiv- und n-Deklination

Lecture 26 - Umweltschutz und Tierschutz. Wir machen Lektion 5 zu Ende.

Lecture 27 - Wir bereiten uns auf eine PrÃ¤sentation vor.

Lecture 28 - Relativsatz 1

Lecture 29 - Relativsatz 2. Und wir lesen eine kleine Geschichte.

Lecture 30 - Zukunftszeichen und VorsÃ¤tze fÃ¼rs neue Jahr: Wir lernen Futur I.

Lecture 31 - Relativsatz - eine Wiederholung | Zukunft: Hamburg 2030

Lecture 32 - Was kann ich fÃ¼r die Umwelt tun? (I)

Lecture 33 - Was kann ich fÃ¼r die Umwelt tun? (II)

Lecture 34 - Was kann ich fÃ¼r die Umwelt tun? (III)

Lecture 35 - Kleines StÃ¤de-Quiz

Lecture 36 - Was kann ich fÃ¼r die Umwelt tun? (IV)

Lecture 37 - Wir lernen und Ã¼ben das Plusquamperfekt.

Lecture 38 - Wir beginnen mit Kapitel 7.

Lecture 39 - Thema Beziehungskisten. Wir lernen dabei temporale NebensÃ¤tze kennen.

Lecture 40 - Wir Ã¼ben temporale NebensÃ¤tze.

Lecture 41 - BerÃ¼hmte Paare. Wir machen Kapitel 7 zu Ende.

Lecture 42 - Wir beginnen mit Kapitel 8.

Lecture 43 - Im Krankenhaus. brauchen nicht und brauchen nur + zu | dass Stze und Infinitiv Stze

Lecture 44 - Wir wiederholen und ben das Reflexiv.

Lecture 45 - Wofr interessierst du dich? | Reflexiv und zweiteilige Konnektoren: Wir machen Kapitel 8 zu Ende.

Lecture 46 - Thema: Hotel Mama. Prasentationen der Lernenden. (I)

Lecture 47 - Hotel Mama. Prasentationen der Lernenden. (II)

Lecture 48 - PrÃ¤sentationen der Lernenden zum Thema Hotel Mama (III)

Lecture 49 - ErgÃ¤nzung der Adjektivdeklination. Wir beginnen mit Kapitel 9.

Lecture 50 - PrÃ¤sentationen der Lernenden zum Thema Hotel Mama (IV)

Lecture 51 - Wir sehen einen Film zum Thema Hotel Mama.

Lecture 52 - Stellung von nicht im Satz.| Volkslieder

Lecture 53 - Wir lernen das Passiv.

Lecture 54 - Wir lernen und Ã¼ben das Passiv.

Lecture 55 - Wir Ã¼ben das Passiv. (II) | PrÃ¤positionen mit dem Genitiv | Wir machen Kapitel 10 zu Ende.

Lecture 56 - Adjektivdeklination - Wiederholung | Kapitel 11: ArtikelwÃ¶rter als Pronomen

Lecture 57 - Kapitel 11: Adjektiv als Nomen | SprichwÃ¶rter | ErgÃ¤nzung zu den RelativsÃ¤tzen

Lecture 58 - Kapitel 11: StÃ¤dterankings | RelativsÃ¤tze mit was und wo

Lecture 59 - Wir machen Kapitel 11 zu Ende. | SÃ¤tze mit je...desto

Lecture 60 - Kapitel 12: Verben als Adjektive - Partizip 2 und Partizip 1

Lecture 61 - Wir lernen und ?ben das Passiv.

Lecture 62 - Kapitel 12: Lesetexte zu den Themen Globalisierung und Gewissensfragen

Lecture 63 - Zwei Prasentationen zum Thema: Leben - in der Stadt oder auf dem Land?

Lecture 64 - Kapitel 12: Lesetext -- Die Fuggerei in Augsburg

Lecture 65 - Zwei Prasentationen zum Thema: Leben - in der Stadt oder auf dem Land? (II)

Lecture 66 - Prasentationen zum Thema: Leben - in der Stadt oder auf dem Land? (III)

Lecture 67 - Prasentationen zum Thema: Leben - in der Stadt oder auf dem Land? (IV)

Lecture 68 - Prasentationen zum Thema: Leben - in der Stadt oder auf dem Land? (V) | Wir lernen

Lecture 69 - Wir lernen, wie man einen informellen Brief oder eine informelle E-Mail schreibt

NPTEL : NOC:Appreciating Hindustani Music (Humanities and Social Sciences)

Co-ordinators : Prof. Lakshmi Sreeram

Lecture 1 - Hindustani Music - A World of Colour, Romance and History

Lecture 2 - Classical or Shastriya - What's in a Name!

Lecture 3 - Dhrupad, Khayal and Instrumental Music: A Bird's-eye View

Lecture 4 - Hindustani Music is Raga Sangeet

Lecture 5 - The Textual Tradition

Lecture 6 - Swara and Shruti: Tone and Microtone

Lecture 7 - Swara and Shruti in the Textual Tradition

Lecture 8 - Tanpura - The King of Overtones

Lecture 9 - Entering the World of Raga - Raga and Swara

Lecture 10 - The World of Raga-2: Strong and Weak Notes

Lecture 11 - The World of Raga-3: Ornament

Lecture 12 - The World of Raga-4: Paths of a Raga

Lecture 13 - Raga and Time Association

Lecture 14 - Raga-Lakshana or Features of Raga

Lecture 15 - Defining Raga

Lecture 16 - Classification of Ragas - The Mela or Thaat System

Lecture 17 - Classification of Ragas - The Raagaanga System

Lecture 18 - Classification of Ragas - Raga Ragini System

Lecture 19 - Extending the Raga Corpus - Winds from the South

Lecture 20 - Extending the Raga Corpus - Jod Ragas

Lecture 21 - Principles of Time in Hindustani Music - Tala and Laya

Lecture 22 - Some Aspects of Tala and a Few Important Talas

Lecture 23 - Tabla as Keeper of Tala in Khayal

Lecture 24 - Khayal, A Compositional Form - 1

Lecture 25 - Khayal, A Compositional Form - 2

Lecture 26 - Khayal Compositions by Contemporary Composers

Lecture 27 - The Vilambit Khayal

Lecture 28 - Tarana and Trivat

Lecture 29 - Raga Vistaar or Badhat - Improvisation in Khayal

Lecture 30 - Ashtaanga of Khayal - The Many Limbs of a Khayal Presentation

Lecture 31 - A Typical Khayal Concert

Lecture 32 - Gharanas - Schools/Styles of Khayal

Lecture 33 - Gharanas of Khayal - An Introduction

Lecture 34 - Gharanas of Khayal - Early Masters

Lecture 35 - Gharanas of Khayal - Twentieth Century Masters

Lecture 36 - Lectuer Demonstration by Pt.Sathyasheel Deshpande

Lecture 37 - Melodic Accompaniment in Khayal

Lecture 38 - The Harmonium as Accompaniment for Khayal-Guest Lecture

Lecture 39 - Dhrupad and Khayal - Some Comparative Remarks

Lecture 40 - Dhrupad - An Overview

Lecture 41 - Dhrupad - Style and Structure

Lecture 42 - Dhrupad - Aalaap

Lecture 43 - Dhrupad - Song Texts in Different Talas

Lecture 44 - Dhamaar - A Compositional Form

Lecture 45 - Sadra - A Compositional Form

Lecture 46 - The Enchanting World of Thumri

Lecture 47 - Instrumental Music - A Brief Overview

Lecture 48 - The Sitar - The Instrument, Technique and Presentation

Lecture 49 - The Sarod - A Lecdem

Lecture 50 - Art of the Tabla - Introduction

Lecture 51 - Art of the Tabla - The Instrument, Its Vocabulary and Diverse Roles

Lecture 52 - Art of the Tabla - Gharanas and Repertoire: Peshkaar and Quaaidaa

Lecture 53 - Art of the Tabla - Gharanas and Repertoire: Qaaidaa, Relaa, Gat, Tukdaa

Lecture 54 - Art of the Tabla - Non Extendable Compositions

Lecture 55 - Bhakthande and Paluskar - The 20th Century Reformers of Hindustani Music

Lecture 56 - Hindustani Music in a World of Millions of Views

NPTEL : NOC:An Introduction to Indian Literary Theory (Humanities and Social Sciences)

Co-ordinators : Prof. Sreenath V.S

Lecture 1 - The Social History of Sanskrit and the Origin of KÃ„vya

Lecture 2 - The RÃ„mÃ„yaÃ¡Â¹â€¡a and Sanskrit Literary Theory

Lecture 3 - The Genesis and Evolution of Sanskrit Literary Theory

Lecture 4 - The Actual Relation Between KÃ„vyaÃ…â€ºÃ„stra or KÃ„vya

Lecture 5 - Sanskrit KÃ„vyaÃ…â€ºÃ„stra in the Medieval Period

Lecture 6 - Sanskrit Literary Theoreticians - Early Period

Lecture 7 - Sanskrit Literary Theoreticians - Medieval Period A

Lecture 8 - Sanskrit Literary Theoreticians - Medieval Period B

Lecture 9 - Sanskrit Literary Theory in the Colonial Period

Lecture 10 - Sanskrit poetics in the Postcolonial Phase

Lecture 11 - Reader in Sanskritic kÃ„vya tradition

Lecture 12 - Who is the ideal spectator for nÃ„Ã¡Â¹Âya?

Lecture 13 - DaÃ…â€ºarÃ…Â«paka: Ten dramatic forms - Part I

Lecture 14 - DaÃ…â€ºarÃ…Â«paka: Ten dramatic forms - Part II

Lecture 15 - UparÃ…Â«pakas

Lecture 16 - KÃ„vya and the Three Languages

Lecture 17 - KÃ„vyasvarÃ…Â«pa or the Ontology of Poetry

Lecture 18 - Bharata and the Idea of Rasa

Lecture 19 - The Beginning of Rasa Discourse in Literary Theory

Lecture 20 - Rasa Theory and Ã„â‚¬nandavardhana

Lecture 21 - Rasa Theory and BhaÃ¡Â¹ÂÃ¡Â¹Â LollaÃ¡Â¹Âa

Lecture 22 - Rasa Theory and Ã…Å¡ri Ã…Å¡aÃ¡Â¹â€¦kuka

Lecture 23 - Rasa Theory and BhaÃ¡Â¹ÂÃ¡Â¹Âa Tauta

Lecture 24 - Rasa Theory and BhaÃ¡Â¹ÂÃ¡Â¹Âa NÃ„yaka

Lecture 25 - Rasa Theory and Abhinavagupta

Lecture 26 - Rasa Theory, RÃ„macandra and GuÃ¡Â¹â€¡acandra

Lecture 27 - Rasa Theory and VidyÃ„dhara

Lecture 28 - The Theory of Alamkara

Lecture 29 - The Concept of Aucitya: An Introduction

Lecture 30 - The Concept of Aucitya and KÃ¡Â¹Â£emendra

Lecture 31 - Two Ways of Implementing Aucitya - Part 1

Lecture 32 - Two Ways of Implementing Aucitya - Part 2

Lecture 33 - Aucitya and KaviÃ…â€ºikÃ¡Â¹Â£a

Lecture 34 - Aucitya and the Readers

Lecture 35 - Aucitya and the Opinion of Literary Theoreticians

Lecture 36 - Aucitya and Ã„â‚¬nandavardhana

Lecture 37 - Guna or Poetic Merit: Bharata and Bhamaha

Lecture 38 - Guna or Poetic Merit: DaÃ¡Â¹â€¡Ã¡Â¸in and UdbhaÃ¡Â¹Âa

Lecture 39 - Guna or Poetic Merit: VÃ„man's Contribution

Lecture 40 - Guna or Poetic Merit: Ã„â‚¬nandavardhana, NamidÃ„shu and PratihÃ„renduraja

Lecture 41 - Guna or Poetic Merit: Bhoja

Lecture 42 - Guna or Poetic Merit: ViÃ…â€ºveÃ…â€ºvara and the author of AgnipurÃ„Ã¡Â¹â€¡a

Lecture 43 - Guna or Poetic Merit: MammaÃ¡Â¹Â's View

Lecture 44 - RÃ„Â«ti or the Theory of Poetic Styles

Lecture 45 - Theory of Dosa or Poetic Blemish: Bharat's View

Lecture 46 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: BhÃ„mah's View

Lecture 47 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: DaÃ¡Â¹â€¡dinÃ¢â‚¬â„¢s View

Lecture 48 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: VÃ„man's View

Lecture 49 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: Ã„â‚¬nandavardhana and MammaÃ¡Â¹Â's Views

Lecture 50 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: MammaÃ¡Â¹Â's View II

Lecture 51 - Theory of DoÃ¡Â¹Â£a or Poetic Blemish: Ã„â‚¬nandavardhana and MammaÃ¡Â¹Â's View III

Lecture 52 - Vakrokti: An Introduction

Lecture 53 - Vakrokti: Pada-pÃ…Â«rvÃ„rtha-vakrata - I

Lecture 54 - Vakrokti: Pada-pÃ…Â«rvÃ„rtha-vakrata - II

Lecture 55 - Vakrokti: Pada-pÃ…Â«rvÃ„rtha-vakrata - III

Lecture 56 - Vakrokti: PadaparÃ„rddha vakratÃ„

Lecture 57 - Vakrokti: VÃ„kya-vakratÃ„

Lecture 58 - Vakrokti: PrakaraÃ¡Â¹â€¡a-vakratÃ„

Lecture 59 - Vakrokti: Prabandha vakratÃ„

Lecture 60 - Dhvani: AvivakÃ¡Â¹Â£ita-vÃ„cya

Lecture 61 - VivakÃ¡Â¹Â£itÃ„nya-paravÃ„cya

NPTEL : NOC:Host-Pathogen Interaction (Immunology) (Humanities and Social Sciences)

Co-ordinators : Prof. Himanshu Kumar

Lecture 1 - History of Immunology - 1

Lecture 2 - History of Immunology - 2

Lecture 3 - History of Immunology - 3

Lecture 4 - History of Immunology - 4 (Nobel Prizes in Immunology)

Lecture 5 - Branches of Immunology

Lecture 6 - An Introduction of Immune system-immunity properties

Lecture 7 - An Introduction of Immune system-link between innate and adaptive immunity

Lecture 8 - An Introduction of immune organs

Lecture 9 - Immune organs - 1

Lecture 10 - Immune organs - 2

Lecture 11 - Immune organs - 3

Lecture 12 - Cells of Immune System - Hematopoiesis

Lecture 13 - Cells of Immune System - Transgenesis - 1

Lecture 14 - Cells of Immune System - Transgenesis - 2

Lecture 15 - Cells of Immune System and and its role in Host Defense - PBMC isolation

Lecture 16 - Cells of Immune System and and its role in Host Defense - Neutrophils

Lecture 17 - Cells of Immune System and and its role in Host Defense - Eosinophils, Basophils, Mast cells

Lecture 18 - Cells of Immune System and and its role in Host Defense - Dendritic cells

Lecture 19 - Cells of Immune System and and its role in Host Defense - Macrophages

Lecture 20 - Cells of Immune System and and its role in Host Defense - Natural Killer cells and NK T cells

Lecture 21 - Cells of Immune System and and its role in Host Defense - B and T cells

Lecture 22 - Basics of Cytokines

Lecture 23 - Basics of Cytokines-Cytokine function and other Immune Mediators

Lecture 24 - Inflammation and Signature of Inflammation

Lecture 25 - Signatures of Inflammation

Lecture 26 - Application of Interferons in Therapies

Lecture 27 - Application of Cytokines in Therapies and Research

Lecture 28 - Introduction of Innate Immunity

Lecture 29 - Introduction of Innate Immunity - Physical, Bio-chamical and Microbiological Barriers

Lecture 30 - Introduction of Innate Immunity - skin

Lecture 31 - Introduction of Innate Immunity - Mucosal Surfaces and Microbiological Barrier

Lecture 32 - Concept of Pattern - recognition receptors (PRRs)

Lecture 33 - Pattern-recognition receptors - TLRs and TLR Ligand

Lecture 34 - Pattern-recognition receptors - TLRs Signaling and MyD88 and TRIF-dependent signalling

Lecture 35 - Pattern-recognition receptors - TLRs and Diseases

Lecture 36 - Pattern-recognition receptors - TLRs and Therapeutics

Lecture 37 - Pattern-recognition receptors - RLR

Lecture 38 - Pattern-recognition receptors - RLR Signaling pathways

Lecture 39 - Pattern-recognition receptors - RLR associated-Diseases and therapeutics

Lecture 40 - Pattern-recognition receptors - NLR and NLR Signaling pathways

Lecture 41 - Pattern-recognition receptors - NLR and Diseases

Lecture 42 - Pattern-recognition receptors - Discovery of DNA Sensor

Lecture 43 - Pattern-recognition receptors - DNA Sensor and Signaling pathway

Lecture 44 - Pattern-recognition receptors - DNA Sensor and Diseases

Lecture 45 - Innate Immunity - Complement Introduction

Lecture 46 - Complement - Classical Pathway

Lecture 47 - Complement - Alternative and Lectin Pathway

Lecture 48 - Complement - Regulation and Diseases

Lecture 49 - Introduction to the adaptive Immunity

Lecture 50 - Adaptive Immunity - Antigen

Lecture 51 - Adaptive Immunity - Antigen/Immunogen Properties

Lecture 52 - Adaptive Immunity - B and T cells Antigenic epitopes

Lecture 53 - Adaptive Immunity - Antibodies

Lecture 54 - Adaptive Immunity - Antibody types

Lecture 55 - Adaptive Immunity - Antibody Diversity

Lecture 56 - Adaptive Immunity - T cells and T cell-mediated Immune responses

Lecture 57 - Host-virus interaction

Lecture 58 - Innate Immunity during virus infection - Type I Interferon-dependent

Lecture 59 - Innate Immunity during virus infection - Type I Interferon-independent

Lecture 60 - Innate immune evasion by viruses

Lecture 61 - Adaptive Immune Responses Against Viruses

Lecture 62 - Adaptive immune evasion by viruses

Lecture 63 - Influenza Virus and Disease - 1

Lecture 64 - Influenza Virus and Disease - 2

Lecture 65 - Influenza Virus and Disease - 3

Lecture 66 - Influenza Virus and Disease - 4

Lecture 67 - Influenza Virus and Disease - 5

Lecture 68 - Influenza Virus and Disease - 6

Lecture 69 - Arbovirus and Aroboviral diseases

Lecture 70 - Arbovirus and Dengue virus infection

Lecture 71 - Arbovirus and Zika virus infection

Lecture 72 - Introduction to Bacterial Infection

Lecture 73 - Virulence factor during Bacterial Infection

Lecture 74 - Bacterial Infection - Tuberculosis - 1

Lecture 75 - Bacterial Infection - Tuberculosis - 2

Lecture 76 - Bacterial Infection - Tuberculosis - 3

Lecture 77 - Fungal Infection - 1

Lecture 78 - Fungal Infection - 2

Lecture 79 - Introduction to the parasite infection and Malaria

Lecture 80 - Parasite infection - Trpanosomiasis (African Sleeping Sickness)

NPTEL : NOC:Indian Feminisms: Concepts and Issues (Humanities and Social Sciences)

Co-ordinators : Prof. Anandita Pan

Lecture 1 - What is Feminism ?

Lecture 2 - Making of Indian Feminism - Part 1

Lecture 3 - Making of Indian Feminism - Part 2

Lecture 4 - Women's Activism

Lecture 5 - Gender and Anti-caste movements

Lecture 6 - Dalit Women's Activism

Lecture 7 - Identity, Difference and Intersectionality - Part 1

Lecture 8 - Identity, Difference and Intersectionality - Part 2

Lecture 9 - Nation and the Construction of Woman

Lecture 10 - Social Reformation - Part 1

Lecture 11 - Social Reformation - Part 2

Lecture 12 - Nationalism and the 'Women's Question

Lecture 13 - Nationalism and the New Patriarchy

Lecture 14 - Concept of Endogamy

Lecture 15 - Nation through the Lens of Women's Autobiographies

Lecture 16 - Gender and Violence

Lecture 17 - Theorising Violence - Dowry

Lecture 18 - Theorising Violence - Domestic Violence

Lecture 19 - Theorising Violence - Rape

Lecture 20 - Theorising Violence - Heteronormativity and Sexuality

Lecture 21 - Resisting Violence

Lecture 22 - Gender and Labour

Lecture 23 - Women's Labour in India - The 20th Century

Lecture 24 - Gender and Class

Lecture 25 - Sexual Harassment in Workplace

Lecture 26 - Gender, Labour, and Agency - Part 1

Lecture 27 - Gender, Labour, and Agency - Part 2

Lecture 28 - Through the Lens of Gender - Textual Analysis

Lecture 29 - Feminist Futures

NPTEL : NOC:United Nations Sustainable Development Goals (Humanities and Social Sciences)

Co-ordinators : Prof. Shiva Ji

Lecture 1 - Introduction, United Nations and a World in Order

Lecture 2 - Scenario of Current Model of Growth and Development

Lecture 3 - Need for Change

Lecture 4 - Definition of Sustainability, Aspects of Sustainability, Transition from MDGs to SDGs - Part 1

Lecture 5 - Definition of Sustainability, Aspects of Sustainability, Transition from MDGs to SDGs - Part 2

Lecture 6 - The Role of UN and the Need for SDGs and Adoption by the World

Lecture 7 - Scope and Inclusion and Agenda 2030

Lecture 8 - Our Common Future and Philosophy behind SDGs

Lecture 9 - Distinction between Development and Sustainable Development

Lecture 10 - Circular economy

Lecture 11 - Design for sustainability

Lecture 12 - Thinking Alternatives and Innovation

Lecture 13 - Causal Mapping, Systemic Mapping and Problem Identification

Lecture 14 - Identifying probable interventions for SD, Framework and Structuring of Seventeen SDGs

Lecture 15 - No Poverty - Part 1

Lecture 16 - No Poverty - Part 2

Lecture 17 - Zero Hunger - Part 1

Lecture 18 - Zero Hunger - Part 2

Lecture 19 - Good Health and Well-being - Part 1

Lecture 20 - Good Health and Well-being - Part 2

Lecture 21 - Quality Education - Part 1

Lecture 22 - Quality Education - Part 2

Lecture 23 - Gender Equality - Part 1

Lecture 24 - Gender Equality - Part 2

Lecture 25 - Clean Water and Sanitation

Lecture 26 - Affordable and Clean Energy - Part 1

Lecture 27 - Affordable and Clean Energy - Part 2

Lecture 28 - Decent Work and Economic Growth - Part 1

Lecture 29 - Decent Work and Economic Growth - Part 2

Lecture 30 - Industry, Innovation and Infrastructure - Part 1

Lecture 31 - Industry, Innovation and Infrastructure - Part 2

Lecture 32 - Reduced Inequality

Lecture 33 - Reduced Inequality

Lecture 34 - Sustainable Cities and Communities - Part 1

Lecture 35 - Sustainable Cities and Communities - Part 2

Lecture 36 - Sustainable Cities and Communities - Part 3

Lecture 37 - Responsible Consumption and Production - Part 1

Lecture 38 - Responsible Consumption and Production - Part 2

Lecture 39 - Climate Action - Part 1

Lecture 40 - Climate Action - Part 2

Lecture 41 - Life Below Water - Part 1

Lecture 42 - Life Below Water - Part 2

Lecture 43 - Life on Land - Part 1

Lecture 44 - Life on Land - Part 2

Lecture 45 - Peace and Justice Strong Institutions

Lecture 46 - Partnerships to achieve the Goal - Part 1

Lecture 47 - Partnerships to achieve the Goal - Part 2

Lecture 48 - Analyzing SDG connections, grouped into People, Ecological, and Spiritual categories - Part 1

Lecture 49 - Analyzing SDG connections, grouped into People, Ecological, and Spiritual categories - Part 2

Lecture 50 - Analyzing SDG connections, grouped into People, Ecological, and Spiritual categories - Part 3

Lecture 51 - Analyzing SDG connections, grouped into People, Ecological, and Spiritual categories - Part 4

Lecture 52 - SDGs and Socio Ecological Systems: Economy SDGs ; Society SDGs ; Biosphere SDGs

Lecture 53 - Financing the SDGs and Global Funds, Implementation Planning, Capacity Building and Finance - Part 1

Lecture 54 - Financing the SDGs and Global Funds, Implementation Planning, Capacity Building and Finance - Part 2

Lecture 55 - Financing the SDGs and Global Funds, Implementation Planning, Capacity Building and Finance - Part 3

Lecture 56 - Financing the SDGs and Global Funds, Implementation Planning, Capacity Building and Finance - Part 4

Lecture 57 - Financing the SDGs and Global Funds, Implementation Planning, Capacity Building and Finance - Part 5

Lecture 58 - Key Climate Conferences and Summits: Rio 92, Kyoto 95, Paris 15, COP26 - Part 1

Lecture 59 - Key Climate Conferences and Summits: Rio 92, Kyoto 95, Paris 15, COP26 - Part 2

Lecture 60 - Key Climate Conferences and Summits: Rio 92, Kyoto 95, Paris 15, COP26 - Part 3

Lecture 61 - Key Climate Conferences and Summits: Rio 92, Kyoto 95, Paris 15, COP26 - Part 4

Lecture 62 - Key Climate Conferences and Summits: Rio 92, Kyoto 95, Paris 15, COP26 - Part 5

Lecture 63 - Case Studies from around the World, Implementation at International Level, Global Reports - Part 1

Lecture 64 - Case Studies from around the World, Implementation at International Level, Global Reports - Part 2

Lecture 65 - Case studies from India, Implementation at National Level, National Reports

Lecture 66 - Nodal Agency for Implementation in India

Lecture 67 - Indian implementation strategy: State reports, assessment, and effectiveness checks

Lecture 68 - Summary

NPTEL : NOC:Learning English in Hindi (Humanities and Social Sciences)

Co-ordinators : Prof. Rajesh

Lecture 1 - Sounds and Writing Symbols in Engish

Lecture 2 - Speech Sounds in English

Lecture 3 - Consonants and Consonant Clusters in English

Lecture 4 - Syllables and Words

Lecture 5 - Some Features of English Words

Lecture 6 - Plural Words in English

Lecture 7 - Parts of speech - 1

Lecture 8 - Parts of Speech - 2

Lecture 9 - Parts of Speech - 3

Lecture 10 - Parts of Speech - 4

Lecture 11 - Articles

Lecture 12 - Words and Phrases in English

Lecture 13 - Sentences in English

Lecture 14 - Direct and Indirect Objects

Lecture 15 - Verb-be (is, are, am) in English

Lecture 16 - Imperative sentences in English (command or request)

Lecture 17 - Questions in English (Interogative sentences)

Lecture 18 - Negative Sentences in English

Lecture 19 - Agreement in English Sentences

Lecture 20 - Participles in English

Lecture 21 - Relative Clauses in English

Lecture 22 - Functions of Modals

Lecture 23 - Passives in English

Lecture 24 - Mood and Modal Verbs

Lecture 25 - Will/Would

Lecture 26 - Modals Verbs: Can or Could

Lecture 27 - Modals Verbs: Could vs Would

Lecture 28 - Modals Verbs/Auxiliary: Must; Shall and Should

Lecture 29 - Telephone English

Lecture 30 - Illustrating Clauses and Sentences

Lecture 31 - Describing Clauses and Sentences

Lecture 32 - Sentence, Clause and Complex Sentences

Lecture 33 - Adjectival (Relative) Clause

Lecture 34 - Adverbs

Lecture 35 - Agreement in English Sentences (Subject and Verb in Sentences)

Lecture 36 - Question Tags in English Sentences

Lecture 37 - Questions in English (Interogative sentences)

Lecture 38 - Learning Softening (Knowing vs Using)

Lecture 39 - Rhythm and Pitch in English

Lecture 40 - Punctuation - Pauses - 1

Lecture 41 - Punctuation - Pauses - 2

Lecture 42 - Advanced Vocabulary

Lecture 43 - Innovation in Vocabulary

Lecture 44 - Metaphors

Lecture 45 - Phrases and Idioms You Must Know

Lecture 46 - Make your expressions impreesive

Lecture 47 - Fundamentals of Learning English for Accuracy, Fluency and Communicative Confidence

NPTEL : NOC:Social History of Medicine in Colonial India (Humanities and Social Sciences)

Co-ordinators : Prof. John Bosco Lourdusamy

Lecture 1 - Significance of Medicine in the Colonial Context

Lecture 2 - Medicine as Cultural and Intellectual Encounter

Lecture 3 - Tutorial 1

Lecture 4 - Colonial Understandings of Indian Landscape, Diseases and Causations; Initial Concerns About Survival

Lecture 5 - Initial Attitudes Towards Indigenous Systems

Lecture 6 - The IMS (Indian Medical Service)

Lecture 7 - Tutorial 2

Lecture 8 - British Settling; Enclavism

Lecture 9 - Consolidation of Medical Measures

Lecture 10 - Medical Education

Lecture 11 - Public Health and Sanitary Measures

Lecture 12 - Sanitary Education; Statistics; Epidemics

Lecture 13 - Tutorial 3

Lecture 14 - Small Pox

Lecture 15 - Malaria

Lecture 16 - Cholera and Plague

Lecture 17 - Epidemics, Colonial Cultural Stereotypes and Accommodative Approaches

Lecture 18 - Epidemics, Cultural Dimensions of Indian Responses and Role of Media

Lecture 19 - Epidemics and International Influences

Lecture 20 - Tutorial 4

Lecture 21 - Tutorial 4 - Part 2

Lecture 22 - Tropical Medicine

Lecture 23 - Kala Azar as Exemplar of Tropical Disease

Lecture 24 - Tropical and Bacteriological Research

Lecture 25 - Malarial Research and Surveys, Vaccine Research and Production

Lecture 26 - Tutorial 5 - Part 1

Lecture 27 - Tutorial 5 - Part 2

Lecture 28 - Women Health: Zenana Mission; Dufferin Fund

Lecture 29 - Association of Medical Women in India; Lock Hospitals; Regulation of Dais

Lecture 30 - Nursing

Lecture 31 - Women's Medical Education; Womenâ€™s Medical Service

Lecture 32 - Tutorial 6

Lecture 33 - Colonial State and Medical Volunteerism

Lecture 34 - Role of Missionaries - Part 1

Lecture 35 - Role of Missionaries - Part 2

Lecture 36 - Reforms Movements and Indigenous Voluntary Organisations

Lecture 37 - Role of International Organisationas and Individuals

Lecture 38 - Tutorial 7

Lecture 39 - Western versus Indigenous Systems

Lecture 40 - Indigenous Response to the Domination of Western Medicine

Lecture 41 - Professionalisation of Indigenous Systems

Lecture 42 - Standarisation and Marketing

Lecture 43 - Tutorial 8 - Part 1

Lecture 44 - Tutorial 8 - Part 2

NPTEL : NOC:Indian Society: Sociological Perspectives (Humanities and Social Sciences)

Co-ordinators : Dr. R. Santhosh

Lecture 1 - Sociology: An Overview

Lecture 2 - Anthropology: An Introduction

Lecture 3 - Theoretical Traditions in Sociology and Anthropology

Lecture 4 - Colonialism and Anthropology

Lecture 5 - Orientalism and the Politics of Knowledge Production - I

Lecture 6 - Orientalism and the Politics of Knowledge Production - II

Lecture 7 - Orientalism and the Politics of Knowledge Production - III

Lecture 8 - Orientalism and the Politics of Knowledge Production - IV

Lecture 9 - Orientalism and Its Critics

Lecture 10 - Ronald Inden: Orientalist Constructions of India - I

Lecture 11 - Ronald Inden: Orientalist Constructions of India - II

Lecture 12 - Development of Sociology and Anthropology in India

Lecture 13 - Sociological Traditions in India - I

Lecture 14 - Sociological Traditions in India - II

Lecture 15 - Indological Approach

Lecture 16 - G. S. Ghurye: Introduction

Lecture 17 - G. S. Ghurye: Features of Caste

Lecture 18 - Irawati Karve: Introduction

Lecture 19 - Radhakamal Mukerjee

Lecture 20 - D. N. Majumdar

Lecture 21 - Marxian Perspective: Historical Materialism

Lecture 22 - Marxian Theory of Social Change

Lecture 23 - Gail Omvedt: Towards a Historical Materialist Analysis of the Origin and Development of Caste - I

Lecture 24 - Gail Omvedt: Towards a Historical Materialist Analysis of the Origin and Development of Caste - II

Lecture 25 - Marxist Sociology of A. R. Desai

Lecture 26 - An Introduction to Structural Functionalism

Lecture 27 - Sociology of M. N. Srinivas

Lecture 28 - Sociology of M. N. Srinivas: Basic Concepts

Lecture 29 - Sociology of M. N. Srinivas: Varna and Jati

Lecture 30 - Andre Beteille: A Social Stratification Perspective to Indian Society

Lecture 31 - Introduction to Structuralism

Lecture 32 - Sociology of Louis Dumont: Homo Hierarchicus - I

Lecture 33 - Sociology of Louis Dumont: Homo Hierarchicus - II

Lecture 34 - Sociology of Louis Dumont: Homo Hierarchicus - III

Lecture 35 - Criticisms of Louis Dumont

Lecture 36 - Introducing Subaltern Studies - I

Lecture 37 - Introducing Subaltern Studies - II

Lecture 38 - Subaltern Studies as Postcolonial Criticism

Lecture 39 - Critique of Subaltern Studies - I

Lecture 40 - Critique of Subaltern Studies - II

Lecture 41 - Feminist Perspectives and Gender Studies in India - I

Lecture 42 - Feminist Perspectives and Gender Studies in India - II

Lecture 43 - Feminist Research: Redefining Methodology in the Social Sciences

Lecture 44 - Feminist Challenges to Sociology in India

Lecture 45 - Mapping and Marking Feminist Sociologies in India

Lecture 46 - Dalit Sociology and Indian Sociology: On Ambedkar's sociology of Caste

Lecture 47 - Introduction to Sociology of Dalits - I

Lecture 48 - Introduction to Sociology of Dalits - II

Lecture 49 - Dalit Women Talk Differently: Debate Between Gopal Guru and Sharmila Rege - I

Lecture 50 - Dalit Women Talk Differently: Debate Between Gopal Guru and Sharmila Rege - II

Lecture 51 - The Cracked Mirror: Introduction

Lecture 52 - The Cracked Mirror: How Egalitarian are the Social Sciences in India? - I

Lecture 53 - The Cracked Mirror: How Egalitarian are the Social Sciences in India? - II

Lecture 54 - The Cracked Mirror: Experience and Theory From Habermas to Guru - I

Lecture 55 - The Cracked Mirror: Experience and Theory From Habermas to Guru - II

Lecture 56 - Decolonialism in Sociology - I

Lecture 57 - Decolonialism in Sociology - II

Lecture 58 - Globalization and Sociology: Risk Society of Ulrich Beck

Lecture 59 - Globalization and Sociology: The Network Society of Manuel Castells

Lecture 60 - Conclusion

NPTEL : NOC:Human Movement Science (Humanities and Social Sciences)

Co-ordinators : Prof. Shruti Bhandurge, Prof. Subham Badhyal

Lecture 1 - Course Introduction

Lecture 2 - Learning outcomes and module design

Lecture 3 - Professional skillset development

Lecture 4 - Skeletal system

Lecture 5 - Muscular system

Lecture 6 - Neuromuscular System

Lecture 7 - Motor control and learning

Lecture 8 - Anatomical planes and axes of motion

Lecture 9 - Major joints and their actions - Part 1

Lecture 10 - Major joints and their actions - Part 2

Lecture 11 - Muscles and movement

Lecture 12 - Posture - static and dynamic

Lecture 13 - Implications of functional anatomy in HMS

Lecture 14 - Introduction to the concepts of biomechanics

Lecture 15 - Review of Basic - Mathematical Concepts

Lecture 16 - Linear Kinematics

Lecture 17 - Angular Kinematics

Lecture 18 - Linear Kinetics

Lecture 19 - Angular Kinetics - Part 1

Lecture 20 - Angular Kinetics - Part 2

Lecture 21 - Angular Kinetics - Part 3

Lecture 22 - Angular Kinetics - Part 4

Lecture 23 - Qualitative analysis - Intro, Data Collection

Lecture 24 - Qualitative analysis - Analysis and Injury

Lecture 25 - Quantitative analysis

Lecture 26 - Coaching implications in HMS

Lecture 27 - Fundamental movement skills - Part 1

Lecture 28 - Fundamental movement skills - Part 2

Lecture 29 - Fundamental movement skills - Part 3

Lecture 30 - Gait Analysis

Lecture 31 - Exercises - Part 1

Lecture 32 - Exercises - Part 2

Lecture 33 - Exercises - Part 3

Lecture 34 - Injury Patterns - Part 1

Lecture 35 - Injury Patterns - Part 2

Lecture 36 - Sports - Part 1

Lecture 37 - Sports - Part 2

Lecture 38 - Biomechanical characteristics of various sports - Part 1

Lecture 39 - Biomechanical characteristics of various sports - Part 2

Lecture 40 - Data Science

Lecture 41 - AI and ML

Lecture 42 - Technological advancements and Research in HMS - Part 1

Lecture 43 - Technological advancements and Research in HMS - Part 2

Lecture 44 - Career Opportunities

NPTEL : NOC:Sports and Performance Nutrition (Humanities and Social Sciences)

Co-ordinators : Prof. Geetha Ghaliyavar

Lecture 1 - Introduction to sports and performance nutrition

Lecture 2 - Introduction to energy availability

Lecture 3 - Fundamentals of carbohydrates

Lecture 4 - Carbohydrate manipulation for sports performance

Lecture 5 - Myths around carbohydrates

Lecture 6 - Dr Sola Athletes with celiac disease and gluten sensitivity

Lecture 7 - Importance of proteins in performance

Lecture 8 - Introduction to protein and protein supplements

Lecture 9 - Introduction to fats and its importance in performance

Lecture 10 - Hydration and electrolytes

Lecture 11 - Practical implications of hydration

Lecture 12 - Mineral - Iron

Lecture 13 - Minerals - Calcium, Magnesium Zinc and Selenium

Lecture 14 - Antioxidants

Lecture 15 - Water soluble vitamins

Lecture 16 - Fat soluble vitamins

Lecture 17 - Energy systems and biochemical pathways

Lecture 18 - Anabolic window period for nutrient intake

Lecture 19 - Introduction to nutrient periodization

Lecture 20 - Applied aspects of nutrient periodization

Lecture 21 - Competition nutrition

Lecture 22 - Carbohydrate loading for sports performance

Lecture 23 - Weight making and weight cycling

Lecture 24 - Travel guidelines for athletes

Lecture 25 - Supplements and ergogenic aids

Lecture 26 - Three R principal

Lecture 27 - Lifestyle practices to enhance recovery

Lecture 28 - Sleep hygiene

Lecture 29 - Immunity and gut health

Lecture 30 - Sports injury and dietary interventions

Lecture 31 - Vegetarian and vegan athletes

Lecture 32 - Diabetic athletes

Lecture 33 - Female athletes

Lecture 34 - Young and adolescent athletes

Lecture 35 - Food intolerances in athletes

Lecture 36 - Sports nutrition in Indian context

Lecture 37 - Nutrigenomics

Lecture 38 - Personal hygiene and sanitation

Lecture 39 - Connections of sports nutrition

Lecture 40 - Food psychology

NPTEL : NOC:Sports Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Chaitanya Sridhar, Prof. Nivedita Rajan, Prof. Priyanka Prabhakar

Lecture 1 - Becoming a Sport Psychologist: Lessons from the field An introduction to field of Sports Psychology

Lecture 2 - Becoming a Sport Psychologist: Lessons from the field Mental health issues in athletes

Lecture 3 - Lessons from the field Learning Sport Science - An integrated approach to learning Sport Psychology

Lecture 4 - Becoming a Sport Psychologist: Lessons from the field Challenges faced by sport psychologists

Lecture 5 - Becoming a Sport Psychologist: Lessons from the field Sport psychology - Working with coaches

Lecture 6 - Introduction to flow

Lecture 7 - Flow in sport and competition

Lecture 8 - Practical approach to flow state: Discussion

Lecture 9 - Developing a Champion mindset: Tools to aid competitive mindset

Lecture 10 - Discussion on Champion and Competitive Mindset

Lecture 11 - Psychological Skills training and Goal setting

Lecture 12 - Goal setting - Part 1

Lecture 13 - Goal setting - Part 2

Lecture 14 - Developing Goal setting systems

Lecture 15 - Discussion on Mental training and Goal setting

Lecture 16 - Imagery in sport - Introduction

Lecture 17 - Models of Imagery and usefulness of Imagery

Lecture 18 - Psychological factors important for PST

Lecture 19 - Imagery in Team - A practical demonstration

Lecture 20 - Discussion on Goal setting and Imagery in sports

Lecture 21 - Communication in sports

Lecture 22 - Intracommunication with self: instinct and animal lessons, body language and tactile communication

Lecture 23 - Discussion on communication and performance

Lecture 24 - Resilience in Sports Teams and Organizations

Lecture 25 - Resilience and Mindfulness in sports

Lecture 26 - Psychological factors in sport

Lecture 27 - Strategies to work with young athletes

Lecture 28 - Working with young children

Lecture 29 - Burnout in sports

Lecture 30 - Burnout in coaches, Discussion with coach

Lecture 31 - Building teams and team culture

Lecture 32 - Discussion on building high performance teams

Lecture 33 - Channeling emotions in sports

Lecture 34 - Discussion on transformational leadership

Lecture 35 - Stress management in sports

Lecture 36 - Psychology of Injury - Introduction

Lecture 37 - Psychological Strategies for Injury

Lecture 38 - Integrated approach to injury - A discussion

Lecture 39 - Career transition in sports - Sports retirement and coping

Lecture 40 - Discussion on Sports career transition

Lecture 41 - Conclusion Video

NPTEL : NOC:Strength and Conditioning for the Indian Population (Humanities and Social Sciences)

Co-ordinators : Prof. Varun Suresh Kumar, Prof. Deckline Leitao

Lecture 1 - Fundamentals of Sports Performance

Lecture 2 - Major Components of Fitness

Lecture 3 - Difference between Fitness and Sport

Lecture 4 - Defining S&C and Sports S&C

Lecture 5 - Defining S&C and Physios Roles and Responsibilities

Lecture 6 - Player Interview - Lakshya Sen

Lecture 7 - Player Interview - Avani Prashanth

Lecture 8 - Principle of Individuality

Lecture 9 - Principle of Progressive Overload

Lecture 10 - Principle of Specificity

Lecture 11 - Principle of -Indianization-

Lecture 12 - Principle of Reversibility

Lecture 13 - Sports Specific Training

Lecture 14 - Safety in the Gym

Lecture 15 - Exercise and the Female Athlete

Lecture 16 - Working with Female Athletes - Do's and Dont's

Lecture 17 - Training Youth Athletes - Part 1

Lecture 18 - Training Youth Athletes - Part 2

Lecture 19 - Training Masters Athletes

Lecture 20 - Training Para Athletes

Lecture 21 - Bodybuilding

Lecture 22 - Powerlifting

Lecture 23 - Weightlifting

Lecture 24 - Effective over Impressive Excercises

Lecture 25 - Anabolic Steriods, Muscle Building, and Sports Performance

Lecture 26 - Free Weight Training

Lecture 27 - Warm Up and Cool Down

Lecture 28 - Free Weights Training (Demonstration) - Part 1

Lecture 29 - Free Weights Training (Demonstration) - Part 2

Lecture 30 - Free Weights Training (Demonstration) - Part 3

Lecture 31 - Free Weights Training (Demonstration) - Part 4

Lecture 32 - Warm up Demonstration

Lecture 33 - Cool Down Demonstration

Lecture 34 - Weight Training Using Machines

Lecture 35 - Training with Machines (Demonstration) - Part 1

Lecture 36 - Training with Machines (Demonstration) - Part 2

Lecture 37 - Training with Machines (Demonstration) - Part 3

Lecture 38 - Training with Machines (Demonstration) - Part 4

Lecture 39 - Training with Machines (Demonstration) - Part 5

Lecture 40 - Bodyweight and Functional Training

Lecture 41 - Bodyweight and Functional Training Demonstration

Lecture 42 - Plyometrics Training

Lecture 43 - Plyometrics Demonstration

Lecture 44 - Cardiovascular Training

Lecture 45 - Cardiovascular Training Demonstration - Part 1

Lecture 46 - Cardiovascular Training Demonstration - Part 2

Lecture 47 - Cardiovascular Training Demonstration - Part 3

Lecture 48 - Stability and Endurance Training

Lecture 49 - Stability and Endurance Training Demonstration - Part 1

Lecture 50 - Stability and Endurance Training Demonstration - Part 2

Lecture 51 - Flexibility training and types of stretches - Part 1

Lecture 52 - Flexibility training and types of stretches - Part 2

Lecture 53 - Periodization of Indian Athlete

Lecture 54 - Sports Specific Program Design

Lecture 55 - Assessments- How, When, Why

Lecture 56 - Opportunities and Challenges of an S&C

Lecture 57 - Training Celebrities/Elite Athletes

Lecture 58 - Role of Social Media in Sport

Lecture 59 - Scope of Technology in Sport

NPTEL : NOC:Essentials of Sports Injury Prevention and Rehabilitation (Humanities and Social Sciences)

Co-ordinators : Prof. Col (Dr) Anup Krishnan (Retd), Prof. Wg Cdr (Dr) CS Guru, Prof. Lt Col (Dr) Atul Sharma

Lecture 1 - Sports Injuries and Prevention

Lecture 2 - Rehabilitation and Reconditioning

Lecture 3 - Joints of the Upper Limb

Lecture 4 - Joints of the Lower Limb

Lecture 5 - The Back In Sports

Lecture 6 - Pre Medical Examination

Lecture 7 - Lab Investigations

Lecture 8 - Flexibility

Lecture 9 - Conditioning

Lecture 10 - Anatomy of Upper Limb

Lecture 11 - Anatomy of Lower Limb

Lecture 12 - Common Injuries Of Lower Limb

Lecture 13 - Common Causes of Upper Limb and Lower Limb

Lecture 14 - Treatments for Various Injuries

Lecture 15 - Head, Face and Neck Injuries

Lecture 16 - Spine Injuries

Lecture 17 - Concussion in Sports

Lecture 18 - Management of Sports Concussion

Lecture 19 - Emergency Action Plan

Lecture 20 - Risk Factors in Injury

Lecture 21 - Prehabilitation and Rehabilitation

Lecture 22 - Periodisation of Rehabilitation - I

Lecture 23 - Periodisation of Rehabilitation - II

Lecture 24 - Team Roles in Sports Injuries

Lecture 25 - Sport-Specific Rehabilitation, Principles and Techniques - I

Lecture 26 - Sport-Specific Rehabilitation, Principles and Techniques - II

Lecture 27 - Sport-Specific Rehabilitation, Principles and Techniques - III

Lecture 28 - Rehabilitation

Lecture 29 - Management of common sports injuries

Lecture 30 - Injury prevention in adolescent athletes and Women athletes - Part 1

Lecture 31 - Injury prevention in adolescent athletes and Women athletes - Part 2

Lecture 32 - Injury prevention in adolescent athletes and Women athletes - Part 3

Lecture 33 - Injury prevention in adolescent athletes and Women athletes - Part 4

Lecture 34 - Injury prevention in adolescent athletes and Women athletes - Part 5

Lecture 35 - Psychological aspects of injury and Rehabilitation - Part 1

Lecture 36 - Psychological aspects of injury and Rehabilitation - Part 2

Lecture 37 - Return to sports and long term injury prevention - Part 1

Lecture 38 - Return to sports and long term injury prevention - Part 2

Lecture 39 - Return to sports and long term injury prevention - Part 3

NPTEL : NOC:Introduction to Exercise Physiology and Sports Performance (Humanities and Social Sciences)

Co-ordinators : Prof. Col (Dr) Anup Krishnan (Retd), Prof. Wg Cdr (Dr) CS Guru, Prof. Lt Col (Dr) Atul Sharma

Lecture 1 - Focus of Exercise and Sports Physiology

Lecture 2 - Evolution of Exercise Physiology

Lecture 3 - Acute and Chronic response to Exercise

Lecture 4 - Functional Anatomy of Skeletal muscle

Lecture 5 - Skeletal muscle and Exercise

Lecture 6 - Bioenergetics - Part 1

Lecture 7 - Bioenergetics - Part 2

Lecture 8 - Cardiovascular System and Exercise - Part 1

Lecture 9 - Cardiovascular System and Exercise - Part 2

Lecture 10 - Cardiovascular System and Exercise - Part 3

Lecture 11 - Respiratory System and Exercise - Part 1

Lecture 12 - Respiratory System and Exercise - Part 2

Lecture 13 - Respiratory System and Exercise - Part 3

Lecture 14 - Neurophysiology and Exercise - Part 1

Lecture 15 - Neurophysiology and Exercise - Part 2

Lecture 16 - Endocrine responses to Exercise - Part 1

Lecture 17 - Endocrine responses to Exercise - Part 2

Lecture 18 - Endocrine responses to Exercise - Part 3

Lecture 19 - Exercise in Children and Adolescents - Part 1

Lecture 20 - Exercise in Children and Adolescents - Part 2

Lecture 21 - Exercise Prescription and Training principles - Part 1

Lecture 22 - Exercise Prescription and Training principles - Part 2

Lecture 23 - Adaptations to aerobic and anaerobic training - Part 1

Lecture 24 - Adaptations to aerobic and anaerobic training - Part 2

Lecture 25 - Adaptations to aerobic and anaerobic training - Part 3

Lecture 26 - Body temperature regulation

Lecture 27 - Physiological response to Exercise in Heat and Cold

Lecture 28 - Acclimation to Heat and Cold

Lecture 29 - Health Risks during Exercise in Heat and Cold

Lecture 30 - Exercise and Sports performance at Altitude

Lecture 31 - Hydration and Fluid Balance - Part 1

Lecture 32 - Hydration and Fluid Balance - Part 2

Lecture 33 - Body composition and its Implications - Part 1

Lecture 34 - Body composition and its Implications - Part 2

Lecture 35 - Body composition and its Implications - Part 3

Lecture 36 - Role of performance testing

Lecture 37 - Performance testing in aerobic sports

Lecture 38 - Performance testing in anaerobic sports

Lecture 39 - Role of exercise in disease prevention

Lecture 40 - Role of exercise in Disease management

NPTEL : NOC:Fundamentals of Sports Training, Load Management and Recovery (Humanities and Social Sciences)

Co-ordinators : Prof. Col (Dr) Anup Krishnan (Retd), Prof. Wg Cdr (Dr) CS Guru, Prof. Kaustubh Shedjale

Lecture 1 - Introduction to Fitness Vocabulary

Lecture 2 - Types of FItness

Lecture 3 - Health Specific Fitness Acute Training varibales - Part 1

Lecture 4 - Health Specific Fitness Acute Training varibales - Part 2

Lecture 5 - Application of Acute Training variables

Lecture 6 - Principle of Training - 1

Lecture 7 - Principle of Training - 2

Lecture 8 - Principle of Training - 3

Lecture 9 - Periodization in sports - 1

Lecture 10 - Periodization in sports - 2

Lecture 11 - Concept of Load Training - 1

Lecture 12 - Concept of Load Training - 2

Lecture 13 - Concept of Load Training - 3

Lecture 14 - Load monitoring in Sports - 1

Lecture 15 - Load monitoring in Sports - 2

Lecture 16 - Aerobic Training Methods - 1

Lecture 17 - Aerobic Training Methods - 2

Lecture 18 - Aerobic Training Methods - 3

Lecture 19 - Anerobic Training Method - 1

Lecture 20 - Anerobic Training Method - 2

Lecture 21 - Load Monitoring Methods in HSF - 1

Lecture 22 - Load Monitoring Methods in HSF - 2

Lecture 23 - Load Monitoring Methods in SSF - 1

Lecture 24 - Load Monitoring Methods in SSF - 2

Lecture 25 - Load Monitoring Methods in SSF - 3

Lecture 26 - Fatigue in Sports Training

Lecture 27 - Overtraining and Overreaching

Lecture 28 - Diagnosis and management of OTS

Lecture 29 - Recovery in sports

Lecture 30 - Recovery Technique

Lecture 31 - Training Program Design - 1

Lecture 32 - Training Program Design - 2

Lecture 33 - Training Program Design - 3

Lecture 34 - Training Program Design - 4

Lecture 35 - Training Program Design - 5

Lecture 36 - Technoloy in Performance Analysis

Lecture 37 - Technoloy in Performance Enchanmnet

Lecture 38 - Waerables in Sports

Lecture 39 - Future of technology in sports

Lecture 40 - Sports Training Technology and Innovation

NPTEL : NOC:Forensic Linguistics (Humanities and Social Sciences)

Co-ordinators : Prof. Deepak Mashru

Lecture 1 - Introduction to Week 1

Lecture 2 - Evolution and concept of Linguistics

Lecture 3 - Defining Linguistics and its branches

Lecture 4 - The role of linguistics in understanding human communication

Lecture 5 - Application of linguistic theories in various fields

Lecture 6 - The Crucial Role of Linguistic Analysis in Legal Settings

Lecture 7 - Impact of Forensic Linguistics and Case Studie

Lecture 8 - Current Trends and Emerging Areas in Forensic Linguistics

Lecture 9 - Introduction to Week 2 - The Confluence of Language and Law

Lecture 10 - Exploring the Interplay Between Language and Law

Lecture 11 - Analysis of Courtroom Discourse

Lecture 12 - Impact of Linguistic Diversity on Legal Processes

Lecture 13 - Interdisciplinary Nature of Forensic Linguistics

Lecture 14 - Ethical Considerations in Forensic Linguistic Analysis

Lecture 15 - Impact on Understanding Legal and Cultural Contexts

Lecture 16 - Analysing Language as Vital Evidence in Legal Contexts

Lecture 17 - Challenges in Presenting Linguistic Evidence in Court

Lecture 18 - Introduction to Week 3

Lecture 19 - Illuminating Authorship Analysis and Its Nuances

Lecture 20 - Navigating Through Forensic Phonetics

Lecture 21 - Discourse Analysis: A Journey through Linguistic Structures

Lecture 22 - Exploring the Depths of Threat and Deception Analysis

Lecture 23 - Unveiling the Secrets of Language Profiling

Lecture 24 - Introduction to Week 4

Lecture 25 - Investigating Real-World Case Studies in Forensic Linguistics

Lecture 26 - Tackling the Challenges and Obstacles Within Forensic Linguistics

Lecture 27 - Upholding Ethics and Professionalism in Forensic Linguistics

Lecture 28 - Envisioning the Future: Prospective Pathways in Forensic Linguistics

NPTEL : NOC:Korean-I (Humanities and Social Sciences)

Co-ordinators : Prof. Soo Jin Shim

Lecture 1 - Introduction to Hangeul

Lecture 2 - Introduction to Hangeul, Korean Consonants and Vowels

Lecture 3 - Features of Hangeul, Korean Consonants 1 and Vowels 1

Lecture 4 - Korean Vowels 2

Lecture 5 - Korean Consonants 2 and 3

Lecture 6 - Korean Vowels 3

Lecture 7 - Korean Batchim (ë°›ì¹¨)

Lecture 8 - ì•ˆë…•í•˜ì„¸ìš” Vocabulary, Grammar 1

Lecture 9 - ì•ˆë…•í•˜ì„¸ìš” Grammar 2, Speaking 1

Lecture 10 - ì•ˆë…•í•˜ì„¸ìš” Speaking 1, Grammar 3, 4

Lecture 11 - ì•ˆë…•í•˜ì„¸ìš” Speaking 2, Self-Introduction

Lecture 12 - ì•ˆë…•í•˜ì„¸ìš”Listening, Reading, Writing, Pronunciation, Culture Note, Self-Check

Lecture 13 - ì´ê±°ëŠ” ëì˜ìš”? Vocabulary, Grammar 1

Lecture 14 - ì´ê±°ëŠ” ëì˜ìš”? Grammar 2, Speaking 1

Lecture 15 - ì´ê±°ëŠ” ëì˜ìš”? Grammar 3, 4, Speaking 2

Lecture 16 - ì´ê±°ëŠ” ëì˜ìš”? Speaking 2, Listening

Lecture 17 - ì´ê±°ëŠ” ëì˜ìš”? Reading, Writing, Pronunciation, Self-Check

Lecture 18 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Vocabulary, Grammar 1

Lecture 19 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Grammar 2, Speaking 1

Lecture 20 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Speaking 1, Grammar 3, 4

Lecture 21 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Speaking 2, More practice

Lecture 22 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Listening, Reading

Lecture 23 - í•œêµì–´ë¥¼ ê³µë¶€í•´ìš”. Writing, Pronunciation, Culture Note, Self-Check

Lecture 24 - ì–´ë””ì— ìžˆì–´ìš”? Vocabulary, Grammar 1

Lecture 25 - ì–´ë””ì— ìžˆì–´ìš”? Grammar 2, Speaking 1

Lecture 26 - ì–´ë””ì— ìžˆì–´ìš”? Speaking 1, Grammar 3, 4

Lecture 27 - ì–´ë””ì— ìžˆì–´ìš”? Exercise, Speaking 2

Lecture 28 - ì–´ë””ì— ìžˆì–´ìš”? Speaking 2, Listening, Reading

Lecture 29 - ì–´ë””ì— ìžˆì–´ìš”? Writing, Pronunciation, Culture Note, Self-Check

Lecture 30 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Vocabulary, Grammar 1

Lecture 31 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Grammar 2, Exercise, Speaking 1

Lecture 32 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Speaking 1, Grammar 3

Lecture 33 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Grammar 4, Exercise, Speaking 2

Lecture 34 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Listening, Reading

Lecture 35 - ì£¼ë§ì— ì¹œêµ¬ë¥¼ ë§Œë,¬ì–´ìš”. Writing, Pronunciation, Culture Note, Self-Check

Lecture 36 - ì–¼ë§ˆì˜ˆìš”? Vocabulary, Grammar 1

Lecture 37 - ì–¼ë§ˆì˜ˆìš”? Grammar 2, Speaking 1

Lecture 38 - ì–¼ë§ˆì˜ˆìš”? Speaking 1, Grammar 3

Lecture 39 - ì–¼ë§ˆì˜ˆìš”? Grammar 3, 4, Exercise

Lecture 40 - ì–¼ë§ˆì˜ˆìš”? Speaking 2, Listening

Lecture 41 - ì–¼ë§ˆì˜ˆìš”? Reading, Writing, Pronunciation, Culture Note, Self-Check

NPTEL : NOC:Performance Traditions of the Mahabharata in Tamilnadu (Humanities and Social Sciences)

Co-ordinators : Prof. Sashikanth Ananthachari, Prof. Rajesh Kumar

Lecture 1 - A Brief Introduction To The Mahabharata

Lecture 2 - A Brief Introduction To The Mahabharata Festivals Of Tamil Nadu

Lecture 3 - The Idea Of The Chariot

Lecture 4 - The Custodians Of The Festival

Lecture 5 - The Festivals As Total Theatre

Lecture 6 - Potturaja And The Anti-War Nature Of The Festival

Lecture 7 - Kelai Draupadai (Listen Draupadi!) - Documentary

Lecture 8 - A brief introduction to Koothu as a theatrical form

Lecture 9 - Vil Valaippu, or The bending of the bow

Lecture 10 - Draupadi Kalayanam or The Marriage ritual of Draupadi

Lecture 11 - Subhadra Kalyanam

Lecture 12 - Rajasuya Yaagam

Lecture 13 - Draupadiyin Thugilum, Parandhamanin Arulum

Lecture 14 - Arjunaâ€™s Tapas

Lecture 15 - Kichaka Vadham

Lecture 16 - Krishnan Thoodu

Lecture 17 - Aravan Kalabali

Lecture 18 - Karna Moksham

Lecture 19 - Pathinettam Por or the Eighteenth Dayâ€™s War

Lecture 20 - Dharumarin Pattabhishekam and Ashwamedha Yaagam

NPTEL : NOC:Posthumanism: An Introduction (Humanities and Social Sciences)

Co-ordinators : Prof. Pramod K Nayar

Lecture 1 - Posthumanism: Contexts I : Technologies

Lecture 2 - Contexts II : Humanism and its Critiques

Lecture 3 - Contexts III : the Environment and the Anthropocene

Lecture 4 - Transhumanism

Lecture 5 - Popular Posthumanism

Lecture 6 - Critical Posthumanism. Genealogies - 1 : New Materialisms

Lecture 7 - Critical Posthumanism. Genealogies - 2 : Human-Animal Studies - I

Lecture 8 - Critical Posthumanism. Genealogies - 2 : Human-Animal Studies - II

Lecture 9 - Critical Posthumanism. Genealogies - 3 : Consciousness and Cognition Studies

Lecture 10 - Critical Posthumanism. Genealogies - 4 : Feminist Epistemologies, Ethics and Posthumanism

Lecture 11 - Critical Posthumanism. Genealogies - 5 : Disability Studies

Lecture 12 - Posthuman Bodies: Cyborgs 1

Lecture 13 - Posthuman Bodies: Cyborgs 2 - Gender and Cyborgs

Lecture 14 - Posthuman Biology

Lecture 15 - Biotech, Biocapitalism and Posthuman Bodies/Biology - I

Lecture 16 - Biotech, Biocapitalism and Posthuman Bodies/Biology - II

Lecture 17 - Biopolitics and Biocapitalism in Contemporary Literature

Lecture 18 - The Question of the Nonhuman - I

Lecture 19 - The Question of the Nonhuman - II

Lecture 20 - Companion Species and Multispecies

Lecture 21 - Transcorporeal Trauma

Lecture 22 - Multispecies in Contemporary Literature

Lecture 23 - BioArt

Lecture 24 - Posthuman Performance Arts

Lecture 25 - Literary Posthumanisms 1

Lecture 26 - Literary Posthumanisms 2 : Feminist Speculative Fiction

Lecture 27 - Literary Posthumanisms 3 : Group Discussion

Lecture 28 - Posthuman Subjects - I

Lecture 29 - Posthuman Subjects - II

Lecture 30 - Posthuman Subjects and Ethics - I

Lecture 31 - Posthuman Subjects and Ethics - II

Lecture 32 - Posthuman Vulnerability, Ethics and Contemporary Literature

Lecture 33 - The Environment and Posthumanism

Lecture 34 - The Posthuman, the Anthropocene and the Post-natural in Contemporary Literature - I

Lecture 35 - The Posthuman, the Anthropocene and the Post-natural in Contemporary Literature - II

Lecture 36 - Posthumanism and Care

Lecture 37 - Posthumanism and the Anthropocene: Group Discussion

Lecture 38 - Human Enhancement - I

Lecture 39 - Human Enhancement - II

Lecture 40 - Human Enhancement - III

Lecture 41 - Moral Enhancement

Lecture 42 - Posthuman Sports

Lecture 43 - Moral Enhancement and Contemporary Literature: Octavia Butlerâ€™s Hyperempaths

Lecture 44 - Literary Posthumanism IV : Group Discussion

NPTEL : NOC:Indian Popular Culture (Humanities and Social Sciences)

Co-ordinators : Prof Bibhuti Mary Kachhap

Lecture 1 - What is Culture, Definitions of Popular Culture

Lecture 2 - History and development of Popular Culture

Lecture 3 - Mass Culture

Lecture 4 - Sub Culture

Lecture 5 - Sub Cultures and Counterculture

Lecture 6 - History and Understanding of India Popular Culture

Lecture 7 - Implications of Cultural Studies in India

Lecture 8 - Desire for Cultural Studies in India

Lecture 9 - Iconography

Lecture 10 - Print Culture

Lecture 11 - Pre-history of Comics

Lecture 12 - Regional Comic Space and Web Comics

Lecture 13 - Cartoons - Emergence and History

Lecture 14 - Regional Space for Comics

Lecture 15 - Emergence of Graphic Narratives

Lecture 16 - Indian Cinema - History

Lecture 17 - Modernity and Popular

Lecture 18 - Globalization and Hindi Cinema

Lecture 19 - contemporary popular and Celebrity Culture

Lecture 20 - Celebrity Studies and Indian Cinema

Lecture 21 - Visual Narrative: Advertisements

Lecture 22 - Indianness after 1960s

Lecture 23 - Advertisement campaigns

Lecture 24 - Advertisements: Political influence of brands

Lecture 25 - Constructing the Indian Consumer

Lecture 26 - History of Television in India

Lecture 27 - Telefilms and Indian TV Serials

Lecture 28 - Television and OTT series for 21st Century

Lecture 29 - Benevolent Sexism on Screen

Lecture 30 - Ambivalent Sexism and Sexual Violence

Lecture 31 - History of OTT platforms

Lecture 32 - Impact of OTTs

Lecture 33 - Art Vs Content

Lecture 34 - Creative Economy Powering OTTs

Lecture 35 - Webseries

Lecture 36 - History of the term, different theories on conflict, Hobbsian Social Contract Theory

Lecture 37 - Cyberculture and different types of digital divides, ethnographic methods

Lecture 38 - Features of Cyberculture and Cyberactivism

Lecture 39 - Cyberpolitics and the Millenials of India

Lecture 40 - Cyberactivism and its impact on Social Movements

NPTEL : NOC:Time value of money-Concepts and Calculations (Humanities and Social Sciences)

Co-ordinators : Dr.Bikash Mohanty

Lecture 1 - Introduction

Lecture 2 - Interest Rate

Lecture 3 - Simple interest

Lecture 4 - Compounding techniques - I & II

Lecture 5 - Discrete annually compounding - I & II

Lecture 6 - Continuous compounding

Lecture 7 - Comparison of all compounding methods

Lecture 8 - Present value

Lecture 9 - Future Value

Lecture 10 - Annuities - I & II

Lecture 11 - Perpetuity

Lecture 12 - Amortization

Lecture 13 - Multiple cash flow - I & II

Lecture 14 - Valuation of bond - I & II

Lecture 15 - Valuation of ordinary shares

NPTEL : NOC:Depreciation, Alternate Investment and Profitability Analysis (Humanities and Social Sciences)

Co-ordinators : Prof. Bikash Mohanty

Lecture 1 - Introduction to course

Lecture 2 - Introduction to depreciation and Straight line method

Lecture 3 - Declining balance method

Lecture 4 - Double-declining balance method

Lecture 5 - Sum-of-the-digits method

Lecture 6 - Sinking fund method and Repair provision method

Lecture 7 - Accelerated cost recovery method - I

Lecture 8 - Accelerated cost recovery method - II

Lecture 9 - Introduction to alternate investment: Annual cost method-I

Lecture 10 - Introduction to alternate investment: Annual cost method

Lecture 11 - Present worth method

Lecture 12 - Rate of return method

Lecture 13 - Incremental rate of return

Lecture 14 - Perpetuity method

Lecture 15 - Minimum return as cost

Lecture 16 - Introduction to profitability analysis and Payback period

Lecture 17 - Return on investment

Lecture 18 - Net Return

Lecture 19 - Discounted cash flow - I

Lecture 20 - Discounted cash flow - II

NPTEL : NOC:Soft Skills (Humanities and Social Sciences)

Co-ordinators : Prof. Binod Mishra

Lecture 1 - Introduction to Soft Skills

Lecture 2 - Aspects of Soft Skills

Lecture 3 - Effective Communication Skills

Lecture 4 - Classification of Communication

Lecture 5 - Personality Development

Lecture 6 - Positive Thinking

Lecture 7 - Telephonic Communication Skills - Part I

Lecture 8 - Telephonic Communication Skills - Part II

Lecture 9 - Communicating Without Words

Lecture 10 - Paralanguage

Lecture 11 - Proxemics

Lecture 12 - Haptics: The Language of Touch

Lecture 13 - Meta-communication

Lecture 14 - Listening Skills

Lecture 15 - Types of Listening

Lecture 16 - Negotiation Skills - I

Lecture 17 - Negotiation Skills - II

Lecture 18 - Culture as Communication

Lecture 19 - Communicating across Cultures

Lecture 20 - Organizational Communication

Lecture 21 - Communication Breakdown - Part I

Lecture 22 - Communication Breakdown - Part II

Lecture 23 - Advanced Writing Skills

Lecture 24 - Principles of Business Writing

Lecture 25 - Types of Business Writing - Part I

Lecture 26 - Types of Business Writing - Part II

Lecture 27 - Business Letters

Lecture 28 - Business Letters: Format and Style

Lecture 29 - Types of Business Letters - Part I

Lecture 30 - Types of Business Letters - Part II

Lecture 31 - Report Writing

Lecture 32 - Types of Reports

Lecture 33 - Strategies for Report Writing - Part I

Lecture 34 - Strategies for Report Writing - Part II

Lecture 35 - Evaluation and Organization of Data

Lecture 36 - Structure of Reports - Part I

Lecture 37 - Structure of Reports - Part II

Lecture 38 - Report Style - Part I

Lecture 39 - Report Style - Part II

Lecture 40 - Group Communication

Lecture 41 - Leadership Skills

Lecture 42 - Group Discussion - Part I

Lecture 43 - Group Discussion - Part II

Lecture 44 - Meeting Management

Lecture 45 - Adaptability and Work Ethics

Lecture 46 - Advanced Speaking Skills

Lecture 47 - Oral Presentations, Speeches, and Debates

Lecture 48 - Combating Nervousness

Lecture 49 - Patterns and Methods of Presentation

Lecture 50 - Oral Presentation: Planning and Preparation

Lecture 51 - Making Effective Presentations

Lecture 52 - Speeches for Various Occasions

Lecture 53 - Interviews

Lecture 54 - Planning and Preparation - Part I

Lecture 55 - Planning and Preparation - Part II

Lecture 56 - Drafting an Effective RÃ©sumÃ©

Lecture 57 - Facing Job Interviews - Part I

Lecture 58 - Facing Job Interviews - Part II

Lecture 59 - Emotional Intelligence and Critical Thinking

Lecture 60 - Applied Grammar

NPTEL : NOC:Sociology of Science (Humanities and Social Sciences)

Co-ordinators : Dr. Aninday Jayant Mishra

Lecture 1 - Sociology: Anthony Giddens - Part 1

Lecture 2 - Sociology: Anthony Giddens - Part 2

Lecture 3 - History of Science: Thomas Kuhn

Lecture 4 - HSS in Technology Institutes: Ravinder Kaur - Part 1

Lecture 5 - HSS in Technology Institutes: Ravinder Kaur - Part 2

Lecture 6 - Ethos of Science - I

Lecture 7 - Ethos of Science - II

Lecture 8 - Science and Economy of 17th Century England

Lecture 9 - Matthew Effect - Part 1

Lecture 10 - Matthew Effect - Part 2

Lecture 11 - Matthew Effect - Part 3

Lecture 12 - Thomas Kuhn - Part 1

Lecture 13 - Thomas Kuhn - Part 2

Lecture 14 - Karl Popper - Part 1

Lecture 15 - Karl Popper - Part 2

Lecture 16 - Scientist as Indexical Reasoner - Part 1

Lecture 17 - Scientist as Indexical Reasoner - Part 2

Lecture 18 - Science technology and Colonial Power - Part 1

Lecture 19 - Science Technology and Colonial Power - Part 2

Lecture 20 - Large Community but Few Peers: E Haribabu

NPTEL : NOC:Perspectives on Neurolinguistic (Humanities and Social Sciences)

Co-ordinators : Prof. Smita Jha

Lecture 1 - Introduction

Lecture 2 - Scope of Neurolinguistic Programming

Lecture 3 - NLP Communicating Model

Lecture 4 - NLP Filters

Lecture 5 - Causes and Effect

Lecture 6 - Four Pillars of NLP

Lecture 7 - Sensory Acuity

Lecture 8 - Rapport

Lecture 9 - Flexibility

Lecture 10 - Useful NLP Techniques

Lecture 11 - Presuppositions of NLP

Lecture 12 - Four Stages of Competence

Lecture 13 - Metacognition

Lecture 14 - Outcome and Ecology

Lecture 15 - Introducing Frames : Outcome and Ecology

Lecture 16 - Negotiation

Lecture 17 - Persuasion

Lecture 18 - Emotionality

Lecture 19 - Stage Fear - I

Lecture 20 - Stage Fear - II

NPTEL : NOC:Literature, Culture and Media (Humanities and Social Sciences)

Co-ordinators : Prof. Rashmi Gaur

Lecture 1 - Introduction Aims and Objectives

Lecture 2 - Defining Literature

Lecture 3 - Defining Culture

Lecture 4 - Relationship between Literature and Culture

Lecture 5 - Literature, Culture and Media

Lecture 6 - Introduction to Cultural Studies

Lecture 7 - Cultural Studies I: Raymond Williams

Lecture 8 - Cultural Studies II: Stuart Hall

Lecture 9 - High Culture and Popular Culture

Lecture 10 - Subculture and Counterculture

Lecture 11 - Modernism and Postmodernism - I

Lecture 12 - Modernism and Postmodernism - II

Lecture 13 - Lyotards The Postmodern Condition: A Report on Knowledge

Lecture 14 - FoucaultÃ¢â,¬â„¢s Notion of Knowledge and Power

Lecture 15 - Poststructuralism and Deconstruction

Lecture 16 - Introduction to Feminism - I

Lecture 17 - Introduction to Feminism - II

Lecture 18 - Theories of Gender

Lecture 19 - Men's and Masculinity Studies

Lecture 20 - Queer Studies and Representations of Gender in Media

Lecture 21 - Intersectionality

Lecture 22 - Introduction to Postcolonial Theory

Lecture 23 - Key Concepts in Postcolonial theory

Lecture 24 - Said, Spivak and Bhabha

Lecture 25 - Postcolonial Reading of Achebe and Amitav Ghosh

Lecture 26 - Theories of Ideology

Lecture 27 - Adorno and Horkheimer on Culture

Lecture 28 - 1. Culture Industry and Mass Deception; 2. Walter Benjamin

Lecture 29 - Interconnections between Literature, Culture and Identity: Woolf and Deshpande - I

Lecture 30 - Interconnections between Literature, Culture and Identity: Woolf and Deshpande - II

Lecture 31 - The Evolution of Media: Print forms

Lecture 32 - Media and Culture - I

Lecture 33 - Media and Culture - II

Lecture 34 - Media, Culture and Technology

Lecture 35 - Harold Innis

Lecture 36 - Introduction to Marshall McLuhan

Lecture 37 - Media and the Electric Age

Lecture 38 - Hot and Cool Media

Lecture 39 - Postmodern Media - I

Lecture 40 - Postmodern Media - II and Formation of Public Opinion

Lecture 41 - Word and the Image: Drama, Photography, Birth of the Cinema

Lecture 42 - Film and Literature - I

Lecture 43 - Film and Literature - II

Lecture 44 - Language of Films: Mise-en-scene, Type of Shots, Camera angles/movements, Montage

Lecture 45 - Reading of 12 Years a Slave: Film and Text

Lecture 46 - Development of Media: Radio

Lecture 47 - Development of Media: Television

Lecture 48 - Film, Television and Literature

Lecture 49 - Impact of Technology on Literary Genres: Novel

Lecture 50 - Media in the 21st Century

Lecture 51 - Approaches to Digital Forms of Media

Lecture 52 - Literature, Internet and Culture

Lecture 53 - Digital Culture, Media, and Literature

Lecture 54 - Representation of Partition in Different Media: A historical and Cultural Analysis - I

Lecture 55 - Representation of Partition in Different Media: A historical and Cultural Analysis - II

Lecture 56 - Game Studies - I

Lecture 57 - Game Studies - II

Lecture 58 - Body Culture Studies and Representation of Women in the Media

Lecture 59 - Media and Gender

Lecture 60 - Media and Language, Glass Ceiling in Media

NPTEL : NOC:Body Language: Key to Professional Success (Humanities and Social Sciences)

Co-ordinators : Prof. Rashmi Gaur

Lecture 1 - Defining Body Language, Scope and Relevance

Lecture 2 - Defining Proxemics, Four Zones

Lecture 3 - Proxemics: Behavioral Connotations

Lecture 4 - Oculesics - I

Lecture 5 - Oculesics - II

Lecture 6 - Haptics - I

Lecture 7 - Haptics - II

Lecture 8 - Kinesics: Types and Contexts

Lecture 9 - Facial Expressions

Lecture 10 - Macro and Micro Facial Expressions

Lecture 11 - Mouth and Smiles

Lecture 12 - Cultural Differences in Smiles; Head Nods

Lecture 13 - Hand Movements

Lecture 14 - Understanding Finger Movements

Lecture 15 - Movements of Feet and Legs

Lecture 16 - Paralanguage

Lecture 17 - Chronemics

Lecture 18 - Chromatics, Olfactics and Physical Appearance

Lecture 19 - Digital Body Language

Lecture 20 - Gustorics and Silence

NPTEL : NOC:Interpersonal Skills (Humanities and Social Sciences)

Co-ordinators : Prof. Smita Jha

Lecture 1 - Introduction to Interpersonal Skills

Lecture 2 - What are the Important Interpersonal Skills

Lecture 3 - How Can I Develop Interpersonal Skills

Lecture 4 - Practice Makes Interview Perfect

Lecture 5 - Personal Attributes

Lecture 6 - Interpersonal Attributes

Lecture 7 - Technical Communication Skills

Lecture 8 - What is Technical Communication

Lecture 9 - Body Language - 1

Lecture 10 - Body Language - 2

Lecture 11 - Decision making - 1

Lecture 12 - Decision making - 2

Lecture 13 - Pronunciation - 1

Lecture 14 - Pronunciation - 2

Lecture 15 - Creative Problem Solving - 1

Lecture 16 - Creative problem solving - 2

Lecture 17 - Time Management - 1

Lecture 18 - Time Management - 2

Lecture 19 - Leadership skills - 1

Lecture 20 - Leadership skills - 2

Lecture 21 - Group Dynamics - 1

Lecture 22 - Group Dynamics - 2

Lecture 23 - Reducing Stage Fright - 1

Lecture 24 - Reducing Stage Fright - 2

Lecture 25 - Death by Power Point - 1

Lecture 26 - Death by Power Point - 2

Lecture 27 - Negotiation - 1

Lecture 28 - Negotiation - 2

Lecture 29 - Assertiveness - 1

Lecture 30 - Assertiveness - 2

Lecture 31 - Emotional Intelligence - 1

Lecture 32 - Emotional Intelligence - 2

Lecture 33 - Brain Storming Technique - 1

Lecture 34 - Brain Storming Technique - 2

Lecture 35 - Group Discussion - 1

Lecture 36 - Group Discussion - 2

Lecture 37 - Persuasion - 1

Lecture 38 - Persuasion - 2

Lecture 39 - Glossophobia - 1

Lecture 40 - Glossophobia - 2

NPTEL : NOC:Introduction to Environmental Economics (Humanities and Social Sciences)

Co-ordinators : Prof. Diptimayee Nayak, Prof. S. P. Singh

Lecture 1 - Meaning, Rationale and Evolution

Lecture 2 - Basic Concepts and Tools from Micro and Welfare Economics

Lecture 3 - Environmental Economics and Other Sub-disciplines

Lecture 4 - Study Specific in Environmental Economics, Major Problems, and Key Concerns

Lecture 5 - Commons and Collective Actions Problem: Seminal Theories - I

Lecture 6 - Commons and Collective Actions Problem: Seminal Theories - II

Lecture 7 - Commons and Collective Actions Problem: Seminal Theories - III

Lecture 8 - Mancur Olson's Theory of Collective Action

Lecture 9 - Collective Action and Prisoner's Dilemma Game

Lecture 10 - Governing the Commons: The Evolution of Institutions for Collective Action - I

Lecture 11 - Governing the Commons: The Evolution of Institutions for Collective Action - II

Lecture 12 - Environmental Goods and Ecosystem Services - I

Lecture 13 - Environmental Goods and Ecosystem Services - II

Lecture 14 - Ecological Footprint - I

Lecture 15 - Ecological Footprint - II

Lecture 16 - Poverty and Environment Linkages - I

Lecture 17 - Poverty and Environment Linkages - II

Lecture 18 - Poverty and Environment Linkages - III

Lecture 19 - Environment and Economic Growth Linkages - I

Lecture 20 - Environment and Economic Growth Linkages - II

Lecture 21 - Environmental Sustainability - I

Lecture 22 - Environmental Sustainability - II

Lecture 23 - Environmental Performance Index

Lecture 24 - Benefit-Cost Analysis and The Environment - I

Lecture 25 - Benefit-Cost Analysis and The Environment - II

Lecture 26 - Consumer Demand for Environmental Goods - I

Lecture 27 - Consumer Demand for Environmental Goods - II

Lecture 28 - Welfare Effects of Price Change

Lecture 29 - Non-market Environment Valuation: Revealed Preference Methods

Lecture 30 - Hedonic Pricing Method

Lecture 31 - Household Production Function: Averting Expenditure/Defensive Expenditure Method - I

Lecture 32 - Household Production Function: Averting Expenditure/Defensive Expenditure Method - II

Lecture 33 - Damage Costs/Costs of Illness and Lost Output Approach

Lecture 34 - Travel Cost Method

Lecture 35 - Contingent Valuation Method: A Stated Preference Method

Lecture 36 - Choice Experiment Method: A Stated Preference Method

Lecture 37 - Market Efficiency and Optimality - I

Lecture 38 - Market Efficiency and Optimality - II

Lecture 39 - Market Efficiency and Optimality - III

Lecture 40 - Market Efficiency and Optimality - IV

Lecture 41 - Consumer and Producer Surplus - I

Lecture 42 - Consumer and Producer Surplus - II

Lecture 43 - Optimal Provision of Public Goods and Bads - I

Lecture 44 - Optimal Provision of Public Goods and Bads - II

Lecture 45 - Optimal Provision of Public Goods and Bads - III

Lecture 46 - Externality and Market Failure

Lecture 47 - Pigouvian Fees

Lecture 48 - Property Rights and Coase Theorem - I

Lecture 49 - Property Rights and Coase Theorem - II

Lecture 50 - Environmental Regulation and Basic Regulatory Instruments - I

Lecture 51 - Environmental Regulation and Basic Regulatory Instruments - II

Lecture 52 - Command and Control Approach

Lecture 53 - Command and Control Approach: Type of Standards - I

Lecture 54 - Command and Control Approach: Type of Standards - II

Lecture 55 - Environmental Regulation and Basic Regulatory Instruments - Market-based Instruments - I

Lecture 56 - Environmental Regulation and Basic Regulatory Instruments - Market-based Instruments - II

Lecture 57 - Environmental Regulation and Basic Regulatory Instruments - Market-based Instruments - III

Lecture 58 - Environmental Regulation and Basic Regulatory Instruments - Market-based Instruments - IV

Lecture 59 - Environmental Regulation and Basic Regulatory Instruments - Market Trading Systems - I

Lecture 60 - Environmental Regulation and Basic Regulatory Instruments - Market Trading Systems - II

NPTEL : NOC:Effective Writing (Humanities and Social Sciences)

Co-ordinators : Prof. Binod Mishra

Lecture 1 - Introduction to Effective Writing

Lecture 2 - Effective Writing as an Art

Lecture 3 - Principles of Effective Writing

Lecture 4 - Types and Stages of Effective Writing

Lecture 5 - Notions of Correctness and Appropriateness - Part I

Lecture 6 - Notions of Correctness and Appropriateness - Part II

Lecture 7 - Essay Writing

Lecture 8 - Types of Essays

Lecture 9 - Essentials of Academic Writing - Part I

Lecture 10 - Essentials of Academic Writing - Part II

Lecture 11 - Business Writing and its Functions

Lecture 12 - Mechanics of Business Writing

Lecture 13 - Business Letters and Memos

Lecture 14 - Format of Business Letters and Memos

Lecture 15 - Types of Business Letter

Lecture 16 - Sales, Complaint and Adjustment Letters

Lecture 17 - Report Writing

Lecture 18 - Strategies and Structure of Reports

Lecture 19 - Style of Report Writing

Lecture 20 - Creative Writing

NPTEL : NOC:International Trade - Theory and Empirics (Humanities and Social Sciences)

Co-ordinators : Prof. Pratap C. Mohanty

Lecture 1 - Introduction to Strategic Trade and Protectionism

Lecture 2 - Introduction to Protectionism and Strategic Trade

Lecture 3 - India's International Trade: Latest Facts and Figures

Lecture 4 - Facts on Trade Policies and Facilitations

Lecture 5 - Introduction to Trade Theories: What, Why and for Whom?

Lecture 6 - Mercantilism

Lecture 7 - From Mercantilism to Adam Smith

Lecture 8 - Theory of Comparative Cost Advantage

Lecture 9 - Static to Dynamic Comparative Advantage Theory

Lecture 10 - Empirical Testing of Comparative Advantage Theory

Lecture 11 - Neoclassical Trade Theory - Standard Trade Model

Lecture 12 - Heckscher-Ohlin Theory of Trade

Lecture 13 - H-O-S Model in Trade and Income Distribution

Lecture 14 - Empirical Testing of H-O Theory

Lecture 15 - Extension to H-O Theory

Lecture 16 - Imperfect Competition and Trade

Lecture 17 - Monopolistic Competition and Trade

Lecture 18 - Intra-Industry versus Inter-Industry Trade

Lecture 19 - Measuring Intra-Industry Trade - I

Lecture 20 - Measuring Intra-Industry Trade - II

Lecture 21 - Partial Equilibrium Analysis of Trade

Lecture 22 - Offer Curves in Trade Analysis

Lecture 23 - Terms of Trade with Cases

Lecture 24 - Measurement of Terms of Trade

Lecture 25 - Terms of Trade: Determinants and Impacts

Lecture 26 - Trade Protectionism

Lecture 27 - Types of Protections

Lecture 28 - Welfare Effects of Tariffs

Lecture 29 - Effective Protections

Lecture 30 - Effective Protections - Latest Facts and Figures

Lecture 31 - Non-Tariff Measures: Recent Facts

Lecture 32 - Types of Non-Tariff Barriers

Lecture 33 - Effects of Non-Tariffs Barriers

Lecture 34 - Technical Barriers to Trade (TBTs)

Lecture 35 - Sanitary and Phytosanitary Measures (SPS)

Lecture 36 - Economic Integration: Blocs and Blocks

Lecture 37 - Theory of Customs Union

Lecture 38 - Structure and Functions of WTO

Lecture 39 - India and WTO

Lecture 40 - Strategic Trade - Summary and Conclusion

Lecture 41 - Trade and Balance of Payment

Lecture 42 - Trends of India's BoP

Lecture 43 - Foreign Exchange Market

Lecture 44 - Types of Foreign Exchange market

Lecture 45 - Exchange Rate Determination

Lecture 46 - Monetary Approach to the Balance of Payments and Exchange Rates

Lecture 47 - Exchange Rate Dynamics

Lecture 48 - Exchange Rate in the Short run

Lecture 49 - Exchange Rate in the Long run

Lecture 50 - Capital Mobility and the Trilemma of the Exchange Rate Regime

Lecture 51 - Adjustment with Fixed and Flexible Exchange Rates

Lecture 52 - Stability of Foreign Exchange Markets

Lecture 53 - J-Curve Effect

Lecture 54 - Exchange Rate Pass-through

Lecture 55 - Optimum Currency Area

Lecture 56 - Import Substitution versus Export Orientation

Lecture 57 - East Asian Miracle - I

Lecture 58 - East Asian Miracle - II

Lecture 59 - Trade and Development - Post Covid-I

Lecture 60 - Trade and Development - Post Covid-II

NPTEL : NOC:Handling Large Scale Unit Level Data Using STATA (Humanities and Social Sciences)

Co-ordinators : Prof. Pratap C. Mohanty

Lecture 1 - Introduction to Data

Lecture 2 - Introduction to Unit Level Data

Lecture 3 - Understanding Unit Level Data: NSSO

Lecture 4 - Understanding Unit Level Data: IHDS

Lecture 5 - Understanding Unit Level Data: NFHS

Lecture 6 - Review of Sample Techniques - I

Lecture 7 - Review of Sample Techniques - II

Lecture 8 - Sample Size

Lecture 9 - Sample Size Determination - I

Lecture 10 - Sample Size Determination - II

Lecture 11 - Introduction to Stata

Lecture 12 - Exploring Data in Stata

Lecture 13 - Managing Data in Stata - I

Lecture 14 - Managing Data in Stata - II

Lecture 15 - Managing Data in Stata - III

Lecture 16 - Questionnaire Design

Lecture 17 - Tabulation and Creation of New Variables in Stata - I

Lecture 18 - Tabulation and Creation of New Variables in Stata - II

Lecture 19 - Tabulation and Creation of New Variables in Stata - III

Lecture 20 - Variable and Value Labels

Lecture 21 - Extraction in Stata - I

Lecture 22 - Extraction in Stata - II

Lecture 23 - Combining Datasets in Stata - I

Lecture 24 - Combining Datasets in Stata - II

Lecture 25 - Review of Commands

Lecture 26 - Factor Analysis with Stata - I

Lecture 27 - Factor Analysis with Stata - II

Lecture 28 - Linear Regression Analysis in Stata - I

Lecture 29 - Linear Regression Analysis in Stata - II

Lecture 30 - Linear Regression Analysis in Stata - III

Lecture 31 - Introduction to Qualitative Variables

Lecture 32 - Binary Response Model - I

Lecture 33 - Binary Response Model - II

Lecture 34 - Binary Response Model - III

Lecture 35 - Binary Response Model - IV

Lecture 36 - Introduction to Panel Data

Lecture 37 - Panel Data Models

Lecture 38 - Pooled Cross-sectional Data

Lecture 39 - Construction of Panel Data

Lecture 40 - Analysis of Panel Data in Stata

NPTEL : NOC:Indian Poetry in English (Humanities and Social Sciences)

Co-ordinators : Prof. Binod Mishra

Lecture 1 - Introduction to Indian English Poetry - Part I

Lecture 2 - Introduction to Indian English Poetry - Part II

Lecture 3 - Toru Dutt

Lecture 4 - Rabindranath Tagore

Lecture 5 - Sri Aurobindo - Part 1

Lecture 6 - Sri Aurobindo - Part 2

Lecture 7 - Sarojni Naidu

Lecture 8 - Nissim Ezekiel

Lecture 9 - Jayanta Mahapatra

Lecture 10 - K. N Daruwalla

Lecture 11 - Shiv K. Kumar

Lecture 12 - Arun Kolatkar

Lecture 13 - Arvind K. Mehrotra

Lecture 14 - Kamala Das

Lecture 15 - Adil Jussawalla

Lecture 16 - Gieve Patel

Lecture 17 - Pritish Nandy

Lecture 18 - A.K. Ramanujan - Part I

Lecture 19 - A.K. Ramanujan - Part II

Lecture 20 - Agha Shahid Ali

Lecture 21 - Meena Alexander

Lecture 22 - Vikram Seth

Lecture 23 - Sujata Bhatt

Lecture 24 - Eunice de Souza

Lecture 25 - Lakshmi Kannan

Lecture 26 - Tara Patel

Lecture 27 - Menka Shivdasani

Lecture 28 - Niranjan Mohanty

Lecture 29 - Charu Sheel Singh

Lecture 30 - Bibhu Padhi

Lecture 31 - Gopi Kottoor

Lecture 32 - T V Reddy

Lecture 33 - R. K. Singh

Lecture 34 - R. Parthasarathy

Lecture 35 - Mamang Dai

Lecture 36 - Temsula Ao and Easterine Kire

Lecture 37 - Hoshang Merchant

Lecture 38 - Jeet Thayil

Lecture 39 - Meena Kandasamy

Lecture 40 - Summary

NPTEL : NOC:Exploring Survey Data on Health Care (Humanities and Social Sciences)

Co-ordinators : Prof. Pratap C. Mohanty

Lecture 1 - Problem Statement and Research Questions

Lecture 2 - Data, Measurement and Scaling

Lecture 3 - Understanding Healthcare Database: NSSO

Lecture 4 - Understanding Healthcare Database: NFHS

Lecture 5 - Understanding Healthcare Database: LASI

Lecture 6 - Understanding Sampling Base and Design

Lecture 7 - Preparing Schedule and Questionnaire

Lecture 8 - Sample Size Determination - Observational Study

Lecture 9 - Sample Size Determination and Probability Proportional to Size Sampling

Lecture 10 - Focus Group Discussion (FGD)

Lecture 11 - Pre-testing of Sample

Lecture 12 - Weights and Representative Sampling

Lecture 13 - Normalizing Data

Lecture 14 - Deal with Missing Values

Lecture 15 - Validity, Reliability, Accuracy and Precision of Sample

Lecture 16 - Basic Understanding of STATA

Lecture 17 - Syntax and Do File

Lecture 18 - Making Dictionary File

Lecture 19 - Data Browse and Basic Statistics - I

Lecture 20 - Data Browse and Basic Statistics - II

Lecture 21 - Basic Understanding of SPSS and Data Filtration in STATA

Lecture 22 - Data Extraction from ASCII Format

Lecture 23 - Merging Blocks of Information after Extraction

Lecture 24 - Composite Index

Lecture 25 - Measure of Variation- r2, R2, Adjusted R2, Pseudo R2

Lecture 26 - Regression Models of Quantitative Healthcare Variables

Lecture 27 - Regression Models of Qualitative Dependent Variables

Lecture 28 - Relative Risk Ratio Estimation

Lecture 29 - Generalized Linear Model

Lecture 30 - Independence of Irrelevant ALternatives

Lecture 31 - Balanced and Unbalanced Panel in Healthcare

Lecture 32 - Common Constant Model in Healthcare

Lecture 33 - Fixed Effect Model in Healthcare

Lecture 34 - Random Effect Model in Healthcare

Lecture 35 - Construction of Pseudo Panel

Lecture 36 - Need for Evaluation

Lecture 37 - Propensity Score Matching (PSM)

Lecture 38 - Difference-in-Difference Method (DID)

Lecture 39 - Randomized Control Trial (RCT)

Lecture 40 - Regression Discontinuity Method

NPTEL : NOC:Contextualizing Gender (Humanities and Social Sciences)

Co-ordinators : Prof. Rashmi Gaur

Lecture 1 - Introduction, Aims and Objectives

Lecture 2 - Introduction to Gender Studies

Lecture 3 - Feminist Consciousness and Gendered Experiences in Simone de Beauvoir

Lecture 4 - Gender Perspectives in Simone de Beauvoirs The Second Sex (Volume 1)

Lecture 5 - Gender Perspectives in Simone de Beauvoirs The Second Sex (Volume 2)

Lecture 6 - Gender and Race Consciousness - I

Lecture 7 - Gender and Race Consciousness - II

Lecture 8 - Intersectionality

Lecture 9 - Gender and Power Politics in bell hooks

Lecture 10 - Gender and Power Politics in Audre Lorde

Lecture 11 - Gender-Blurring in Toni Morrison - I

Lecture 12 - Gender-Blurring in Toni Morrison - II

Lecture 13 - Gender-Blurring in Toni Morrison - III

Lecture 14 - Unmasking Heterosexual Assumptions in Nancy Chodorow

Lecture 15 - Technologies of Gender in Teresa de Lauretis

Lecture 16 - Introduction to Queer Theory

Lecture 17 - Sex/Gender System in Gayle Rubin

Lecture 18 - Thinking Gender and Homosexuality in Gayle Rubin

Lecture 19 - Queer Theory and Literature in Eve Sedgwick

Lecture 20 - Eve Sedgwicks Epistemology of the Closet

Lecture 21 - Introduction to Queer Literature

Lecture 22 - 21st Century Queer Fiction

Lecture 23 - Queer Cinema - I

Lecture 24 - Queer Cinema - II

Lecture 25 - Queer Representation in OTT Platforms

Lecture 26 - Introduction to Judith Butler

Lecture 27 - Gender Trouble - I

Lecture 28 - Gender Trouble - II

Lecture 29 - Bodies that Matter - I

Lecture 30 - Bodies that Matter - II

Lecture 31 - Speech and Subjectivity

Lecture 32 - Gender in Translation

Lecture 33 - Undoing Gender - I

Lecture 34 - Undoing Gender - II

Lecture 35 - Judith Butler and the Unaccountable Subject

Lecture 36 - Performativity, Precarity and Sexual Politics

Lecture 37 - Gender Politics and the Right to Appear

Lecture 38 - Global Gender Movements

Lecture 39 - Mapping the Theories of Social Movements

Lecture 40 - #MeToo and the Politics of Social Change

Lecture 41 - Hegemonic Masculinity: Rethinking the Concept - I

Lecture 42 - Hegemonic Masculinity: Rethinking the Concept - II

Lecture 43 - Feminism and Men/Masculinities Scholarship by Chris Beasley

Lecture 44 - Postcolonial Masculinities by Fataneh Farahani and Suruchi Thapar-Bjorkert

Lecture 45 - Engaging Men for Gender Justice by Tal Peretz

Lecture 46 - Cyborg and Feminism in Anne Balsamos Technologies of the Gendered Body - I

Lecture 47 - Cyborg and Feminism in Anne Balsamos Technologies of the Gendered Body - II

Lecture 48 - Female Bodybuilding, Cosmetic Surgery and New Imaging Technologies in Anne Balsamo

Lecture 49 - The Virtual body in Anne Balsamos Technologies of the Gendered Body

Lecture 50 - Feminist Cultural Studies of Science and Technology in Anne Balsamo

Lecture 51 - Introduction to Biopolitics and Gender by Jemima Repo

Lecture 52 - Women or Womankind? by Jemima Repo - I

Lecture 53 - Women or Womankind? by Jemima Repo - II

Lecture 54 - Gender for a Marxist Dictionary from Simians, Cyborgs and Women by Donna J. Haraway

Lecture 55 - Biopolitics, Gender Representation and Video Games

Lecture 56 - Introduction to the Literary Posthuman: Narratives of Becoming Post

Lecture 57 - A Cyborg Manifesto by Donna Harroway

Lecture 58 - Ex-Machina and The Female Cyborg

Lecture 59 - Re-figuring the Subject by Rosi Braidotti

Lecture 60 - A Gender Perspective on COVID-19 Pandemic

NPTEL : NOC:Public Speaking (Humanities and Social Sciences)

Co-ordinators : Prof. Binod Mishra

Lecture 1 - Introduction to Public Speaking

Lecture 2 - Communication Process and Roadblocks

Lecture 3 - Use of Rhetoric in Public Speaking

Lecture 4 - Role of Listening in Public Speaking

Lecture 5 - Role of Ethics in Public Speaking

Lecture 6 - Relevance of Public Speaking

Lecture 7 - Audience Awareness and Creating Credibility

Lecture 8 - Content Creation and Organization

Lecture 9 - Role of Personality in Public Speaking

Lecture 10 - Use of Technology in Public Speaking

Lecture 11 - Cultural Awareness in Public Speaking

Lecture 12 - Breaking the Ice: Impress to Express

Lecture 13 - Glossophobia

Lecture 14 - Emotional Intelligence

Lecture 15 - Role of Positivity in Public Speaking

Lecture 16 - Significance of Citations in Public Speaking

Lecture 17 - Digression: Usage and Concerns

Lecture 18 - Forms and Stages of Public Speaking - Part I

Lecture 19 - Forms and Stages of Public Speaking - Part II

Lecture 20 - Classroom Interaction

Lecture 21 - Classroom Lectuers

Lecture 22 - Kinesics

Lecture 23 - Proxemics

Lecture 24 - Chronemics

Lecture 25 - Haptics

Lecture 26 - Paralanguage

Lecture 27 - Meta-communication

Lecture 28 - Conversation

Lecture 29 - Negotiations

Lecture 30 - Debates

Lecture 31 - Elocution and Recitation

Lecture 32 - Group Discussion

Lecture 33 - Speeches

Lecture 34 - Types of Speeches

Lecture 35 - Speeches for Special Occasions

Lecture 36 - Use of Humour in Speeches

Lecture 37 - Interviews

Lecture 38 - Types of Interviews - I

Lecture 39 - Types of Interviews - II

Lecture 40 - Preparing for Interviews

Lecture 41 - Facing the Interview

Lecture 42 - Conference Presentations - Part I

Lecture 43 - Conference Presentations - Part II

Lecture 44 - Meeting Management

Lecture 45 - Leadership Skills - Part I

Lecture 46 - Leadership Skills - Part II

Lecture 47 - Oral Presentation - Part I

Lecture 48 - Oral Presentation - Part II

Lecture 49 - Use of Visual Aids in Oral Presentation

Lecture 50 - Use of Connectives in Oral Presentation

Lecture 51 - Effective use of Language in Public Speaking

Lecture 52 - Handling Feedback and Criticism

Lecture 53 - Role of Creative Thinking in Pubic Speaking

Lecture 54 - Some Other Forums of Public Speaking

Lecture 55 - Etiquettes and Mannerisms in Public Speaking

Lecture 56 - Online Interactions and their Challenges

Lecture 57 - Sample Interviews

Lecture 58 - Analysis of Sample Interviews

Lecture 59 - Sample Speeches and their Analysis

Lecture 60 - Summary and Conclusion

NPTEL : NOC:Partition of India in Print Media and Cinema (Humanities and Social Sciences)

Co-ordinators : Prof. Sarbani Banerjee

Lecture 1 - History of the Partition of India - I

Lecture 2 - History of the Partition of India - II

Lecture 3 - History of the Partition of India - III

Lecture 4 - History of the Partition of India - IV

Lecture 5 - History of the Partition of India - V

Lecture 6 - History of the Partition of India - VI

Lecture 7 - History of the Partition of India - VII

Lecture 8 - History and Alternative Memory Writings - I

Lecture 9 - History and Alternative Memory Writings - II

Lecture 10 - History and Alternative Memory Writings - III

Lecture 11 - History and Alternative Memory Writings - IV

Lecture 12 - History and Alternative Memory Writings - V

Lecture 13 - Caste Politics and The Bengal Chapter - I

Lecture 14 - Caste Politics and The Bengal Chapter - II

Lecture 15 - Caste Politics and The Bengal Chapter - III

Lecture 16 - Caste Politics in Punjab Partition Micro-societies and Sub-Cultures

Lecture 17 - Womanhood and Motherhood - I

Lecture 18 - Womanhood and Motherhood - II

Lecture 19 - Womanhood and Motherhood - III

Lecture 20 - Womanhood and Motherhood - IV

Lecture 21 - Woman in the Context of Partition - I

Lecture 22 - Woman in the Context of Partition - II

Lecture 23 - Woman in the Context of Partition - III

Lecture 24 - Accounts of the Survivor - I

Lecture 25 - Accounts of the Survivor - II

Lecture 26 - Accounts of the Survivor - III

Lecture 27 - Accounts of the Survivor - IV

Lecture 28 - Accounts of the Survivor - V

Lecture 29 - Accounts of the Survivor - VI

Lecture 30 - Accounts of the Survivor - VII

Lecture 31 - Accounts of the Survivor - VIII

Lecture 32 - Accounts of the Survivor - IX

Lecture 33 - Home and Nostalgia - I

Lecture 34 - Home and Nostalgia - II

Lecture 35 - Home and Nostalgia - III

Lecture 36 - Home and Nostalgia - IV

Lecture 37 - Home and Nostalgia - V

Lecture 38 - Refugee, Desh and Nation - I

Lecture 39 - Refugee, Desh and Nation - II

Lecture 40 - Refugee, Desh and Nation - III

Lecture 41 - Refugee, Desh and Nation - IV

Lecture 42 - Refugee, Desh and Nation - V

Lecture 43 - Refugee, Desh and Nation - VI

Lecture 44 - Refugee, Desh and Nation - VII

Lecture 45 - Refugee, Desh and Nation - VIII - Agency/Lack thereof for the Immigrant Women

Lecture 46 - Displaced People, Abandoned Homes - I

Lecture 47 - Displaced People, Abandoned Homes - II

Lecture 48 - Displaced People, Abandoned Homes - III

Lecture 49 - Displaced People, Abandoned Homes - IV

Lecture 50 - Displaced People, Abandoned Homes - V

Lecture 51 - Displaced People, Abandoned Homes - VI

Lecture 52 - Refuge Women and Patriarchal Society - I

Lecture 53 - Refuge Women and Patriarchal Society - II

Lecture 54 - Refuge Women and Patriarchal Society - III

Lecture 55 - Refuge Women and Patriarchal Society - IV

Lecture 56 - Refuge Women and Patriarchal Society - V

Lecture 57 - Refuge Women and Patriarchal Society - VI

Lecture 58 - Partition Literature in the 21st Century - I

Lecture 59 - Partition Literature in the 21st Century - II

Lecture 60 - Immigrant Populace in the Diaspora - I

Lecture 61 - Immigrant Populace in the Diaspora - II

Lecture 62 - Immigrant Populace in the Diaspora - III

NPTEL : NOC:Narrative Mode and Fiction (Humanities and Social Sciences)

Co-ordinators : Prof. Sarbani Banerjee

Lecture 1 - Genealogy of Genre - I

Lecture 2 - Genealogy of Genre - II

Lecture 3 - Genealogy of Genre - III

Lecture 4 - Fiction and Different Modes of Narrative - I

Lecture 5 - Fiction and Different Modes of Narrative - II

Lecture 6 - Fiction and Different Modes of Narrative - III

Lecture 7 - Fiction and Different Modes of Narrative - IV

Lecture 8 - Commentary on the Genre of Novel - I

Lecture 9 - Commentary on the Genre of Novel - II

Lecture 10 - Commentary on the Genre of Novel - III

Lecture 11 - Commentary on the Genre of Novel - IV

Lecture 12 - Commentary on the Genre of Novel - V

Lecture 13 - Commentary on the Genre of Novel - VI

Lecture 14 - Novel and Existence - I

Lecture 15 - Novel and Existence - II

Lecture 16 - Novel and Existence - III

Lecture 17 - Novel and Existence - IV

Lecture 18 - Novel and Existence - V

Lecture 19 - Novel and Existence - VI

Lecture 20 - Features of the Novel - I

Lecture 21 - Features of the Novel - II

Lecture 22 - Features of the Novel - III

Lecture 23 - Features of the Novel - IV

Lecture 24 - Features of the Novel - V

Lecture 25 - Features of the Novel - VI

Lecture 26 - Features of the Novel - VII

Lecture 27 - Tragedy and Comic Absurdity in Novel - I

Lecture 28 - Tragedy and Comic Absurdity in Novel - II

Lecture 29 - Tragedy and Comic Absurdity in Novel - III

Lecture 30 - Tragedy and Comic Absurdity in Novel - IV

Lecture 31 - The Modern Novel - I

Lecture 32 - The Modern Novel - II

Lecture 33 - The Modern Novel - III

Lecture 34 - The Modern Novel - IV

Lecture 35 - The Modern Novel - V

Lecture 36 - Short Story in the Modern and Post-modern Era - I

Lecture 37 - Short Story in the Modern and Post-modern Era - II

Lecture 38 - Short Story in the Modern and Post-modern Era - III

Lecture 39 - Short Story in the Modern and Post-modern Era - IV

Lecture 40 - Short Story in the Modern and Post-modern Era - V

Lecture 41 - Short Story in the Modern and Post-modern Era - VI

Lecture 42 - Short Story in the Modern and Post-modern Era - VII

Lecture 43 - Short Story in the Modern and Post-modern Era - VIII

Lecture 44 - Short Story and Novel - I

Lecture 45 - Short Story and Novel - II

Lecture 46 - Short Story and Novel - III

Lecture 47 - Short Story and Novel - IV

Lecture 48 - Science Fiction - I

Lecture 49 - Science Fiction - II

Lecture 50 - Science Fiction - III

Lecture 51 - Science Fiction - IV

Lecture 52 - Science Fiction - V

Lecture 53 - Science Fiction - VI

Lecture 54 - Science Fiction - VII

Lecture 55 - Magical Realism - I

Lecture 56 - Magical Realism - II

Lecture 57 - Magical Realism - III

Lecture 58 - Magical Realism - IV

Lecture 59 - Magical Realism - V

Lecture 60 - Future of Fictional Writing - I

Lecture 61 - Future of Fictional Writing - IV

NPTEL : NOC:Group Dynamics (Humanities and Social Sciences)

Co-ordinators : Prof. Pooja Garg

Lecture 1 - Introduction of Groups - Part I

Lecture 2 - Introduction of Groups - Part II

Lecture 3 - Introduction of Groups - Part III

Lecture 4 - Introduction of Groups - Part IV

Lecture 5 - Group Process - Part I

Lecture 6 - Group Process - Part II

Lecture 7 - Interpersonal Attraction and Social Relationship - Part I

Lecture 8 - Interpersonal Attraction and Social Relationship - Part II

Lecture 9 - Group Communication - Part I

Lecture 10 - Group Communication - Part II

Lecture 11 - Group Communication - Part III

Lecture 12 - Interactive Behavior - Part I

Lecture 13 - Interactive Behavior - Part II

Lecture 14 - Interactive Behavior - Part III

Lecture 15 - Interactive Behavior - Part IV

Lecture 16 - Group Leadership - Part I

Lecture 17 - Group Leadership - Part II

Lecture 18 - Group Leadership - Part III

Lecture 19 - Group Leadership - Part IV

Lecture 20 - Group Leadership - Part V

Lecture 21 - Group Leadership - Part VI

Lecture 22 - Group Leadership - Part VII

Lecture 23 - Organizational Justice, Ethics and Corporate Social Responsibility - Part I

Lecture 24 - Organizational Justice, Ethics and Corporate Social Responsibility - Part II

Lecture 25 - Organizational Justice, Ethics and Corporate Social Responsibility - Part III

Lecture 26 - Organizational Justice, Ethics and Corporate Social Responsibility - Part IV

Lecture 27 - Organizational Justice, Ethics and Corporate Social Responsibility - Part V

Lecture 28 - Positive Organizational Scholarship - Part I

Lecture 29 - Positive Organizational Scholarship - Part II

Lecture 30 - Positive Organizational Scholarship - Part III

Lecture 31 - Positive Organizational Scholarship - Part IV

Lecture 32 - Positive Organizational Scholarship - Part V

Lecture 33 - Positive Organizational Scholarship - Part VI

Lecture 34 - Positive Organizational Scholarship - Part VII

Lecture 35 - Positive Organizational Scholarship - Part VIII

Lecture 36 - Positive Organizational Scholarship - Part IX

NPTEL : NOC:Countering Stage Fright (Humanities and Social Sciences)

Co-ordinators : Prof. Smita Jha

Lecture 1 - Introduction to the Course - I

Lecture 2 - Introduction to the Course - II

Lecture 3 - Definition with Symptoms - I

Lecture 4 - Definition with Symptoms - II

Lecture 5 - Is Stage Fright Common ? - I

Lecture 6 - Is Stage Fright Common ? - II

Lecture 7 - When and Where Does Performance Anxiety Happen ? - I

Lecture 8 - When and Where Does Performance Anxiety Happen ? - II

Lecture 9 - Symptoms of Performance Anxiety - I

Lecture 10 - Symptoms of Performance Anxiety - II

Lecture 11 - Causes of Stage Fright - I

Lecture 12 - Causes of Stage Fright - II

Lecture 13 - Types of Stage Fright - I

Lecture 14 - Types of Stage Fright - II

Lecture 15 - Can Stage Fright be Cured ? - I

Lecture 16 - Can Stage Fright be Cured ? - II

Lecture 17 - Systematic Desensitization as Countering Stage Fright - I

Lecture 18 - Systematic Desensitization as Countering Stage Fright - II

Lecture 19 - Systematic Desensitization as Countering Stage Fright - III

Lecture 20 - Systematic Desensitization as Countering Stage Fright - IV

NPTEL : NOC:Advance Course in Social Psychology (Humanities and Social Sciences)

Co-ordinators : Prof. Pooja Garg

Lecture 1 - Introduction to Social Psychology - Part I

Lecture 2 - Introduction to Social Psychology - Part II

Lecture 3 - Methods Adopted in Social Psychology - Part I

Lecture 4 - Methods Adopted in Social Psychology - Part II

Lecture 5 - Methods Adopted in Social Psychology - Part III

Lecture 6 - Methods Adopted in Social Psychology - Part IV

Lecture 7 - Methods Adopted in Social Psychology - Part V

Lecture 8 - Methods Adopted in Social Psychology - Part VI

Lecture 9 - Interpersonal Attraction - Part I

Lecture 10 - Interpersonal Attraction - Part II

Lecture 11 - Prosocial Behavior - Part I

Lecture 12 - Prosocial Behavior - Part II

Lecture 13 - Attitudes - Part I

Lecture 14 - Attitudes - Part II

Lecture 15 - Attitudes - Part III

Lecture 16 - Attitudes - Part IV

Lecture 17 - Attitudes - Part V

Lecture 18 - Attitudes - Part VI

Lecture 19 - Social Influence - Part I

Lecture 20 - Social Influence - Part II

Lecture 21 - Social Influence - Part III

Lecture 22 - Social Influence - Part IV

Lecture 23 - Distributive, Procedural and Interactional Justice

Lecture 24 - Conflicting Behavior - Part I

Lecture 25 - Conflicting Behavior - Part II

Lecture 26 - Conflicting Behavior - Part III

Lecture 27 - Conflicting Behavior - Part IV

Lecture 28 - Communication - Part I

Lecture 29 - Communication - Part II

Lecture 30 - Communication - Part III

Lecture 31 - Communication - Part IV

Lecture 32 - Communication - Part V

Lecture 33 - Communication - Part VI

Lecture 34 - Group Behaviour - Part I

Lecture 35 - Group Behaviour - Part II

Lecture 36 - Group Behaviour - Part III

Lecture 37 - Group Behaviour - Part IV

Lecture 38 - Group Behaviour - Part V

Lecture 39 - Group Behaviour - Part VI

Lecture 40 - Group Behaviour - Part VII

Lecture 41 - Group Behaviour - Part VIII

Lecture 42 - Group Leadership - Part I

Lecture 43 - Group Leadership - Part II

Lecture 44 - Group Leadership - Part III

Lecture 45 - Group Leadership - Part IV

Lecture 46 - Group Leadership - Part V

Lecture 47 - Group Leadership - Part VI

Lecture 48 - Group Leadership - Part VII

Lecture 49 - Group Leadership - Part VIII

Lecture 50 - Group Leadership - Part IX

Lecture 51 - Group Leadership - Part X

Lecture 52 - Group Leadership - Part XI

Lecture 53 - Interactive Behaviour - Part I

Lecture 54 - Interactive Behaviour - Part II

Lecture 55 - Interactive Behaviour - Part III

NPTEL : NOC:Performative Gender and Religions in South Asia (Humanities and Social Sciences)

Co-ordinators : Prof. Sarbani Banerjee

Lecture 1 - Introducing Performance and its Characteristics in the South Asian Context - I

Lecture 2 - Introducing Performance and its Characteristics in the South Asian Context - II

Lecture 3 - Introducing Performance and its Characteristics in the South Asian Context - III

Lecture 4 - Introducing Performance and its Characteristics in the South Asian Context - IV

Lecture 5 - Sanskrit Dramaturgy and Rasa Theory - I

Lecture 6 - Sanskrit Dramaturgy and Rasa Theory - II

Lecture 7 - Sanskrit Dramaturgy and Rasa Theory - III

Lecture 8 - Sanskrit Dramaturgy and Rasa Theory - IV

Lecture 9 - Sanskrit Dramaturgy and Rasa Theory - V

Lecture 10 - Bhakti Tradition - I

Lecture 11 - Bhakti Tradition - II

Lecture 12 - Bhakti Tradition - III

Lecture 13 - Bhakti Tradition - IV

Lecture 14 - Bhakti Tradition - V

Lecture 15 - Sufi Tradition - I

Lecture 16 - Sufi Tradition - II

Lecture 17 - Sufi Tradition - III

Lecture 18 - Sufi Tradition - IV

Lecture 19 - Bhakti Mysticism and Poetics - I

Lecture 20 - Bhakti Mysticism and Poetics - II

Lecture 21 - Bhakti Mysticism and Poetics - III

Lecture 22 - Bhakti Mysticism and Poetics - IV

Lecture 23 - Bhakti Mysticism and Poetics - V

Lecture 24 - Bhakti Mysticism and Poetics - VI

Lecture 25 - Gender and Performance in Bhakti Movement - I

Lecture 26 - Gender and Performance in Bhakti Movement - II

Lecture 27 - Gender and Performance in Bhakti Movement - III

Lecture 28 - Gender and Performance in Bhakti Movement - IV

Lecture 29 - Sufi Mysticism and Poetics - I

Lecture 30 - Sufi Mysticism and Poetics - II

Lecture 31 - Sufi Mysticism and Poetics - III

Lecture 32 - Sufi Mysticism and Poetics - IV

Lecture 33 - Sufi Mysticism and Poetics - V

Lecture 34 - Sufi Mysticism and Poetics - VI

Lecture 35 - Gender and Performance in Sufi Movement - I

Lecture 36 - Gender and Performance in Sufi Movement - II

Lecture 37 - Gender and Performance in Sufi Movement - III

Lecture 38 - Gender and Performance in Sufi Movement - IV

Lecture 39 - Folk Traditions and Performances - I

Lecture 40 - Folk Traditions and Performances - II

Lecture 41 - Folk Traditions and Performances - III

Lecture 42 - Folk Traditions and Performances - IV

Lecture 43 - Folk Traditions and Performances - V

Lecture 44 - Folk Traditions and Performances - VI

Lecture 45 - Folk Traditions and Performances - VII

Lecture 46 - Classical Traditions and Performances - I

Lecture 47 - Classical Traditions and Performances - II

Lecture 48 - Classical Traditions and Performances - III

Lecture 49 - Classical Traditions and Performances - IV

Lecture 50 - Classical Traditions and Performances - V

Lecture 51 - Classical Traditions and Performances - VI

Lecture 52 - Tribal Traditions and Performances - I

Lecture 53 - Tribal Traditions and Performances - II

Lecture 54 - Tribal Traditions and Performances - III

Lecture 55 - Tribal Traditions and Performances - IV

Lecture 56 - Tribal Traditions and Performances - V

Lecture 57 - Tribal Traditions and Performances - VI

Lecture 58 - Bhakti, Sufi, and Cinema - I

Lecture 59 - Bhakti, Sufi, and Cinema - II

Lecture 60 - Bhakti, Sufi, and Cinema - III

Lecture 61 - Bhakti, Sufi, and Cinema - IV

Lecture 62 - Bhakti, Sufi, and Cinema - V

Lecture 63 - Secularism in the Western and Indian Context

NPTEL : NOC:Online Communication in the Digital Age (Humanities and Social Sciences)

Co-ordinators : Prof. Rashmi Gaur

Lecture 1 - Introduction, Aims and Objectives

Lecture 2 - Computer Mediated Communication

Lecture 3 - Impersonal Computer - Mediated Communication

Lecture 4 - Interpersonal Communication Theories of CMC

Lecture 5 - Interpersonal Computer-Mediated Communication

Lecture 6 - Intrapersonal Computer-Mediated Communication

Lecture 7 - Digital Identity - I

Lecture 8 - Digital Identity - II

Lecture 9 - Embodiment and Digital Identity

Lecture 10 - Digital Identity in the Workplace

Lecture 11 - Introduction to Technical Communication

Lecture 12 - Workplace Communication

Lecture 13 - Need of Specific Audiences

Lecture 14 - Persuading your Audience

Lecture 15 - Teamwork and Global Considerations

Lecture 16 - Virtual Teams and Virtual Presentations

Lecture 17 - Digital Writing

Lecture 18 - Evolution of Digital Literary Practices

Lecture 19 - Evolving Landscape of Cybernetic Writing

Lecture 20 - The Digital Literary Domain

Lecture 21 - Introduction to the Digital Humanities

Lecture 22 - Digital Humanities and Literary Analyses

Lecture 23 - Towards an Intersectional Approach to Digital Humanities

Lecture 24 - Introduction to Postcolonial Digital Humanities

Lecture 25 - Feminism and Future of Digital Humanities

Lecture 26 - Professional Communication, Digital Rhetoric and Digital Literacy

Lecture 27 - Professional Communication, Digital Rhetoric and Digital Literacy (Continued...)

Lecture 28 - New Literacies in Multimodality and Multimedia

Lecture 29 - Evolution of Social Software

Lecture 30 - Artificial Intelligence and Online Communication

Lecture 31 - Artificial Intelligence and Online Communication (Continued...)

Lecture 32 - Introduction to Social Media

Lecture 33 - Social Networking Sites

Lecture 34 - Blogging and Microblogging

Lecture 35 - Online Social Support and Social Media

Lecture 36 - Social Media Marketing

Lecture 37 - Advertising Strategies and Social Media Marketing

Lecture 38 - Social Media Entertainment and Media Studies

Lecture 39 - Digital Storytelling

Lecture 40 - Playing with Stories: Interactive Digital Storytelling in Film and Games

Lecture 41 - Digital Ethics

Lecture 42 - Fundamentals of Ethical Behaviour

Lecture 43 - The Social Network: Navigating Ethics in Entrepreneurship

Lecture 44 - Digital Deception: Introduction

Lecture 45 - Linguistic Style of Liars

Lecture 46 - Scammers and Swindlers in Online Spaces

Lecture 47 - Perils and Pitfalls of Online Communication - Part I

Lecture 48 - Perils and Pitfalls of Online Communication - Part II

Lecture 49 - Deceptive Realities: Cinematic Exploration of Digital Deception

Lecture 50 - Cyberbullying

Lecture 51 - Gender and Online Communication

Lecture 52 - Theories of Gender in Digital Spaces

Lecture 53 - Digital Feminist Interventions

Lecture 54 - Cyberfeminism and Cyborg Metaphors

Lecture 55 - Transforming Stereotypes: Evolving Portrayals of Gender in Video Games

Lecture 56 - The Future of Communication Technology

Lecture 57 - Augmented Reality

Lecture 58 - Virtual Reality and the Metaverse

Lecture 59 - Exploring the Digital Persona: The World of Avatars

Lecture 60 - Online Communication: Summative Insights

NPTEL : NOC:Energy Resources, Economics and Sustainability (Humanities and Social Sciences)

Co-ordinators : Prof. Pratham Arora

Lecture 1 - Introduction

Lecture 2 - Introduction to Fossil Fuels

Lecture 3 - Introduction to Renewable Energy

Lecture 4 - Energy Consumption in Different Countries

Lecture 5 - Energy Consumption in Different Sectors

Lecture 6 - Energy Consumption

Lecture 7 - Energy Flow Diagram - I

Lecture 8 - Energy Flow Diagram - II

Lecture 9 - Fossil Fuel Resources - I

Lecture 10 - Fossil Fuel Resources - II

Lecture 11 - Energy Economics - I

Lecture 12 - Energy Economics - II

Lecture 13 - Energy Economics - III

Lecture 14 - Energy Economics - IV

Lecture 15 - Wind Farm Financial Model - I

Lecture 16 - Wind Farm Financial Model - II

Lecture 17 - Economic Decision Making

Lecture 18 - Economic Decision Making and Project Financing

Lecture 19 - Economic and Environment

Lecture 20 - Business and the Environment

Lecture 21 - Energy, Ecology and Environment

Lecture 22 - Recent Successes in Environmental Stewardship - I

Lecture 23 - Recent Successes in Environmental Stewardship - II

Lecture 24 - Global Climate Change

Lecture 25 - Global Climate Change Mitigation - I

Lecture 26 - Global Climate Change Mitigation - II

Lecture 27 - Global Climate Change Mitigation: International Protocols

Lecture 28 - Global Climate Change Myths

Lecture 29 - Nuclear Waste and Thermal Pollution

Lecture 30 - Environmental Impacts of Different Energy Pathways - I

Lecture 31 - Environmental Impacts of Different Energy Pathways - II

Lecture 32 - Understanding Sustainability

Lecture 33 - Introduction to Life Cycle Assessment (LCA)

Lecture 34 - LCA Phases

Lecture 35 - LCA System, Boundary, and Allocation

Lecture 36 - LCA: Life Cycle Stages

Lecture 37 - LCA: Data and Impact Assessment

Lecture 38 - LCA: Impact Categories

Lecture 39 - LCA Computational Structure

Lecture 40 - SimaPro Tutorial

Lecture 41 - Case Studies - I

Lecture 42 - Case Studies - II

NPTEL : NOC:Cognitive Ergonomics (Humanities and Social Sciences)

Co-ordinators : Prof. M. K. Asthana

Lecture 1 - Introduction to Cognitive Ergonomics - I

Lecture 2 - Introduction to Cognitive Ergonomics - II

Lecture 3 - Human Cognitive Abilities and Skills - I

Lecture 4 - Human Cognitive Abilities and Skills - II

Lecture 5 - Human Cognitive Abilities and Skills - III

Lecture 6 - Human Cognitive Abilities and Skills - IV

Lecture 7 - Human Cognitive Abilities and Skills - V

Lecture 8 - Human Cognitive Abilities and Skills - VI

Lecture 9 - Human Computer Interaction - I

Lecture 10 - Human Computer Interaction - II

Lecture 11 - Human Computer Interaction - III

Lecture 12 - Human Computer Interaction - IV

Lecture 13 - Usability - I

Lecture 14 - Usability - II

Lecture 15 - Usability - III

Lecture 16 - Human Error - I

Lecture 17 - Human Error - II

Lecture 18 - Human Error - III

Lecture 19 - Cognitive Safety - I

Lecture 20 - Cognitive Safety - II

NPTEL : NOC:The English Novel: Interdisciplinary Approaches (Humanities and Social Sciences)

Co-ordinators : Prof. Aruni Mahapatra, Prof. Smita Jha

Lecture 1 - Introduction: Why Study a Novel

Lecture 2 - The Art of Fiction

Lecture 3 - Classical Narrative Theory

Lecture 4 - Rhetorical Narrative Theory

Lecture 5 - Adaptation

Lecture 6 - How to Read a Novel

Lecture 7 - The Novel After Theory : Introduction

Lecture 8 - The Novel After Theory : Gender

Lecture 9 - The Novel After Theory : Class

Lecture 10 - Environment and Literature

Lecture 11 - Disability

Lecture 12 - Pride and Prejudice I : Scholarly Approaches

Lecture 13 - Pride and Prejudice II : Author Background and Context - I

Lecture 14 - Pride and Prejudice III : Author Background and Context - II

Lecture 15 - Pride and Prejudice IV : Theme, Form and Style - I

Lecture 16 - Pride and Prejudice V : Theme, Form and Style - II

Lecture 17 - Pride and Prejudice VI : Textual Analysis

Lecture 18 - Pride and Prejudice VII : Scholarly Approaches

Lecture 19 - Jane Eyre: Background (Author and Context)

Lecture 20 - Jane Eyre: Theme, Form and Style - I

Lecture 21 - Theme, Form and Style - II

Lecture 22 - Jane Eyre: Scholarly Debates

Lecture 23 - Jane Eyre: Textual Analysis

Lecture 24 - Intertextual Connections

Lecture 25 - Dracula by Bram Stoker : A Discussion - I

Lecture 26 - Dracula by Bram Stoker : A Discussion - II

Lecture 27 - Mrs Dalloway: Author Background and Context

Lecture 28 - Mrs Dalloway II : Theme, Form and Style

Lecture 29 - Mrs Dalloway III : Scholarly Debates

Lecture 30 - Mrs Dalloway IV : Textual Analysis - I

Lecture 31 - Mrs Dalloway V : Intertextual Connections - I

Lecture 32 - Mrs Dalloway VI : Textual Analysis - II

Lecture 33 - Mrs Dalloway VII : Intertextual Connections - II

Lecture 34 - Mrs Dalloway VIII : Textual Analysis - III

Lecture 35 - Atonement: Background (Author and Context)

Lecture 36 - Atonement: Theme, Form and Style

Lecture 37 - Atonement: Intertextual Connections

Lecture 38 - Atonement: Scholarly Debates

Lecture 39 - The Reluctant Fundamentalist I : Theme, Form and Style

Lecture 40 - The Reluctant Fundamentalist II : Textual Analysis

NPTEL : NOC:Memory (Humanities and Social Sciences)

Co-ordinators : Prof. M. K. Asthana

Lecture 1 - Introduction to Memory and Models of Memory

Lecture 2 - Introduction to Memory

Lecture 3 - Methods of Studying Memory - I

Lecture 4 - Methods of Studying Memory - II

Lecture 5 - Methods of Studying Memory - III

Lecture 6 - Neuropsychology of Memory, Research Methods in Memory

Lecture 7 - Neuropsychology of Memory - I

Lecture 8 - Neuropsychology of Memory - II

Lecture 9 - Research Methods in Memory

Lecture 10 - Methods in Memory Modulation

Lecture 11 - Retrieval of Memory - I

Lecture 12 - Retrieval of Memory - II

Lecture 13 - Retrieval of Memory - III

Lecture 14 - Retrieval of Memory - IV

Lecture 15 - Retrieval of Memory - V

Lecture 16 - Working Memory - I

Lecture 17 - Working Memory - II

Lecture 18 - Working Memory - III

Lecture 19 - Working Memory - IV

Lecture 20 - Episodic and Semantic Memory

Lecture 21 - Episodic Memory

Lecture 22 - Episodic Memory Processing

Lecture 23 - Semantic and Lexical Memory - I

Lecture 24 - Semantic and Lexical Memory - II

Lecture 25 - Forgetting - I

Lecture 26 - Forgetting - II

Lecture 27 - Forgetting - III

Lecture 28 - Forgetting - IV

Lecture 29 - Forgetting - V

Lecture 30 - Memory Disorders - Amnesia - I

Lecture 31 - Memory Disorders - Amnesia - II

Lecture 32 - Memory Disorders - Amnesia - III

Lecture 33 - Memory Disorders

Lecture 34 - Memory Disorders - Alzheimerâ€™s Disease

Lecture 35 - Eyewitness Testimony

Lecture 36 - Metamemory - I

Lecture 37 - Metamemory - II

Lecture 38 - Mnemonics

Lecture 39 - Memory Reconsolidation - I

Lecture 40 - Memory Reconsolidation - II

NPTEL : NOC:Artistic Exploration in Scientific Research and Technology (Humanities and Social Sciences)

Co-ordinators : Prof. Bitasta Das

Lecture 1 - Science and Humanities

Lecture 2 - Humanities and Art

Lecture 3 - Idea of Folk

Lecture 4 - Folk and Folk Art

Lecture 5 - Importance of Folklore

Lecture 6 - Folk Art Around the World

Lecture 7 - Indian Folk Art

Lecture 8 - Indian Schools of Painting

Lecture 9 - Indian Folk Paintings - 1

Lecture 10 - Indian Folk Paintings - 2

Lecture 11 - Madhubani: Understanding the Technique

Lecture 12 - Gond: Understanding the Technique

Lecture 13 - Warli: Understanding the Technique

Lecture 14 - Chittara: Understanding the Technique

Lecture 15 - Sohrai: Understanding the Technique

Lecture 16 - Importance of Interdisciplinary Approach

Lecture 17 - Art vis-Ã -vis Science and Technology

Lecture 18 - When Art Meets Science and Technology

Lecture 19 - Folk Art A Potent Medium of Communication

Lecture 20 - Representation of Science and Technology with Indian Folk Art - 1

Lecture 21 - Representation of Science and Technology with Indian Folk Art - 2

Lecture 22 - Recapitulation

Lecture 23 - Conclusion

NPTEL : NOC:Introduction to Law on Electricity (Law)

Co-ordinators : Prof. Uday Shankar

Lecture 1 - Introduction of the Electricity Law; Constitutional Design

Lecture 2 - Evolution of Laws on Electricity Salient Features of Electricity Act, 2003

Lecture 3 - Evolution of Laws on Electricity

Lecture 4 - Salient Features of the Electricity Act 2003

Lecture 5 - Energy Security

Lecture 6 - Energy Mix

Lecture 7 - National Electricity Plan and Policy

Lecture 8 - Rural Electrification

Lecture 9 - Generation and Captive Power Plant

Lecture 10 - Generation and Captive Power Plant (Continued...)

Lecture 11 - Captive Power Plant and Dedicated Transmission Line

Lecture 12 - License

Lecture 13 - License (Continued...)

Lecture 14 - Transmission

Lecture 15 - Load Despatch Centre

Lecture 16 - Distribution

Lecture 17 - Distribution (Continued...)

Lecture 18 - Distribution and Retail Competition

Lecture 19 - Open Access

Lecture 20 - Open Access (Continued...)

Lecture 21 - Open Access (Continued...)

Lecture 22 - Trading

Lecture 23 - Trading and Power Market

Lecture 24 - Consumer Welfare

Lecture 25 - Rights of Consumer

Lecture 26 - Offences under the Electricity Act

Lecture 27 - Tariff

Lecture 28 - Tariff - Determination

Lecture 29 - Tariff - Competitive Bidding

Lecture 30 - Regulatory Commissions

Lecture 31 - Regulatory Commissions (Continued...)

Lecture 32 - Appellate Tribunal

Lecture 33 - Other Institutions under the Act

Lecture 34 - Electricity (Amendment) Bill 2020/2021 - A Critical Comment

Lecture 35 - Renewable Energy

Lecture 36 - Renewable Energy (Continued...)

Lecture 37 - Role of Civil Society; Comments on Draft Renewable Energy Act, 2015

Lecture 38 - Energy Efficiency

Lecture 39 - Energy Conservation Act, 2001

Lecture 40 - Energy Conservation Act, 2001 (Continued...)

NPTEL : NOC:Legal and Regulatory Issues in Biotechnology (Law)

Co-ordinators : Prof. Niharika Sahoo Bhattacharya

Lecture 1 - Biotechnology product development cycle and critical issues

Lecture 2 - Biotechnology product development cycle and critical issues (Continued...)

Lecture 3 - Ethics in Animal and Human Research

Lecture 4 - Ethics in Animal and Human Research: Code of ethics and regulation (Continued...)

Lecture 5 - Ethics in Stem Cell Research

Lecture 6 - Stem Cell Research in India

Lecture 7 - Patenting issues in biotechnology

Lecture 8 - Patenting issues in biotechnology (Continued...)

Lecture 9 - Patenting issues in biotechnology (Continued...)

Lecture 10 - IPR issues in Plant biotechnology

Lecture 11 - Regulatory Framework for Genetically engineered Plant

Lecture 12 - Cartagena Protocol

Lecture 13 - Regulatory approval process for Biopharmaceuticals

Lecture 14 - Regulatory approval process for Biopharmaceuticals and Biosimialars in US

Lecture 15 - Data exclusivity and Patent term extension

Lecture 16 - Resource Sharing: material transfer agreement

Lecture 17 - Technology transfer agreements and patents

NPTEL : NOC:New Labour Codes of India (Law)

Co-ordinators : Prof.Raju Kd

Lecture 1 - Introduction

Lecture 2 - Government Policies

Lecture 3 - History of Labour Law in the Country

Lecture 4 - History - Previous Social Security Legislations in India (Continued...)

Lecture 5 - National Labour Commission Reports

Lecture 6 - Evolution of Trade Unions in India

Lecture 7 - Constitutional Freedom to Form Associations and Unions

Lecture 8 - ILO on Trade Union

Lecture 9 - Trade Union - Definitions, Registration, Cancellation, Management of Funds

Lecture 10 - Trade Union - Recognition, Immunities

Lecture 11 - Industrial Disputes - Introduction - Definitions

Lecture 12 - Resolution of Industrial Disputes

Lecture 13 - Concept of Workman, Contract of Service, Contract for Service

Lecture 14 - Strike

Lecture 15 - Lock-out

Lecture 16 - Lay-off

Lecture 17 - Retrenchment

Lecture 18 - Closure of Undertakings

Lecture 19 - Industrial Employment (Standing Orders)

Lecture 20 - Disciplinary Action and Procedures

Lecture 21 - The Code on Wages, 2019 - An Introduction

Lecture 22 - Minimum Wages, Floor Wages, Central and State Advisory Board

Lecture 23 - Payment of Wages, Deductions and Recovery, Fines

Lecture 24 - Equal Remuneration

Lecture 25 - Bonus

Lecture 26 - C.311-Minimum Wage Fixing Convention, 1970

Lecture 27 - C:26-ILO Minimum Wage-Fixing Machinery Convention,1928 C-99 Minimum Wage-Fixing

Lecture 28 - C.95-Protection of Wages Convention, 1949

Lecture 29 - C-100:Equal Remuneration Convention,1951,International Instruments on Equality

Lecture 30 - C-173:Protection of Workersâ€™ Claims (Employerâ€™s Insolvency) Convention, 1992

Lecture 31 - Code on Social Security, 2020 - Introduction

Lecture 32 - Definitions Under The Code on Social Security, 2020

Lecture 33 - Social Security Organizations (SSOs)

Lecture 34 - Employees Compensation and Benefits

Lecture 35 - The Concept of Arising Out of and in the Course of Employment

Lecture 36 - Employee's State Insurance

Lecture 37 - Different Benefits Under the ESI Scheme

Lecture 38 - Employee's Provident Fund

Lecture 39 - Gratuity

Lecture 40 - Maternity Benefit

Lecture 41 - Social Security in case of Building and Other Construction Worker

Lecture 42 - Social Security for Unorganized Sector and Platform workers

Lecture 43 - Bonded Labour System Abolition and Regulation

Lecture 44 - Child Labour Prohibition

Lecture 45 - Plantation Labour

Lecture 46 - Occupational Safety Health and Working Conditions Code, 2020 -Introduction, Definitions

Lecture 47 - Occupational Health and Safety

Lecture 48 - Working conditions, Welfare Provisions and Liability of Occupier

Lecture 49 - Regulation of Working Hours and the Concept of Decent Work

Lecture 50 - Duties of Employer and Employees, Special Provisions relating to Employment of Women

Lecture 51 - The Meaning of Factory,Manufacturing Process,Approval and Licensing of Factories

Lecture 52 - Role of Inspector-cum-Facilitator and Other Authorities

Lecture 53 - Social Security Fund, Offences and Penalties

Lecture 54 - Contract Labourand Proposed ILO Convention

Lecture 55 - Inter-State Migrant Workers

Lecture 56 - Mine Workers and Working Conditions

Lecture 57 - Beedi and Cigar Workers (Kerala and West Bengal Legislations)

Lecture 58 - Audio-Visual Workers; Cine Workers and Dock Workers

Lecture 59 - The Effective Abolition of Child Labour (C029; C105; C138 and C182)

Lecture 60 - The Governance Conventions of ILO Labour Standards

NPTEL : NOC:IP Management and Technology Transfer (Law)

Co-ordinators : Prof. Gouri Gargate

Lecture 1 - Introduction

Lecture 2 - Why IP and IPM ?- Context of the development of IP culture

Lecture 3 - IP and academia - I

Lecture 4 - IP and academia - II

Lecture 5 - IP and its role in education and research

Lecture 6 - Types of IP - Patent

Lecture 7 - Types of IP - Copyright and trademark

Lecture 8 - Types of IP - Industrial design, SICLD, PPVFR

Lecture 9 - Types of IP - GI and Trade secret

Lecture 10 - IPM and various jurisdictions

Lecture 11 - Emerging areas of IP and open innovation

Lecture 12 - What is IPMS?

Lecture 13 - IPM system in organisation

Lecture 14 - IPM system model - I

Lecture 15 - IPM system model - II

Lecture 16 - IP Audit framework to evaluate your IPM system

Lecture 17 - Application of IPM model to develop/improve your IPM system

Lecture 18 - Case Study - I

Lecture 19 - Case Study - II

Lecture 20 - Capsule version-I

Lecture 21 - Use of IP analytics for your IPM

Lecture 22 - IPM and competitive intelligence

Lecture 23 - Case study - III

Lecture 24 - Case study - IV

Lecture 25 - Case study - V

Lecture 26 - IP policy

Lecture 27 - Case study - VI : IP policy of IITB

Lecture 28 - Case study - VI : IP policy of IITB

Lecture 29 - IP life cycle management

Lecture 30 - IP life cycle management and IP policy

Lecture 31 - IP commercialization

Lecture 32 - Technology transfer- Definition, concept

Lecture 33 - Technology transfer models

Lecture 34 - Different ways of technology transfer

Lecture 35 - Case study - VII

Lecture 36 - Introduction to TT contracts

Lecture 37 - Structure of TT contracts

Lecture 38 - Integrative approach- IPM and TT

Lecture 39 - Capsule version II

Lecture 40 - Am I ready for IPM and TT ? (Course applicability)

NPTEL : NOC:Biodiversity Protection, Farmers and Breeders Rights (Law)

Co-ordinators : Prof. Padmavati, Dr. Narendran Thiruthy

Lecture 1 - Concept and Scope of Biodiversity Protection

Lecture 2 - Types of Biodiversity, Megabiodiverse Centers

Lecture 3 - Biodiversity Mapping

Lecture 4 - Types of Bio-resources, Conservation Mechanisms

Lecture 5 - International Resources / Centres of Conservation

Lecture 6 - Traditional Resources Rights, Ecosystem Measures

Lecture 7 - Overview of International Framework

Lecture 8 - Convention on Biodiversity - Objectives and Articles

Lecture 9 - International Regime on ABS

Lecture 10 - Biodiversity and Climate Change

Lecture 11 - Biobanks - Governance issues

Lecture 12 - The Biodiversity Act, 2002

Lecture 13 - Regulatory Authorities in India - NBA and SBB

Lecture 14 - Biodiversity Management Committees

Lecture 15 - Peoples Biodiversity Registers

Lecture 16 - ABS Regulation and Benefit Sharing in India

Lecture 17 - Trade Regime and Biodiversity

Lecture 18 - Comparison of Biodiversity Laws of countries

Lecture 19 - TRIPS and CBD Relation

Lecture 20 - CBD and relation to other international treaties related to environment and organization

Lecture 21 - Interrelationship and New Developments

Lecture 22 - Biodiversity and Interface with IPR

Lecture 23 - Challenges related to biopiracy - case studies

Lecture 24 - Patents based on bioresources - Recent Trends and Developments

Lecture 25 - Disclosure requirements in Patent - A comparative perspective

Lecture 26 - Regulatory Law - Comparative perspective

Lecture 27 - Concept,Definitions and Criteria for Plant Variety Protection

Lecture 28 - Protection of Plant Varieties and Farmers' Right 2001 - Major Provisions of the Act

Lecture 29 - Plant Variety Protection - Comparative Perspective

Lecture 30 - International Union for Protection of New Plant Varieties (UPOV)

Lecture 31 - Farmers' Rights - Other Country Model

Lecture 32 - Principles of Biodiversity Governance

Lecture 33 - Compliance Procedure and Linkage with IPR

Lecture 34 - Compliance Procedures under International Framework

Lecture 35 - Compliance Procedures in India

Lecture 36 - Compliance Procedures in EU

Lecture 37 - Biodiversity and Interrelationship with Life

Lecture 38 - Sustainable Development Agenda

Lecture 39 - Biodiversity, ecosystem functioning, ecosystem services

Lecture 40 - Biodiversity and Human Happiness

NPTEL : NOC:International Trade Law (Law)

Co-ordinators : Prof. Raju KD

Lecture 1 - Introduction to the World Trading system

Lecture 2 - The history of Indian Trade and the Formation of GATT

Lecture 3 - The GATT to WTO

Lecture 4 - The Uruguay Round and The World Trade Organization

Lecture 5 - Introduction to World Agriculture Trade

Lecture 6 - The GATT and Agriculture

Lecture 7 - The WTO Agriculture Agreement Objectives, Domestic Support and Different Boxes

Lecture 8 - Food Security Concerns at WTO

Lecture 9 - Rules of Dumping and Anti - Dumping

Lecture 10 - Determination of Injury, Definition of Industry, Domestic Industry and Casual Link

Lecture 11 - Procedural Aspects and Indian Laws on Anti-Dumping

Lecture 12 - Agreement on Sanitary and Phytosanitary measures (SPS)

Lecture 13 - Assessment of Risks, Codex and Standards

Lecture 14 - SPS v. TBT Agreement

Lecture 15 - Technical Barriers to Trade Agreement (TBT) and Indian Institutions

Lecture 16 - Basic TBT Commitments, Indian Laws, Rules and Regulations

Lecture 17 - General Agreements on Trade in Services (GATS)

Lecture 18 - Different Modes of Services

Lecture 19 - Opening of Legal Service Sector in India

Lecture 20 - Trade-Related Investment Measures Agreement (TRIMs)

Lecture 21 - Local Content and WTO disputes

Lecture 22 - Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement

Lecture 23 - Patents and Trademarks

Lecture 24 - Copyright, Industrial Design and Integrated Circuits

Lecture 25 - Geographical Indications and Trade Secrets

Lecture 26 - Doha Declaration and Post-TRIPs Scenario

Lecture 27 - Agreement on Customs Valuation (CV)

Lecture 28 - Different Methods of calculating Customs Valuation

Lecture 29 - Indian Laws on Customs Valuation

Lecture 30 - The Agreement on Pre-Shipment Inspection

Lecture 31 - GATT Dispute Settlement

Lecture 32 - Dispute Settlement in WTO

Lecture 33 - Panel Proceedings

Lecture 34 - Appellate Body Proceedings

NPTEL : NOC:Centre-State Relations in India (Law)

Co-ordinators : Prof. Uday Shankar

Lecture 1 - Concepts of Federalism and Theories of Federalism

Lecture 2 - Nature of Centre-State Relations under the Indian Constitution

Lecture 3 - Constitutional Provisions Relating to Centre-State Relations

Lecture 4 - Administrative Relations between Centre and State

Lecture 5 - Administrative Relations between Centre and Union Territories

Lecture 6 - Administration and Control of Scheduled Areas and Scheduled Tribes

Lecture 7 - Administrative Control of Tribal Areas

Lecture 8 - Governor's role and control of Centre

Lecture 9 - Inter-State Disputes Relating to Water

Lecture 10 - Administrative Relations during Emergency

Lecture 11 - Administrative Relations during Emergency

Lecture 12 - Introduction to Services under Constitution, Public and Joint Public Service Commissions

Lecture 13 - Constitutional Provisions relating to Services between Union and Delhi

Lecture 14 - Distribution of Legislative Power

Lecture 15 - Residuary Power and Interpretation of Statutes

Lecture 16 - Power of Parliament to legislate for matters in State List

Lecture 17 - Doctrine of Repugnancy

Lecture 18 - Interpretation of Lists under Schedule VII of the Constitution

Lecture 19 - Doctrine of Doctrines of Pith and Substance, Incidental and Ancillary Power

Lecture 20 - Legislative Relations during Emergency

Lecture 21 - Legislative Relations of State with special status

Lecture 22 - Legislative Relations of Union and States in relation to role of Governor

Lecture 23 - Legislative Relations of Union and Panchayats

Lecture 24 - Legislative Power relating to tax laws

Lecture 25 - Goods and Services Tax and Goods and Services Tax Council

Lecture 26 - Distribution of Revenue between Centre and States

Lecture 27 - Finance Commission under Article 280

Lecture 28 - Inter State Commerce and Inter-Commerce Commission under Art 307

Lecture 29 - Consolidated Fund of India and States, Contingency Fund of India and States and Exemptions

Lecture 30 - Financial Emergency

Lecture 31 - Grants-in-aid (Art 275)

Lecture 32 - Discretionary Grants (Art 282)

Lecture 33 - Borrowing by Union and State

Lecture 34 - Inter-State Council

Lecture 35 - Zonal Council and North Eastern Council

Lecture 36 - National Development Council, Planning Commission and NITI Aayog

Lecture 37 - Mechanism to Resolve Centre - State Disputes

Lecture 38 - Emerging Issues in Federalism I - One Nation One Election, Language Federalism

Lecture 39 - Emerging Issues in Federalism II - Demand for new States, Demand for Special Status

Lecture 40 - Role of Rajya Sabha in Federal Scheme

NPTEL : NOC:Intellectual Property Disputes: Court Practices and Enforcement (Law)

Co-ordinators : Prof. Gouri Gargate

Lecture 1 - Introduction

Lecture 2 - Why IP and IP disputes? Context of the development of IP enforcement culture

Lecture 3 - IP litigation overview

Lecture 4 - IP litigation - Academic and research organisation

Lecture 5 - IP litigation - Industry and nation

Lecture 6 - Intellectual property rights

Lecture 7 - Patent System in India

Lecture 8 - Copyright and Trademark System in India

Lecture 9 - Industrial design, SICLD, PPVFR system in India

Lecture 10 - Geographical Indication, Traditional Knowledge and Trade secret system in India

Lecture 11 - Brief Overview of Court System in India

Lecture 12 - Brief Overview of Court Systems in UK, USA and EU

Lecture 13 - Substantive and Procedural Subject Matters

Lecture 14 - Role of Police

Lecture 15 - IP case laws- Academic system

Lecture 16 - IP and Competition Commission of India - Introduction

Lecture 17 - IP, AI and IP disputes

Lecture 18 - Disruptive Innovation, IP and IP disputes

Lecture 19 - Case laws - Emerging technologies

Lecture 20 - Capsule - I

Lecture 21 - Patent Infringement- Introduction

Lecture 22 - Enforcement of Patent rights - Rights of patentee and Co-patentee

Lecture 23 - Enforcement of Patent rights - Administrative

Lecture 24 - Enforcement of Patent rights - Judicial

Lecture 25 - Enforcement of Patent rights - Judicial (Continued...)

Lecture 26 - Patent Case laws

Lecture 27 - Trademark Infringement- Introduction

Lecture 28 - Enforcement of Trademark rights - Rights of Trademark owner

Lecture 29 - Enforcement of Trademark rights - I

Lecture 30 - Enforcement of Trademark rights - II

Lecture 31 - Trademark Case laws

Lecture 32 - Copyright Infringement- Introduction

Lecture 33 - Enforcement of Copyright rights - Rights of Copyright owner

Lecture 34 - Enforcement of Copyright rights - I

Lecture 35 - Enforcement of Copyright rights - II

Lecture 36 - Copyright Case laws

Lecture 37 - Industrial design and IP disputes

Lecture 38 - Trade secret and IP disputes

Lecture 39 - GI, SICLD, PPVFR and IP disputes

Lecture 40 - Capsule version - II

Lecture 41 - Am I ready for IPM and TT? (Course applicability)

NPTEL : NOC:Right to Information and Good Governance (Law)

Co-ordinators : Prof. Sairam Bhat

Lecture 1 - Introduction to Transparency, Accountability and Good Governance - Part 1

Lecture 2 - Introduction to Transparency, Accountability and Good Governance - Part 2

Lecture 3 - India's Progress In Ensuring Transparency and Accountability

Lecture 4 - RTI and its contribution in strengthening Transparency and International Perspective on RTI Law

Lecture 5 - hronology of State RTI Laws in India and major Landmarks in RTI Journey

Lecture 6 - Chronology of State RTI Laws in India and major Landmarks in RTI Journey

Lecture 7 - Constituional and judicial perspective on RTI

Lecture 8 - Judical Activism and RTI

Lecture 9 - Judical Precedents, Reasonalbe Restricitions and Comparative perspective on RTI

Lecture 10 - Legislating the Right to Information: Background and Challenges - I

Lecture 11 - Legislating the Right to Information: Background and Challenges - II

Lecture 12 - Legislating the Right to Information: Background and Challenges - III

Lecture 13 - Legislating the Right to Information: Background and Challenges - IV

Lecture 14 - Legislating the Right to Information: Background and Challenges - V

Lecture 15 - Legislating the Right to Information: Background and Challenges - VI

Lecture 16 - Legislating the Right to Information: Background and Challenges - VII

Lecture 17 - Legislating the Right to Information: Background and Challenges - VIII

Lecture 18 - Legislating the Right to Information: Background and Challenges - IX

Lecture 19 - Salient Features of the RTI Act - I

Lecture 20 - Salient Features of the RTI Act - II

Lecture 21 - Salient Features of the RTI Act - III

Lecture 22 - Salient Features of the RTI Act - IV

Lecture 23 - Salient Features of the RTI Act - V

Lecture 24 - Salient Features of the RTI Act - VI

Lecture 25 - Salient Features of the RTI Act - VII

Lecture 26 - The Roles and Responsibilities of the Chief Information Commissioner - I

Lecture 27 - The Roles and Responsibilities of the Chief Information Commissioner - II

Lecture 28 - The Roles and Responsibilities of the Chief Information Commissioner - III

Lecture 29 - Public Information Officers, Appeal and Internal Office Management for effective RTI Management system - I

Lecture 30 - Public Information Officers, Appeal and Internal Office Management for effective RTI Management system - II

Lecture 31 - Public Information Officers, Appeal and Internal Office Management for effective RTI Management system - III

Lecture 32 - Public Information Officers, Appeal and Internal Office Management for effective RTI Management system - IV

Lecture 33 - Public Authority - I

Lecture 34 - Public Authority - II

Lecture 35 - Public Authority - III

Lecture 36 - Public Authority - IV

Lecture 37 - Public Authority - V

Lecture 38 - Public Authority - VI

Lecture 39 - Public Authority - VII

Lecture 40 - Public Authority - VIII

Lecture 41 - Public Authority - IX

Lecture 42 - Public Authority - X

Lecture 43 - Public Authority - XI

Lecture 44 - Public Authority - XII

Lecture 45 - Public Authority - XIII

Lecture 46 - Public Authority - XIV

Lecture 47 - Exempted Information - I

Lecture 48 - Exempted Information - II

Lecture 49 - Exempted Information - III

Lecture 50 - Exempted Information - IV

Lecture 51 - Exempted Information - V

Lecture 52 - Exempted Information - VI

Lecture 53 - Exempted Information - VII

Lecture 54 - Exempted Information - VIII

Lecture 55 - Exempted Information - IX

Lecture 56 - Exempted Information - X

Lecture 57 - Exempted Information - XI

Lecture 58 - Information Commissions under the RTI Act - I

Lecture 59 - Information Commissions under the RTI Act - II

Lecture 60 - Information Commissions under the RTI Act - III

Lecture 61 - Information Commissions under the RTI Act - IV

Lecture 62 - Information Commissions under the RTI Act - V

Lecture 63 - Role of NGOs and Right to Information Act

Lecture 64 - RTI Act and Political Parties - I

Lecture 65 - RTI Act and Political Parties - II

Lecture 66 - Official Secrets Act and RTI

Lecture 67 - Whistleblowers Protection Act and Right to Information - I

Lecture 68 - Whistleblowers Protection Act and Right to Information - II

Lecture 69 - Whistleblowers Protection Act and Right to Information - III

Lecture 70 - Comparative Perspective on RTI Law - I

Lecture 71 - Comparative Perspective on RTI Law - II

Lecture 72 - Ecological Perspective of Right to Information

Lecture 73 - Victimization and Misuse of Right to Information

Lecture 74 - Landmark Judgements Under the RTI Act - I

Lecture 75 - Landmark Judgements Under the RTI Act - II

NPTEL : NOC:Constitution of India and Environmental Governance: Administrative and Adjudicatory Process (Law)

Co-ordinators : Prof. M. K. Ramesh, Prof. Sairam Bhat

Lecture 1 - Introduction to Environmental Governance: Basis, Sources and Foundational Norms: Salient and Standout Features of the Discourse

Lecture 2 - Theoretical Moorings, Sources and Evolution - Part 1

Lecture 3 - Theoretical Moorings, Sources and Evolution - Part 2

Lecture 4 - Theoretical Moorings, Sources and Evolution - Part 3

Lecture 5 - Theoretical Moorings, Sources and Evolution - Part 4

Lecture 6 - Theoretical Moorings, Sources and Evolution - Part 5

Lecture 7 - Theoretical Moorings, Sources and Evolution - Part 6

Lecture 8 - Theoretical Moorings, Sources and Evolution - Part 7

Lecture 9 - Common Law Roots and Constitutonal Basis: Common Law and Criminal Law Anchors

Lecture 10 - Constitutional Scheme of Environment and Natural Resources Management

Lecture 11 - Communitarian Management and Decentralised Governance

Lecture 12 - Constitutional Right to Environment

Lecture 13 - Overarching Law-Environment Protection Act - I

Lecture 14 - Overarching Law-Environment Protection Act - II

Lecture 15 - Pollution Control: Law, Enforcement and Compliance: The Setting; Scope and Application

Lecture 16 - Authorities regulating Pollution Control

Lecture 17 - Pollution Control Boards: Its consitution and role

Lecture 18 - Powers and Functions of Various Authorities - I

Lecture 19 - Powers and Functions of Various Authorities - II

Lecture 20 - Environment Impact Assessment Law: Why EIA? Evolution of EIA

Lecture 21 - EIA Notification, 2006 - I

Lecture 22 - EIA Notification, 2006 - II

Lecture 23 - United Nations Framework Convention on Climate Change

Lecture 24 - Kyoto Protocol: Developments Between 1992-2012

Lecture 25 - Paris Agreement and Climate Justice

Lecture 26 - India Case Study: National Rendezvous for Climate Justice

Lecture 27 - Biodiversity: Significance and Concerns

Lecture 28 - Development of the International Framework on Biodiversity: Convention on Biodiversity 1992

Lecture 29 - Protocols Under the Convention on Biodiversity 1992

Lecture 30 - Indian Biodiversity Legal Framework

Lecture 31 - Legal Framework on Biosafety

Lecture 32 - Forest and Wildlife Law: Introduction to Indian Forest Act 1927

Lecture 33 - Forest and Wildlife Law: Introduction to Forest Conservation Act, 1980

Lecture 34 - Forest Rights and CAMPA: Introduction to Forest Rights Act, 2006

Lecture 35 - Forest and Wildlife Law: Introduction to Wildlife Protection Act, 1972

Lecture 36 - Specific Ecosystems and their Management: I. Regulation of Coastal Areas

Lecture 37 - Specific Ecosystems and their Management: II. Ecologically Sensitive Zones

Lecture 38 - Specific Ecosystems and their Management: III. Wetlands and Water Bodies

Lecture 39 - Water Policy and Law: An Overview

Lecture 40 - Water Policy and Law: Indian Legal Framework

Lecture 41 - Basic Legal Framework and Strategies for Waste Management - I

Lecture 42 - Basic Legal Framework and Strategies for Waste Management - II

Lecture 43 - Law Concerning Hazardous Wastes and Substances

Lecture 44 - Environmental Justice Dispensation: Role of Higher Judiciary

Lecture 45 - Catalytic Role and Complementary Role of the Judiciary

Lecture 46 - Positive Aspects of Judicial Activism

Lecture 47 - Critical Review of Judicial Activism

Lecture 48 - Overview of the law relating to Compensation for Environmental Wrong and History of the Growth of Environmental Tribunals

Lecture 49 - History and Growth of Environmental Tribunals

Lecture 50 - Overview of the law relating to Compensation for Environmental Wrong and History of the Growth of Environmental Tribunals

Lecture 51 - History and Growth of Environmental Tribunals

Lecture 52 - National Green Tribunal - I

Lecture 53 - National Green Tribunal - II

Lecture 54 - National Green Tribunal - III

Lecture 55 - Accessing and Securing Environmental Justice within the Statutory Framework

Lecture 56 - Environmental Legal Order: Law and Policy

Lecture 57 - Environmental Legal Order: Structures and Schemes of Governance

Lecture 58 - Environmental Adjudication

Lecture 59 - Suggestions and Wrap Up

NPTEL : NOC:Constitutional Studies (Law)

Co-ordinators : Prof. Sudhir Krishnaswamy

Lecture 1 - Introduction to Constitutions

Lecture 2 - Why have a Constitution?

Lecture 3 - Constitutional Change

Lecture 4 - How Should a Society Make a Constitution?

Lecture 5 - Making India's Constitution

Lecture 6 - Purpose History Preamble

Lecture 7 - Preamble Values Meaning

Lecture 8 - Citizenship: Basic Concepts

Lecture 9 - Citizenship: Challenges and Future

Lecture 10 - Introduction to Fundamental Rights

Lecture 11 - Fundamental Rights

Lecture 12 - Right to Equality

Lecture 13 - Directive Principles of State Policy and Philosophical Principles

Lecture 14 - Case Studies

Lecture 15 - Right to Life

Lecture 16 - Positive Life

Lecture 17 - Free Speech and Religious Freedom

Lecture 18 - Directive Principles of State Policy

NPTEL : NOC:Advanced Contracts, Tendering and Public Procurement (Law)

Co-ordinators : Prof. Sairam Bhat

Lecture 1 - Course Outline and Overview - Part 1

Lecture 2 - Course Outline and Overview - Part 2

Lecture 3 - Introduction to Contract Law

Lecture 4 - Development of Contract Law

Lecture 5 - Evaluation of Contract Law

Lecture 6 - Formation of Contract - Offer

Lecture 7 - Formation of Contract - Revocation of Offer

Lecture 8 - Formation of Contract - Capacity to Contract

Lecture 9 - Formation of Contract - Capacity and Consideration

Lecture 10 - Formation of Contract - Free Consent - Part 1

Lecture 11 - Formation of Contract - Free Consent - Part 2

Lecture 12 - Formation of Contract - Free Consent III: Unconscionable and Standard Form of Contracts

Lecture 13 - Formation of Contract- Free Consent IV: Voidable Contracts

Lecture 14 - Formation of Contract: Legality of Object and Public Policy - Part 1

Lecture 15 - Formation of Contract: Legality of Object and Public Policy - Part 2

Lecture 16 - Formation of Contract: Legality of Object and Public Policy - Part 3

Lecture 17 - Formation of Contract: Legality of Object and Public Policy - Part 4

Lecture 18 - Void Agreements - Part 1

Lecture 19 - Void Agreements - Part 2

Lecture 20 - Void Agreements - Part 3

Lecture 21 - Void Agreements - Part 4

Lecture 22 - Discharge of Contracts - Part 1

Lecture 23 - Discharge of Contracts - Part 2

Lecture 24 - Breach of Contracts - Part 1

Lecture 25 - Breach of Contracts - Part 2

Lecture 26 - Breach of Contracts - Part 3

Lecture 27 - Liquidated Damages in Government Contracts - Part 1

Lecture 28 - Liquidated Damages in Government Contracts - Part 2

Lecture 29 - Special Contracts: Bailment - Part 1

Lecture 30 - Special Contracts: Bailment - Part 2

Lecture 31 - Special Contracts: Pledge

Lecture 32 - Special Contracts: Indemnity - Part 1

Lecture 33 - Special Contracts: Indemnity - Part 2

Lecture 34 - Special Contracts: Guarantee - Part 1

Lecture 35 - Special Contracts: Guarantee - Part 2

Lecture 36 - Special Contracts: Agency - Part 1

Lecture 37 - Special Contracts: Agency - Part 2

Lecture 38 - Special Contracts: Sale of Goods - Part 1

Lecture 39 - Special Contracts: Sale of Goods - Part 2

Lecture 40 - Special Contracts: Sale of Goods - Part 3

Lecture 41 - Special Contracts: Sale of Goods - Part 4

Lecture 42 - Special Contracts: Sale of Goods - Part 5

Lecture 43 - Tendering, Contracts, Public Procurement

Lecture 44 - Public Private Partnerships: Law and Policy in India - Part 1

Lecture 45 - Public Private Partnerships: Law and Policy in India - Part 2

Lecture 46 - Public Private Partnerships: Law and Policy in India - Part 3

Lecture 47 - Public Private Partnerships: Law and Policy in India - Part 4

Lecture 48 - Government Contracts - Part 1

Lecture 49 - Government Contracts - Part 2

Lecture 50 - Government Contracts - Part 3

Lecture 51 - Government Contracts - Part 4

Lecture 52 - Government Contracts - Part 5

Lecture 53 - Bank Guarantee

Lecture 54 - Writ Reliefs in Government Contracts - Part 1

Lecture 55 - Writ Reliefs in Government Contracts - Part 2

Lecture 56 - Arbitration Clauses in Government Contracts

NPTEL : NOC:Conflict Management through Mediation (Law)

Co-ordinators : Dr. Ashok R. Patil

Lecture 1 - Introduction to Course Outline and concepts

Lecture 2 - Need for ADR and Hierarchy of Courts

Lecture 3 - Conflict and Conflict Management - Part 1

Lecture 4 - Conflict and Conflict Management - Part 2

Lecture 5 - Legal Development of ADR in India

Lecture 6 - Introduction to Week 2

Lecture 7 - Judicial Process v Mediation

Lecture 8 - Arbitration v Mediation

Lecture 9 - Conciliation v Mediation

Lecture 10 - Lok Adalats v Mediation

Lecture 11 - Negotiation v Mediation

Lecture 12 - Introduction to Week 3

Lecture 13 - Concept of Mediation

Lecture 14 - Features of mediation

Lecture 15 - Advantages of mediation

Lecture 16 - Stages of Mediation

Lecture 17 - Types of Mediation

Lecture 18 - Pre-Litigation Mediation

Lecture 19 - Post-Litigation Mediation

Lecture 20 - Private Mediation

Lecture 21 - Challenges in mediation

Lecture 22 - Introduction to Week 5

Lecture 23 - Communication in mediation

Lecture 24 - Paraphrasing, Restating and Reflecting

Lecture 25 - Summarising

Lecture 26 - Reframing

Lecture 27 - Body Language and Perception

Lecture 28 - Do's and Don't for Mediator

Lecture 29 - Role of Mediator

Lecture 30 - Mediator-Personality

Lecture 31 - Medition under Consumer Protection Act, 2019 - Introduction

Lecture 32 - Medition under Consumer Protection Act, 2019 - Chapter V

Lecture 33 - Consumer Protection (Mediation) Rules, 2020

Lecture 34 - Consumer Protection (Mediation) Regulations, 2020

Lecture 35 - Mediation under Commercial Courts Act, 2015 - Part 1

Lecture 36 - Mediation under Commercial Courts Act, 2015 - Part 2

Lecture 37 - United Nations Convention on International Settlement Agreements Resulting from Mediation, 2018 - Part 1

Lecture 38 - United Nations Convention on International Settlement Agreements Resulting from Mediation, 2018 - Part 2

Lecture 39 - Mediation Bill, 2021 - Part 1

Lecture 40 - Mediation Bill, 2021 - Part 2

Lecture 41 - Online Despute Resolution

Lecture 42 - Online Mediation

Lecture 43 - Mediation under Companies Act, 2013

Lecture 44 - Mediation Settlement

Lecture 45 - Mediaition Settlement Illustration/Sample 1

Lecture 46 - Mediaition Settlement Illustration/Sample 2 - Part 1

Lecture 47 - Mediaition Settlement Illustration/Sample 2 - Part 2

Lecture 48 - Mediaition Settlement Illustration/Sample 3

NPTEL : NOC:Constitution Law and Public Administration in India (Law)

Co-ordinators : Prof. Sairam Bhat

Lecture 1 - Introduction to Constitutional Law and Public Administration in India

Lecture 2 - Background, History and Framing of the Constitution of India - I

Lecture 3 - Background, History and Framing of the Constitution of India - II

Lecture 4 - Sources of the Constitution and Constituent Assembly

Lecture 5 - Salient Features of the Constitution of India

Lecture 6 - Schedules of the Indian Constitution

Lecture 7 - Constitution and Public Policy

Lecture 8 - Supremacy of the Indian Constitution - I

Lecture 9 - Supremacy of the Indian Constitution - II

Lecture 10 - Preamble of the Indian Constitution

Lecture 11 - Union and Its Territory - I

Lecture 12 - Union and Its Territory - II

Lecture 13 - Union and Its Territory - III

Lecture 14 - Citizenship - I

Lecture 15 - Citizenship - II

Lecture 16 - Introduction to Fundamental Rights

Lecture 17 - Article 12 Definition of State - I

Lecture 18 - Article 12 Definition of State - II

Lecture 19 - Right to Equality - I

Lecture 20 - Right to Equality - II

Lecture 21 - Rights Against Discrimination - I

Lecture 22 - Rights Against Discrimination - II

Lecture 23 - Right to Freedom - I

Lecture 24 - Right to Freedom - II

Lecture 25 - Article 20

Lecture 26 - Article 21

Lecture 27 - Article 21A and Article 22

Lecture 28 - Right to Freedom of Religion

Lecture 29 - Right to Constitutional Remedies - I (Article 32)

Lecture 30 - Right to Constitutional Remedies - II (Article 32 and Article 226)

Lecture 31 - Article 33 - Armed Forces and Fundamental Rights

Lecture 32 - Directive Principles of State Policy (DPSPs)

Lecture 33 - DPSPs and Fundamental Duties

Lecture 34 - Amendment to the Constitution

Lecture 35 - Different Forms of Governance: Federal, Unitary, Parliamentary, Presidential System

Lecture 36 - Introduction to Union and State Legislatures

Lecture 37 - Union and State Legislatures - II

Lecture 38 - Law Making and Legislative Interpretation

Lecture 39 - Election Commission and Election Process

Lecture 40 - Union Executive

Lecture 41 - State Executive

Lecture 42 - Introduction to the Indian Judiciary

Lecture 43 - Supreme Court of India

Lecture 44 - Judicial Review - I

Lecture 45 - Judicial Review - II

Lecture 46 - Constitutional Authorities - I (CAG and EC)

Lecture 47 - Constitutional Authorities - II (EC)

Lecture 48 - Constitutional Authorities - III (Public Service Commissions and Law Officers)

Lecture 49 - Local Self Governance

Lecture 50 - E-Governance

Lecture 51 - Administrative Tribunals - I

Lecture 52 - Administrative Tribunals - II

Lecture 53 - Administrative Tribunals - III

Lecture 54 - Role of Public Policy in Public Administration - I

Lecture 55 - Role of Public Policy in Public Administration - II

Lecture 56 - Role of Public Policy in Public Administration - III

Lecture 57 - Delegated Legislation - I

Lecture 58 - Delegated Legislation - II

Lecture 59 - Non-Constitutional Bodies - I (CVC)

Lecture 60 - Non-Constitutional Bodies - II (CBI)

Lecture 61 - Non-Constitutional Bodies - III (Lokpal and Lokayukta)

Lecture 62 - Non-Constitutional Bodies - IV (Information Commission)

Lecture 63 - Non-Constitutional Bodies - V (Disaster Management Authority)

Lecture 64 - Non-Constitutional Bodies - VI (Planning Commission and RBI)

NPTEL : Managerial Accounting (Management)

Co-ordinators : Dr. Varadraj Bapat

Lecture 1 - Introduction to Management Accounting

Lecture 2 - Double Entry System, Forms of Organisation

Lecture 3 - Financial Statements

Lecture 4 - Balance Sheet

Lecture 5 - Profit and Loss Account

Lecture 6 - Company Account

Lecture 7 - Accounting Concepts, Standards, IFRS

Lecture 8 - Depreciation, Inventory, Goodwill

Lecture 9 - Inventory Valuation, Cash Flow

Lecture 10 - Cash Flow Statement Cases

Lecture 11 - Cash Flow Statement Cases

Lecture 12 - Cash Flow Statement Cases-Part II

Lecture 13 - Fund Flow Statement Cases

Lecture 14 - Common-size, Comparative Statement Analysis

Lecture 15 - Ratio Analysis

Lecture 16 - Financial Statements Analysis

Lecture 17 - Comparative, Common-size and Ratio Analysis

Lecture 18 - Financial Statements Analysis - Colgate Palmolive Case

Lecture 19 - Financial Statements Analysis - Dabur India Case

Lecture 20 - Types of Costs

Lecture 21 - Accounting for Costs

Lecture 22 - Cost Allocation, Absorption

Lecture 23 - Job and Process Accounting

Lecture 24 - Job and Process Accounting including cost sheet and equivalent production

Lecture 25 - Equivalent production and Activity Based Costing

Lecture 26 - Activity Based Costing and Management

Lecture 27 - Cost Volume Profit Analysis

Lecture 28 - Relevant and Sunk Cost in Decision Making

Lecture 29 - New Product, Shut Down and Joint Products

Lecture 30 - Budget and Budgetory control

Lecture 31 - Budgeting and Standard Costing

Lecture 32 - Standard Costing - Material, Labour and Overhead Variances

Lecture 33 - Standard Costing - Mix, Yeild, Sales and Fixed Overhead Variances

Lecture 34 - Standard Costing - Mix, Yeild and Fixed Overhead Variances

Lecture 35 - Cost Volume Profit and Break-Even Point Analysis

Lecture 36 - Cost Volume Profit Analysis - Cost Indifference Point and Levearge

Lecture 37 - Cash Flow Advanced Cases

Lecture 38 - Cash Flow Advanced Cases-Part II

Lecture 39 - Financial Statements Analysis Advanced

Lecture 40 - Financial Statement- Forcasting and Valuation - Dabur Case

Lecture 41 - Financial Statement- Forcasting and use of Adjusted data - Pfizer and Merck Case

NPTEL : Managerial Economics (Management)

Co-ordinators : Dr. Trupti Mishra

Lecture 1 - Introduction to Managerial Economics

Lecture 2 - Introduction to Managerial Economics (Continued...)

Lecture 3 - Introduction to Managerial Economics (Continued...)

Lecture 4 - Basic Tools of Economic Analysis and Optimization Techniques

Lecture 5 - Basic Tools of Economic Analysis and Optimization Techniques (Continued...)

Lecture 6 - Basic Tools of Economic Analysis and Optimization Techniques (Continued...)

Lecture 7 - Basic Tools of Economic Analysis and Optimization Techniques (Continued...)

Lecture 8 - Theory of Demand

Lecture 9 - Theory of Demand (Continued...)

Lecture 10 - Theory of Demand (Continued...)

Lecture 11 - Theory of Demand (Continued...)

Lecture 12 - Consumer Behaviour

Lecture 13 - Consumer Behaviour (Continued...)

Lecture 14 - Elasticity of Supply

Lecture 15 - Demand Forecasting

Lecture 16 - Demand Forecasting (Continued...)

Lecture 17 - Theory of Production

Lecture 18 - Theory of Production (Continued...)

Lecture 19 - Theory of Production (Continued...)

Lecture 20 - Theory of Cost

Lecture 21 - Theory of Cost (Continued...)

Lecture 22 - Theory of Cost (Continued...)

Lecture 23 - Theory of Cost (Continued...)

Lecture 24 - Theory of Market

Lecture 25 - Perfect Competition

Lecture 26 - Perfect Competition (Continued...)

Lecture 27 - Monopoly

Lecture 28 - Monopoly (Continued...)

Lecture 29 - Monopoly (Continued...)

Lecture 30 - Monopolistic

Lecture 31 - Oligopoly

Lecture 32 - Oligopoly (Continued...)

Lecture 33 - Oligopoly (Continued...)

Lecture 34 - Oligopoly (Continued...)

Lecture 35 - Oligopoly and Game Theory

Lecture 36 - Oligopoly and Game Theory (Continued...)

Lecture 37 - Game Theory / Product Pricing

Lecture 38 - Product Pricing

Lecture 39 - Product Pricing (Continued...)

Lecture 40 - Summary

NPTEL : NOC:Financial Accounting (Management)

Co-ordinators : Dr. Varadraj Bapat

Lecture 1 - Introduction and Scope of Accounting

Lecture 2 - Financial Statements

Lecture 3 - Balance Sheet - 1

Lecture 4 - Balance Sheet - 2

Lecture 5 - Balance Sheet - 3

Lecture 6 - Balance Sheet - 4

Lecture 7 - Balance Sheet - 5

Lecture 8 - Profit and Loss Account - 1

Lecture 9 - Profit and Loss Account - 2

Lecture 10 - Profit and Loss Account - 3

Lecture 11 - Depreciation - 1

Lecture 12 - Depreciation - 2

Lecture 13 - Inventory Valuation

Lecture 14 - Cash Flow Statement - 1

Lecture 15 - Cash Flow Statement - 2

Lecture 16 - Cash Flow Statement - 3

Lecture 17 - Cash Flow Statement - 4

Lecture 18 - Cash Flow Statement - 5

Lecture 19 - Corporate Governance

Lecture 20 - Corporate Governance: Global Models

Lecture 21 - Corporate Governance: Enron Case

Lecture 22 - Accounting Standards and Principles

Lecture 23 - Evolution of Accounting

Lecture 24 - Recording of Financial Transactions

Lecture 25 - Zee Case: Profit and Loss and Balance Sheet

Lecture 26 - Zee Case: Balance Sheet

Lecture 27 - Hindalco Case: Profit and Loss and Balance Sheet

Lecture 28 - Hindalco Case: Balance Sheet and Cash Flow Statement

Lecture 29 - Interpretation and Analysis of Financial Statements

Lecture 30 - Ratio Analysis and Interpretation - 1

Lecture 31 - Ratio Analysis and Interpretation - 2

Lecture 32 - Interpretation and Analysis of Financial Statements: Shipping Corp. of India - 1

Lecture 33 - Interpretation and Analysis of Financial Statements: Shipping Corp. of India - 2

Lecture 34 - Interpretation and Analysis of Financial Statements: Shipping Corp. of India - 3

Lecture 35 - Interpretation and Analysis of Financial Statements: Shipping Corp. of India - 4

Lecture 36 - Financial Statement Analysis: TCS Case - 1

Lecture 37 - Financial Statement Analysis: TCS Case - 2

Lecture 38 - Financial Statement Analysis: RIL Case - 1

Lecture 39 - Financial Statement Analysis: RIL Case - 2

Lecture 40 - Revision of Course

NPTEL : NOC:Cost Accounting (Management)

Co-ordinators : Dr. Varadraj Bapat

Lecture 1 - Introduction to Cost Accounting

Lecture 2 - Classification of Costs

Lecture 3 - Marginal Costing

Lecture 4 - Cost Volume Profit Analysis

Lecture 5 - Margin of Safety

Lecture 6 - Application of Breakeven Point Analysis

Lecture 7 - Sensitivity Analysis

Lecture 8 - Case of Ayur Pharma

Lecture 9 - Different Decision Scenarios and Profit Planning

Lecture 10 - Relevant Costs in Decision Making

Lecture 11 - Case Study : Break-even point

Lecture 12 - Case Study : JSW ISPAT Steel

Lecture 13 - Case Study on Projection : Divya Aushadhi Ltd

Lecture 14 - Case Study : Shree Cements

Lecture 15 - Budgeting and Budgetary Control

Lecture 16 - Functional Budget

Lecture 17 - Cash Budget

Lecture 18 - Standard Costing And Variance Analysis

Lecture 19 - Material Cost Variances

Lecture 20 - Overhead Variance

NPTEL : NOC:Game Theory (Management)

Co-ordinators : Prof.K.S. Mallikarjuna Rao

Lecture 1 - Combinatorial Games: Introduction and examples

Lecture 2 - Combinatorial Games: N and P positions

Lecture 3 - Combinatorial Games: Zermeloâ€™s Theorem

Lecture 4 - Combinatorial Games: The game of Hex

Lecture 5 - Combinatorial Games: Nim games

Lecture 6 - Combinatorial Games: Sprague-Grundy Theorem - I

Lecture 7 - Combinatorial Games: Sprague-Grundy Theorem - II

Lecture 8 - Combinatorial Games: Sprague-Grundy Theorem - III

Lecture 9 - Combinatorial Games: The Sylver Coinage Game

Lecture 10 - Zero-Sum Games: Introduction and examples

Lecture 11 - Zero-Sum Games: Saddle Point Equilibria and the Minimax Theorem

Lecture 12 - Zero-Sum Games: Mixed Strategies

Lecture 13 - Zero-Sum Games: Existence of Saddle Point Equilibria

Lecture 14 - Zero-Sum Games: Proof of the Minimax Theorem

Lecture 15 - Zero-Sum Games: Properties of Saddle Point Equilibria

Lecture 16 - Zero-Sum Games: Computing Saddle Point Equilibria

Lecture 17 - Zero-Sum Games: Matrix Game Properties

Lecture 18 - Non-Zero-Sum Games: Introduction and Examples

Lecture 19 - Non-Zero-Sum Games: Existence of Nash Equilibrium - Part I

Lecture 20 - Non-Zero-Sum Games: Existence of Nash Equilibrium - Part II

Lecture 21 - Iterated elimination of strictly dominated strategies

Lecture 22 - Lemke-Howson Algorithm - I

Lecture 23 - Lemke-Howson Algorithm - II

Lecture 24 - Lemke-Howson Algorithm - III

Lecture 25 - Evolutionarily Stable Strategies - I

Lecture 26 - Evolutionarily Stable Strategies - II

Lecture 27 - Evolutionarily Stable Strategies - III

Lecture 28 - Fictitious Play

Lecture 29 - Brown-Von Neumann-Nash Dynamics

Lecture 30 - Potential Games

Lecture 31 - Cooperative Games: Correlated Equilibria

Lecture 32 - Cooperative Games: The Nash Bargaining Problem - I

Lecture 33 - Cooperative Games: The Nash Bargaining Problem - II

Lecture 34 - Cooperative Games: The Nash Bargaining Problem - III

Lecture 35 - Cooperative Games: Transferable Utility Games

Lecture 36 - Cooperative Games: The Core

Lecture 37 - Cooperative Games: Characterization of Games with non-empty Core

Lecture 38 - Cooperative Games: Shapley Value

Lecture 39 - Cooperative Games: The Nucleolus

Lecture 40 - The Matching Problem

NPTEL : NOC:Introduction to Stochastic Processes (Management)

Co-ordinators : Prof. Manjesh Hanawal

Lecture 1 - Sample Space and events

Lecture 2 - Axioms of Probability

Lecture 3 - Independence of events and Conditional Probability

Lecture 4 - Bayeâ€™s Theorem and Introduction to Random Variables

Lecture 5 - CDF and itâ€™s properties

Lecture 6 - Continuity of Probability

Lecture 7 - Discrete and Continuous random variables

Lecture 8 - Expectation of random variables and its properties

Lecture 9 - Variance and some inequalities of random variables

Lecture 10 - Discrete Probability Distributions

Lecture 11 - Continuous Probability Distributions

Lecture 12 - Jointly distributed random variables and conditional distributions

Lecture 13 - Correlation and Covariance

Lecture 14 - Transformation of random vectors

Lecture 15 - Gaussian random vector and joint Gaussian distribution

Lecture 16 - Random Processes

Lecture 17 - Properties of random Process

Lecture 18 - Poisson Process

Lecture 19 - Properties of Poisson Process - Part 1

Lecture 20 - Properties of Poisson Process - Part 2

Lecture 21 - Convergence of sequence of random variables - Part 1

Lecture 22 - Convergence of sequence of random variables - Part 2

Lecture 23 - Relation between different notions of convergence

Lecture 24 - Cauchyâ€™s criteria of convergence

Lecture 25 - Convergence in expectation

Lecture 26 - Law of Large Numbers

Lecture 27 - Central limit theorem

Lecture 28 - Chernoff bound

Lecture 29 - Introduction to Markov property

Lecture 30 - Transition Probability Matrix

Lecture 31 - Finite dimensional distribution of Markov chains

Lecture 32 - Strong Markov Property

Lecture 33 - Stopping Time

Lecture 34 - Hitting Times and Recurrence

Lecture 35 - Mean Number of returns to a state

Lecture 36 - Communicating classes and class properties

Lecture 37 - Class Properties (Continued...)

Lecture 38 - Positive Recurrence and The Invariant Probability Vector

Lecture 39 - Properties of Invariant Probability Vector

Lecture 40 - Condition For Transience

Lecture 41 - Example of Queue

Lecture 42 - Queue Continued and Example of Page Rank

Lecture 43 - Introduction to renewal Theory

Lecture 44 - The Elementary Renewal Theorem

Lecture 45 - Application to DTMC

Lecture 46 - Renewal Reward Theorem

Lecture 47 - Introduction to Continuous Time Markov Chains

Lecture 48 - Properties of states in CTMC

Lecture 49 - Embedded markov chain

NPTEL : NOC:Introduction to System Dynamics Modeling (Management)

Co-ordinators : Prof. Jayendran Venkateswaran

Lecture 1 - Introduction to Systems Thinking

Lecture 2 - Systems Thinking and System Dynamics

Lecture 3 - Causal Loop Diagram (CLD)

Lecture 4 - Guidelines to build CLD - I

Lecture 5 - Guidelines to build CLD - II

Lecture 6 - Guidelines to build CLD - III

Lecture 7 - Examples of CLD

Lecture 8 - Study Traffic Congestion using CLD - I

Lecture 9 - Study Traffic Congestion using CLD - II

Lecture 10 - Stock and Flow Diagram Brief History

Lecture 11 - Stock and Flow Diagram: Basics - I

Lecture 12 - Stock and Flow Diagram: Basics - II

Lecture 13 - Stock and Flow Diagram: Basics - III

Lecture 14 - Graphical Integration

Lecture 15 - Patterns of Behaviour: Types

Lecture 16 - Dynamics of Positive Feedback systems

Lecture 17 - Doubling Time in Positive Feedback systems

Lecture 18 - Introduction to Modeling using Vensim software

Lecture 19 - Dynamics of Negative Feedback system: Introduction

Lecture 20 - Dynamics of Negative Feedback System: Modelling in Vensim

Lecture 21 - Negative Feedback Loop: Analytical equation

Lecture 22 - Dynamics of Negative Feedback System: Extension of Model

Lecture 23 - Zero-Value Goal system, Positive and Negative Loop Systems

Lecture 24 - Dynamic of Simple Structures: S-Shaped Growth limited by Capacity

Lecture 25 - Dynamic of Simple Structures: S-Shaped Growth- Conversion of CLD to SFD

Lecture 26 - Dynamic of Simple Structures: S-Shaped Growth- Customisation in Vensim

Lecture 27 - Dynamic of Simple Structures: Extension of model to include death rate

Lecture 28 - Dynamic of Simple Structures: Examples of systems exhibiting S-shaped growth

Lecture 29 - Dynamic of Simple Structures: Second Structure of S-Shaped Growth

Lecture 30 - Dynamic of Simple Structures: SFD of New Products

Lecture 31 - Diffusion Model and parameter estimation - I

Lecture 32 - Diffusion Model and parameter estimation - II

Lecture 33 - Bass Diffusion Model

Lecture 34 - Bass Diffusion Model (Continued...)

Lecture 35 - Modeling Delays: Material Delay

Lecture 36 - Modeling Delays: Graphical Representation

Lecture 37 - Modeling Delays: Higher order Material Delay

Lecture 38 - Delays: Information Delay

Lecture 39 - Delays: Modeling Information Delay

Lecture 40 - Delays: Higher Order Information Delay

Lecture 41 - Second Order Systems: Romeo and Juliet Model

Lecture 42 - Second Order Systems: The Red and the Black, Gone with the Wind

Lecture 43 - Modeling Oscillations - Part I

Lecture 44 - Modeling Oscillations - Part II

Lecture 45 - Modeling Non-linear Relations: Introduction

Lecture 46 - Modeling Non-linear Relations: Table or Lookup function

Lecture 47 - Formulation Non Linear Relationship Table Functions - Part I

Lecture 48 - Formulation Non Linear Relationship Table Functions - Part II

Lecture 49 - Stock Management Structure - Part I

Lecture 50 - Stock Management Structure - Part II

Lecture 51 - Supply Chain Models - I

Lecture 52 - Supply Chain Models - II

Lecture 53 - Supply Chain Models - III

Lecture 54 - Supply Chain Models - IV

Lecture 55 - Modeling Example: Societal Ageing

Lecture 56 - Testing System Dynamics Models: Introduction with Example 1

Lecture 57 - Testing System Dynamics Models: Example 2

Lecture 58 - Testing System Dynamics Models: Example 3

Lecture 59 - Model Validation and Policy design

Lecture 60 - Sensitivity analysis and policy analysis

Lecture 61 - Modeling Example

Lecture 62 - System Archetypes

Lecture 63 - Course Wrap-up

NPTEL : NOC:Bandit Algorithm (Online Machine Learning) (Management)

Co-ordinators : Prof. Manjesh Hanawal

Lecture 1 - Introduction to Online Learning - I

Lecture 2 - Introduction to Online Learning - II

Lecture 3 - Basics of Statistical Learning

Lecture 4 - Empirical risk minimization

Lecture 5 - Consistency Halving algorithm

Lecture 6 - Online Learnability

Lecture 7 - Standard Optimal Algorithm

Lecture 8 - Classification in unrealizability case

Lecture 9 - Covers Impossibility Result

Lecture 10 - Weighted Majority

Lecture 11 - Proof Weighted Majority

Lecture 12 - Full Information vs Bandit Setting

Lecture 13 - Adversarial Bandit Setting

Lecture 14 - Exponential Weights for Exploration and Exploitation Algorithm

Lecture 15 - Regret Bound of Exp3

Lecture 16 - Regret Bound of Exp3 (Continued...)

Lecture 17 - Exp3.P and Exp3.IX

Lecture 18 - Online Convex Optimisation

Lecture 19 - Follow the Leader (FTL) Algorithm

Lecture 20 - Follow the Regularized Leader

Lecture 21 - Online Gradient Descent

Lecture 22 - Strongly Convex Function

Lecture 23 - FoReL with Strongly Convex Regulariser

Lecture 24 - FoReL with Strongly Convex Regulariser (Continued...)

Lecture 25 - Euclidean and Entropy Regularizer

Lecture 26 - Introduction to Stochastic Bandits

Lecture 27 - Concentration Inequalities

Lecture 28 - Subgaussian Random Variable

Lecture 29 - Regret Definition and Regret Decomposition

Lecture 30 - Explore and Commit (ETC) Algorithm

Lecture 31 - Regret Analysis and ETC

Lecture 32 - Optimism in the Face of Uncertainty

Lecture 33 - Upper Confidence Bound Algorithm

Lecture 34 - Regret Analysis of UCB

Lecture 35 - Problem Dependent and Independent Bounds of UCB

Lecture 36 - KL-UCB Algorithm

Lecture 37 - Thompson Sampling - Brief Discussion

Lecture 38 - Proof Idea of Lower Bounds - 1

Lecture 39 - Proof Idea of Lower Bounds - 2

Lecture 40 - Proof of Lower Bound - 1

Lecture 41 - Proof of Lower Bound - 2

Lecture 42 - Stochastic Contextual Bandits

Lecture 43 - Introduction to Stochastic Linear Bandits

Lecture 44 - Stochastic Linear Bandits

Lecture 45 - Regret Analysis of SLB - I

Lecture 46 - Regret Analysis of SLB - II

Lecture 47 - Regret Analysis of SLB - III

Lecture 48 - Construction of Confidence Ellipsoids - I

Lecture 49 - Construction of Confidence Ellipsoids - II

Lecture 50 - Adversarial Contextual Bandits - I

Lecture 51 - Adversarial Contextual Bandits - II

Lecture 52 - Exp4 Algorithm

Lecture 53 - Regret of Exp4

Lecture 54 - Adversarial Linear Bandits

Lecture 55 - Exp3 for Adversarial Linear Bandits

Lecture 56 - Introduction to Pure Exploration and its lower bounds

Lecture 57 - Uniform Exploration

Lecture 58 - KL-LUCB

Lecture 59 - Lilâ€™ UCB

Lecture 60 - Lower Bound for Pure Exploration Problem

NPTEL : NOC:Organization Development and Change in 21st Century (Management)

Co-ordinators : Prof. Ashish Pandey

Lecture 1 - Introduction: Management of Change

Lecture 2 - Coping with Change and Transient Competitive Advantage

Lecture 3 - Sustainable Development, OD and Management of Change

Lecture 4 - Social Entrepreneurship

Lecture 5 - Comparison of Various Planned Change Models

Lecture 6 - Diagnostic for Organization Development and Change

Lecture 7 - Steps in Successful Organizational Change

Lecture 8 - Design of Effective Interventions and their prerequisites

Lecture 9 - Individual Level OD Interventions: A Rationale

Lecture 10 - Different kinds of Individual level OD Interventions

Lecture 11 - Group or Team Level OD Interventions

Lecture 12 - Design of Specific Interventions to Tackle Different Challenges of Different Teams

Lecture 13 - Organization Level OD Interventions

Lecture 14 - Discussion on various large group Interventions

Lecture 15 - Appreciative Inquiry - â€˜Positiveâ€™ Turn of OD

Lecture 16 - Managing OD and Change through Restructuring Organizations

Lecture 17 - Different Types of Organization Designs

Lecture 18 - New Forms of Organization Design

Lecture 19 - Change in the Organization Design

Lecture 20 - Change in Organization Culture

Lecture 21 - Can Organization Culture be Managed?: A Case Analysis

Lecture 22 - Organization Development in Digital Transformation

Lecture 23 - Mergers and Acquisitions - A Special Case of OD

Lecture 24 - Stages of Mergers and Acquisitions: A Case Study

Lecture 25 - Transorganizational OD Intervention

Lecture 26 - OD Interventions through Human Resource Functions

Lecture 27 - Talent Management as OD Intervention

Lecture 28 - Organization Learning - Relevance and Possibility

Lecture 29 - Learning Organization - Experimentation, Knowledge Management and Innovation

Lecture 30 - Organizational Development - Cultural and Economic Contexts

Lecture 31 - Organization Development - Global and Trans-organizational Setting

Lecture 32 - Organizational Development in the Entrepreneurial Firms

Lecture 33 - OD Interventions in Family Owned Entrepreneurial Firms

Lecture 34 - Organizational Development in the Not for Profit Organizations (NPOs) and Social Enterprises (SEs)

Lecture 35 - Organizational Development in Non-Industrial Settings

Lecture 36 - Organizational Development in Educational Institutions

NPTEL : NOC:Managerial Economics (Management)

Co-ordinators : Prof. Trupti Mishra

Lecture 1 - Introduction to Economics and Managerial Economics

Lecture 2 - Introduction to the Managerial Economics- Economics and Managerial economics, Review of Economic Terms and Economic Rationality

Lecture 3 - Introduction to the Managerial Economics- Opportunity Cost, Measuring and Maximizing Profit

Lecture 4 - Introduction to the Managerial Economics- Understanding Incentive and Marginal Analysis

Lecture 5 - Introduction to the Managerial Economics- Marginal and Incremental Analysis, Model of an Economy

Lecture 6 - Basic Tools of Economic Analysis and Optimization Techniques- Functional relationship between economic variables, Important Economic functions

Lecture 7 - Basic Tools of Economic Analysis and Optimization Techniques- Important Economic Function (Continued...)

Lecture 8 - Basic Tools of Economic Analysis and Optimization Techniques- Slope and its use in Economic Analysis, Derivatives of various functions

Lecture 9 - Basic Tools of Economic Analysis and Optimization Techniques- Derivative of various functions

Lecture 10 - Basic Tools of Economic Analysis and Optimization Techniques- Optimization Technique

Lecture 11 - Basic Tools of Economic Analysis and Optimization Techniques- Constrained optimization

Lecture 12 - Basic Tools of Economic Analysis and Optimization Techniques- Regression Technique

Lecture 13 - Basic Tools of Economic Analysis and Optimization Techniques- Regression Technique (Continued...)

Lecture 14 - Basic Tools of Economic Analysis and Optimization Techniques- Ordinary Least Square (OLS) method

Lecture 15 - Theory of Demand- Defining Demand, Law of Demand

Lecture 16 - Theory of Demand- Demand Schedule/Demand Curve/ Demand Function, Factors affecting Demand, Market Demand

Lecture 17 - Theory of Demand- Change in Demand Curve, Supply/ Law of Supply, Factors affecting Supply

Lecture 18 - Theory of Demand- Change/Shift in the Supply, Market Equilibrium, Change in Equilibrium

Lecture 19 - Theory of Demand- A Shift in both Supply and Demand, Elasticity of Demand, Types of Elasticity of Demand

Lecture 20 - Theory of Demand- Price elasticity of demand, Degree of price elasticity of demand, Elasticity and revenue, Factors influencing price elasticity of demand

Lecture 21 - Theory of Demand- Income Elasticity of Demand, Cross-Price Elasticity of Demand, Advertising Elasticity of Demand

Lecture 22 - Theory of Demand- Numerical for each Elasticity of Demand

Lecture 23 - Consumer Behaviour- Consumer Preferences, Utility Analysis (Total and Marginal Utility)

Lecture 24 - Consumer Behaviour- Numerical for Utility analysis, Law of Diminishing Marginal Utility, Indifference Curve Analysis

Lecture 25 - Consumer Behaviour- Budget line and Consumer equilibrium, Law of Equi-Marginal utility

Lecture 26 - Consumer Behaviour- Price, Income and Substitution Effects, Consumer Surplus

Lecture 27 - Elasticity of Supply- Numerical example to understand Consumer Surplus, Elasticity of Supply

Lecture 28 - Elasticity of Supply- Impact of Tax on Price and Quantity, Price fixed by Law

Lecture 29 - Demand Forecasting

Lecture 30 - Methods of Demand Forecasting- Subjective methods of demand forecasting

Lecture 31 - Demand Forecasting-Quantitative method of Demand forecasting

Lecture 32 - Demand Forecasting- Quantitative method of Demand forecasting (Continued...)

Lecture 33 - Theory of Production- Introduction

Lecture 34 - Theory of Production- Law of Diminishing Return

Lecture 35 - Theory of Production- long Run Production Analysis, Return to Scale, Isoquants

Lecture 36 - Theory of Production- Isocost, Optimal Combination of Inputs, Expansion path, Economic Region of Production

Lecture 37 - Theory of Production- Different kind of Production Functions: Cobb Douglas Production function, Optimal input combination

Lecture 38 - Theory of Production- Effect of Changes in Input Prices, Law of Diminishing returns, Return to Scale

Lecture 39 - Theory of Cost- Cost of Production, Types of Cost: Accounting/Economic Analysis

Lecture 40 - Theory of Cost- Cost-Output Relationship, Short run cost Analysis

Lecture 41 - Long Run Cost Analysis

Lecture 42 - Long-Run Marginal Cost Curve

Lecture 43 - Theory of Cost: Breakeven Analysis and Contribution Analysis

Lecture 44 - Theory of Cost: Profit Volume Ratio, Margin of Safety and Learning Curve

Lecture 45 - Theory of Cost: Application of Cost Analysis & Economies of Scale

Lecture 46 - Theory of Cost: Production Economies

Lecture 47 - Theory of Cost: Managerial and Transport Economies of Scale

Lecture 48 - Theory of Market: Introduction

Lecture 49 - Theory of Market: Perfect Competition

Lecture 50 - Theory of Market: Short-run Profit Maximization under Perfect Competition

Lecture 51 - Theory of Market: Short-run Market Supply and Firm Supply under Perfect Competition

Lecture 52 - Theory of Market: Long-run Profit Maximization under Perfect Competition

Lecture 53 - Theory of Market: Real World Application of Perfect Competition & Introduction to Monopoly

Lecture 54 - Theory of Market: Types of Monopoly

Lecture 55 - Theory of Market: Supply Curve of Monopoly Firm

Lecture 56 - Theory of Market: Effect of shift of Cost in case of Monopoly

Lecture 57 - Theory of Market: Social cost of Monopoly Power

Lecture 58 - Theory of Market: Regulation of Monopoly Power and Monopsony

Lecture 59 - Theory of Market: Bilateral Monopoly

Lecture 60 - Theory of Market: Monopolistic Competition

Lecture 61 - Theory of Market: Monopolistic Competition- Non-Price Competition and Introduction to Oligopoly

Lecture 62 - Theory of Market: Characteristics of Oligopoly Market

Lecture 63 - Theory of Market: Oligopoly Market (Continued...)

Lecture 64 - Theory of Market: Oligopoly Market- Stackelbergâ€™s Model

Lecture 65 - Theory of Market: Collusive Oligopoly

Lecture 66 - Theory of Market: Collusive Oligopoly (Continued...)

Lecture 67 - Theory of Market: Collusive Oligopoly (Continued...)

Lecture 68 - Theory of Market: Collusive Oligopoly-Price Leadership Model

Lecture 69 - Oligopoly and Game Theory

Lecture 70 - Oligopoly and Game Theory (Continued...)

Lecture 71 - Oligopoly and Game Theory- Nash Equilibrium

Lecture 72 - Oligopoly and Game Theory â€“ The Prisonerâ€™s Dilemma and Types of Games

Lecture 73 - Applications of Game Theory in Economics

Lecture 74 - Product pricing- Price Discrimination

Lecture 75 - Product pricing- Price Discrimination (Continued...)

Lecture 76 - Types of Product pricing

Lecture 77 - Types of Product pricing (Continued...1)

Lecture 78 - Types of Product pricing (Continued...2)

Lecture 79 - Types of Product pricing (Continued...3)

Lecture 80 - Summary of Course

NPTEL : NOC:Quality Control and Improvement with MINITAB (Management)

Co-ordinators : Prof. Indrajit Mukherjee

Lecture 1 - Introduction of Quality

Lecture 2 - Voice of the Customer and Kano Model

Lecture 3 - Quality Function Deployment

Lecture 4 - Critical to Quality Characteristics

Lecture 5 - Data Visualization for Quality Control and Improvement

Lecture 6 - Importance of Pareto Chart and Cause and Effect Diagram

Lecture 7 - Design Failure Mode and Effect Analysis

Lecture 8 - Introduction to Statistical Process Control

Lecture 9 - X-bar and R Chart

Lecture 10 - X-bar and S Chart

Lecture 11 - Individual Moving Range Chart and Attribute Chart

Lecture 12 - Attribute Control Charts and Process Capability

Lecture 13 - Process Capability Index

Lecture 14 - Process Performance and Sigma Level

Lecture 15 - Process Capability for Attribute data

Lecture 16 - Basic Statistics and Confidence Interval

Lecture 17 - Hypothesis Testing

Lecture 18 - One-sample t Test

Lecture 19 - Two-sample t Test

Lecture 20 - Paired t Test and ANOVA

Lecture 21 - One-way ANOVA

Lecture 22 - One-way ANOVA (Continued...)

Lecture 23 - ANCOVA and Nonparametric Test

Lecture 24 - Linear Regression

Lecture 25 - Linear Regression (Continued...) and Multiple Regression

Lecture 26 - Best Subset Regression, Multicollinearity

Lecture 27 - Multicollinearity, Best Subset Regression, Multiple Regression, Basics on Design of Experiment

Lecture 28 - Design of Experiment, One-factor-at-a-time experiment

Lecture 29 - Two-factor asymmetric Design, Symmetric Factorial Design, Two-way ANOVA

Lecture 30 - Two-factor symmetric Design, Robust setting, Two-way ANOVA

Lecture 31 - Measurement System Analysis

Lecture 32 - Measurement System Analysis (Continued...)

Lecture 33 - Measurement System Analysis (Continued...), Introduction to Factorial Experiments

Lecture 34 - Factorial Experiments

Lecture 35 - Factorial Experiments (Continued...)

Lecture 36 - Factorial Experiments (Continued...)

Lecture 37 - Blocking in Factorial Design.

Lecture 38 - Multiple response Optimization and RSM

Lecture 39 - Fractional Factorial Design

Lecture 40 - Taguchi Method

NPTEL : NOC:Business and Sustainable Development (Management)

Co-ordinators : Prof. Trupti Mishra

Lecture 1 - Introduction to Sustainable Development and Sustainability

Lecture 2 - Evolution of Sustainable Development

Lecture 3 - Importance of Sustainability

Lecture 4 - Sustainability - A mega trend

Lecture 5 - Environment, Human and Economy

Lecture 6 - Robert Solowâ€™s Conceptualization of Sustainability

Lecture 7 - Introduction to Firmâ€™s Response

Lecture 8 - Sustainable Products

Lecture 9 - Cleaner Production

Lecture 10 - Cleaner Production Illustrations

Lecture 11 - Life Cycle Assessment

Lecture 12 - Understanding LCA Through Examples

Lecture 13 - Design for Environment

Lecture 14 - Sustainability Reporting

Lecture 15 - Current Status of ESG in Indian Companies

Lecture 16 - Corporate Strategy

Lecture 17 - Competitive Environment Strategies

Lecture 18 - Eco-Branding

Lecture 19 - Competitive Environmental Strategy Matrix

Lecture 20 - CSR and Social Sustainability

Lecture 21 - Sustainable Development Goal (SDG)

Lecture 22 - Sustainability Standards

Lecture 23 - Sustainability Standards

Lecture 24 - Green Supply Chain

Lecture 25 - Examples of Green Supply Chain

Lecture 26 - Environmental Regulations and Policy Instruments

Lecture 27 - Market based instruments in India

Lecture 28 - Environmental Laws and Disclosure Regulations

Lecture 29 - Risks and Opportunities

Lecture 30 - Sustainable financial product and services

Lecture 31 - Sustainable Value Framework

Lecture 32 - Course Summary

NPTEL : NOC:Advances in Strategic Human Resource Management (Management)

Co-ordinators : Prof. Ashish Pandey

Lecture 1 - The Evolution and Role of HR Function

Lecture 2 - Evolution and Nature of Strategic Human Resource Management

Lecture 3 - Contributions of and Trends in HR Function

Lecture 4 - Measuring Effectiveness of HR Function

Lecture 5 - Competence Maturity Model and People Competence Maturity Model

Lecture 6 - Organizational Healing: An Introduction

Lecture 7 - Working with Remote Teams

Lecture 8 - Restoring Social and Psychological Well-being

Lecture 9 - Employee Assistance Program

Lecture 10 - Talent Management: An Introduction

Lecture 11 - Potential Matrix: A Tool for Talent Management

Lecture 12 - HR Digitization for Talent Management

Lecture 13 - Positive Employee Relation: The Introduction

Lecture 14 - Positive Work Practices in Organization

Lecture 15 - Humanistic Management Model

Lecture 16 - Link of Humanistic Model and HR Processes

Lecture 17 - Process to make organization great place to work

Lecture 18 - Diversity Management: The Introduction

Lecture 19 - Significance of a Diverse and Inclusive Workplace

Lecture 20 - Significance of a Diverse and Inclusive Workplace

Lecture 21 - Biases in Organization and Ways of their Resolution

Lecture 22 - Intergenerational Relationships in Organization: The Introduction

Lecture 23 - Classifications of Generations at Workforce

Lecture 24 - Types and Attributes of Generations at Workplace

Lecture 25 - Ways of Synergizing Across Generations

Lecture 26 - Ways of enhancing Intergeneration Synergy

Lecture 27 - Intergenerational Relationships in Organization: The Introduction

Lecture 28 - Classifications of Generations at Workforce

Lecture 29 - Types and Attributes of Generations at Workplace

Lecture 30 - Ways of Synergizing Across Generations

Lecture 31 - Intergenerational Relationships in Organization: The Introduction

Lecture 32 - Classifications of Generations at Workforce

Lecture 33 - Types and Attributes of Generations at Workplace

Lecture 34 - Ways of Synergizing Across Generations

Lecture 35 - Role and Challenges of Sustainable HRM

Lecture 36 - Contribution of HRM in Corporate Sustainability and Corporate Social Responsibility

Lecture 37 - Ways to integrate Corporate Sustainability and Corporate Social Responsibility with HRM

Lecture 38 - Important HR Metrics and Ratios in HRM Function

Lecture 39 - HR Analytics explained through Case Examples

Lecture 40 - Tools for Effective Decision Making and Factors for Success in Future at Work

NPTEL : NOC:Yoga and Positive Psychology for Managing Career and Life (Management)

Co-ordinators : Prof. Ashish Pandey

Lecture 1 - Why the Course on Managing Self and Career

Lecture 2 - Present Context of Professional Work

Lecture 3 - State of Wellbeing of Indian Youth

Lecture 4 - Link between Self-Management and Career Management

Lecture 5 - Journey of Positive Psychology

Lecture 6 - Can there be a Universal Positive Psychology ?

Lecture 7 - Difference in Good Life and Life Satisfaction

Lecture 8 - Why Yoga with Positive Psychology ?

Lecture 9 - Genesis of this Course

Lecture 10 - Using Stories to Understand Optimal Experiences

Lecture 11 - Fundamental Questions in Positive Psychology

Lecture 12 - What Positive Psychology is Not

Lecture 13 - Positive-Negative Dialects of Well-Being

Lecture 14 - Positive Psychology: The Second Wave

Lecture 15 - Positivity and Human Potential in Yogic Traditions

Lecture 16 - Holistic Life Goals

Lecture 17 - Embracing Emotions and Positive Behavior

Lecture 18 - Discovering Dharma

Lecture 19 - Distinction with Negative Human Potential

Lecture 20 - Positive Events: 16 Sanskaras

Lecture 21 - Four Ashrams or Stations in Life

Lecture 22 - Yagna - Positive Event

Lecture 23 - Positive Institutions

Lecture 24 - Family - A Positive Institution

Lecture 25 - Yoga and Governance

Lecture 26 - Positive Governance

Lecture 27 - Macro and Micro Integration in Yogic Perspective

Lecture 28 - Self and Society

Lecture 29 - Point for Action and Reflection

Lecture 30 - Health and Wellbeing

Lecture 31 - How does wellbeing affect life ?

Lecture 32 - Yogic Perspectives of Health and Wellbeing

Lecture 33 - Doshas

Lecture 34 - Mind-body Complex

Lecture 35 - Diseases in Yogic Perspective

Lecture 36 - Panch Kosha or Five Layers of Self

Lecture 37 - Managing Mind

Lecture 38 - Factors to Enhance Well-being

Lecture 39 - Self-Realization - The Ultimate Joy

Lecture 40 - What is the Indian Worldview ?

Lecture 41 - Ways of Attaining Well-Being

Lecture 42 - TattvaBodh and Wisdom

Lecture 43 - Indriyajaya or Self-Control

Lecture 44 - Indriyajaya in Positive Psychology

Lecture 45 - Dharmic Drishti (Vision)

Lecture 46 - Dharmic Desires and Pursuits

Lecture 47 - Dharmahkriya in Positive Psychology

Lecture 48 - Sukhayu-Hitayu

Lecture 49 - DharmahKriya, Sukhayu-Hitayu and Career Success ?

Lecture 50 - What is our real nature ?

Lecture 51 - How the Mind Works: A Yogic Perspective

Lecture 52 - Obstacles in Attaining Wellbeing

Lecture 53 - Reflection on Functioning of the Mind

Lecture 54 - How to avoid Klisht Vrittis ?

Lecture 55 - Crossing Obstacles to Well-Being

Lecture 56 - Six Inner Treasures

Lecture 57 - How are the Six Inner Treasures Valuable

Lecture 58 - Mental, Vital and Physical Consciousness

Lecture 59 - Major Forms of Yoga in Indian Tradition

Lecture 60 - Ashtanga Yoga or Raj Yoga

Lecture 61 - Yoga for Panch Koshas

Lecture 62 - Three Pillars of Health

Lecture 63 - Spiritual Significance of Food

Lecture 64 - Eight Factors about Food

Lecture 65 - Seasons with Revolving Sun and Impact on Physiology

Lecture 66 - Contemporary Knowledge about Food and Mental Health

Lecture 67 - Food and Activities during the Cycle of the Day

Lecture 68 - Yogasanas to Integrate Body and Emotions

Lecture 69 - Interoception, Asanas and Well-Being

Lecture 70 - Characteristics of Asanas

Lecture 71 - Process for Moving into Posture

Lecture 72 - Asanas for Different Body Constitution

Lecture 73 - Notes on Pranayama

Lecture 74 - Contemporary Evidences of Prana

Lecture 75 - Prana Vayu, Nadi System and Chakras

Lecture 76 - Pranayama Practices and Conscious Breathing

Lecture 77 - Process and Benefits of Diaphragmatic Breathing

Lecture 78 - Guidelines for Pranayama

Lecture 79 - Nadi Shodhana Pranayama (Alternate Nostril Breathing)

Lecture 80 - Tranquilizing Pranayamas

Lecture 81 - Organizational Suffering and Dysfunctional Behaviors

Lecture 82 - Introduction to Pratyahara

Lecture 83 - Indriya-Pratyahara: Control of the Senses

Lecture 84 - Methods of Pratyahara

Lecture 85 - Understanding Emotional Intelligence

Lecture 86 - Emotional Intelligence and its Relation to Everyday Behavior

Lecture 87 - How Yoga Helps in Emotional Balance

Lecture 88 - Positive and Negative Emotions

Lecture 89 - Dealing with Negative Emotions

Lecture 90 - How Yoga Helps in Equanimity of Mind

Lecture 91 - What are the 7 Stages of Wisdom

Lecture 92 - What Yoga does for Balancing Emotions and Cognitions

Lecture 93 - How Yoga Impacts Student's Performance: Empirical Studies

NPTEL : NOC:Business Fundamentals for Entrepreneurs (Part 1: Internal Operation) (Management)

Co-ordinators : Prof. Devdip Purkayastha

Lecture 1 - Module 1 - Part 1

Lecture 2 - Module 1 - Part 2

Lecture 3 - Module 2 - Part 1

Lecture 4 - Module 2 - Part 2

Lecture 5 - Module 3 - Part 1

Lecture 6 - Module 3 - Part 2

Lecture 7 - Module 3 - Part 3

Lecture 8 - Module 4 - Part 1

Lecture 9 - Module 4 - Part 2

Lecture 10 - Module 5 - Part 1

Lecture 11 - Module 5 - Part 2

Lecture 12 - Module 6 - Part 1

Lecture 13 - Module 6 - Part 2

Lecture 14 - Module 7 - Part 1

Lecture 15 - Module 7 - Part 2

Lecture 16 - Module 8 - Part 1

Lecture 17 - Module 8 - Part 2

Lecture 18 - Module 9 - Part 1

Lecture 19 - Module 9 - Part 2

Lecture 20 - Module 10

NPTEL : NOC:Supply Chain Digitization (Management)

Co-ordinators : Prof. Priyanka Verma, Prof. Sushmita Narayana, Prof. Debabrata Das

Lecture 1 - Introduction of Supply Chain Management

Lecture 2 - Fundamentals of Supply Chain Management

Lecture 3 - Supply Chain Drivers

Lecture 4 - Supply Chain Processes - I

Lecture 5 - Supply Chain Processes - II

Lecture 6 - Supply Chain Challenges

Lecture 7 - Need/Strategies

Lecture 8 - Push Vs Pull

Lecture 9 - Case Study on Product Segmentation

Lecture 10 - Case Study on Inventory Segmentation

Lecture 11 - Link between Corporate and Supply Chain Strategy

Lecture 12 - Interface between Operations and Finance

Lecture 13 - Procurement Strategy (Make Vs Buy)

Lecture 14 - Procurement Strategy (Kraljic Matrix) - I and II

Lecture 15 - Procurement Strategy (Kraljic Matrix) - I and II

Lecture 16 - Introduction to Platform Economy

Lecture 17 - Introduction to Platform Economy - Example

Lecture 18 - Introduction to Channel Structures and Supply Chain Coordination

Lecture 19 - Newsvendor Case Example (Deterministic Setting) - I and II

Lecture 20 - Newsvendor Case Example (Deterministic Setting) - I and II

Lecture 21 - Newsvendor Case (Probabilistic Setting and Contracts) - I and II

Lecture 22 - Newsvendor Case (Probabilistic Setting and Contracts) - I and II

Lecture 23 - Channel Structure Designs in Supply Chains (Brick and Mortar)

Lecture 24 - Channel Structure Designs in Supply Chains (Dual Channels)

Lecture 25 - Channel Structure Designs in Supply Chains (Multi and Omni Channels)

Lecture 26 - Introduction to Analytics and Big Data

Lecture 27 - Different Types of Analytics and its Applications in Supply Chain Management

Lecture 28 - Predictive Analytics: Case Study on Predictive Maintenance

Lecture 29 - Predictive Analytics: Classification Tree Model

Lecture 30 - Predictive Analytics: Building Classification Tree Model using Python

Lecture 31 - Role of AI/ML in Forecasting and Demand Analytics

Lecture 32 - Demand Forecasting using AI/ML: A Case Study

Lecture 33 - Demand Forecasting using AI/ML: Regression Tree Model

Lecture 34 - Demand Forecasting using AI/ML: Building Regression Tree Model using Python

Lecture 35 - Demand Forecasting using AI/ML: Random Forest Regression Model

Lecture 36 - Supply Chain Network Optimization: Break even analysis

Lecture 37 - Supply Chain Network Optimization: Facility location using Centre of Gravity

Lecture 38 - Supply Chain Network Optimization: Case on Capacitated Plant Location Model

Lecture 39 - Case on Supply Chain Network Design - I

Lecture 40 - Case on Supply Chain Network Design - II

Lecture 41 - Location of Distribution Centers using Clustering Technique: A Case Study

Lecture 42 - Steps of building K-Means Clustering Algorithm: A Case Study

Lecture 43 - Location of Distribution Centers: Building K-Means Clustering Model using Python

Lecture 44 - Measuring Efficiency of Manufacturing Facilities: A DEA Model - I

Lecture 45 - Measuring Efficiency of Manufacturing Facilities: A DEA Model - II

Lecture 46 - Role of Product Tracking and Traceability

Lecture 47 - Track and Trace Systems - I and II

Lecture 48 - Track and Trace Systems - I and II

Lecture 49 - ERP, WMS and TMS - I and II

Lecture 50 - ERP, WMS and TMS - I and II

Lecture 51 - Introduction to Supply Chain Digital Twin

Lecture 52 - Supply Chain Digital Twin: Greenfield Analysis - A Case Study - I

Lecture 53 - Supply Chain Digital Twin: Greenfield Analysis - A Case Study - II

Lecture 54 - Supply Chain Digital Twin: Network Optimization - A Case Study

Lecture 55 - Network Optimization with Capacity Constraints and Control Tower

Lecture 56 - Digital Infrastructure for Supply Chains: Industry 4.0

Lecture 57 - Industry 4.0 - IIoT, Cloud Computing, Horizontal and Vertical System Integration

Lecture 58 - Industry 4.0 - Cybersecurity, Big Data Analytics, Simulation, AR, Robots, AM

Lecture 59 - Blockchain

Lecture 60 - Supply Chain and Industry 4.0

NPTEL : NOC:Business Forecasting (Management)

Co-ordinators : Prof. Pankaj Dutta

Lecture 1 - Introduction to Business Forecasting

Lecture 2 - Data Driven Decision Making and Essentials of Predictive Analytics

Lecture 3 - Data Driven Decision Making and Essentials of Predictive Analytics

Lecture 4 - Types of Forecasting: Qualitative Approaches and Quantitative Approaches

Lecture 5 - Components of a Time Series and Measures of Forecast Accuracy

Lecture 6 - Components of a Time Series and Measures of Forecast Accuracy

Lecture 7 - Moving Average Methods: Simple, Weighted, and Exponential Moving Average

Lecture 8 - Moving Average Methods: Simple, Weighted, and Exponential Moving Average

Lecture 9 - Exponential Smoothing

Lecture 10 - Trend Projections and Holt Model

Lecture 11 - Simple Linear Regression and Measure of Goodness and Standard Error

Lecture 12 - Simple Linear Regression and Measure of Goodness and Standard Error

Lecture 13 - Simple Linear Regression and Measure of Goodness and Standard Error

Lecture 14 - Multiple Linear Regression and Multicollinearity

Lecture 15 - Multiple Linear Regression and Multicollinearity

Lecture 16 - Multiple Linear Regression and Multicollinearity

Lecture 17 - Seasonality, Seasonal Index, and Quarterly Average Method

Lecture 18 - Seasonality, Seasonal Index, and Quarterly Average Method

Lecture 19 - Seasonality and Trend: Winter's Holt Method

Lecture 20 - Seasonality and Trend: Winter's Holt Method

Lecture 21 - Multiplicative Decomposition Method

Lecture 22 - Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF)

Lecture 23 - ARIMA: Auto-Regressive (AR) Process

Lecture 24 - ARIMA: Moving Average (MA) Process

Lecture 25 - ARIMA: Auto-Regressive Moving Average (ARMA) Process

Lecture 26 - Auto-Regressive Integrated Moving Average (ARIMA) Model

Lecture 27 - Introduction to Machine Learning

Lecture 28 - Introduction to Machine Learning

Lecture 29 - Logistic Regression

Lecture 30 - Logistic Regression

Lecture 31 - Human Judgment in Time Series Analysis

Lecture 32 - Monte Carlo Simulation: Discrete Case

Lecture 33 - Monte Carlo Simulation: Discrete Case

Lecture 34 - Monte Carlo Simulation: Continuous case

Lecture 35 - System Dynamics (Additional Learning)

Lecture 36 - Predictive Analytics using @Risk Software

Lecture 37 - Predictive Analytics using @Risk Software

Lecture 38 - Predictive Analytics using @Risk Software

NPTEL : NOC:Business Fundamentals for Entrepreneurs (Part 2: External Operation) (Management)

Co-ordinators : Prof. Devdip Purkayastha

Lecture 1 - Market Research - Part 1

Lecture 2 - Market Research - Part 2

Lecture 3 - Customers and Segments - Part 1

Lecture 4 - Customers and Segments - Part 2

Lecture 5 - Value Based Marketing - Part 1

Lecture 6 - Value Based Marketing - Part 2

Lecture 7 - Marketing Communication - Part 1

Lecture 8 - Marketing Communication - Part 2

Lecture 9 - Sales Channels and Distribution - Part 1

Lecture 10 - Sales Channels and Distribution - Part 2

Lecture 11 - B2B and B2C Selling - Part 1

Lecture 12 - B2B and B2C Selling - Part 2

Lecture 13 - Customer Service Management - Part 1

Lecture 14 - Customer Service Management - Part 2

Lecture 15 - Supply Chain Management - Part 1

Lecture 16 - Supply Chain Management - Part 2

Lecture 17 - Quadrangle of Success

NPTEL : Organisation Management (Management)

Co-ordinators : Prof. Vinayshil Gautam

Lecture 1 - Introduction to Organization Management,Nature, Scope and Complexity

Lecture 2 - Longitudinal thinking and legacy factor:Organizational Growth

Lecture 3 - Longitudinal thinking and legacy factor:Organizational Growth (Continued...)

Lecture 4 - Longitudinal thinking and legacy factor:Organizational Growth (Continued...)

Lecture 5 - Theory and majors schools of Thought and Framework of Organizational Analysis

Lecture 6 - Theory and majors schools of thought and framework of organizational analysis (Continued...)

Lecture 7 - Theory and majors schools of thought and framework of organizational analysis (Continued...)

Lecture 8 - Systems contingency approach to organization theory and practice; techniques of organizational diagnosis

Lecture 9 - Systems contingency approach to organization theory and practice; techniques of organizational diagnosis (Continued...)

Lecture 10 - Systems contingency approach to organization theory and practice; techniques of organizational diagnosis (Continued...)

Lecture 11 - Theory of organizational structures - nature and consequence of structure

Lecture 12 - Theory of organizational structures - nature and consequence of structure (Continued...)

Lecture 13 - Socio-culture dimension of work and behavior

Lecture 14 - Socio-culture dimension of work and behavior (Continued...)

Lecture 15 - Socio-culture dimension of work and behavior (Continued...)

Lecture 16 - Impact of environment and cultural variables on organization structure & style

Lecture 17 - Impact of environment and cultural variables on organization structure & style (Continued...)

Lecture 18 - Impact of environment and cultural variables on organization structure & style (Continued...)

Lecture 19 - Organization Change and Organisation Development

Lecture 20 - Organization Change and Organisation Development (Continued...)

Lecture 21 - Intervention strategies for organization development - individual, Group and Interpersonal Interventions

Lecture 22 - Intervention strategies for organization development - individual, Group & interpersonal interventions (Continued...)

Lecture 23 - Intervention strategies for organization development - individual, Group & interpersonal interventions (Continued...)

Lecture 24 - Total System Intervention & Stabilizing Change Management by Objectives

Lecture 25 - Total System Intervention & Stabilizing Change Management by Objectives (Continued...)

Lecture 26 - Total System Intervention & Stabilizing Change Management by Objectives (Continued...)

Lecture 27 - Nature of Organisational Processes

Lecture 28 - Nature of Organisational Processes (Continued...)

Lecture 29 - Nature of Organisational Processes (Continued...)

Lecture 30 - Environmental analysis Techniques and impact for organizational growth

Lecture 31 - Environmental analysis Techniques and impact for organizational growth (Continued...)

Lecture 32 - Environmental analysis Techniques and impact for organizational growth (Continued...)

Lecture 33 - Issues of Mechnisation, Automation and Computerisation

Lecture 34 - Issues of Mechnisation, Automation and Computerisation (Continued...)

Lecture 35 - Organisation Interdependence

Lecture 36 - Organisation Interdependence (Continued...)

Lecture 37 - Organisation Interdependence (Continued...)

Lecture 38 - Organisation Evaluation

Lecture 39 - Organisation Evaluation (Continued...)

Lecture 40 - Organisation Evaluation (Continued...)

NPTEL : Organisation of Engineering Systems and Human Resources Management (Management)

Co-ordinators : Prof. Vinayshil Gautam

Lecture 1 - Introduction to the subject and the course

Lecture 2 - Understanding organizations: nature and functions

Lecture 3 - Understanding organizations: nature and functions (Continued...)

Lecture 4 - Concerns of organising engineering business and systems

Lecture 5 - Concerns of organising engineering business and systems (Continued...)

Lecture 6 - Concerns of organising engineering business and systems (Continued...)

Lecture 7 - Structure and process issues in running organisations

Lecture 8 - Structure and process issues in running organisations (Continued...)

Lecture 9 - Design issues in running organisations

Lecture 10 - Design issues in running organisations (Continued...)

Lecture 11 - Operating organizations

Lecture 12 - Operating organizations (Continued...)

Lecture 13 - Operating organizations (Continued...)

Lecture 14 - Cybernetics and systems framework

Lecture 15 - Cybernetics and systems framework (Continued...)

Lecture 16 - Socio-technical systems

Lecture 17 - Socio-technical systems (Continued...)

Lecture 18 - Socio-technical systems (Continued...)

Lecture 19 - Dealing with efficiency and excellence

Lecture 20 - Dealing with efficiency and excellence (Continued...)

Lecture 21 - Dealing with efficiency and excellence (Continued...)

Lecture 22 - Man-machine relationship

Lecture 23 - Man-machine relationship (Continued...)

Lecture 24 - Longitudinal Thinking

Lecture 25 - Longitudinal Thinking (Continued...)

Lecture 26 - Concerns of recruitment, selection, skill formation and redeployment

Lecture 27 - Concerns of recruitment, selection, skill formation and redeployment (Continued...)

Lecture 28 - Concerns of recruitment, selection, skill formation and redeployment (Continued...)

Lecture 29 - Developing teams and leadership

Lecture 30 - Developing teams and leadership (Continued...)

Lecture 31 - Understanding motivation

Lecture 32 - Understanding motivation (Continued...)

Lecture 33 - Elements of human resources planning

Lecture 34 - Elements of human resources planning (Continued...)

Lecture 35 - Elements of human resources planning (Continued...)

Lecture 36 - Indian Industrial Law and managing industrial

Lecture 37 - Indian Industrial Law and managing industrial (Continued...)

Lecture 38 - Indian Industrial Law and managing industrial (Continued...)

NPTEL : NOC:Economic Growth and Development (Management)

Co-ordinators : Prof. Rajshree Bedamatta

Lecture 1 - Concepts of Economic Growth and Development

Lecture 2 - Structural features of developed and underdeveloped countries

Lecture 3 - The Global North and the Global South: Why the Divide?

Lecture 4 - Growth versus Development - some indices of economic development

Lecture 5 - Modern Economic Growth

Lecture 6 - Strategies of economic development and growth - I

Lecture 7 - Strategies of economic development and growth - II

Lecture 8 - Strategies of economic development and growth - III

Lecture 9 - Strategies of economic development and growth - IV

Lecture 10 - Strategies of economic development and growth - V

Lecture 11 - Strategies of economic development and growth - VI

Lecture 12 - Growth and Inequality

Lecture 13 - Economic Growth and Public Support

Lecture 14 - Measures of Inequality

Lecture 15 - Introduction to Human Development-Putting People First

Lecture 16 - The Human Development and Capability Approach

Lecture 17 - Utilitarianism, Basic Needs Approach and the Capability Approach

Lecture 18 - Measuring Human Development - I

Lecture 19 - Measuring Human Development - II

Lecture 20 - Other Human Development Indices

Lecture 21 - Multidimensional Poverty, MDGs and SDGs

Lecture 22 - Gender mainstreaming and Gender budgeting

Lecture 23 - In Conclusion

NPTEL : NOC:Organizational Behaviour: Individual Dynamics in Organization (Management)

Co-ordinators : Prof. Abraham Cyril Issac

Lecture 1 - Understanding organizational behaviour:Tracing the evolution - 1

Lecture 2 - Understanding organizational behaviour:Tracing the evolution - 2

Lecture 3 - Individual in the organization: The building blocks

Lecture 4 - Understanding individual differences - 1

Lecture 5 - Understanding individual differences - 2

Lecture 6 - Diverse workforce, inclusive mindset - 1

Lecture 7 - Diverse workforce, inclusive mindset - 2

Lecture 8 - Perception of diversity and inclusion

Lecture 9 - Ableism and inclusion

Lecture 10 - Diversity management

Lecture 11 - The perceptual process

Lecture 12 - Factors that influence perception

Lecture 13 - Perception and decision making

Lecture 14 - What affects decisions?

Lecture 15 - Ethical decision making

Lecture 16 - Affect and emotions

Lecture 17 - Affective events theory

Lecture 18 - Emotional intelligence

Lecture 19 - Understanding stress

Lecture 20 - Emotions and moods: Application at workplace

Lecture 21 - Understanding self and personality

Lecture 22 - Types and theories of personality

Lecture 23 - Measuring personality

Lecture 24 - Personality traits relevant to organization

Lecture 25 - Assessing personality: caveats and concerns

Lecture 26 - Values and its importance

Lecture 27 - Sources and types of values

Lecture 28 - Values that cut across cultures

Lecture 29 - Person-job fit

Lecture 30 - Person-organization fit

Lecture 31 - Motivation: Basic understanding and definition

Lecture 32 - Tracing the roots: Early theories - 1

Lecture 33 - Tracing the roots: Early theories - 2

Lecture 34 - Keeping up with times: Contemporary theories - 1

Lecture 35 - Keeping up with times: Contemporary theories - 2

Lecture 36 - Job Design and job characteristics model

Lecture 37 - Employee involvement

Lecture 38 - Motivating the employees: Strategies for organization - 1

Lecture 39 - Motivating the employees: Strategies for organization - 2

Lecture 40 - Organizational justice and employee motivation

Lecture 41 - Defining learning

Lecture 42 - How do individuals learn?

Lecture 43 - Theories of learning - 1

Lecture 44 - Theories of learning - 2

Lecture 45 - Learning in an organizational setting

Lecture 46 - Understanding creativity

Lecture 47 - Stages of individual creativity

Lecture 48 - Creativity and problem solving

Lecture 49 - Defining psychological capital

Lecture 50 - Using Psychological capital and mindfulness at work

Lecture 51 - Understanding knowledge sharing

Lecture 52 - Understanding knowledge hiding - what it is and what it is not

Lecture 53 - Individual factors affecting knowledge hiding

Lecture 54 - Integrating knowledge sharing and hiding behavior

Lecture 55

Lecture 56 - Understanding employee voice and silence

Lecture 57 - Individual factors affecting voice behavior

Lecture 58 - Individual factors affecting silence

Lecture 59 - Can silence be strategic?

Lecture 60 - Strategies for fostering safe environment at work

NPTEL : NOC:Labour Welfare and Industrial Relations (Management)

Co-ordinators : Prof. Abraham Cyril Issac

Lecture 1 - Background, IR in the post-independence period, functions of IR

Lecture 2 - Approaches towards IR, models of IR

Lecture 3 - Introduction to trade unions, labour legislations, worker's participation

Lecture 4 - Employers' Federation and their role in IR

Lecture 5 - Sailent features of IR in India

Lecture 6 - Birth and evolution of the trade union movement in India

Lecture 7 - Objectives, Theories, Bases of TUs

Lecture 8 - TU federations, Presence of local TUs, Reasons for growth, Compulsory Unionism

Lecture 9 - Trade Unions Act 1926: Aim, scope, registration, Rights and Responsibilities of TUs

Lecture 10 - Size and Finance of TUs, TU rivalry and recognition

Lecture 11 - Industrial Disputes: Meaning, Causes, Interests and Right Disputes

Lecture 12 - Strikes ,Forms, and Effects of Strike

Lecture 13 - Industrial Dispute Act 1947: Disputes Settlement Machineries

Lecture 14 - Statutory and Non-Statutory measures of Settlement

Lecture 15 - Collective Bargaining : Importance, Theories, Hurdles to CB in India

Lecture 16 - Introduction, objectives, classifications

Lecture 17 - Intra mural labour welfare services

Lecture 18 - Extra mural labour welfare services

Lecture 19 - Evolution of social security measures, Mention of welfare provisions of few labour laws

Lecture 20 - Social Security, Convention (No.102) ILO

Lecture 21 - Social security legislations: Evolution and Growth

Lecture 22 - Provision for old age and against unemployment and Gratuity, exisiting social security laws

Lecture 23 - Issues in Labour Welfare and Social Security, Review of welfare amenities

Lecture 24 - Role of Welfare officer, problems in enforcement of welfare amenities

Lecture 25 - Employees Compensation Act 1923: Occupational diseases, Compensation

Lecture 26 - Right to compensation in presence of Employees' State Insurance Act

Lecture 27 - Evolution of Provident Fund legislation in India, Central Government Health Scheme, 1954

Lecture 28 - Employees Provident Fund and Miscellaneous Provisions Act, 1952: scope, definitions

Lecture 29 - Employees' Provident Fund, Deposit Linked Insurance Schemes

Lecture 30 - Employee Pension Scheme 1995, Miscellaneous Provisions

Lecture 31 - Payment of Gratuity Act 1972: Enactment, Scope and Coverage

Lecture 32 - Payment of Gratuity Act 1972: Main Provisions, Compulsory Insurance, Other Provisions

Lecture 33 - Maternity Benefit Act 1961: Growth, Definitions, Main Provisions, and Other Provisions

Lecture 34 - Child labour (Prohibition& Regulation)Act,1986: Objectives

Lecture 35 - Prohibition of Employment and Regulation of Conditions of children in certain occupations

Lecture 36 - Central Board of Workers' Education Scheme : Rational, Schemes, Composition of Board

Lecture 37 - Five Year Plans and Workers' Education

Lecture 38 - Factories Act 1948: definitions, authorities

Lecture 39 - Health, safety, provisions relating to hazardous processes

Lecture 40 - Welfare, working hours of adults

Lecture 41 - Employment of young persons, annual leave with wages and Penalties and procedure,other provisions

Lecture 42 - Payment of Wages Act, 1936: Objective, Scope

Lecture 43 - Wage legalities, Authorized deductions, miscellaneous provisions

Lecture 44 - Minimum Wages Act 1948: Scope, Fixation of minimum wages

Lecture 45 - Procedure for fixing minimum wages, mode of payment, miscellaneous provisions

Lecture 46 - Equal Remuneration Act 1976: Scope, definations, provisions

Lecture 47 - Workers' Participation in Management

Lecture 48 - Degree and Forms of Labour Participation

Lecture 49 - Workers Committee, Joint management Councils

Lecture 50 - Employee's Participation in PSUs Participation in Private sector

Lecture 51 - The participation of workers in Management Bill 1990

Lecture 52 - Labour Welfare and Industrial Relations: Case Laws

Lecture 53 - Introduction, Labour reforms undertaken

Lecture 54 - Code on Wages 2019

Lecture 55 - Occupational Safety, Health and Working Conditions Code, 2020

Lecture 56 - Industrial Relations Code, 2020

Lecture 57 - Code on Social Security, 2020

Lecture 58 - Labour Welfare and Industrial Relations: A Bird's Eye View

NPTEL : Strategic Marketing - Contemporary Issues (Management)

Co-ordinators : Prof. Jayanta Chatterjee

Lecture 1 - Strategic Marketing

Lecture 2 - Strategic Marketing

Lecture 3 - Strategic Marketing

Lecture 4 - Strategic Marketing

Lecture 5 - Strategic Marketing

Lecture 6 - Strategic Marketing

Lecture 7 - Strategic Marketing

Lecture 8 - Strategic Marketing

Lecture 9 - Strategic Marketing

Lecture 10 - Strategic Marketing

Lecture 11 - Strategic Marketing

Lecture 12 - Strategic Marketing

Lecture 13 - Strategic Marketing

Lecture 14 - Strategic Marketing

Lecture 15 - Strategic Marketing

Lecture 16 - Strategic Marketing

Lecture 17 - Strategic Marketing

Lecture 18 - Strategic Marketing

Lecture 19 - Strategic Marketing

Lecture 20 - Strategic Marketing

Lecture 21 - Strategic Marketing

Lecture 22 - Strategic Marketing

Lecture 23 - Strategic Marketing

Lecture 24 - Strategic Marketing

Lecture 25 - Strategic Marketing

Lecture 26 - Strategic Marketing

Lecture 27 - Strategic Marketing

Lecture 28 - Strategic Marketing

Lecture 29 - Strategic Marketing

Lecture 30 - Strategic Marketing

Lecture 31 - Strategic Marketing

Lecture 32 - Strategic Marketing

Lecture 33 - Strategic Marketing

Lecture 34 - Strategic Marketing

Lecture 35 - Strategic Marketing

Lecture 36 - Strategic Marketing

Lecture 37 - Strategic Marketing

NPTEL : NOC:Strategy: An Introduction to game Theory (Management)

Co-ordinators : Prof. Aditya K. Jagannatham, Dr. Vimal Kumar

Lecture 1 - Introduction Examples: Markets / Politics / Auctions

Lecture 2 - Prisonersâ€™ Dilemma

Lecture 3 - Best Response and Nash Equilibrium

Lecture 4 - Another Example: Markets

Lecture 5 - Dominant Strategies

Lecture 6 - Stag Hunt â€“ Coordination and Bank Runs

Lecture 7 - Battle of Sexes and Multiple Nash Equilibria

Lecture 8 - Tragedy of Commons

Lecture 9 - Tragedy of Commons

Lecture 10 - Cournot Duopoly

Lecture 11 - Cournot Duopoly

Lecture 12 - Mixed Strategies

Lecture 13 - Battle of Sexes

Lecture 14 - Battle of Sexes: Best Response Dynamic

Lecture 15 - Paying Taxes

Lecture 16 - Portfolio Management Game

Lecture 17 - Rationality, Choice and Common Knowledge

Lecture 18 - Lterated Elimination of Domination Strategies

Lecture 19 - Auction

Lecture 20 - Auction: As a Normal Form Game

Lecture 21 - Traffic at Equilibrium and Braesss Paradox

Lecture 22 - Linear Markets

Lecture 23 - Extensive Form Games

Lecture 24 - Game Tree and Information Sets

Lecture 25 - Strategies in Extensive from Games

Lecture 26 - Extensive from Games with Simultaneous Moves and Their Normal From Representation

Lecture 27 - Sub Game Perfect Equilibrium Part-I

Lecture 28 - Sub Game Perfect Equilibrium Part-II

Lecture 29 - The Art of War: Lesson 1

Lecture 30 - Ultimatum Game

Lecture 31 - Stackelberg Model

Lecture 32 - Bayesian Games

Lecture 33 - Bayesian Game: BoS

Lecture 34 - Bayesian Nash Equilibrium

Lecture 35 - Yield vs Fight

Lecture 36 - Yield vs. Fight: Bayesian NE

Lecture 37 - Bayesian Cournot Game

Lecture 38 - Bayesian Games with mixed strategies

Lecture 39 - Auctions

Lecture 40 - Sealed Bid First Price Auction

Lecture 41 - Expected Revenue

Lecture 42 - Bayesian Second Price Auction

Lecture 43 - Expected Revenue: Second Price Auction

Lecture 44 - All Pay Auction

Lecture 45 - A Hawk-Dove Game

Lecture 46 - Evolutionary Biology

Lecture 47 - Evolutionary stable Strategy (ESS)

Lecture 48 - ESS and NE

Lecture 49 - Repeated Games

Lecture 50 - Finitely Repeated Game having Multiple Equilibriums

Lecture 51 - Chain-Store Paradox

Lecture 52 - Infinitely Repeated Game

Lecture 53 - Non Cooperative Bargaining

Lecture 54 - Axiomatic Bargaining

Lecture 55 - Extensive Form Game with Incomplete Information

Lecture 56 - Introduction to perfect Bayesian Equilibrium

Lecture 57 - Obtaining PBE

Lecture 58 - Gift Game

NPTEL : NOC:Managing Services (Management)

Co-ordinators : Prof. Jayanta Chatterjee

Lecture 1 - What is Service?

Lecture 2 - Evolving Service Markets

Lecture 3 - The Service Customers

Lecture 4 - Product Service Systems

Lecture 5 - The Service Act

Lecture 6 - Seamless Service

Lecture 7 - Service Management Elements

Lecture 8 - Core Vs. Supplementary Services

Lecture 9 - Intangibility of Services

Lecture 10 - Response to IHIP Challenges

Lecture 11 - Process & Promotion

Lecture 12 - Process Issues in Service

Lecture 13 - Challenges of Services-1

Lecture 14 - Service Uniqueness-2

Lecture 15 - Consumer in the Services Flow-1

Lecture 16 - Service Consumer Behavior-2

Lecture 17 - Customer Co Creation of Services-1

Lecture 18 - Customer Co Creation of Services-2

Lecture 19 - Current Service Map to New Service Design

Lecture 20 - Current Service Map to New Service Design.

Lecture 21 - Case Study on Service Excellence-1

Lecture 22 - Case Study on Service Excellence-2

Lecture 23 - Services Excellence - Culture

Lecture 24 - People in Services

Lecture 25 - Position - Value Proposition-1

Lecture 26 - Position - Value Proposition-2

Lecture 27 - Branding Services-1

Lecture 28 - Distributing Services

Lecture 29 - Distributing Services

Lecture 30 - Network of Services

Lecture 31 - Strategy for Service Businesses

Lecture 32 - Strategy for Service Businesses.

Lecture 33 - Strategy for Service Businesses..

Lecture 34 - Pricing - Basic Concepts

Lecture 35 - Service Pricing

Lecture 36 - Service Pricing.

Lecture 37 - Service Quality-I

Lecture 38 - Service Quality-II

Lecture 39 - Service Quality-III

Lecture 40 - Service Complaints and Recovery Strategies

Lecture 41 - Loyalty - Relationship-I

Lecture 42 - Loyalty - Relationship-II

Lecture 43 - Strategy Canvas - Service Portfolio Analysis

Lecture 44 - Loyalty - Relationship

Lecture 45 - Managing Partner Relationships

Lecture 46 - Global Service Ecosystem - Contemporary Issues

Lecture 47 - Service Ecosystem - Service Innovation

Lecture 48 - Services as Systems: A Holistic Approach

NPTEL : NOC:Quantitative Finance (Management)

Co-ordinators : Dr. Raghu Nandan Sengupta

Lecture 1

Lecture 2

Lecture 2 (Continued) - Part 1

Lecture 2 (Continued) - Part 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

NPTEL : NOC:Marketing Management-I (Management)

Co-ordinators : Prof. Jayanta Chatterjee, Dr. Shashi Shekhar Mishra

Lecture 1 - Defining Marketing

Lecture 2 - Core Concepts in Marketing

Lecture 3 - Case Studies

Lecture 4 - Marketing of Services

Lecture 5 - Evolution of Marketing

Lecture 6 - Contemporary Issues in Modern Marketing Practices

Lecture 7 - Introduction to Competitor Analysis

Lecture 8 - Marketing Objectives

Lecture 9 - Strategy and Core Competency

Lecture 10 - PESTEL Framework

Lecture 11 - Competitive Analysis

Lecture 12 - Case Study

Lecture 13 - Introduction To Marketing Information System

Lecture 14 - Components of a Marketing Information System

Lecture 15 - Marketing Research Process

Lecture 16 - MDP and MRP

Lecture 17 - Exploratory Research

Lecture 18 - Exploratory Research (Continued...)

Lecture 19 - Causal Research

Lecture 20 - Measurment and Scaling

Lecture 21 - Questionnaire and Sampling

Lecture 22 - Sampling Techniques

Lecture 23 - Data Collection, Preparation and Analysis

Lecture 24 - Multivariate Data Analysis

Lecture 25 - Introduction to Consumer Behviour and Need Recognition

Lecture 26 - Information Search

Lecture 27 - Socio-Cultural Influences on the Consumer Buying Process

Lecture 28 - Psychological Influences on Consumer Buying Process

Lecture 29 - Evaluation of Alternatives

Lecture 30 - Purchase and Post Purchase Evaluation

Lecture 31 - Service Consumption

Lecture 32 - Structural Models of Attitude

Lecture 33 - Industrial Buyer Behaviour - I

Lecture 34 - Industrial Buyer Behaviour - II

Lecture 35 - Industrial Marketing Program and Buying Process

Lecture 36 - Three Dimension of Industrial Buyer Behaviour

Lecture 37 - Consumer Decision-Making Process Revisited

Lecture 38 - Identifying and Choosing Oppurtunities

Lecture 39 - Market Segmentation - I

Lecture 40 - Market Segmentation - II

Lecture 41 - Segmentation and Targeting

Lecture 42 - Segmentationa and Post Segmentation Strategies

Lecture 43 - Introduction to Marketing Strategy

Lecture 44 - Positioning

Lecture 45 - Segmentation and Targeting in B2B Market

Lecture 46 - Crafting the Positioning and Branding Effectively

NPTEL : NOC:Marketing Management-II (Management)

Co-ordinators : Prof. Jayanta Chatterjee, Dr. Shashi Shekhar Mishra

Lecture 1 - Brief Recap of Basic Concepts from Marketing Management 1 - I

Lecture 2 - Brief Recap of Basic Concepts from Marketing Management 1 - II

Lecture 3 - Product - An Important Component of the 4P

Lecture 4 - New Product Development - I

Lecture 5 - New Product Development - II

Lecture 6 - Entreprenuerial Marketing

Lecture 7 - Screening New Product Ideas

Lecture 8 - Diffusion of Innovation

Lecture 9 - Product Life Cycle and Introduction to Strategy

Lecture 10 - Strategy for New Product Introduction - I

Lecture 11 - Strategy for New Product Introduction - II

Lecture 12 - Marketing Strategies for Different Stages in PLC

Lecture 13 - Introduction to Brand, Branding and Brand Equity

Lecture 14 - Strategic Brand Management Process

Lecture 15 - Brand Building - I

Lecture 16 - Brand Building - II

Lecture 17 - Secondary Associations of a Brand and Advantages of Brand

Lecture 18 - Measuring Brand Equity and other Brand Related Constructs

Lecture 19 - Global Dimensions of Brands

Lecture 20 - Brand Message and Advantage of Brand

Lecture 21 - Branding Strategies - I

Lecture 22 - Branding Strategies - II

Lecture 23 - Strategic Brand Management

Lecture 24 - Creating a Powerful Brand

Lecture 25 - Introduction to Pricing

Lecture 26 - Considerations for Setting the Price

Lecture 27 - Determing the Demand and Cost Estimation

Lecture 28 - Cost Estimation and Break Even Analysis

Lecture 29 - Different Methods of Pricing - I

Lecture 30 - Different Methods of Pricing - II

Lecture 31 - Introduction to Distribution

Lecture 32 - Types of Channel and their Dynamics

Lecture 33 - Different Channel Options

Lecture 34 - Integrated Marketing Channel

Lecture 35 - Retailing and Wholesaling - I

Lecture 36 - Retailing and Wholesaling - II

Lecture 37 - Retail Marketing Management

Lecture 38 - Choosing Retail Location and Layout

Lecture 39 - Introduction to Integrated Marketing Communications

Lecture 40 - Models of Communication

Lecture 41 - Designing and Implementing Marketing Communication

Lecture 42 - Digital Marketing Communication

Lecture 43 - Introduction to Services Marketing

Lecture 44 - Characteristics of Services

Lecture 45 - Failure of Service and Solutions

Lecture 46 - Service Quality

Lecture 47 - Recap of Important Concepts - I

Lecture 48 - Recap of Important Concepts - II

NPTEL : NOC:Project Management (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Introduction to Project Management

Lecture 2 - Introduction to Agile Project Management

Lecture 3 - Project Management Process for a Project - I

Lecture 4 - Project Management Process for a Project - II

Lecture 5 - Project Management Process for a Project - III

Lecture 6 - Project Stakeholder and Risk Management

Lecture 7 - Project Risk Management

Lecture 8 - Solving Project Management Decision Problems

Lecture 9 - Project Risk Management Analysis - I

Lecture 10 - Project Risk Management Analysis - II

Lecture 11 - Analytic Hierarchy Process for Project Selection

Lecture 12 - Decision Tree Analysis

Lecture 13 - Decision Tree Analysis and Risk Management

Lecture 14 - Application of Utility Theory in Project Management - I

Lecture 15 - Application of Utility Theory in Project Management - II

Lecture 16 - Application of Utility Theory in Project Management - III

Lecture 17 - Application of Utility Theory in Project Management - IV

Lecture 18 - Other Criteria used for Project Selection

Lecture 19 - Work Breakdown Structure in Project Management

Lecture 20 - Activity Networks used in Project Management

Lecture 21 - Concept of Critical Path Method (CPM) and Introduction to PERT

Lecture 22 - Program Evaluation Review Technique (PERT) - I

Lecture 23 - Program Evaluation Review Technique (PERT) - II

Lecture 24 - Aspects and applications of CPM and PERT

Lecture 25 - Concepts of a Project Life Cycle

Lecture 26 - Discounting Rates and Project Pricing

Lecture 27 - Concept of Forward Rates and Payback Time

Lecture 28 - Important Example of PERT Network involving Probabilistic time and variance

Lecture 29 - Scheduling and Crashing of Jobs

Lecture 30 - Resource levelling and resource constraint

Lecture 31 - Detailed Explanation on Crashing of Jobs

Lecture 32 - Project scheduling and Crashing Â– An Example

Lecture 33 - Earned Value Management

Lecture 34 - Key components of Earned Value Management

Lecture 35 - Introduction to Graphical Evaluation and Review Technique (GERT) - I

Lecture 36 - Graphical Evaluation and Review Technique (GERT) - II

Lecture 37 - Graphical Evaluation and Review Technique (GERT) - III

Lecture 38 - Graphical Evaluation and Review Technique (GERT) - IV

Lecture 39 - Graphical Evaluation and Review Technique (GERT) - V

Lecture 40 - Q-GERT: Queue graphical evaluation and review technique and Theory of Constraint

NPTEL : NOC:Systems Engineering: Theory and Practice (Management)

Co-ordinators : Dr. Deepu Philip

Lecture 1 - Systems Engineering Â– What is, origin and examples

Lecture 2 - Systems Engineering as a profession

Lecture 3 - Systems Engineering Management (SEM)

Lecture 4 - SEM - Lifecycle Integration

Lecture 5 - Systems Engineering - Modern Version

Lecture 6 - Overview of Systems Engineering Process

Lecture 7 - System Design Process

Lecture 8 - Systems View Point

Lecture 9 - Complex Systems and System Development Process

Lecture 10 - System Environments

Lecture 11 - System Interfaces and Interactions

Lecture 12 - System Development Process

Lecture 13 - System Engineering Life Cycle Stages

Lecture 14 - System Engineering Life Cycle Stages (Continued...)

Lecture 15 - Requirement Analysis

Lecture 16 - Requirement Analysis (Continued...)

Lecture 17 - Unmanned Aerial Systems - A Systems Engineering Case Study

Lecture 18 - Discussion about Systems Engineering and System Thinking with Professor Ian Angell

Lecture 19 - Demonstration of real life systems by the Indian Army

Lecture 20 - Need Analysis

Lecture 21 - Functional Analysis

Lecture 22 - Functional Flow Block Diagram

Lecture 23 - Quality Function Deployment

Lecture 24 - Timeline Analysis Sheet and Requirement Allocation Sheet

Lecture 25 - Design Synthesis

Lecture 26 - Design Synthesis (Continued...)

Lecture 27 - Design Synthesis Tools

NPTEL : NOC:Total Quality Management - I (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Quality and its Dimensions

Lecture 2 - Quality and Variability

Lecture 3 - History of Quality Control

Lecture 4 - Management Aspects of Quality - I

Lecture 5 - Management aspects of Quality - II

Lecture 6 - Introduction to Concepts of Probability

Lecture 7 - Six Sigma Overview

Lecture 8 - DMAIC for Problem Solving

Lecture 9 - DMAIC exmaples and DMADV

Lecture 10 - Quality Improvement

Lecture 11 - 7 Old Tools for Quality Assurance

Lecture 12 - 7 New Tools for Quality Assurance

Lecture 13 - CPM, PDPC and Introduction To House of Quality

Lecture 14 - Building the House of Quality

Lecture 15 - Introduction to Acceptance Sampling

Lecture 16 - The Operating Characteristic Curve

Lecture 17 - The OC curve and Sampling Plans

Lecture 18 - Double Sampling

Lecture 19 - Sequential Sampling, Military Standard and Introduction to R

Lecture 20 - Basic Understanding of R and Introduction to Control Charts

Lecture 21 - Basics of X bar and R chart

Lecture 22 - Usage of X bar chart and R chart

Lecture 23 - Variable Sample Size in X bar and R chart

Lecture 24 - Patterns in Charts

Lecture 25 - S chart and OC curve

Lecture 26 - S square chart and MR chart

Lecture 27 - Attribute charts- The p chart

Lecture 28 - np control chart

Lecture 29 - Estimating control limits with varying sample size

Lecture 30 - OC curve, c and u charts

Lecture 31 - u, g and h chart

Lecture 32 - Introduction to Process Capability Analysis

Lecture 33 - PCR calculation and Gauge Capability

Lecture 34 - Introduction to ISO 9000

NPTEL : NOC:Management of New Products and Services (Management)

Co-ordinators : Prof. Jayanta Chatterjee

Lecture 1 - Similarities and Differences

Lecture 2 - Theoretical Foundations I Competitive Strategy

Lecture 3 - Theoretical Foundations II Product Strategy

Lecture 4 - Theoretical Foundations III Understanding Customer Behaviour

Lecture 5 - Theoretical Foundations IV Product Life Cycle (PLC) and Chasm

Lecture 6 - Theoretical Foundations V Product Platforms and Portfolios

Lecture 7 - Theoretical Foundations VI Understanding Customers (STP)

Lecture 8 - STP continued

Lecture 9 - Understanding Product Platforms

Lecture 10 - The Idea Generation process

Lecture 11 - Creating Customer Value Proposition

Lecture 12 - Lean Product Process

Lecture 13 - Estimating Marketing and Sales Potential

Lecture 14 - Introduction to New Product Forecasting Techniques

Lecture 15 - Diffusion process and Product Life Cycle

Lecture 16 - Technology Adoption Life Cycle and Crossing the Chasm

Lecture 17 - Managing New Products in Large Organizations

Lecture 18 - Introduction to the Stage Gate model

Lecture 19 - What is a Lean Startup

Lecture 20 - The Business Model Canvas

Lecture 21 - Introduction to Intellectual Property Rights

Lecture 22 - Taking the Product to the Market - Deployment Strategies

NPTEL : NOC:Total Quality Management-II (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Introduction to Statistics

Lecture 2 - Introduction to Probability Theory

Lecture 3 - Distribution of a Random Variable - I

Lecture 4 - Distribution of a Random Variable - II

Lecture 5 - Part-I : Interval Estimation - I

Lecture 6 - Part-II : Interval Estimation - II

Lecture 7 - Confidence Interval III and the introduction to Hypothesis Testing

Lecture 8 - Hypothesis Testing

Lecture 9 - The Analysis of Variance (ANOVA) - I

Lecture 10 - The Analysis of Variance (ANOVA) - II

Lecture 11 - The Analysis of Variance (ANOVA) - III

Lecture 12 - The Analysis of Variance (ANOVA) - IV

Lecture 13 - The Analysis of Variance (ANOVA) - V

Lecture 14 - The Analysis of Variance (ANOVA) - VI

Lecture 15 - The Analysis of Variance (ANOVA) - VII and Introduction to Factorial Design

Lecture 16 - Factorial Designs - I

Lecture 17 - Factorial Designs - II

Lecture 18 - Factorial Designs - III

Lecture 19 - Factorial Designs - IV

Lecture 20 - Factorial Designs - V

Lecture 21 - Factorial Designs - VI

Lecture 22 - Factorial Designs - VII

Lecture 23 - Factorial Designs - VIII

Lecture 24 - Two level Fractional Factorial Design - I

Lecture 25 - Two level Fractional Factorial Design - II

Lecture 26 - Two level Fractional Factorial Design - III

Lecture 27 - Two level Fractional Factorial Design - IV

Lecture 28 - Two level Fractional Factorial Design - V

Lecture 29 - Two level Fractional Factorial Design - VI

Lecture 30 - Two level Fractional Factorial Design - VII

Lecture 31 - Additional Design and Analysis Topics for Factorial and Fractional Factorial Designs - I

Lecture 32 - Additional Design and Analysis Topics for Factorial and Fractional Factorial Designs - II

Lecture 33 - Confounding in the 3^k Factorial Design - I

Lecture 34 - Confounding in the 3^k Factorial Design - II

Lecture 35 - Fractional Replication of the 3^k Factorial Design

Lecture 36 - Factorials with Mixed Levels

Lecture 37 - Fitting Regression Models - I

Lecture 38 - Fitting Regression Models - II

Lecture 39 - Fitting Regression Models - III

Lecture 40 - Fitting Regression Models - IV

Lecture 41 - Fitting Regression Models - V

NPTEL : NOC:Practitioners Course In Descriptive, Predictive and Prescriptive Analytics (Management)

Co-ordinators : Dr. Amandeep Singh, Dr. Deepu Philip

Lecture 1 - Introduction

Lecture 2 - Analytics for Decision Making Support

Lecture 3 - Decision Needs and Analytics

Lecture 4 - Systems, Models and Modeling Process

Lecture 5 - Types of Models

Lecture 6 - Data and its Types

Lecture 7 - Overview of Probability

Lecture 8 - Statistics and Analytics (Private)

Lecture 9 - Descriptive Statistics â€“ Graphical Tools (Private)

Lecture 10 - Frequency Distribution and Histogram

Lecture 11 - Stem and Leaf Plot

Lecture 12 - Box Plots

Lecture 13 - Business Intelligence and Analytics

Lecture 14 - Normal Distribution

Lecture 15 - Sampling

Lecture 16 - Sampling Techniques

Lecture 17 - Hypothesis Testing

Lecture 18 - Hypothesis Testing continued

Lecture 19 - Machine Learning

Lecture 20 - Correlation

Lecture 21 - Correlation continued

Lecture 22 - Regression

Lecture 23 - Analysis of Varience (ANOVA) - Part 1

Lecture 24 - Analysis of Varience (ANOVA) - Part 2

Lecture 25 - Machine Learning - Part 2

Lecture 26 - Machine Learning - Part 3

Lecture 27 - Machine Learning - Part 4

Lecture 28 - Machine Learning - Part 5

NPTEL : NOC:Microeconomics: Theory and Applications (Management)

Co-ordinators : Prof. Deep Mukerjee

Lecture 1 - Introduction

Lecture 2 - Major themes in Microeconomics - Part 1

Lecture 3 - Major themes in Microeconomics - Part 2

Lecture 4 - Basic differential calculus

Lecture 5 - Demand Function

Lecture 6 - Comparative Statics and Marshallian Consumer Theory

Lecture 7 - Marshallian Consumer Theory (Continued...)

Lecture 8 - Optimization Theory and Techniques - Part 1

Lecture 9 - Optimization Theory and Techniques - Part 2

Lecture 10 - Practice Session

Lecture 11 - Indifference Curves - Part 1

Lecture 12 - Indifference Curves - Part 2

Lecture 13 - Consumer Equilibrium - Part 1

Lecture 14 - Consumer Equilibrium - Part 2

Lecture 15 - Income consumption curve (ICC) and related issues

Lecture 16 - Price consumption curves and related issues

Lecture 17 - Slutsky Equation

Lecture 18 - Price Change and Consumer Welfare - Part 1

Lecture 19 - Price Change and Consumer Welfare - Part 2

Lecture 20 - Price Change and Consumer Welfare - Part 3

Lecture 21 - Intertemporal Choice - Part 1

Lecture 22 - Intertemporal Choice - Part 2

Lecture 23 - Introduction to Risk

Lecture 24 - Consumer Choice Involving Risk - Part 1

Lecture 25 - Consumer Choice Involving Risk - Part 2

Lecture 26 - Neoclassical Production Function

Lecture 27 - Isoquants - Part 1

Lecture 28 - Isoquants - Part 2

Lecture 29 - Cobb-Douglass production function

Lecture 30 - Firm's Optimization Problems - Part 1

Lecture 31 - Firm's Optimization Problems - Part 2

Lecture 32 - Cost Function - Part 1

Lecture 33 - Cost function - Part 2

Lecture 34 - Short-run Cost Curves

Lecture 35 - Long-run Cost Curves

Lecture 36 - Short-run Equilibrium of firm

Lecture 37 - Short-run equilibrium of firm and supply function

Lecture 38 - Long-run equilibrium of a competitive firm - Part 1

Lecture 39 - Long-run equilibrium of a competitive firm - Part 2

Lecture 40 - Long-run Equilibrium of Competitive Industry

Lecture 41 - Welfare Analysis of Competitive Market

Lecture 42 - Welfare Analysis of Government Intervention on Competitive Market - Part 1

Lecture 43 - Welfare Analysis of Government Intervention in Competitive Market - Part 2

Lecture 44 - Monopoly - Part 1

Lecture 45 - Monopoly - Part 2

Lecture 46 - Discriminating Monopoly

Lecture 47 - Practice session (Monopoly)

Lecture 48 - Oligopoly - Part 1

Lecture 49 - Oligopoly - Part 2

Lecture 50 - Model for Cartel Behaviour

Lecture 51 - Practice session (Oligopoly)

Lecture 52 - Externality and Market Failure - Part 1

Lecture 53 - Externality and Market Failure - Part 2

Lecture 54 - Linear Programming - Part 1

Lecture 55 - Linear Programming - Part 2

Lecture 56 - Linear Programming - Part 3

Lecture 57 - Linear Programming - Part 4

Lecture 58 - Linear Regression - Part 1

Lecture 59 - Linear Regression - Part 2

Lecture 60 - Linear Regression - Part 3

Lecture 61 - Linear Regression - Part 4

NPTEL : NOC:Data Analysis and Decision Making-I (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Introduction

Lecture 2 - Data Representation and Frequency

Lecture 3 - Frequency Table and Mean

Lecture 4 - Descriptive Statistics

Lecture 5 - Introduction To Probability

Lecture 6 - Conditional Probability

Lecture 7 - Baye'S Theorem And Distributions

Lecture 8 - Binomial Distribution

Lecture 9 - Hypergeometric, Poisson, Normal Distribution

Lecture 10 - Distribution Function

Lecture 11 - Normal Distribution

Lecture 12 - Sampling

Lecture 13 - Some Distributions

Lecture 14 - More on Distributions

Lecture 15 - Estimators

Lecture 16 - MLE

Lecture 17 - Statistical Inference

Lecture 18 - Hypothesis Testing

Lecture 19 - Hypothesis Testing:A

Lecture 20 - Hypothesis Testing:B

Lecture 21 - Hypothesis Testing

Lecture 22 - Simple Linear Regression

Lecture 23 - Multiple Linear Regression

Lecture 24 - Weighted Moving Averages

Lecture 25 - Weighted Moving Averages

Lecture 26 - Forecasting

Lecture 27 - Forecasting

Lecture 28 - Data Properties

Lecture 29 - Multivariate Statistical Analysis

Lecture 30 - Multivariate Statistical Analysis

Lecture 31 - Multivariate Statistical Analysis

Lecture 32 - Multivariate Statistical Analysis

Lecture 33 - Multivariate Distribution

Lecture 34 - Multivariate Extreme Value Distribution

Lecture 35 - Mle Estimates

Lecture 36 - Mle Estimates

Lecture 37 - Copula Theory

Lecture 38 - PCA

Lecture 39 - PCA

Lecture 40 - Factor Analysis

Lecture 41 - Factor Analysis

Lecture 42 - Introduction to Utility Theory

Lecture 43 - Utility Analysis

Lecture 44 - Decision Sciences

Lecture 45 - Utility Functions

Lecture 46 - Exponential Utility Function

Lecture 47 - Risk Concepts

Lecture 48 - Utility Theory Axioms

Lecture 49 - Utility Analysis

Lecture 50 - Chebyshev'S Inequality

Lecture 51 - Loss Function

Lecture 52 - Loss Function

Lecture 53 - Loss Function and MLR

Lecture 54 - MLR

Lecture 55 - Loss Function

Lecture 56 - Cannonical Correlation

Lecture 57 - cannonical Correlation (Continued...)

Lecture 58 - Structural Equation Modeling (SEM)

Lecture 59 - SEM

Lecture 60 - SEM

NPTEL : NOC:Economics of Health and Health Care (Management)

Co-ordinators : Prof. Deep Mukerjee

Lecture 1 - Introduction to Health

Lecture 2 - Health Economics Map and Health Expenditure

Lecture 3 - Utility

Lecture 4 - Indifference Curve

Lecture 5 - Budget Line

Lecture 6 - Theory of Demand

Lecture 7 - Theory of Supply

Lecture 8 - Price Elasticity of Demand

Lecture 9 - Income Elasticity of Demand and Price Elasticity of Supply

Lecture 10 - Production Function

Lecture 11 - Relationship Between AP, MP and Law of Diminishing Marginal Returns

Lecture 12 - Long Run Production Function and Isoquant

Lecture 13 - Returns to Scale

Lecture 14 - Iso-Cost Curve and Co-production

Lecture 15 - Introduction to Cost Theory

Lecture 16 - Break-even Point and Long Run Cost Curve

Lecture 17 - Cost-Volume-Profit Analysis

Lecture 18 - Costing in a Hospital System

Lecture 19 - Choice in Healthcare

Lecture 20 - Measurements based on Choices

Lecture 21 - Grossman's Demand Model

Lecture 22 - Market Structures and Perfect Competition

Lecture 23 - Market Imperfection

Lecture 24 - Ideal Healthcare Market Conditions

Lecture 25 - Imperfect in Healthcare Markets

Lecture 26 - Building Blocks of Health Systems and Health Financing

Lecture 27 - Mechanisms of Health Financing

Lecture 28 - Introduction to health insurance

Lecture 29 - Important concepts of health insurance

Lecture 30 - Strategies for Private Health Insurance companies

Lecture 31 - Types of health insurance and Death Spiral

Lecture 32 - Third Party Administrator.

Lecture 33 - Managed Care Organizations

Lecture 34 - Reinsurance

Lecture 35 - What is Economic Evaluation?

Lecture 36 - Cost Minimization Analysis and Cost Effectiveness Analysis

Lecture 37 - Cost-utility Analysis

Lecture 38 - Cost-Benefit Analysis

Lecture 39 - Types of Goods- Excludability and Rivalry in Consumption

Lecture 40 - Public Goods, Common Resources and decision making based on Cost-Benefit Analysis

Lecture 41 - Tragedy of Commons and Evaluation Framework

Lecture 42 - Fundamental concepts of economic externalities

Lecture 43 - External cost, external benefit and efficient output

Lecture 44 - External cost, external benefit and efficient output

Lecture 45 - Economics of Health and Healthcare

Lecture 46 - Development Indices

Lecture 47 - Social Determinants of Health

Lecture 48 - Fundamental Concepts and Theories Related to Population,Health and Development

Lecture 49 - Population Composition and demographic Dividend

Lecture 50 - Theories Related to Fertility, Population Growth and Socio-Economic Advancements

Lecture 51 - Underwriting

NPTEL : NOC:Simulation of Business Systems: An Applied Approach (Management)

Co-ordinators : Dr. Deepu Philip

Lecture 1 - What is Simulation

Lecture 2 - Terminologies in Simulation

Lecture 3 - How to Built Simulation Model

Lecture 4 - Components of Discrete Event Simulation

Lecture 5 - A Simple Example

Lecture 6 - Terminologies and Like Approaches

Lecture 7 - Monte-Carlo Simulation

Lecture 8 - How to build Simulation? - Major considerations

Lecture 9 - Basic Simulation terms and Illustrative examples

Lecture 10 - Steps in a Simulation Study

Lecture 11 - An introduction to ARENA

Lecture 12 - Simulation experiments using ARENA

Lecture 13 - Probability and Statistics for simulation

Lecture 14 - Pareto Analysis

Lecture 15 - Frequency Distribution

Lecture 16 - Simulation of Tandem Queues using ARENA

Lecture 17 - Simulation with ARENA: Use of Decision node

Lecture 18 - Simulation with ARENA: Use of Assign Node

Lecture 19 - Simulation with ARENA: Use of Batch Node

Lecture 20 - Stem and Leaf Display

Lecture 21 - Tecnomatix: Plant Simulation - Part 1

Lecture 22 - Tecnomatix: Plant Simulation - Part 2

Lecture 23 - Tecnomatix: Plant Simulation - Part 3

Lecture 24 - Probability Distributions - I

Lecture 25 - Probability Distributions - II

Lecture 26 - Valid Model for Input Data

NPTEL : NOC:Management of Field Sales (Management)

Co-ordinators : Prof. Jayanta Chatterjee

Lecture 1 - Introduction to Management of Field Sales

Lecture 2 - Sales Role and Activities

Lecture 3 - Value added selling and Non Verbal Messages

Lecture 4 - Communication Styles in Field Sales

Lecture 5 - Managing Product Life cycle

Lecture 6 - From Product To Benefit

Lecture 7 - The Sales Process

Lecture 8 - Prospecting

Lecture 9 - From Prospecting to Preparing the Sales Call

Lecture 10 - The Buying Process

Lecture 11 - Approaching the Customer with Adaptive Selling

Lecture 12 - Interactive Sales Presentation

Lecture 13 - Consultative Questioning Strategy

Lecture 14 - Account Evaluation - Long Term Approach

Lecture 15 - Negotiating Buyer Concerns

Lecture 16 - Sales Force Structure

Lecture 17 - Leading the Sales Force

Lecture 18 - Sales Force Motivation

Lecture 19 - Forecasting Sales and Developing Budgets

Lecture 20 - Understanding Sales Analytics

NPTEL : NOC:Data Analysis and Decision Making-II (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Utility Analysis

Lecture 2 - Utility Analysis

Lecture 3 - Utility Analysis

Lecture 4 - Utility Analysis

Lecture 5 - Utility Analysis

Lecture 6 - Utility Analysis

Lecture 7 - Utility Analysis

Lecture 8 - Utility Analysis

Lecture 9 - Decisions and Utility Analysis

Lecture 10 - Safety first principle

Lecture 11 - Loss Function

Lecture 12 - Loss Function

Lecture 13 - Balanced Loss Function

Lecture 14 - DEA

Lecture 15 - DEA

Lecture 16 - DEA

Lecture 17 - DEA

Lecture 18 - Decision Trees

Lecture 19 - Decision Trees

Lecture 20 - Decision Trees

Lecture 21 - AHP

Lecture 22 - AHP

Lecture 23 - AHP

Lecture 24 - AHP

Lecture 25 - AHP

Lecture 26 - ELECTRE

Lecture 27 - ELECTRE

Lecture 28 - ELECTRE

Lecture 29 - ELECTRE

Lecture 30 - ELECTRE

Lecture 31 - TOPSIS

Lecture 32 - TOPSIS

Lecture 33 - TOPSIS

Lecture 34 - TOPSIS

Lecture 35 - TOPSIS

Lecture 36 - VIKOR

Lecture 37 - VIKOR

Lecture 38 - VIKOR

Lecture 39 - VIKOR

Lecture 40 - VIKOR

Lecture 41 - MAUT

Lecture 42 - MAUT

Lecture 43 - MAUT

Lecture 44 - multi-objective optimization

Lecture 45 - reliability based optimization

Lecture 46 - Optimization

Lecture 47 - Goal programming

Lecture 48 - GERT

Lecture 49 - Demand model

Lecture 50 - Bass model

Lecture 51 - GERT

Lecture 52 - GERT

Lecture 53 - GERT

Lecture 54 - AIS

Lecture 55 - AIS

Lecture 56 - AIS

Lecture 57 - AIS

Lecture 58 - ANN

Lecture 59 - Metaheuristics techniques

Lecture 60 - General Concepts

NPTEL : NOC:Advanced Green Manufacturing Systems (Management)

Co-ordinators : Dr. Deepu Philip, Dr. Amandeep Singh

Lecture 1 - Significance of manufacturing

Lecture 2 - Productivity in manufacturing

Lecture 3 - Product lifecycle

Lecture 4 - Introduction to optimization

Lecture 5 - Mathematical modeling example

Lecture 6 - Rules of modeling

Lecture 7 - Modeling with continuous variable - Part 1

Lecture 8 - Modeling with continuous variable - Part 2

Lecture 9 - Value Engineering Green Plan: Introduction

Lecture 10 - Value Engineering Green Plan: Methodology - Part 1

Lecture 11 - Value Engineering Green Plan: Methodology - Part 2

Lecture 12 - Value Engineering Green Plan - FAST diagramming

Lecture 13 - Value Engineering - Case Study

Lecture 14 - Value Engineering Green Plan - Paired comparison technique

Lecture 15 - Creativity Techniques

Lecture 16 - Frugal Innovation

Lecture 17 - Green Quality Function Deployment - Part 1

Lecture 18 - Green Quality Function Deployment - Part 2

Lecture 19 - Solving optimization problems

Lecture 20 - Solving optimization problems using MS Excel

Lecture 21 - MS Excel Solver demonstration

Lecture 22 - Solving optimization problems using MS Excel

Lecture 23 - Design of Experiments for Factor Selection

Lecture 24 - Fundamental Techniques of Experimentation

Lecture 25 - Simple Comparative Experiments

Lecture 26 - ANOVA - Part 1

Lecture 27 - ANOVA - Part 2

Lecture 28 - ANOVA - Part 3

Lecture 29 - Design for Environment - Part 1

Lecture 30 - Design for Environment - Part 2

Lecture 31 - Design for Environment - Part 3

Lecture 32 - Design for Environment - Part 4

Lecture 33 - Life Cycle Assessment, EIO-LCA tool

Lecture 34 - Life Cycle Assessment, process based software

Lecture 35 - Introduction to Factorial Experiments

Lecture 36 - Statistical Analysis in Factorial Experiments

Lecture 37 - Numerical Analysis in Factorial Experiments - Part 1

Lecture 38 - Numerical Analysis in Factorial Experiments - Part 2

Lecture 39 - Overview of Optimization Methods - Part 1

Lecture 40 - Overview of Optimization Methods - Part 2

Lecture 41 - Green Factory through Green Unit Processes - Part 1

Lecture 42 - Green Factory through Green Unit Processes - Part 2

Lecture 43 - Green Factory Simulation - Part 1

Lecture 44 - Green Factory Simulation - Part 2

Lecture 45 - Green Factory Simulation - Part 3

Lecture 46 - Advanced Green Manufacturing Systems course summary

NPTEL : NOC:Data Analysis and Decision Making-III (Management)

Co-ordinators : Prof. Raghunandan Sengupta

Lecture 1 - Introduction

Lecture 2 - Linear Programming

Lecture 3 - Linear Programming

Lecture 4 - Utility Analysis

Lecture 5 - Utility Analysis

Lecture 6 - Utility Theory

Lecture 7 - Utility Theory

Lecture 8 - Utility Analysis

Lecture 9 - Safety First Principle

Lecture 10 - Safety First Principle (Continued...)

Lecture 11 - Optimization

Lecture 12 - Optimization

Lecture 13 - Optimization

Lecture 14 - Optimization

Lecture 15 - Simplex Method

Lecture 16 - Simplex Method

Lecture 17 - Simplex Method

Lecture 18 - Simplex Method

Lecture 19 - Optimization

Lecture 20 - Simplex Method

Lecture 21 - Simplex Method

Lecture 22 - Simplex Method

Lecture 23 - Simplex Method

Lecture 24 - Optimization

Lecture 25 - Optimization

Lecture 26 - Optimization

Lecture 27 - Simplex Method

Lecture 28 - Simplex Method

Lecture 29 - Simplex Method

Lecture 30 - Transportation Problem

Lecture 31 - Transportation Problem

Lecture 32 - Transportation Problem

Lecture 33 - Transportation Problem

Lecture 34 - Transportation Problem

Lecture 35 - Loss Function

Lecture 36 - DEA

Lecture 37 - DEA

Lecture 38 - DEA

Lecture 39 - Gomory Cutting Plane Algorithm

Lecture 40 - Gomory Cutting Plane Algorithm

Lecture 41 - Integer Programming

Lecture 42 - Integer Programming

Lecture 43 - Integer Programming

Lecture 44 - Quadratic Programming

Lecture 45 - Portfolio Optimization

Lecture 46 - Chance Constraint Problem

Lecture 47 - Branch and Bound

Lecture 48 - Branch and Bound

Lecture 49 - Branch and Bound

Lecture 50 - Branch and Bound

Lecture 51 - Quadratic Programming

Lecture 52 - Steepest Descent

Lecture 53 - Reliability Based Optimization

Lecture 54 - Reliability Based Optimization

Lecture 55 - Reliability Based Optimization

Lecture 56 - Sequential Optimization and Reliability Assessment

Lecture 57 - Reliability/Stochastic Optimization

Lecture 58 - Reliability/Stochastic Optimization

Lecture 59 - Robustness

Lecture 60 - Robustness

NPTEL : NOC:Artificial Intelligence (AI) for Investments (Management)

Co-ordinators : Prof. Abhinava Tripathi

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

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Lecture 31

Lecture 32

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Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

NPTEL : NOC:Brand Management (Management)

Co-ordinators : Prof. Abhishek Kumar

Lecture 1 - Brands and Marketplace

Lecture 2 - Brands and Marketplace (Continued...)

Lecture 3 - Product Vs Brand

Lecture 4 - Product Vs Brand (Continued...)

Lecture 5 - Brand Management - The Activity

Lecture 6 - Brand Management - The Activity (Continued...)

Lecture 7 - Brand Associations as Raw Material

Lecture 8 - Brand Associations as Raw Material (Continued...)

Lecture 9 - Minning Brand Associations

Lecture 10 - Minning Brand Associations (Continued...)

Lecture 11 - Unearthing Brand Iceberg

Lecture 12 - Unearthing Brand Iceberg (Continued...)

Lecture 13 - Brand Personality

Lecture 14 - Brand Personality (Continued...)

Lecture 15 - Brand Identity

Lecture 16 - Brand Identity (Continued...)

Lecture 17 - Brand Positioning and Repositioning - Part A

Lecture 18 - Brand Positioning and Repositioning - Part A (Continued...)

Lecture 19 - Brand Positioning and Repositioning - Part B

Lecture 20 - Brand Positioning and Repositioning - Part B (Continued...)

Lecture 21 - Brand Positioning and Repositioning (Continued...)

Lecture 22 - Evolution of Brand Manager System

Lecture 23 - Evolution of Brand Manager System (Continued...)

Lecture 24 - Evolution of Brand Manager System - Part B (Continued...)

Lecture 25 - Brand Extensions

Lecture 26 - Brand Extensions (Continued...)

Lecture 27 - Brand Architecture - Part 1

Lecture 28 - Brand Architecture - Part 1 (Continued...)

Lecture 29 - Brand Architecture - Part 2

Lecture 30 - Brand Architecture - Part 2 (Continued...)

Lecture 31 - Relationship Between Pricing and Brand Positioning

Lecture 32 - Relationship Between Pricing and Brand Positioning (Continued...)

Lecture 33 - Pricing - A Tool for Brand Management

Lecture 34 - Pricing - A Tool for Brand Management (Continued...)

Lecture 35 - Marketing Brand Equity

Lecture 36 - Marketing Brand Equity (Continued...)

Lecture 37 - Financial Brand Equity

Lecture 38 - Financial Brand Equity (Continued...)

Lecture 39 - Brands Serving Psycho-Socio Functions

Lecture 40 - Brand Management - Glossary

NPTEL : NOC:Advanced Business Decision Support Systems (Management)

Co-ordinators : Prof. Deepu Philip, Dr. Amandeep Singh Oberoi, Dr. Prabal Pratap Singh

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

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Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

NPTEL : NOC:Advanced Algorithmic Trading and Portfolio Management (Management)

Co-ordinators : Prof. Abhinava Tripathi

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

NPTEL : NOC:Advanced Financial Instruments for Sustainable Business and Decentralized Markets (Management)

Co-ordinators : Prof. Abhinava Tripathi

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

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Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

NPTEL : NOC:Multivariate Procedures with R (Management)

Co-ordinators : Prof. Narendra K Sharma

Lecture 0 - How to Learn and Follow the Course

Lecture 1 - R Software and its Installation

Lecture 2 - Help, Documentation, Examples, Packages and Libraries

Lecture 3 - Command Line and Data Editor

Lecture 4 - Introduction to R Studio

Lecture 5 - R as a Calculator

Lecture 6 - Calculation with Data Vectors and Built-in Function

Lecture 7 - Matrix Operations

Lecture 8 - Matrix Operations

Lecture 9 - Univariate Data-Central Tendency and Variability

Lecture 10 - Bivariate Data

Lecture 11 - Missing Data Handling

Lecture 12 - Measuring Central Tendency with Missing Data

Lecture 13 - Measuring Variation with Missing Data

Lecture 14 - Coefficient of Variation and Summary

Lecture 15 - Boxplots and Grouped Boxplots

Lecture 16 - Bar Diagram, Subdivided and Multiple Bar Diagrams

Lecture 17 - Pie Diagram, Histogram and Multiple Histogram

Lecture 18 - Scatter Plots, Smooth Scatter Plots and Matrix Plots

Lecture 19 - Three Dimensional Plots, Star Plots and Chernoff Faces

Lecture 20 - Continuous and Discrete

Lecture 21 - Probability Functions

Lecture 22 - Probability Functions for Continuous Bivariate and Multivariate Random Variables

Lecture 23 - Theoretical Properties

Lecture 24 - Application in R Software

Lecture 25 - Bivariate Normal and Multivariate Normal Distributions in R

Lecture 26 - Chi Square (X2), t and F Distribution

Lecture 27 - Point and Interval Estimation

Lecture 28 - Maximum Likelihood Estimation

Lecture 29 - Basics of Tests of Hypothesis

Lecture 30 - Test and Confidence Interval for Mean in One Sample with Known Variance in Univariate Data

Lecture 31 - Test and Confidence Interval for Mean in One Sample with Unknown Variance in Univariate Data

Lecture 32 - Tests for Mean in Two Samples with Univariable Data

Lecture 33 - Analysis of Variance and Homogeneity of Variances with Univariate Data

Lecture 34 - Tests for Mean Vector with Multivariate Data in One Sample

Lecture 35 - Tests for Mean Vector with Multivariate Data in Two Sample

Lecture 36 - Centering, Scaling and Z-Scores

Lecture 37 - Introduction and Basic Concepts

Lecture 38 - Estimation of Parameters

Lecture 39 - Model Fitting with R Software

Lecture 40 - Test of Hypothesis and Confidence Interval Estimation on Individual Regression Coefficients

Lecture 41 - Analysis of Variance and Implementation in R Software

Lecture 42 - Goodness of Fit and Testing of Normality

Lecture 43 - Logistic Regression Model

Lecture 44 - Introduction to Classification

Lecture 45 - Bayes Procedure for Classification

Lecture 46 - Classification Procedure for Multivariate Normal Distributions

Lecture 47 - Classification Procedure and Analysis in R

Lecture 48 - Basic Concepts and Definitions

Lecture 49 - Hierarchical Classification

Lecture 50 - Hierarchical Classification and Analysis with R

Lecture 51 - Hierarchical Classification with Examples in R

Lecture 52 - Concepts and Theoretical Setup

Lecture 53 - Principle Component and Its Graphical Analysis in R

Lecture 54 - Canonical Variables and Concepts

Lecture 55 - Statistical Analysis of Canonical Variables

Lecture 56 - Canonical Variables Analysis in R

NPTEL : NOC:Business Marketing - Technology Focus (Management)

Co-ordinators : Prof. Jayanta Chatterjee

Lecture 1 - Introduction to B2B Marketing

Lecture 2 - Tech Marketing

Lecture 3 - Technology life cycle, networks and platforms

Lecture 4 - Organization Markets and Competition

Lecture 5 - Organization Buying decsions

Lecture 6 - Researching Business Markets

Lecture 7 - Design and Tech Market

Lecture 8 - Customer Driven Innovation, New Product Management

Lecture 9 - Market Segments - Technology Focus

Lecture 10 - PLC and TALC

Lecture 11 - Crossing the Chasm

Lecture 12 - B2B Brands - 1

Lecture 13 - B2B Brands - 2

Lecture 14 - B2B Pricing Basics

Lecture 15 - Critical Underpinning Concepts

Lecture 16 - Pricing (Continued...)

Lecture 17 - Pricing Summary

Lecture 18 - B2B Sales

Lecture 19 - Supply Chain

Lecture 20 - Marketing Communicaion

Lecture 21 - Digital Marketing

Lecture 22 - Digital Relationship Management

Lecture 23 - E-Marketing Tools

Lecture 24 - E-Market Place

Lecture 25 - B2B E-Commerce

Lecture 26 - Electronic Auction

Lecture 27 - E-Procurement

Lecture 28 - Marketing as Strategy - I

Lecture 29 - Marketing as Strategy - II

Lecture 30 - LIVE Session (JCB, TATA Steel, THERMAX)

Lecture 31 - Marketing Orientation

Lecture 32 - Marketing - R&D interaction

Lecture 33 - Marketing Metrics

Lecture 34 - Sample Question and Answers

NPTEL : NOC:Advanced R Programming for Data Analytics in Business (Management)

Co-ordinators : Prof. Abhinava Tripathi

Lecture 1 - Fundamentals of R

Lecture 2 - Data cleaning

Lecture 3 - Data Visualization - Part 1

Lecture 4 - Data Visualization - Part 2

Lecture 5 - Introduction to Probability Theory

Lecture 6 - Conditional Probabilities and Bayes Theorem

Lecture 7 - Random Variables and Probability Distributions

Lecture 8 - Binomial Distribution

Lecture 9 - Continuous Random Variables and Normal Distribution

Lecture 10 - Descriptive Analytics: Measures of Central Tendency

Lecture 11 - Descriptive Analytics: Measures of Variability and Shape

Lecture 12 - Statistical Inference: Sampling

Lecture 13 - Statistical Inference: Central Limit Theorem and Confidence Intervals

Lecture 14 - Statistical Inference: Hypothesis testing

Lecture 15 - Introduction to R

Lecture 16 - Inferential statistics: R Implementation

Lecture 17 - Statistical Inference: Sampling

Lecture 18 - Hypothesis Testing: R Implementation

Lecture 19 - Regression Modelling - Part 1

Lecture 20 - Regression Modelling - Part 2

Lecture 21 - Regression Algorithm: Application - Part 1

Lecture 22 - Regression Algorithm: Application - Part 2

Lecture 23 - Classification Algorithms: Logit/Probit Regression - Part 1

Lecture 24 - Classification Algorithms: Logit/Probit Regression - Part 2

Lecture 25 - Classification Algorithms: Application - Part 1

Lecture 26 - Classification Algorithms: Application - Part 2

Lecture 27 - Advanced Data Visualization - Part 1

Lecture 28 - Advanced Data Visualization - Part 2

Lecture 29 - Introduction to Panel Data Modelling

Lecture 30 - Panel data application and implementation with R

Lecture 31 - Advanced Time-Series Models

Lecture 32 - Introduction to ARMA process

Lecture 33 - Forecasting with ARMA models

Lecture 34 - Non-stationarity, Cointegration, and Error correction Models

Lecture 35 - Return and Volatility Modelling and Forecasting

Lecture 36 - Maximum Likelihood Estimation (MLE)

Lecture 37 - Quantile Regression - Part A

Lecture 38 - Quantile Regression - Part B

Lecture 39 - Solar Panel Marketing Case Study

Lecture 40 - PCA and Clustering - Part 1

Lecture 41 - PCA and clustering - Part 2

Lecture 42 - Tutorial - HR Analytics - Part 1

Lecture 43 - Tutorial - HR Analytics - Part 2

Lecture 44 - Application of Logistic Regression - Part 1

Lecture 45 - Application of logistic regression - Part 2

NPTEL : Econometric Modelling (Management)

Co-ordinators : Dr. Rudra P. Pradhan

Lecture 1 - Introduction to Econometric Modelling

Lecture 2 - Structure of Econometric Modelling

Lecture 3 - Univariate Econometric Modelling

Lecture 4 - Bivariate Econometric Modelling

Lecture 5 - Bivariate Econometric Modelling (Continued...)

Lecture 6 - Probability

Lecture 7 - Bivariate Econometric Modelling

Lecture 8 - Bivariate Econometric Modelling (Continued...)

Lecture 9 - Reliability BEM

Lecture 10 - Reliability BEM (Continued...1)

Lecture 11 - Reliability BEM (Continued...2)

Lecture 12 - ANOVA for Bivariate Econometric Modelling

Lecture 13 - Trivariate Econometric Modelling

Lecture 14 - Trivariate Econometric Modelling (Continued...)

Lecture 15 - Reliability of Trivariate Econometric Modelling

Lecture 16 - Multivariate Econometric Modelling

Lecture 17 - Multivariate Econometric Modelling (Continued...)

Lecture 18 - Matrix Approach to Econometric Modelling

Lecture 19 - Matrix Approach to Econometric Modelling (Continued...)

Lecture 20 - Multicolinearity Problem

Lecture 21 - Multicolinearity Problem (Continued...)

Lecture 22 - Autocorrelation Problem

Lecture 23 - Autocorrelation Problem (Continued...)

Lecture 24 - Heteroscedasticity Problem

Lecture 25 - Heteroscedasticity Problem (Continued...)

Lecture 26 - Dummy Modelling

Lecture 27 - Dummy Modelling (Continued...)

Lecture 28 - LOGIT and PROBIT Model

Lecture 29 - LOGIT and PROBIT Model (Continued...)

Lecture 30 - Panel Data Modelling

Lecture 31 - Panel Data Modelling (Continued...)

Lecture 32 - Simultaneous Equation Modelling

Lecture 33 - Simultaneous Equation Modelling (Continued...)

Lecture 34 - Structural Equation Modelling

Lecture 35 - Structural Equation Modelling (Continued...)

Lecture 36 - Time Series Modelling

Lecture 37 - Time Series Modelling (Continued...)

Lecture 38 - Unit Root

Lecture 39 - Cointegration

Lecture 40 - Concluding Remarks

NPTEL : Organizational Behaviour (Management)

Co-ordinators : Dr. Susmita Mukhopadhyay

Lecture 1 - Understanding Organizational Behaviour

Lecture 2 - Effectiveness in Organizations

Lecture 3 - Social System and Organizational Culture

Lecture 4 - Social System and Organizational Culture (Continued...)

Lecture 5 - Individual differences and work behaviour

Lecture 6 - Personality

Lecture 7 - Personality (Continued...)

Lecture 8 - Attitudes

Lecture 9 - Attitudes (Continued...)

Lecture 10 - Attitudes (Continued...)

Lecture 11 - Perceptions and Attributions

Lecture 12 - Perceptions and Attributions (Continued...)

Lecture 13 - Motivation

Lecture 14 - Motivation (Continued...)

Lecture 15 - Job Design, Work and Motivation

Lecture 16 - Job Design, Work and Motivation (Continued...)

Lecture 17 - Evaluation, Feedback and Rewards

Lecture 18 - Evaluation, Feedback and Rewards (Continued...)

Lecture 19 - Managing Misbehaviour

Lecture 20 - Stress

Lecture 21 - Counseling

Lecture 22 - Informal and Formal Groups

Lecture 23 - Teams and Teambuilding

Lecture 24 - Managing Conflict and Negotiation

Lecture 25 - Managing Conflict and Negotiation (Continued...)

Lecture 26 - Power and Politics

Lecture 27 - Empowerment and Participation

Lecture 28 - Assertive Behaviour and Transactional Analysis

Lecture 29 - Communication

Lecture 30 - Communication (Continued...)

Lecture 31 - Decision Making

Lecture 32 - Decision Making (Continued...)

Lecture 33 - Leadership

Lecture 34 - Leadership (Continued...)

Lecture 35 - Leadership (Continued...)

Lecture 36 - Organizational structure and Design

Lecture 37 - Organizational structure and Design (Continued...)

Lecture 38 - Organizational structure and Design (Continued...)

Lecture 39 - Change and Innovation

Lecture 40 - Change and Innovation (Continued...)

Lecture 41 - Organizational behaviour across cultures

NPTEL : Security Analysis and Portfolio Management (Management)

Co-ordinators : Dr. Jitendra Mahakud, Dr. Chandra Sekhar Mishra

Lecture 1 - Introduction to Investment Management

Lecture 2 - Markets for Investment

Lecture 3 - Risk and Return

Lecture 4 - Risk and Return (Continued...)

Lecture 5 - Organization and Function of Equity and Debt Markets

Lecture 6 - Mutual Funds

Lecture 7 - Market Efficiency - Concepts and forms of efficiency

Lecture 8 - Testing Market Efficiency

Lecture 9 - Financial Statement Analysis

Lecture 10 - Financial Statement Analysis (Continued...)

Lecture 11 - Valuation of Equity Shares - I

Lecture 12 - Valuation of Equity Shares - II

Lecture 13 - Economic Analysis - I

Lecture 14 - Economic Analysis - II

Lecture 15 - Industry Analysis - I

Lecture 16 - Industry Analysis - II

Lecture 17 - Company Analysis - I

Lecture 18 - Company Analysis - II

Lecture 19 - Technical Analysis - I

Lecture 20 - Technical Analysis - II

Lecture 21 - Introduction to Portfolio Management

Lecture 22 - Introduction to Portfolio Management (Continued...)

Lecture 23 - Capital Market Theory - I

Lecture 24 - Capital Market Theory - II

Lecture 25 - Arbitrage Pricing Theory

Lecture 26 - Multifactor Pricing Model

Lecture 27 - Markowitz Optimal Portfolio Selection Model

Lecture 28 - Other Optimal Portfolio Selection Models

Lecture 29 - Equity Portfolio Management Strategies - I

Lecture 30 - Equity Portfolio Management Strategies - II

Lecture 31 - Introduction to Bond Analysis

Lecture 32 - Bond Pricing and Yield

Lecture 33 - Interest Rate: Determination & Structure

Lecture 34 - Bond Price Volatility

Lecture 35 - Bond Portfolio Management Strategies - I

Lecture 36 - Bond Portfolio Management Strategies - II

Lecture 37 - Derivatives - I

Lecture 38 - Derivatives - II

Lecture 39 - Portfolio Performance Evaluation - I

Lecture 40 - Portfolio Performance Evaluation - II

NPTEL : Six Sigma (Management)

Co-ordinators : Prof. Tapan P. Bagchi

Lecture 1 - Concepts in Quality Management - I

Lecture 2 - Concepts in Quality Management - II

Lecture 3 - Concepts in Quality Management - III

Lecture 4 - Initiating Six Sigma

Lecture 5 - Review of Probability and Statistics - I

Lecture 6 - Review of Probability and Statistics - II

Lecture 7 - Review of Probability and Statistics - III

Lecture 8 - Review of Probability and Statistics - IV

Lecture 9 - QM Systems Overview

Lecture 10 - Cost of Quality and TQM Tools

Lecture 11 - QFD and ISO 9000

Lecture 12 - QS 9000 and Awards

Lecture 13 - Competing Through Service Quality

Lecture 14 - Introduction to Project Management

Lecture 15 - Project Life Cycle

Lecture 16 - Critical Path Method

Lecture 17 - Measurement System Analysis

Lecture 18 - Acceptance Sampling

Lecture 19 - Design of Sampling Plans

Lecture 20 - MIL-STD-105E Sampling Plan

Lecture 21 - Introduction to SPC

Lecture 22 - Control Chart Examples

Lecture 23 - Control Charts by Excel

Lecture 24 - Process Capability

Lecture 25 - Quality Function Deployment

Lecture 26 - Design of Experiments - Overview

Lecture 27 - Planning for DOE

Lecture 28 - Factor Effect Calculations

Lecture 29 - ANOVA in DOE

Lecture 30 - Benchmarking in Six Sigma

Lecture 31 - How to Benchmark

Lecture 32 - Six Sigma in Supply Chains

Lecture 33 - Taguchi Methods

Lecture 34 - Robust Design

Lecture 35 - The Journey to Six Sigma

Lecture 36 - A Case Study of Defect Reduction

Lecture 37 - DFM & Reliability

Lecture 38 - Failure Modes & Effects Analysis (FMEA)

Lecture 39 - Implementing Six Sigma

Lecture 40 - Getting Results From Six Sigma

NPTEL : International Business Communication (Management)

Co-ordinators : Prof. A. Malic

Lecture 1 - Introduction

Lecture 2 - Definitions & Concepts

Lecture 3 - Communicative Competence - I

Lecture 4 - Communicative Competence - II

Lecture 5 - Communicative Competence - III

Lecture 6 - Intercultural Communication - I

Lecture 7 - Intercultural Communication - II

Lecture 8 - Intercultural Communication - III

Lecture 9 - Intercultural Communication - Thought and Speech

Lecture 10 - Intercultural Communication - Thought and Speech (Continued...)

Lecture 11 - Intercultural Communication: Translation as Problematic Discourse

Lecture 12 - Nonverbal Communication

Lecture 13 - Barriers to Communication

Lecture 14 - Barriers to Communication (Continued...)

Lecture 15 - Barriers to Communication (Continued...) & Listening

Lecture 16 - Listening (Continued...)

Lecture 17 - Communication Rules

Lecture 18 - Communication Style

Lecture 19 - Interpersonal Communication

Lecture 20 - Interpersonal Communication (Continued...)

Lecture 21 - Relational Communication

Lecture 22 - Relational Communication (Continued...)

Lecture 23 - Organizational Communication

Lecture 24 - Organizational Communication (Continued...)

Lecture 25 - Collaboration

Lecture 26 - Communication in Groups and Teams

Lecture 27 - Communication in Groups and Teams (Continued...1)

Lecture 28 - Communication in Groups and Teams (Continued...2)

Lecture 29 - Persuasive Communication

Lecture 30 - Persuasive Communication (Continued...)

Lecture 31 - Negotiation and Conflict Management

Lecture 32 - Negotiation and Conflict Management (Continued...)

Lecture 33 - Leadership

Lecture 34 - Written Communication in International Business

Lecture 35 - Role of Technology in international Business Communication

Lecture 36 - Moving to Another Culture

Lecture 37 - Re-entry

Lecture 38 - Crisis Communication

Lecture 39 - Ethics in Business Communication

Lecture 40 - Conclusion

NPTEL : Consumer Behaviour (Management)

Co-ordinators : Dr. Sangeeta Sahney

Lecture 1 - Introduction to the Study of Consumer Behaviour

Lecture 2 - Introduction to the Study of Consumer Behaviour (Continued...)

Lecture 3 - Market Research and Consumer Behaviour

Lecture 4 - Market Research and Consumer Behaviour (Continued...)

Lecture 5 - Market Segmentation and Positioning

Lecture 6 - Market Segmentation and Positioning (Continued...)

Lecture 7 - The Consumer Decision Making Process

Lecture 8 - The Consumer Decision Making Process (Continued...)

Lecture 9 - Models of Consumers and Models of Consumer Behaviour

Lecture 10 - Models of Consumers and Models of Consumer Behaviour (Continued...)

Lecture 11 - Models of Consumers and Models of Consumer Behaviour (Continued...)

Lecture 12 - Models of Consumers and Models of Consumer Behaviour (Continued...)

Lecture 13 - Consumer Needs and Motivation, Emotions and Mood, Consumer Involvement

Lecture 14 - Consumer Needs and Motivation, Emotions and Mood, Consumer Involvement (Continued...)

Lecture 15 - Consumer Needs and Motivation, Emotions and Mood, Consumer Involvement (Continued...)

Lecture 16 - Consumer Needs and Motivation, Emotions and Mood, Consumer Involvement (Continued...)

Lecture 17 - Consumer Needs and Motivation, Emotions and Mood, Consumer Involvement (Continued...)

Lecture 18 - Consumer Learning

Lecture 19 - Consumer Learning (Continued...)

Lecture 20 - Consumer Learning (Continued...)

Lecture 21 - Consumer Learning (Continued...)

Lecture 22 - Personality, Self Concept and Self Image

Lecture 23 - Personality, Self Concept and Self Image (Continued...)

Lecture 24 - Consumer Perception, Risk and Imagery

Lecture 25 - Consumer Perception, Risk and Imagery (Continued...)

Lecture 26 - Consumer Perception, Risk and Imagery (Continued...)

Lecture 27 - Consumer Attitudes

Lecture 28 - Consumer Attitudes (Continued...)

Lecture 29 - Consumer Attitudes (Continued...)

Lecture 30 - Consumer Communication

Lecture 31 - Consumer Communication (Continued...)

Lecture 32 - Consumer Groups and Reference Groups

Lecture 33 - Family and Family Life Cycle

Lecture 34 - Social Class and Mobility, Lifestyle Analysis

Lecture 35 - Culture, Sub-Culture and Cross-Culture

Lecture 36 - Culture, Sub-Culture and Cross-Culture (Continued...)

Lecture 37 - Interpersonal Communication and Influence

Lecture 38 - Opinion Leadership

Lecture 39 - Diffusion of Innovation

Lecture 40 - Diffusion of Innovation (Continued...)

NPTEL : International Finance (Management)

Co-ordinators : Dr. Arun K. Misra

Lecture 1 - International Financial Environment

Lecture 2 - International Financial Transactions

Lecture 3 - Gold Standard

Lecture 4 - Purchasing Power Parity

Lecture 5 - Floating and Fixed Exchange Rate Regimes

Lecture 6 - Currency Boards and Currency Basket Systems

Lecture 7 - Features of Foreign Exchange Market

Lecture 8 - Exchange Rate Arithmetic

Lecture 9 - Understanding Merchant Rates

Lecture 10 - Foreign Exchange Forward Contracts

Lecture 11 - Value at Risk for Foreign Exchange Market

Lecture 12 - International Parity Conditions and Movement Exchange Rate

Lecture 13 - Exchange Rate Determination and Forecasting

Lecture 14 - Development of Foreign Exchange Market in India

Lecture 15 - Foreign Exchange Exposures : Transaction Exposure

Lecture 16 - Transaction Exposure Management

Lecture 17 - Foreign Exchange Futures Market for Transaction Exposure Management

Lecture 18 - Foreign Currency Options : Transaction Exposure Management

Lecture 19 - Interest Rate Swaps

Lecture 20 - Currency Swaps

Lecture 21 - Operating Exposure Assessment

Lecture 22 - Operating Exposure Management

Lecture 23 - International Capital Structure and Capital Assets Pricing Model

Lecture 24 - International Capital Budgeting

Lecture 25 - Evaluation of Foreign Direct Investment

Lecture 26 - Cross Listing of Shares : Depository Receipts

Lecture 27 - International Financial Integration

Lecture 28 - World Trade Organisation

Lecture 29 - India's Forex Reserves Composition and Determinants of Optimum Reserves

Lecture 30 - Movement of Exchange Rates in India

Lecture 31 - International Trade Theory

Lecture 32 - International Bond Market

Lecture 33 - India's Foreign Trade - Direction and Composition

Lecture 34 - Financial Stability

Lecture 35 - Test-1

Lecture 36 - Money and Forex Market Interaction : Indian Experience

Lecture 37 - Test-2

Lecture 38 - Characteristics of Indian Foreign Exchange Market

Lecture 39 - Test-3

Lecture 40 - Test-4

NPTEL : Applied Multivariate Statistical Modeling (Management)

Co-ordinators : Dr. J. Maiti

Lecture 1 - Introduction to multivariate statistical modeling

Lecture 2 - Introduction to multivariate statistical modeling (Continued...)

Lecture 3 - Univariate descriptive statistics

Lecture 4 - Sampling distribution

Lecture 5 - Estimation

Lecture 6 - Estimation (Continued...)

Lecture 7 - Hypothesis testing

Lecture 8 - Multivariate descriptive statistics

Lecture 9 - Multivariate descriptive statistics (Continued...)

Lecture 10 - Multivariate normal distribution

Lecture 11 - Multivariate normal distribution (Continued...)

Lecture 12 - Multivariate Inferential Statistics

Lecture 13 - Multivariate Inferential Statistics (Continued...)

Lecture 14 - ANOVA (Analysis of Varianace)

Lecture 15 - Analysis of Variance (Continued...)

Lecture 16 - Multivariate Analysis of Variance (MANOVA)

Lecture 17 - MANOVA (Continued...)

Lecture 18 - Tutorial - ANOVA

Lecture 19 - Tutorial ANOVA (Continued...)

Lecture 20 - MANOVA - Case Study

Lecture 21 - Multiple Regression â€“ Introduction

Lecture 22 - MLR - Sampling distribution of regression coefficients

Lecture 23 - MLR - Model adequacy tests

Lecture 24 - MLR - Test of assumptions

Lecture 25 - MLR - Model diagnostics

Lecture 26 - MLR - Case Study

Lecture 27 - Multivariate Linear Regression

Lecture 28 - Multivariate Linear Regression - Estimation

Lecture 29 - Multivariate Linear Regression - Model Adequacy tests

Lecture 30 - Principal Component Analysis (PCA)

Lecture 31 - PCA - Model Adequacy & Interpretation

Lecture 32 - Regression Modeling using SPSS

Lecture 33 - Factor Analysis

Lecture 34 - Factor Analysis - Estimation & Model Adequacy testing

Lecture 35 - Factor Analysis - Model Adequacy, rotation, factor scores & case study

Lecture 36 - Cluster Analysis

Lecture 37 - Cluster Analysis (Continued...)

Lecture 38 - Introduction to Structural Equation Modeling (SEM)

Lecture 39 - SEM - Measurement Model

Lecture 40 - SEM - Structural Model

Lecture 41 - Correspondence Analysis

Lecture 42 - Correspondence Analysis (Continued...)

NPTEL : Economics, Management, Entrepreneurship (Management)

Co-ordinators : Prof. P.K.J. Mohapatra

Lecture 1 - Introduction

Lecture 2 - Market Equilibrium : Demand and Supply

Lecture 3 - Elasticity of Demand

Lecture 4 - Demand Forecasting

Lecture 5 - Production

Lecture 6 - Exercises on Economics

Lecture 7 - Cost - Volume - Profit Relationships

Lecture 8 - Cost Management Systems and Activity Costing Systems

Lecture 9 - Relevant Information and Decision Making

Lecture 10 - Cost Allocation

Lecture 11 - Exercises on Economics (Continued...)

Lecture 12 - Double - Entry Bookkeeping

Lecture 13 - Job Costing

Lecture 14 - Process Costing

Lecture 15 - The Master Budget

Lecture 16 - Flexible Budegst and Variance Analysis

Lecture 17 - Financial Statements

Lecture 18 - Financial Statements (Continued...)

Lecture 19 - Analysis of Financial Statements

Lecture 20 - Exercises (Continued...)

Lecture 21 - Time Value of Money

Lecture 22 - Comparison of Alternatives

Lecture 23 - Comparison of Alternatives (Continued...)

Lecture 24 - Comparison of Alternatives (Continued...)

Lecture 25 - Depreciation Accounting

Lecture 26 - Depreciation Accounting (Continued...)

Lecture 27 - Exercises

Lecture 28 - Evolution of Management Thoughts

Lecture 29 - Functions of Management

Lecture 30 - Functions of Management (Continued...)

Lecture 31 - Functions of Management (Continued...)

Lecture 32 - Directing

Lecture 33 - Product Development

Lecture 34 - Forecasting Revisited

Lecture 35 - Forecasting Revisited (Continued...)

Lecture 36 - Forecasting Revisited (Continued...)

Lecture 37 - Capacity Planning

Lecture 38 - Capacity Planning (Continued...) and Plant Location

Lecture 39 - Product Service Strategies and Plant Layout

Lecture 40 - Plant Lauout (Continued...) and Production Planning and Control

Lecture 41 - Production Planning and Control (Continued...)

Lecture 42 - Inventory Management

Lecture 43 - Inventory Management (Continued...)

Lecture 44 - Supply Chain Management

Lecture 45 - Supply Chain Management (Continued...) and Marketing Management

Lecture 46 - Marketing Management (Continued...)

Lecture 47 - Forms of Ownership

Lecture 48 - Starting a New Company and Small - scale Industrial Undertakings

Lecture 49 - Capital Financing

Lecture 50 - Entrepreneurship - Final Words

NPTEL : NOC:Principles of Human Resource Management (Management)

Co-ordinators : Prof. A Malik

Lecture 1 - Introduction to HRM

Lecture 2 - Job Analysis and Design

Lecture 3 - Employee testing and selection

Lecture 4 - Performance appraisal

Lecture 5 - Performance evaluation and feedback

Lecture 6 - The Training process: Assessment of training needs and Training methods

Lecture 7 - General and Specific Training and Evaluation of Training

Lecture 8 - Career Management and planning

Lecture 9 - Career Development

Lecture 10 - Compensation

Lecture 11 - Pay for performance systems

Lecture 12 - Pay and Reward systems

Lecture 13 - Benefits

Lecture 14 - Separation and Administration of Benefits

Lecture 15 - Business Ethics

Lecture 16 - Ethical Aspects of HRM Activities

Lecture 17 - Employee Health

Lecture 18 - Employee Wellbeing in the Workplace

Lecture 19 - Organized Labor

Lecture 20 - Managing the Labor Relations Process

Lecture 21 - International HRM

Lecture 22 - Global Employment Law, Industrial Relations and International Ethics

Lecture 23 - Challenges to International HRM

Lecture 24 - Strategic HRM

Lecture 25 - Multilevel Model of Strategic HRM

Lecture 26 - Strategic HRM in a Networked World

Lecture 27 - Sustainable HRM

Lecture 28 - HR Measurement and Accountability

Lecture 29 - Types of Score Cards

Lecture 30 - Discipline in Organizations

Lecture 31 - Dealing with Difficult Employees

Lecture 32 - Using HRM to Prevent the Need for Discipline

NPTEL : NOC:Commodity Derivatives and Risk Management (Management)

Co-ordinators : Dr. Prabina Rajib

Lecture 1 - Introduction to Commodity Derivatives and Risk Management

Lecture 2 - Introduction to Commodity Derivatives and Risk Management (Continued...)

Lecture 3 - Futures Contract Specifications

Lecture 4 - Futures Contract Specifications (Continued...)

Lecture 5 - Futures Contract - Mark-to-Market Margin

Lecture 6 - Commodity Options and Commodity Spreads

Lecture 7 - Pricing and Valuations of Futures Contract

Lecture 8 - Pricing and Valuations of Futures Contract (Continued...)

Lecture 9 - Convenience Field, Contango-Backwardation

Lecture 10 - Commodity Basic Risk - Part I

Lecture 11 - Commodity Basic Risk - Part II

Lecture 12 - Minimum Variance Hedge Ratio - Part I

Lecture 13 - Minimum Variance Hedge Ratio - Part II

Lecture 14 - Commodity Indexes - Part I

Lecture 15 - Commodity Indexes - Part II

Lecture 16 - Agri-Commodity Price Risk Management - Part I

Lecture 17 - Agri-Commodity Price Risk Management - Part II

Lecture 18 - Seasonality in Agri-Commodity, Contango and Backwardation - Part I

Lecture 19 - Seasonality in Agri-Commodity, Contango and Backwardation - Part II

Lecture 20 - Commodity Prices Determination - Part I

Lecture 21 - Commodity Prices Determination - Part II

Lecture 22 - Crude Oil Derivatives - Part I

Lecture 23 - Crude Oil Price Determination

Lecture 24 - Spot-Futures Relationship in Crude Oil - Part I

Lecture 25 - Spot-Futures Relationship in Crude Oil - Part II

Lecture 26 - Hedging of Crude Oil and Refined Product Price Risk - Part I

Lecture 27 - Hedging of Crude Oil and Refined Product Price Risk - Part II

Lecture 28 - Introduction to Gold and Gold Derivatives

Lecture 29 - LBMA, Gold Spot Price and Gold Derivatives

Lecture 30 - OTC Contracts on Gold and Gold Dehedge

Lecture 31 - Spot Trading of Electricity in India - Part I

Lecture 32 - Spot Trading of Electricity in India - Part II

Lecture 33 - Weather Derivatives - Part I

Lecture 34 - Weather Derivatives - Part II

Lecture 35 - Introduction to Carbon Credit Market

Lecture 36 - Carbon Derivatives

Lecture 37 - Physical Market for Freight, Freight Exchanges, Freight Indexes

Lecture 38 - Hedging Freight rate Risk with Freight Rate Derivatives

Lecture 39 - Metal Derivatives and London Metal Exchange (LME)

Lecture 40 - Real Estate Derivatives

NPTEL : NOC:Strategic Communication for Sustainable Development (Management)

Co-ordinators : Prof. A Malik

Lecture 1 - Introduction

Lecture 2 - Models for Public Participation in Sustainable Development

Lecture 3 - Role of Communication in Sustainable Development

Lecture 4 - Sustainability Communication

Lecture 5 - Approaches to Sustainability Communication : Strong Sustainability

Lecture 6 - Approaches to Sustainability Communication : Integrative Approach

Lecture 7 - Sociological Perspectives on Sustainability Communication

Lecture 8 - Psychological Perspectives on Sustainability Communication

Lecture 9 - Psychological Perspectives on Sustainability Communication (Continued...)

Lecture 10 - Steyn and Puth's Model for Communication Strategy

Lecture 11 - Application of Steyn and Puth's Model to Development

Lecture 12 - Tools of Strategic Communication for Sustainable Development

Lecture 13 - Role of Strategic Communication for Sustainable Development

Lecture 14 - Role of Stakeholders in Strategic Communication for Sustainable Development

Lecture 15 - Systems Approach to Identifying Decisive Information

Lecture 16 - Adapting CSR Communication Strategies to Sustainable Development

Lecture 17 - Strategic Conversations

Lecture 18 - Creating a Strategic Communication Plan

Lecture 19 - Communication for Behavioral Impact (COMBI) for Sustainable Development

Lecture 20 - Media and Sustainability Communication

Lecture 21 - ICTs in Sustainable Development

Lecture 22 - Community Informatics

Lecture 23 - Challenges to the use of ICTs in Sustainable Development Efforts

Lecture 24 - Wrap up and Conclusion

NPTEL : NOC:Consumer Behaviour (Management)

Co-ordinators : Prof. Srabanti Mukherjee

Lecture 1 - Introduction to Consumer Behaviour

Lecture 2 - The Changing Patterns of Consumer Behaviour

Lecture 3 - Dimensions of Consumerism

Lecture 4 - Use of Market Segmentation in Consumer Behaviour

Lecture 5 - Process of Motivation

Lecture 6 - Theories of Motivation

Lecture 7 - Consumer Involvement

Lecture 8 - Case Study on Motivation and Involvement

Lecture 9 - Concept and Levels of Perception

Lecture 10 - Process of Perception

Lecture 11 - Theories of Personality - I

Lecture 12 - Theories of Personality - II

Lecture 13 - Brand Personality and Self concept

Lecture 14 - Theories of Learning

Lecture 15 - Attitude Formation - I

Lecture 16 - Attitude Formation - II

Lecture 17 - Changing Attitude

Lecture 18 - Exercise on Attitude Formation and Change

Lecture 19 - Values

Lecture 20 - AIO Classification

Lecture 21 - VALS - I Typology

Lecture 22 - VALS - TM Typology

Lecture 23

Lecture 24

Lecture 25 - Group Influences on Consumption

Lecture 26 - Role of Celebrity Endorsement

Lecture 27 - Concept of Family and Family Life Cycle

Lecture 28 - Family Buying Decisions

Lecture 29 - Diffusion of Innovations - I

Lecture 30 - Diffusion of Innovations - II

Lecture 31 - Influencing Factors for Adoption and Opinion Leadership

Lecture 32 - Consumer Decision Making

Lecture 33 - Consumer Black Box Model

Lecture 34 - Models of Consumer Behaviour - I

Lecture 35 - Models of Consumer Behaviour - II

Lecture 36 - Models of Consumer Behaviour - III

Lecture 37 - Models of Consumer Behaviour - IV

Lecture 38 - Organisational Buying Behaviour - I

Lecture 39 - Organisational Buying Behaviour - II

Lecture 40 - Dimensions of Consumer Research

NPTEL : NOC:Foundation Course in Managerial Economics (Management)

Co-ordinators : Prof. Barnali Nag

Lecture 1 - Principles of Economics

Lecture 2 - Demand - Supply Framework

Lecture 3 - Determinants of Demand

Lecture 4 - Supply Curve, Determinants of Supply Curve

Lecture 5 - Demand Supply Equilibrium

Lecture 6 - Elasticity of Demand and Supply

Lecture 7 - Determinants of Elasticity of Demand

Lecture 8 - Elasticity and Revenue

Lecture 9 - Elasticity of Supply

Lecture 10 - Demand Supply and Government Policies

Lecture 11 - Demand Supply and Government Policies (Continued...)

Lecture 12 - Taxes and Demand and Supply Framework

Lecture 13 - Elasticity and Taxes

Lecture 14 - Efficiency and Market Equilibrium

Lecture 15 - Production and Cost

Lecture 16 - Costs

Lecture 17 - Cost Curves

Lecture 18 - LR and SR Cost Curves

Lecture 19 - Market Structures

Lecture 20 - Perfect Competition

Lecture 21 - Perfect Competition and Profit Maximization

Lecture 22 - Suppy Curve of Firm in Perfect Competition

Lecture 23 - Supply Curve of Market in Perfect Competition

Lecture 24 - Market Supply (Continued...)

Lecture 25 - Monopoly

Lecture 26 - Monopoly - Determination of Price and Quality

Lecture 27 - Monopoly - Supply and Efficiency

Lecture 28 - Price Discrimination

Lecture 29 - Public Policy and Regulation

Lecture 30 - Monopolistic Competition

Lecture 31 - Monopolistic Competition - Determining P and K

Lecture 32 - Monopolistic Competition - Efficiency and Welfare

Lecture 33 - Monopolistic Competition - Advertising

Lecture 34 - Oligopoly

Lecture 35 - Oligopoly - Determining P and Q

Lecture 36 - Oligopoly - P and Q Outcomes with Example

Lecture 37 - Difference between Market Outcomes

Lecture 38 - Oligopoly - Game Theory

Lecture 39 - Oligopoly - Game Theory (Continued...)

Lecture 40 - Oligopoly Pricing

Lecture 41 - Public Policy in Oligopoly

NPTEL : NOC:Knowledge Management (Management)

Co-ordinators : Prof. K. B. L. Srivastava

Lecture 1 - Introduction to KM

Lecture 2 - Introduction to KM (Continued...)

Lecture 3 - Why KM ?

Lecture 4 - KM System Life Cycle (KSLC)

Lecture 5 - Aligning KM and business strategy

Lecture 6 - Process and models of KM cycle

Lecture 7 - Process and models of KM cycle (Continued...)

Lecture 8 - Knowledge creation and architecture

Lecture 9 - Capturing tacit knowledge

Lecture 10 - Capturing tacit knowledge (Continued...)

Lecture 11 - Knowledge codification

Lecture 12 - Knowledge codification

Lecture 13 - System development: system testing and deployment

Lecture 14 - System development: system testing and deployment (Continued...)

Lecture 15 - Knowledge transfer and knowledge sharing

Lecture 16 - Knowledge infrastructure

Lecture 17 - Knowledge infrastructure (Continued...)

Lecture 18 - Knowledge audit

Lecture 19 - The knowledge team

Lecture 20 - The knowledge team (Continued...)

Lecture 21 - Analysis, design of KM system

Lecture 22 - Analysis, design of KM system

Lecture 23 - Developing the KM system

Lecture 24 - Prototyping and deployment

Lecture 25 - Prototyping and deployment

Lecture 26 - Inferences from data

Lecture 27 - Inferences from data

Lecture 28 - Data mining

Lecture 29 - Data Management

Lecture 30 - Knowledge portals

Lecture 31 - Evaluation of KM effectiveness: Tools and

Lecture 32 - Metrics

Lecture 33 - Legal issues

Lecture 34 - Ethical Issues

Lecture 35 - Managerial issues

Lecture 36 - KM. Experiences form Indian companies

Lecture 37 - KM practices of select industries

Lecture 38 - KM practices of select industries

Lecture 39 - Linking KM with innovation and learning organization

Lecture 40 - Future of KM

NPTEL : NOC:Services Marketing: A Practical Approach (Management)

Co-ordinators : Dr. Biplab Datta

Lecture 1 - Introduction

Lecture 2 - Why Study Services Marketing Management?

Lecture 3 - The Service System

Lecture 4 - Characteristics of Services

Lecture 5 - Understanding the Macro-Environment - I

Lecture 6 - Understanding the Macro-Environment - II

Lecture 7 - Understanding the Macro-Environment - III and Understanding the Micro-Environment - I

Lecture 8 - Understanding the Micro-Environment - II

Lecture 9 - Services Marketing Process

Lecture 10 - Exploring Marketing Oppurtunities - I

Lecture 11 - Exploring Marketing Oppurtunities - II

Lecture 12 - Segmenting the Market, Targeting and Positioning

Lecture 13 - Services Marketing Research

Lecture 14 - Understanding Consumer Behaviour

Lecture 15 - New Service Development

Lecture 16 - The Service Product

Lecture 17 - Service Quality - I

Lecture 18 - Service Quality - II

Lecture 19 - Designing the Service Process - I

Lecture 20 - Designing the Service Process - II

Lecture 21 - Developing Service Personnel

Lecture 22 - Educating Customers

Lecture 23 - Managing Service Delivery Channels

Lecture 24 - Managing Channel Conflict

Lecture 25 - Managing Demand and Capacity - I

Lecture 26 - Managing Demand and Capacity - II

Lecture 27 - Designing the Physical Evidence

Lecture 28 - Managing Integrated Marketing Communications - I

Lecture 29 - Managing Integrated Marketing Communications - II

Lecture 30 - Pricing the Service

Lecture 31 - Managing Customers

Lecture 32 - Managing Service Recovery

Lecture 33 - Providing Service Guarantees

Lecture 34 - Consumer Protection

Lecture 35 - Case Study - I

Lecture 36 - Case Study - II

Lecture 37 - Case Study - III

Lecture 38 - Case Study - IV

Lecture 39 - Case Study - V

NPTEL : NOC:Business Ethics (Management)

Co-ordinators : Dr. Susmita Mukhopadhyay

Lecture 1 - What is Business Ethics? Why Business Ethics is important?

Lecture 2 - Business Ethics in different organizational contexts

Lecture 3 - Globalization: a key context for Business Ethics

Lecture 4 - Sustainability: a key goal for Business Ethics

Lecture 5 - What is Corporation?

Lecture 6 - Corporate Social Responsibility

Lecture 7 - Stakeholder theory of the firm

Lecture 8 - Corporate accountability

Lecture 9 - Corporate citizenship

Lecture 10 - Normative ethical theories and descriptive ethical theories, western modernist ethical theories

Lecture 11 - Western modernist ethical theories (Continued...)

Lecture 12 - Alternative perspectives on ethical theories

Lecture 13 - Indian perspective on Ethics

Lecture 14 - Models of ethical decision making and individual influences on ethical decision making

Lecture 15 - Situational influences on ethical decision making

Lecture 16 - Case Study 1

Lecture 17 - What is Business Ethics Management?

Lecture 18 - Setting standards of ethical behavior

Lecture 19 - Managing stakeholder relationship

Lecture 20 - Assessing ethical performance

Lecture 21 - Organizing for business ethics

Lecture 22 - Shareholders as stakeholders: understanding Corporate Governance

Lecture 23 - Ethical issues in corporate governance

Lecture 24 - Shareholders as citizens of corporation

Lecture 25 - Shareholding for sustainability

Lecture 26 - Financial Management: Overview and perspective

Lecture 27 - Models of organizations

Lecture 28 - Firm-employee relationship

Lecture 29 - Firm-employee relationship (Continued...)

Lecture 30 - Globalization and employment

Lecture 31 - Towards sustainable employment

Lecture 32 - Case Study 2

Lecture 33 - Consumers as stakeholders

Lecture 34 - Ethical issues, marketing and the consumer

Lecture 35 - Globalization and consumers

Lecture 36 - Consumers and corporate citizenship

Lecture 37 - Sustainable consumption

Lecture 38 - Suppliers and competitors as stakeholders

Lecture 39 - Ethical issues and competitors

Lecture 40 - Globalization, suppliers and competitors

Lecture 41 - The corporate citizen in the business community

Lecture 42 - Sustainability and business relationship

Lecture 43 - Civil society and business ethics

Lecture 44 - Ethical issues and CSOs

Lecture 45 - Globalization and CSOs

Lecture 46 - Corporate citizenship and civil society

Lecture 47 - Civil society, business and sustainability

Lecture 48 - Government, regulation and business ethics

Lecture 49 - Ethical issues in the relation between business and government

Lecture 50 - Globalization and business-government relations

Lecture 51 - Corporate citizenship and regulation

Lecture 52 - Governments, business and sustainability

Lecture 53 - Case Study 3

Lecture 54 - Environment and business ethics

Lecture 55 - Ethics of pollution control

Lecture 56 - Ethics of conserving depletable resources

Lecture 57 - Sustainability

Lecture 58 - Information technology and business ethics

Lecture 59 - Data identity and security

Lecture 60 - Computer crimes and IPR

Lecture 61 - TRIPS in India

NPTEL : NOC:Gender Justice and Workplace Security (Management)

Co-ordinators : Prof. Dipa Dube

Lecture 1 - Introduction to Gender Justice

Lecture 2 - Introduction to Gender Justice (Continued...)

Lecture 3 - Introduction to Gender Justice (Continued...)

Lecture 4 - Introduction to Gender Justice (Continued...)

Lecture 5 - International and Constitutional Perspectives

Lecture 6 - International Perspectives

Lecture 7 - Constitutional Perspectives

Lecture 8 - Constitutional Perspectives (Continued...)

Lecture 9 - Constitutional Perspectives (Continued...)

Lecture 10 - Women at workplace

Lecture 11 - Women at workplace (Continued...)

Lecture 12 - Women at workplace (Continued...)

Lecture 13 - Women at workplace (Continued...)

Lecture 14 - Gender Violence- Within and Beyond

Lecture 15 - Gender Violence- Within and Beyond (Continued...)

Lecture 16 - Gender Violence- Within and Beyond (Continued...)

Lecture 17 - Gender Violence- Within and Beyond (Continued...)

Lecture 18 - Gender Violence- Within and Beyond (Continued...)

Lecture 19 - Role of different agencies

Lecture 20 - Role of different agencies (Continued...)

NPTEL : NOC:Corporate Social Responsibility (Management)

Co-ordinators : Prof. Aradhna Malik

Lecture 1 - Introduction to the Course

Lecture 2 - What is CSR?

Lecture 3 - Why CSR?

Lecture 4 - Theories of CSR

Lecture 5 - Theories of CSR (Continued...)

Lecture 6 - Theories of CSR (Continued...)

Lecture 7 - Evolution of CSR

Lecture 8 - Evolution of CSR (Continued...)

Lecture 9 - CSR-Global Timeline

Lecture 10 - CSR-Global Timeline (Continued...)

Lecture 11 - CSR in India

Lecture 12 - CSR in India (Continued...)

Lecture 13 - Who are Stakeholders?

Lecture 14 - The Stakeholder Approach

Lecture 15 - Stakeholders and CSR

Lecture 16 - Stakeholders Theory Perspectives

Lecture 17 - Stakeholder Theory in Action

Lecture 18 - Stakeholder Identification

Lecture 19 - Stakeholder Salience

Lecture 20 - Stakeholder Management

Lecture 21 - Stakeholder Dialogue

Lecture 22 - Management of Stakeholder Diaglogue

Lecture 23 - Planning of CSR Activities: Responsibility Paradigms

Lecture 24 - CSR Design and Implementation: Stakeholder Integration

Lecture 25 - CSR Design and Implementation: Stakeholder Integration (Continued...)

Lecture 26 - CSR Activities: Corporate Social Performance

Lecture 27 - CSR Design and Implementation: CSR Process

Lecture 28 - CSR Activities

Lecture 29 - Bases for Evaluation of CSR Activities

Lecture 30 - Measurement of CSR: Sustainability Indexes

Lecture 31 - An Example of CSR Evaluation: RobecoSAM Sustainability Index

Lecture 32 - CSR in India

Lecture 33 - What is Corporate Governance?

Lecture 34 - Theories of Corporate Governance

Lecture 35 - Why Corporate Governance?

Lecture 36 - Models and Systems of Corporate Governance

Lecture 37 - Implementing Corporate Governance

Lecture 38 - Board of Directors

Lecture 39 - Board of Directors (Continued...)

Lecture 40 - Principles of Corporate Governance

Lecture 41 - Corporate Governance and Corporate Social Responsibility

Lecture 42 - Corporate Governance and Corporate Social Responsibility (Continued...)

Lecture 43 - What is Corporate Citizenship?

Lecture 44 - Stages of Corporate Citizenship

Lecture 45 - Why Corporate Citizenship?

Lecture 46 - Corporate Citizenship and CSR

Lecture 47 - What is Sustainable Development?

Lecture 48 - Corporate Sustainability and CSR

Lecture 49 - Integration of Corporate Sustainability with CSR

Lecture 50 - Integration of Corporate Sustainability with CSR (Continued...)

Lecture 51 - SDG Compass

Lecture 52 - SDG Compass (Continued...)

Lecture 53 - CSR Public Policies: Lessons from Europe

Lecture 54 - CSR Public Policies: Lessons from Europe (Continued...)

Lecture 55 - Consumer Social Responsibility (CnSR)

Lecture 56 - Corporate Social Irresponsibility (CSiR)

Lecture 57 - Future of CSR

Lecture 58 - Wrap-Up

NPTEL : NOC:Decision Modeling (Management)

Co-ordinators : Prof. Biswajit Mahanty

Lecture 1 - Decision Analysis: Introduction (Repplace with the new one)

Lecture 2 - Payoff Matrix

Lecture 3 - Decision Making Under Risk

Lecture 4 - Value of Information

Lecture 5 - Probability Concepts

Lecture 6 - Bayes Theorem

Lecture 7 - Decision Tree

Lecture 8 - Decision Problem with Experimentation

Lecture 9 - Decision Problem with Experimentation (Continued...)

Lecture 10 - Decision Problem Example

Lecture 11 - Introduction to Waiting Lines

Lecture 12 - Poisson and Exponential Distribution

Lecture 13 - Birth and Death Process

Lecture 14 - M/M/1 Queing Model

Lecture 15 - Queuing Examples

Lecture 16 - Queuing Examples (Continued...)

Lecture 17 - M/D/1 and M/M/s Queuing Models

Lecture 18 - M/M/s and M/M/infinity Models

Lecture 19 - Finite Queue Space and Queuing Cost Models

Lecture 20 - Queuing Cost, Priority and Networking Models

Lecture 21 - Introduction to Simulation

Lecture 22 - Discrete-Event and Monte-Carlo Simulation

Lecture 23 - Pseudo random Numbers

Lecture 24 - Simulation Examples

Lecture 25 - Generation of Random Variates

Lecture 26 - Simulation Examples (Continued...)

Lecture 27 - Monte-Carlo Simulation and Output Analysis

Lecture 28 - Variance Reduction and Simulation Software

Lecture 29 - Continuous Simulation and System Dynamics

Lecture 30 - System Dynamics Example

Lecture 31 - Introduction to Graph Theory

Lecture 32 - Introduction (Continued...)

Lecture 33 - Operations on a Graph, Tree and Spanning Tree

Lecture 34 - Minimal Spanning Tree

Lecture 35 - Cutsets

Lecture 36 - Fundamental Circuits and Network Simplex Method

Lecture 37 - Maximal Flow Problems

Lecture 38 - Maximal Flow Problems (Continued...)

Lecture 39 - Shortest Path Problems

Lecture 40 - Shortest Path Problems (Continued...)

NPTEL : NOC:E-Business (Management)

Co-ordinators : Prof. Mamata Jenamani

Lecture 1 - Introduction

Lecture 2 - Types of e-business transactions

Lecture 3 - Business Models on the web

Lecture 4 - Business Models on the web (Continued...)

Lecture 5 - Innovative E-Business models for Bricks and Mortar firms

Lecture 6 - Inter and Intra Organizational Business Processes

Lecture 7 - Information system foundations

Lecture 8 - Types of business information system

Lecture 9 - Decision support for the management

Lecture 10 - Enterprise Resource planning

Lecture 11 - Connecting with stakeholders

Lecture 12 - E-procurement - Reengineering the traditional procurement process

Lecture 13 - E-procurement - New paradigms in the procurement process

Lecture 14 - E-procurement - e-procurement Implementation issues and risks

Lecture 15 - Customer relationship management

Lecture 16 - E-Marketing

Lecture 17 - E-Marketing (Continued...)

Lecture 18 - Supply Chain Management - I - The Information flow

Lecture 19 - Supply Chain Management - II - Tntegration

Lecture 20 - Supply Chain Management - III - Interoperability

Lecture 21 - Supply Chain Management - IV - Logistics and distribution

Lecture 22 - Supply Chain Management - V - E-Commerce supply chain

Lecture 23 - Components of E-Business Infrastructure

Lecture 24 - Internet and the Web

Lecture 25 - Networking resources

Lecture 26 - Hardware and software resources

Lecture 27 - Data resources

Lecture 28 - Security categories

Lecture 29 - Security terminologies

Lecture 30 - Digital signature

Lecture 31 - Protocols for security: TLS

Lecture 32 - Impact of security protocol on server performance

Lecture 33 - Digital Payment systems

Lecture 34 - Interoperability of information system

Lecture 35 - Electronic data interchange (EDI)

Lecture 36 - Fundamentals of web services

Lecture 37 - Fundamentals of cloud based systems

Lecture 38 - Automatic data capture using RFID

Lecture 39 - Automatic data capture using RFID and its applications

Lecture 40 - Automatic data capture using RFID and its applications (Continued...)

Lecture 41 - GPS and GIS in supply chain

Lecture 42 - Sensors and IOT: Traceability Across the supply chain

Lecture 43 - Business Analytics and Big data

Lecture 44 - Decision support Concepts

Lecture 45 - Understanding the web log - I

Lecture 46 - Understanding the web log - II

Lecture 47 - Using the Web log: Web usage mining

Lecture 48 - User behaviour modelling from web log

Lecture 49 - User behaviour modelling from web log (Continued...)

Lecture 50 - E-Business Capacity Planning

Lecture 51 - E-Business Capacity Planning (Continued...)

Lecture 52 - Introduction to Recommender System

Lecture 53 - Content Based Recommender System

Lecture 54 - Collaborative Filtering Based Recommender System

Lecture 55 - Association and Demographics Based Recommended System

Lecture 56 - Dynamic Pricing

Lecture 57 - Introduction to Auction

Lecture 58 - Economic Considerations in Auction

Lecture 59 - Winner Determination Problem

Lecture 60 - Online auction issues

NPTEL : NOC:Design and Analysis of Experiments (Management)

Co-ordinators : Prof. Jhareswar Maiti

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30 - Introduction to Factorial Experiments

Lecture 31 - Statistical Analysis of Factorial Experiments

Lecture 32 - Estimation of parameters and model adequacy test for factorial experiement

Lecture 33 - Full_Factorial_Single_Replicate

Lecture 34 - General_Full_factorial_design

Lecture 35 - Blocking_Factorial_design

Lecture 36 - Two_level_Factorial_Experiment

Lecture 37 - Statistical analysis of 2^k factorial design

Lecture 38 - 2_k_Factorial_Design_Single_Replicate

Lecture 39 - 2_k_Factorial_Design_Centre_Points

Lecture 40 - 2_k_Factorial_Design_Optimality_Issues

Lecture 41 - 2_k_ Factorial Design - Issues with Coded Design Variables

Lecture 42 - Blocking and Confounding in 2_k_Factorial Design

Lecture 43 - Blocking and Confounding in 2_k_Factorial Design (Continued...)

Lecture 44 - Blocking and Confounding in 2_k_Factorial Design (Continued...)

Lecture 45 - Fractional factorial design: Introduction

Lecture 46 - Fractional factorial design: Continued...

Lecture 47 - Fractional factorial design: One quarter fraction of the 2k design

Lecture 48 - Alias Structure in Fractional factorial design: Regression Approach

Lecture 49 - General 2^(k-p) Fractional Factorial Design

Lecture 50 - Fractional factorial design: Fold-over Design

Lecture 51 - Plackett-Burman Designs

Lecture 52 - Response Surface Methodology (RSM) - First Order Model

Lecture 53 - Response Surface Methodology (RSM) - First Order Model (Continued...)

Lecture 54 - Experimental Design for Fitting Response Surfaces

Lecture 55 - Response Surface Methodology (RSM): Fitting Second Order Model

Lecture 56 - Analysis of Second Order Response Surface

Lecture 57 - ANOVA using MINITAB

Lecture 58 - Factorial Design using MINITAB

Lecture 59 - Fractional Factorial Design using MINITAB

Lecture 60 - Response Surface Methodology using MINITAB

NPTEL : NOC:Quality Design and Control (Management)

Co-ordinators : Prof. Pradip Kumar Ray

Lecture 1 - History and Evolution of Quality Control and Management

Lecture 2 - History and Evolution of Quality Control and Management

Lecture 3 - History and Evolution of Quality Control and Management

Lecture 4 - History and Evolution of Quality Control and Management

Lecture 5 - History and Evolution of Quality Control and Management

Lecture 6 - Management of Quality - I

Lecture 7 - Management of Quality - I

Lecture 8 - Management of Quality - I

Lecture 9 - Management of Quality - I

Lecture 10 - Management of Quality - I

Lecture 11 - Management of Quality - II

Lecture 12 - Management of Quality - II

Lecture 13 - Management of Quality - II

Lecture 14 - Management of Quality - II

Lecture 15 - Management of Quality - II

Lecture 16 - Statistical Process Control - I

Lecture 17 - Statistical Process Control - I

Lecture 18 - Statistical Process Control - I

Lecture 19 - Statistical Process Control - I

Lecture 20 - Statistical Process Control - I

Lecture 21 - Statistical Process Control - II

Lecture 22 - Statistical Process Control - II (Continued...)

Lecture 23 - Statistical Process Control - II (Continued...)

Lecture 24 - Statistical Process Control - II (Continued...)

Lecture 25 - Statistical Process Control - II (Continued...)

Lecture 26 - Process Capability Analysis

Lecture 27 - Process Capability Analysis (Continued...)

Lecture 28 - Process Capability Analysis (Continued...)

Lecture 29 - Process Capability Analysis (Continued...)

Lecture 30 - Process Capability Analysis (Continued...)

Lecture 31 - Acceptance Sampling - I

Lecture 32 - Acceptance Sampling - I

Lecture 33 - Acceptance Sampling - I

Lecture 34 - Acceptance Sampling - I (Continued...)

Lecture 35 - Acceptance Sampling - I (Continued...)

Lecture 36 - Acceptance Sampling - II

Lecture 37 - Acceptance Sampling - II (Continued...)

Lecture 38 - Acceptance Sampling - II (Continued...)

Lecture 39 - Acceptance Sampling - II (Continued...)

Lecture 40 - Acceptance Sampling - II (Continued...)

Lecture 41 - Design for Reliability - I

Lecture 42 - Design for Reliability - I (Continued...)

Lecture 43 - Design for Reliability - I (Continued...)

Lecture 44 - Design for Reliability - I (Continued...)

Lecture 45 - Design for Reliability - I (Continued...)

Lecture 46 - Design for Reliability - II

Lecture 47 - Design for Reliability - II (Continued...)

Lecture 48 - Design for Reliability - II (Continued...)

Lecture 49 - Design for Reliability - II (Continued...)

Lecture 50 - Design for Reliability - II (Continued...)

Lecture 51 - Quality by Experimental Design

Lecture 52 - Quality by Experimental Design (Continued...)

Lecture 53 - Quality by Experimental Design (Continued...)

Lecture 54 - Quality by Experimental Design (Continued...)

Lecture 55 - Quality by Experimental Design (Continued...)

Lecture 56 - Robust Design and Taguchi Method

Lecture 57 - Robust Design and Taguchi Method (Continued...)

Lecture 58 - Robust Design and Taguchi Method (Continued...)

Lecture 59 - Robust Design and Taguchi Method (Continued...)

Lecture 60 - Robust Design and Taguchi Method (Continued...)

NPTEL : NOC:Business Analytics for Management Decision (Management)

Co-ordinators : Dr. Rudra P. Pradhan

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16 - Statistical inference

Lecture 17 - Testing of Hypothesis

Lecture 18 - Testing of Hypothesis (Continued...)

Lecture 19 - Confidence Interval

Lecture 20 - Confidence Interval 2

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31 - Dummy Modelling

Lecture 32 - Dummy Modelling (Continued...)

Lecture 33 - Panel Data Model

Lecture 34 - Panel Data Model (Continued...)

Lecture 35 - Time Series Forecasting

Lecture 36 - Time Series Forecasting (Continued...)

Lecture 37 - Machine Learning

Lecture 38 - Machine Learning (Continued...)

Lecture 39 - Data Mining

Lecture 40 - Simulation

Lecture 41 - Basics

Lecture 42 - Linear Programming 1

Lecture 43 - Linear Programming 2

Lecture 44 - Special Issues of Linear Programming

Lecture 45 - Simplex Method of Linear Programming

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

Lecture 54

Lecture 55

Lecture 56 - Introduction to decision theory

Lecture 57 - Decision making under uncertainty

Lecture 58 - Decision making under certainty

Lecture 59 - Decision tree

Lecture 60 - The value of information and utility theory

NPTEL : NOC:Soft Skills for Business Negotiations and Marketing Strategies (Management)

Co-ordinators : Prof. Uttam Kumar Bannerjee

Lecture 1 - Introduction to the Course

Lecture 2 - Definition of Hard and Soft Skills

Lecture 3 - Definition of Hard and Soft Skills

Lecture 4 - Discussion on Soft Skills

Lecture 5 - Discussion on Soft Skills (Continued...)

Lecture 6 - Discussion on Soft Skills (Continued...)

Lecture 7 - Discussion on Soft Skills (Continued...)

Lecture 8 - Discussion on Soft Skills (Continued...)

Lecture 9 - Discussion on Soft Skills (Continued...)

Lecture 10 - Discussion on Soft Skills (Continued...)

Lecture 11 - Discussion on Soft Skills (Continued...)

Lecture 12 - Discussion on Soft Skills (Continued...)

Lecture 13 - Discussion on Soft Skills (Continued...)

Lecture 14 - Discussion on Soft Skills (Continued...)

Lecture 15 - Discussion on Soft Skills (Continued...)

Lecture 16 - Discussion on Soft Skills (Continued...)

Lecture 17 - Discussion on Soft Skills (Continued...)

Lecture 18 - Discussion on Soft Skills (Continued...)

Lecture 19 - Discussion on Soft Skills (Continued...)

Lecture 20 - Discussion on Soft Skills (Continued...)

Lecture 21 - Discussion on Soft Skills (Continued...)

Lecture 22 - Discussion on Soft Skills (Continued...)

Lecture 23 - Communications - Verbal and Non-verbal

Lecture 24 - Communications - Verbal and Non-verbal (Continued...)

Lecture 25 - Communications - Verbal and Non-verbal (Continued...)

Lecture 26 - Communications - Verbal and Non-verbal (Continued...)

Lecture 27 - Body Language : For Interviews

Lecture 28 - Body Language : For Interviews (Continued...)

Lecture 29 - Body Language : For Interviews (Continued...)

Lecture 30 - Body Language : For Interviews (Continued...)

Lecture 31 - Body Language : For Interviews (Continued...)

Lecture 32 - Body Language : For Interviews (Continued...)

Lecture 33 - Interviews

Lecture 34 - Judge the Interviewer

Lecture 35 - Gesturs of Interviewer - When you enter

Lecture 36 - Body Language during the Interviews

Lecture 37 - Group Discussions (GD) and Verbal Communication

Lecture 38 - Leadership Quality

Lecture 39 - Negative Impression

Lecture 40 - Art of Speaking

Lecture 41 - Conversation Building, Good Conversation, Frustating Conversation

Lecture 42 - What is Negotiation

Lecture 43 - Purpose of Negotiation

Lecture 44 - Type of Negotiation

Lecture 45 - Negotiation as a Game

Lecture 46 - Key Concepts and our Concepts of Negotiation

Lecture 47 - Basics of negotiation

Lecture 48 - Process sequence phase frequency

Lecture 49 - Managing the process,trickes of countering

Lecture 50 - Barriers to agreements,ending of negotiation

Lecture 51 - Common mistakes

Lecture 52 - Market Strategy, Rule 1 and Rule 2

Lecture 53 - Rule 3 and Rule 4

Lecture 54 - Rule 5, Rule 6, Rule 7 and Rule 8

Lecture 55 - Rule 9, Rule 10, Rule 11 and Rule 12

Lecture 56 - Time Management

NPTEL : NOC:Research Writing (Management)

Co-ordinators : Prof. Aradhna Malik

Lecture 1 - Introduction to the course

Lecture 2 - What is research writing

Lecture 3 - The Writing Process

Lecture 4 - The Writing Process - 2

Lecture 5 - Finding what to read

Lecture 6 - Reading research documents

Lecture 7 - Paying attention to what you read

Lecture 8 - Reviewing Literature

Lecture 9 - Reviewing Literature (Continued...)

Lecture 10 - Elements of writing

Lecture 11 - Reviewing literature

Lecture 12 - Literature review: Supporting your claim

Lecture 13 - Shaping your appeal

Lecture 14 - Outlining

Lecture 15 - Organizing an argument

Lecture 16 - Methodology

Lecture 17 - Tools for writing up literature reviews and methodology

Lecture 18 - Presenting quantitative data

Lecture 19 - Presenting qualitative data

Lecture 20 - Writing the results section

Lecture 21 - Discussion of Results

Lecture 22 - Writing the conclusion section

Lecture 23 - Academic Integrity

Lecture 24 - Using and acknowledging sources

Lecture 25 - Writers Block

Lecture 26 - Revising

Lecture 27 - Mistakes and Fallacies

Lecture 28 - Editing and Proofreading

Lecture 29 - Choosing a journal to publish in

Lecture 30 - Responding to reviewer comments

Lecture 31 - Wrap up

NPTEL : NOC:Engineering Econometrics (Management)

Co-ordinators : Dr. Rudra P. Pradhan

Lecture 1 - Introduction to Engineering Econometrics

Lecture 2 - Introduction to Engineering Econometrics (Continued...)

Lecture 3 - Introduction to Engineering Econometrics (Continued...)

Lecture 4 - Introduction to Engineering Econometrics (Continued...)

Lecture 5 - Introduction to Engineering Econometrics (Continued...)

Lecture 6 - Exploring Data on Spreadsheets

Lecture 7 - Exploring Data on Spreadsheets (Continued...)

Lecture 8 - Exploring Data on Spreadsheets (Continued...)

Lecture 9 - Exploring Data on Spreadsheets (Continued...)

Lecture 10 - Exploring Data on Spreadsheets (Continued...)

Lecture 11 - Descriptive Econometrics

Lecture 12 - Descriptive Econometrics (Continued...)

Lecture 13 - Descriptive Econometrics (Continued...)

Lecture 14 - Descriptive Econometrics (Continued...)

Lecture 15 - Descriptive Econometrics (Continued...)

Lecture 16 - Linear Regression Modelling

Lecture 17 - Linear Regression Modelling (Continued...)

Lecture 18 - Linear Regression Modelling (Continued...)

Lecture 19 - Linear Regression Modelling (Continued...)

Lecture 20 - Linear Regression Modelling (Continued...)

Lecture 21 - Linear Regression Modelling (Continued...)

Lecture 22 - Linear Regression Modelling (Continued...)

Lecture 23 - Modelling Diagnostics

Lecture 24 - Modelling Diagnostics (Continued...)

Lecture 25 - Modelling Diagnostics (Continued...)

Lecture 26 - Multicolinearity problem - III

Lecture 27 - Autocorrelation problem - I

Lecture 28 - Autocorrelation problem - II

Lecture 29 - Heteroskedasticity problem - I

Lecture 30 - Heteroskedasticity problem - II

Lecture 31 - Model Specification- Choosing the Independent Variables

Lecture 32 - Model Specification- Choosing the Independent Variables

Lecture 33 - Non-Linear Regression Modelling - Dummy-Variable Regression Modelling

Lecture 34 - Non-Linear Regression Modelling - Interactive Regression Modelling

Lecture 35 - Non-Linear Regression Modelling - Polynomial (Curvilinear) Regression Model

Lecture 36 - Non-Linear Regression Modelling - Model Transformation

Lecture 37 - Extension of Dummy Regression Modelling

Lecture 38 - Extension of Dummy Regression Modelling - Dummy Independent Variable Modelling

Lecture 39 - Extension of Dummy Regression Modelling - Dummy Dependent Variable Modelling

Lecture 40 - Extension of Dummy Regression Modelling - Dummy Independent Variable Modelling

Lecture 41 - Time Series Modelling - Basics

Lecture 42 - Time Series Modelling - Trend Analysis

Lecture 43 - Time Series Modelling - Trend Analysis (Least Squares Method)

Lecture 44 - Time Series Modelling - Forecasting

Lecture 45 - Time Series Modelling - Stationarity

Lecture 46 - Time Series Modelling - Volatility Modelling

Lecture 47 - Time Series Modelling - Volatility Modelling

Lecture 48 - Time Series Modelling - Volatility Modelling

Lecture 49 - Time Series Modelling - Volatility Modelling

Lecture 50 - Time Series Modelling - Volatility Modelling

Lecture 51 - Time Series Modelling - VAR modelling

Lecture 52 - Time Series Modelling - VAR modelling

Lecture 53 - Panel Data Modelling

Lecture 54 - Panel Data Modelling (Continued...)

Lecture 55 - Panel Data Modelling (Continued...)

Lecture 56 - Panel Data Modelling

Lecture 57 - Fitting Models to Data

Lecture 58 - Fitting Models to Data (Continued...)

Lecture 59 - Fitting Models to Data (Continued...)

Lecture 60 - Fitting Models to Data (Continued...)

NPTEL : NOC:Industrial Safety Engineering (Management)

Co-ordinators : Prof. Jhareswar Maiti

Lecture 1 - Introduction to Industrial Safety Engineering

Lecture 2 - Key concepts and terminologies

Lecture 3 - Key concepts and terminologies-Safety domain ontology

Lecture 4 - Key concepts and terminologies-Risk Assessment and Control

Lecture 5 - Safety Engineering and Accident causing mechanisms

Lecture 6 - Preliminary Hazard List

Lecture 7 - Preliminary Hazard Analysis

Lecture 8 - Hazard and operability study (HAZOP)

Lecture 9 - Failure Modes and Effects Analysis (FMEA)- Identification of Failure Modes

Lecture 10 - Failure Modes and Effects Analysis (FMEA) (Continued...)

Lecture 11 - Application of Hazard Identification Techniques

Lecture 12 - Fault Tree Analysis (FTA) - Construction

Lecture 13 - Fault Tree Analysis (FTA) - Gate by Gate method

Lecture 14 - Fault Tree Analysis (FTA) - Cut-set method

Lecture 15 - Fault Tree Analysis (FTA) - Importance measures

Lecture 16 - Event Tree Analysis (ETA)

Lecture 17 - Bowtie Tool

Lecture 18 - Bow-tie: Common Cause Cut Sets

Lecture 19 - Bow-tie: Cut-sets for Accident Scenarios

Lecture 20 - Bow-tie: Cut-sets for Accident Scenarios (Continued...)

Lecture 21 - Bow-tie: Identification of Safety Barriers

Lecture 22 - Risk Assessment

Lecture 23 - Consequence Assessment

Lecture 24 - Energy Control Model and Hazard Control Hierarchy

Lecture 25 - Safety Function Deployment

Lecture 26 - Ranking of Design Solutions: AHP approach

Lecture 27 - Quantification of Basic Events for Non-repairable Components

Lecture 28 - Quantification of Basic Events: Hazard Rate

Lecture 29 - Quantification of Basic Events: Exponential Distribution

Lecture 30 - Quantification of Basic Events: Weibull Distribution

Lecture 31 - Quantification of Basic Events: Failure to Repair Process

Lecture 32 - Quantification of Basic Events: Combined Process

Lecture 33 - Quantification of Basic Events: Failure and Repair Intensities

Lecture 34 - Computation of combined process parameters: Laplace transform analysis

Lecture 35 - Computation of combined process parameters: Markov Analysis

Lecture 36 - Quantification of Systems Safety and Reliability Block Diagram

Lecture 37 - Systems Safety Quantification: Truth Table Approach

Lecture 38 - Systems Safety Quantification: Structure Function

Lecture 39 - Systems Safety Quantification: Minimal Cut and Minimal Path Representation

Lecture 40 - Systems Safety Quantification: Tutorial

Lecture 41 - Human Error, Classification and Causes

Lecture 42 - Human Error, Classification and Causes (Continued...)

Lecture 43 - Human Error Identification

Lecture 44 - Human Reliability Assessment

Lecture 45 - Human Error Quantification from Expertsâ€™ opinions â€“ Fuzzy Set Approach

Lecture 46 - Accident Investigation

Lecture 47 - Accident Investigation and Analysis: Descriptive Analytics

Lecture 48 - Control Chart Analysis

Lecture 49 - Accident Data Analysis: Regression

Lecture 50 - Accident Data Analysis: Classification Tree

Lecture 51 - Occupational Health and Safety Management Systems(OH&SMS) and OHSAS 18001 - Part I

Lecture 52 - Occupational Health and Safety Management Systems(OH&SMS) and OHSAS 18001 - Part II

Lecture 53 - Occupational Health and Safety Management Systems(OH&SMS) and OHSAS 18001 - Part III

Lecture 54 - Safety Performance Indicators - Part I

Lecture 55 - Safety Performance Indicators - Part II

Lecture 56 - Energy Isolations

Lecture 57 - Virtual Reality - Introduction

Lecture 58 - Geometry of virtual world

Lecture 59 - VR roadmap - A case study

Lecture 60 - Summary

NPTEL : NOC:Management of Inventory Systems (Management)

Co-ordinators : Prof. PK Ray

Lecture 1 - Introduction to Inventory and Materials Management

Lecture 2 - Introduction to Inventory and Materials Management (Continued...)

Lecture 3 - Introduction to Inventory and Materials Management (Continued...)

Lecture 4 - Introduction to Inventory and Materials Management (Continued...)

Lecture 5 - Introduction to Inventory and Materials Management (Continued...)

Lecture 6 - Inventory Problems and Selective Inventory Management

Lecture 7 - Inventory Problems and Selective Inventory Management (Continued...)

Lecture 8 - Inventory Problems and Selective Inventory Management (Continued...)

Lecture 9 - Inventory Problems and Selective Inventory Management (Continued...)

Lecture 10 - Inventory Problems and Selective Inventory Management (Continued...)

Lecture 11 - Static Inventory Problem under Risk

Lecture 12 - Static Inventory Problem under Risk (Continued...)

Lecture 13 - Static Inventory Problem under Risk (Continued...)

Lecture 14 - Static Inventory Problem under Risk (Continued...)

Lecture 15 - Static Inventory Problem under Risk (Continued...)

Lecture 16 - Static Inventory Problems under Uncertainty

Lecture 17 - Static Inventory Problems under Uncertainty (Continued...)

Lecture 18 - Static Inventory Problems under Uncertainty (Continued...)

Lecture 19 - Static Inventory Problems under Uncertainty (Continued...)

Lecture 20 - Static Inventory Problems under Uncertainty (Continued...)

Lecture 21 - Dynamic Inventory Problems under Certainty

Lecture 22 - Dynamic Inventory Problems under Certainty (Continued...)

Lecture 23 - Dynamic Inventory Problems under Certainty (Continued...)

Lecture 24 - Dynamic Inventory Problems under Certainty (Continued...)

Lecture 25 - Dynamic Inventory Problems under Certainty (Continued...)

Lecture 26 - Dynamic Inventory Problems under Risk

Lecture 27 - Dynamic Inventory Problems under Risk (Continued...)

Lecture 28 - Dynamic Inventory Problems under Risk (Continued...)

Lecture 29 - Dynamic Inventory Problems under Risk (Continued...)

Lecture 30 - Dynamic Inventory Problems under Risk (Continued...)

Lecture 31 - MRP, MRP-II and DRP

Lecture 32 - MRP, MRP-II and DRP (Continued...)

Lecture 33 - MRP, MRP-II and DRP (Continued...)

Lecture 34 - MRP, MRP-II and DRP (Continued...)

Lecture 35 - MRP, MRP-II and DRP (Continued...)

Lecture 36 - JIT-based Approaches for Materials Management

Lecture 37 - JIT-based Approaches for Materials Management (Continued...)

Lecture 38 - JIT-based Approaches for Materials Management (Continued...)

Lecture 39 - JIT-based Approaches for Materials Management (Continued...)

Lecture 40 - JIT-based Approaches for Materials Management (Continued...)

Lecture 41 - Basics of Purchasing Management

Lecture 42 - Basics of Purchasing Management (Continued...)

Lecture 43 - Basics of Purchasing Management (Continued...)

Lecture 44 - Basics of Purchasing Management (Continued...)

Lecture 45 - Basics of Purchasing Management (Continued...)

Lecture 46 - Theory of Constraints and Materials Management

Lecture 47 - Theory of Constraints and Materials Management (Continued...)

Lecture 48 - Theory of Constraints and Materials Management (Continued...)

Lecture 49 - Theory of Constraints and Materials Management (Continued...)

Lecture 50 - Theory of Constraints and Materials Management (Continued...)

Lecture 51 - Value Engineering/Analysis and Stores Management

Lecture 52 - Value Engineering/Analysis and Stores Management (Continued...)

Lecture 53 - Value Engineering/Analysis and Stores Management (Continued...)

Lecture 54 - Value Engineering/Analysis and Stores Management (Continued...)

Lecture 55 - Value Engineering/Analysis and Stores Management (Continued...)

Lecture 56 - Logistics and Supply Chain Management

Lecture 57 - Logistics and Supply Chain Management (Continued...)

Lecture 58 - Logistics and Supply Chain Management (Continued...)

Lecture 59 - Logistics and Supply Chain Management (Continued...)

Lecture 60 - Logistics and Supply Chain Management (Continued...)

NPTEL : NOC:Selected Topics in Decision Modeling (Management)

Co-ordinators : Prof. Biswajit Mahanty

Lecture 1 - Dynamic Programming: Introduction

Lecture 2 - Stagecoach Problem

Lecture 3 - An Investment Problem

Lecture 4 - An Investment Problem (Continued...)

Lecture 5 - Further Examples

Lecture 6 - Machine Allocation and Cargo Loading Problem

Lecture 7 - Knapsack Problem

Lecture 8 - Probabilistic Dynamic Programming

Lecture 9 - Probabilistic Dynamic Programming (Continued...)

Lecture 10 - Dijkstra's Algorithm

Lecture 11 - Integer Programming: Introduction

Lecture 12 - Integer Programming: Formulation

Lecture 13 - Integer Programming: Formulation (Continued...)

Lecture 14 - Integer Linear Programming

Lecture 15 - Cutting Plane Method

Lecture 16 - Exhaustive Enumeration and Branch and Bound Techniques

Lecture 17 - Branch and Bound Technique

Lecture 18 - Assignment and Travelling Salesman Problem

Lecture 19 - Travelling Salesman Problem (Continued...)

Lecture 20 - Heuristic Methods for Integer Programming

Lecture 21 - Non-Linear Programming: Introduction

Lecture 22 - Single-Variable Unconstrained Optimization

Lecture 23 - Multi-variable Unconstrained NLP

Lecture 24 - Solving Unconstrained NLP

Lecture 25 - Numerical Methods for Unconstrained NLP

Lecture 26 - Constrained NLP: Lagrange Multipliers

Lecture 27 - Constrained NLP: KKT Conditions

Lecture 28 - Constrained NLP: KKT Conditions (Continued...)

Lecture 29 - Quadratic Programming

Lecture 30 - Example problems on Constrained NLP

Lecture 31 - Introduction to Metaheuristics

Lecture 32 - Genetic Algorithms

Lecture 33 - Genetic Algorithm Process

Lecture 34 - Genetic Algorithm Process (Continued...)

Lecture 35 - Genetic Algorithm Examples

Lecture 36 - Simulated Annealing

Lecture 37 - Tabu Search

Lecture 38 - Particle Swarm Optimization

Lecture 39 - Multi-Objective Optimization

Lecture 40 - NSGA-II Examples

NPTEL : NOC:Ethics in Engineering Practice (Management)

Co-ordinators : Dr. Susmita Mukhopadhyay

Lecture 1 - Introduction to Ethical Reasoning and Engineering Ethics

Lecture 2 - Introduction to Ethical Reasoning and Engineering Ethics (Continued...)

Lecture 3 - Introduction to Ethical Reasoning and Engineering Ethics (Continued...)

Lecture 4 - Professional practice in enginnering

Lecture 5 - Professional practice in enginnering (Continued...)

Lecture 6 - Central Professional responsibilities of engineers

Lecture 7 - Central Professional responsibilities of engineers (Continued...)

Lecture 8 - Workplace Rights and Responsibilities

Lecture 9 - Workplace Rights and Responsibilities (Continued...)

Lecture 10 - Ethics as Design doing Justice to Moral Problems

Lecture 11 - Ethics as Design doing Justice to Moral Problems (Continued...)

Lecture 12 - Intellectual Property Rights and Ethics

Lecture 13 - Intellectual Property Rights and Ethics (Continued...)

Lecture 14 - Trade related Intellectual Property Rights

Lecture 15 - Trade related Intellectual Property Rights in India

Lecture 16 - A brief on Paris Convention, 1967 and The Berne Contract, 1971

Lecture 17 - Computer Software and Digital Information

Lecture 18 - Computer Software and Digital Information (Continued...)

Lecture 19 - Engineers, Nuclear Testing and Weapons

Lecture 20 - Engineers, Nuclear Testing and Weapons (Continued...)

Lecture 21 - Responsibility to Environment

Lecture 22 - Responsibility to Environment (Continued...)

Lecture 23 - Environmental Ethics and Spirituality

Lecture 24 - Engineering as Social Experimentation

Lecture 25 - Research Ethics

Lecture 26 - Research Ethics (Continued...)

Lecture 27 - Engineers as Managers Consultants and Leaders

Lecture 28 - Engineers as Managers Consultants and Leaders (Continued...)

Lecture 29 - Engineers as Managers Consultants and Leaders (Continued...)

Lecture 30 - Key Questions - Ethical Conduct of Engineers

Lecture 31 - Key Questions - Ethical Conduct of Engineers (Continued...)

Lecture 32 - Key Questions - Central Professional Responsibilities of Engineers

Lecture 33 - Key Questions - Central Professional Responsibilities of Engineers (Continued...)

Lecture 34 - Key Questions - Relating to Rights and Responsibilities regarding IPR

Lecture 35 - Key Questions - Relating to Rights and Responsibilities regarding IPR (Continued...)

Lecture 36 - Key Questions - Relating to Rights and Responsibilities regarding IPR (Continued...)

Lecture 37 - Key Questions - Related to Engineers Rights and Duties and Ethics

Lecture 38 - Key Questions - Related to Engineers Rights and Duties and Ethics (Continued...)

Lecture 39 - Leadership Styles and Ethical Conduct

Lecture 40 - Leadership Styles and Ethical Conduct (Continued...)

NPTEL : NOC:Managing Change in Organizations (Management)

Co-ordinators : Prof. Kbl Srivastava

Lecture 1 - Nature of Change Management (1)

Lecture 2 - Nature of Change Management (2)

Lecture 3 - Types of Change

Lecture 4 - Types of Change (Continued...)

Lecture 5 - Types of Change (Continued...)

Lecture 6 - Need for Change

Lecture 7 - Need for Change (Continued...)

Lecture 8 - Scope of Change

Lecture 9 - Scope of Change (Continued...)

Lecture 10 - Scope of Change (Continued...)

Lecture 11 - Diagnosing Organisational Change

Lecture 12 - Diagnosing Organisational Change (Continued...)

Lecture 13 - Diagnosing Organisational Change (Continued...)

Lecture 14 - Resistance to Change

Lecture 15 - Managing Resistance

Lecture 16 - Approaches to Implementing Change

Lecture 17 - Approaches to Implementing Change (Continued...)

Lecture 18 - Approaches to Implementing Change (Continued...)

Lecture 19 - Approaches to Implementing Change (Continued...)

Lecture 20 - Approaches to Implementing Change (Continued...)

Lecture 21 - Implementing Change

Lecture 22 - Vision and Change

Lecture 23 - Vision and Change (Continued...)

Lecture 24 - Vision and Change (Continued...)

Lecture 25 - Vision and Change (Continued...)

Lecture 26 - Communication and Change

Lecture 27 - Communication and Change (Continued...)

Lecture 28 - Communication and Change (Continued...)

Lecture 29 - Sustaining Change

Lecture 30 - Evaluating Change

Lecture 31 - Innovation and Change

Lecture 32 - Innovation and Change (Continued...)

Lecture 33 - Organizational Learning

Lecture 34 - Learning Organization and Change

Lecture 35 - Learning Organization and Change (Continued...)

Lecture 36 - Turnaround Strategy

Lecture 37 - Strategic Convergence and Learning from Change

Lecture 38 - Change Effectiveness

Lecture 39 - Change Management Cases and Examples

Lecture 40 - Change Management Example, Trends and Dynamics

NPTEL : NOC:Financial Institutions and Markets (Management)

Co-ordinators : Dr. Jitendra Mahakud

Lecture 1 - Introduction to Financial System

Lecture 2 - Equilibrium in Financial Markets

Lecture 3 - Efficiency of Financial Markets

Lecture 4 - Measures of Financial Development

Lecture 5 - Financial Development and Economic Growth

Lecture 6 - Systematic risks in financial system

Lecture 7 - Unsystematic risks in financial system

Lecture 8 - Return concepts in financial system

Lecture 9 - Fundamental analysis of financial assets

Lecture 10 - Technical analysis of financial assets

Lecture 11 - Theories of interest rate determination - I

Lecture 12 - Theories of interest rate determination - II

Lecture 13 - Term structure theories of interest rate - I

Lecture 14 - Term structure theories of interest rate - II

Lecture 15 - Term structure theories of interest rate - III

Lecture 16 - Financial market regulation

Lecture 17 - RBI- structure and objective functions

Lecture 18 - Monetary policy instruments

Lecture 19 - Challenges and reforms in monetary policy and central bank autonomy

Lecture 20 - SEBI, IROA and PFRDA: structure and function

Lecture 21 - Commercial banks: Role and Services

Lecture 22 - Commercial banks: Financial statements

Lecture 23 - Commercial bank performance

Lecture 24 - Basel Accords

Lecture 25 - Measure of risk in commercial banks

Lecture 26 - Provident fund and pension fund

Lecture 27 - Insurance companies

Lecture 28 - Mutual funds - I

Lecture 29 - Mutual funds - II

Lecture 30 - NBFCs - I

Lecture 31 - NBFCs - II

Lecture 32 - Venture capital

Lecture 33 - Merchant banks

Lecture 34 - Credit Rating Agencies

Lecture 35 - Non-banking statutory financial organization

Lecture 36 - Call Money Market - I

Lecture 37 - Call Money Market - II

Lecture 38 - Treasury Bills Market

Lecture 39 - Miscellaneous short-term money market - I

Lecture 40 - Miscellaneous short-term money market - II

Lecture 41 - Bond Analysis - I

Lecture 42 - Bond Analysis - II

Lecture 43 - Bond Analysis - III

Lecture 44 - Bond Analysis - IV

Lecture 45 - Bond market in India

Lecture 46 - Stock market - I

Lecture 47 - Stock market - II

Lecture 48 - Stock market - III

Lecture 49 - Stock market - IV

Lecture 50 - Stock market - V

Lecture 51 - Derivatives Market - I

Lecture 52 - Derivatives Market - II

Lecture 53 - Derivatives Market - III

Lecture 54 - Derivatives Market - IV

Lecture 55 - Derivatives Market - V

Lecture 56 - Foreign Exchange Market - I

Lecture 57 - Foreign Exchange Market - II

Lecture 58 - Foreign Exchange Market - III

Lecture 59 - Foreign Exchange Market - IV

Lecture 60 - Foreign Exchange Market - V

NPTEL : NOC:Sales and Distribution Management (Management)

Co-ordinators : Dr. Sangeeta Sahney

Lecture 1 - Introduction to Sales Management

Lecture 2 - Sales Management, Personal Selling, and Salesmanship

Lecture 3 - Functions of Sales Executive and Roles played by Sales Managers

Lecture 4 - Duties and Responsibilities of Sales Managers and the Effective Sales Executive

Lecture 5 - Skills required in Sales Managers and Qualities in a Sales Managers

Lecture 6 - Determining Sales related Marketing Policies

Lecture 7 - Determining Sales related Marketing Policies

Lecture 8 - Strategic Planning, Sales Objectives, Strategies and Tactics

Lecture 9 - The Sales Organization

Lecture 10 - The Sales Organization

Lecture 11 - The Sales Department Relations

Lecture 12 - The Sales Department Relations

Lecture 13 - Planning, Sales forecasting and Budgeting

Lecture 14 - Planning, Sales forecasting and Budgeting

Lecture 15 - Planning, Sales forecasting and Budgeting

Lecture 16 - Buyer-Seller Dyads

Lecture 17 - Diversity of Personal-Selling Situations

Lecture 18 - Theories of Selling

Lecture 19 - Theories of Selling

Lecture 20 - The Selling Process

Lecture 21 - The Selling Process

Lecture 22 - Sales Force Management : Job Analysis

Lecture 23 - Sales Force Management : Recruitment

Lecture 24 - Sales Force Management : Selection

Lecture 25 - Sales Force Management : Training

Lecture 26 - Sales Force Management : Training

Lecture 27 - Sales Force Management : Motivation

Lecture 28 - Sales Force Management : Compensation

Lecture 29 - Sales Force Management : Managing Expenses of Sales Personnel

Lecture 30 - Sales Force Management : Evaluation

Lecture 31 - Sales Force Management : Evaluation

Lecture 32 - Sales Quotas

Lecture 33 - Sales Quotas

Lecture 34 - Sales Territory

Lecture 35 - Sales Territory

Lecture 36 - Distribution Channel Management : Distribution Channels - Part I

Lecture 37 - Distribution Channel Management : Distribution Channels - Part II

Lecture 38 - Channel Systems, Channel Management, Logistics and Marketing Channels - Part I

Lecture 39 - Channel Systems, Channel Management, Logistics and Marketing Channels - Part II

Lecture 40 - International Sales and Channel Management

NPTEL : NOC:Six Sigma (Management)

Co-ordinators : Prof. Jitesh J Thakkar

Lecture 1 - Brief overview of the course

Lecture 2 - Quality concepts and definition

Lecture 3 - History of continuous improvement

Lecture 4 - Six Sigma Principles and Focus Areas - Part 1

Lecture 5 - Six Sigma Principles and Focus Areas - Part 2

Lecture 6 - Six Sigma Applications

Lecture 7 - Quality Management: Basics and Key Concepts

Lecture 8 - Fundamentals of Total Quality Management

Lecture 9 - Cost of quality

Lecture 10 - Voice of customer

Lecture 11 - Quality Function Deployment (QFD)

Lecture 12 - Management and Planning Tools - Part 1

Lecture 13 - Management and Planning Tools - Part 2

Lecture 14 - Six Sigma Project Identification, Selection and Definition

Lecture 15 - Process characteristics and Monitoring

Lecture 16 - Process characteristics and analysis

Lecture 17 - Process Mapping: SIPOC

Lecture 18 - Data Collection and Summarization - Part 1

Lecture 19 - Data Collection and Summarization - Part 2

Lecture 20 - Measurement systems: Fundamentals

Lecture 21 - Measurement systems analysis: Gage R&R study

Lecture 22 - Fundamentals of statistics

Lecture 23 - Probability theory

Lecture 24 - Process capability analysis: Key Concepts

Lecture 25 - Process capability analysis: Measures and Indices

Lecture 26 - Process capability analysis: Minitab Application

Lecture 27 - Non-normal process capability analysis

Lecture 28 - Hypothesis testing: Fundamentals

Lecture 29 - Hypothesis Testing: Single Population Test

Lecture 30 - Hypothesis Testing: Two Population Test

Lecture 31 - Hypothesis Testing: Two Population: Minitab Application

Lecture 32 - Correlation and Regression Analysis

Lecture 33 - Regression Analysis: Model Validation

Lecture 34 - One-Way ANOVA

Lecture 35 - Two-Way ANOVA

Lecture 36 - Multi-vari Analysis

Lecture 37 - Failure Mode Effect Analysis (FMEA)

Lecture 38 - Introduction to Design of Experiment

Lecture 39 - Randomized Block Design

Lecture 40 - Randomized Block Design: Minitab Application

Lecture 41 - Factorial Design

Lecture 42 - Factorial Design: Minitab Application

Lecture 43 - Fractional Factorial Design

Lecture 44 - Fractional Factorial Design: Minitab Application

Lecture 45 - Taguchi Method: Key Concepts

Lecture 46 - Taguchi Method: Illustrative Application

Lecture 47 - Seven QC Tools

Lecture 48 - Statistical Process Control: Key Concepts

Lecture 49 - Statistical Process Control: Control Charts for Variables

Lecture 50 - Operating Characteristic (OC) Curve for Variable Control charts

Lecture 51 - Statistical Process Control: Control Charts for Attributes

Lecture 52 - Operating Characteristic (OC) Curve for Attribute Control charts

Lecture 53 - Statistical Process Control: Minitab Application

Lecture 54 - Acceptance Sampling: Key Concepts

Lecture 55 - Acceptance Sampling Plans for Attributes: Key Concepts

Lecture 56 - Design of Acceptance Sampling Plans for Attributes

Lecture 57 - Acceptance Sampling Plans for Variables

Lecture 58 - Acceptance Sampling: Minitab Application

Lecture 59 - Design for Six Sigma (DFSS): DMADV, DMADOV

Lecture 60 - Design for Six Sigma (DFSS): DFX

Lecture 61 - Team Management

Lecture 62 - Six Sigma: Case study

Lecture 63 - Six Sigma: Summary of key concepts

NPTEL : NOC:Performance and Reward Management (Management)

Co-ordinators : Dr. Susmita Mukhopadhyay

Lecture 1 - Understanding meaning of performance management and reward systems management with performance management process

Lecture 2 - Understanding meaning of performance management and reward systems management with performance management process (Continued...)

Lecture 3 - Understanding meaning of performance management and reward systems management with performance management process (Continued...)

Lecture 4 - Understanding meaning of performance management and reward systems management with performance management process (Continued...)

Lecture 5 - Understanding meaning of performance management and reward systems management with performance management process (Continued...)

Lecture 6 - Developing an understanding as to why performance management and reward management are of strategic importance and their role in strategic planning

Lecture 7 - Developing an understanding as to why performance management and reward management are of strategic importance and their role in strategic planning (Continued...)

Lecture 8 - Developing an understanding as to why performance management and reward management are of strategic importance and their role in strategic planning (Continued...)

Lecture 9 - Developing an understanding as to why performance management and reward management are of strategic importance and their role in strategic planning (Continued...)

Lecture 10 - Developing an understanding as to why performance management and reward management are of strategic importance and their role in strategic planning (Continued...)

Lecture 11 - Implementation of a performance management system, definining performance and choosing a measurement approach and understanding the meaning of results

Lecture 12 - Implementation of a performance management system, definining performance and choosing a measurement approach and understanding the meaning of results (Continued...)

Lecture 13 - Implementation of a performance management system, definining performance and choosing a measurement approach and understanding the meaning of results (Continued...)

Lecture 14 - Implementation of a performance management system, definining performance and choosing a measurement approach and understanding the meaning of results (Continued...)

Lecture 15 - Implementation of a performance management system, definining performance and choosing a measurement approach and understanding the meaning of results (Continued...)

Lecture 16 - Implementing a performance management system in your organization

Lecture 17 - Implementing a performance management system in your organization (Continued...)

Lecture 18 - Implementing a performance management system in your organization (Continued...)

Lecture 19 - Implementing a performance management system in your organization (Continued...)

Lecture 20 - Implementing a performance management system in your organization (Continued...)

Lecture 21 - Role of performance management in employee development, addressing performance management skills and team reward management

Lecture 22 - Role of performance management in employee development, addressing performance management skills and team reward management (Continued...)

Lecture 23 - Role of performance management in employee development, addressing performance management skills and team reward management (Continued...)

Lecture 24 - Role of performance management in employee development, addressing performance management skills and team reward management (Continued...)

Lecture 25 - Role of performance management in employee development, addressing performance management skills and team reward management (Continued...)

Lecture 26 - Overview,reward system, understanding total, strategic and international reward

Lecture 27 - Overview,reward system, understanding total, strategic and international reward (Continued...)

Lecture 28 - Overview,reward system, understanding total, strategic and international reward (Continued...)

Lecture 29 - Overview,reward system, understanding total, strategic and international reward (Continued...)

Lecture 30 - Overview,reward system, understanding total, strategic and international reward (Continued...)

Lecture 31 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 32 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 33 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 34 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 35 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 36 - Understanding linkage between performance management and reward, an overview of various types of reward; financial reward, non-financial reward; contingent pay scheme; bonus scheme; team pay ; rewarding for business performance; recognition sc

Lecture 37 - Valuing and grading jobs, understanding pay levels, job evaluation schemes, equal pay, market rate analysis, designing of grade and pay structure

Lecture 38 - Valuing and grading jobs, understanding pay levels, job evaluation schemes, equal pay, market rate analysis, designing of grade and pay structure (Continued...)

Lecture 39 - Valuing and grading jobs, understanding pay levels, job evaluation schemes, equal pay, market rate analysis, designing of grade and pay structure (Continued...)

Lecture 40 - Valuing and grading jobs, understanding pay levels, job evaluation schemes, equal pay, market rate analysis, designing of grade and pay structure (Continued...)

Lecture 41 - Valuing and grading jobs, understanding pay levels, job evaluation schemes, equal pay, market rate analysis, designing of grade and pay structure (Continued...)

Lecture 42 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers

Lecture 43 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers (Continued...)

Lecture 44 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers (Continued...)

Lecture 45 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers (Continued...)

Lecture 46 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers (Continued...)

Lecture 47 - Rewarding Special Groups, rewarding directors and senior executives, sales and customer service staff, knowledge workers and manual workers (Continued...)

Lecture 48 - Understanding relevance of employee benefits and pension schemes, employee benefits, flexible benefits, pension scheme, 7th Pay Commission

Lecture 49 - Understanding relevance of employee benefits and pension schemes, employee benefits, flexible benefits, pension scheme, 7th Pay Commission (Continued...)

Lecture 50 - Understanding relevance of employee benefits and pension schemes, employee benefits, flexible benefits, pension scheme, 7th Pay Commission (Continued...)

Lecture 51 - Understanding relevance of employee benefits and pension schemes, employee benefits, flexible benefits, pension scheme, 7th Pay Commission (Continued...)

Lecture 52 - Understanding relevance of employee benefits and pension schemes, employee benefits, flexible benefits, pension scheme, 7th Pay Commission (Continued...)

Lecture 53 - Developing and Implementing Reward Systems

Lecture 54 - Developing and Implementing Reward Systems (Continued...)

Lecture 55 - Developing and Implementing Reward Systems (Continued...)

Lecture 56 - Developing and Implementing Reward Systems (Continued...)

Lecture 57 - Developing and Implementing Reward Systems (Continued...)

Lecture 58 - Understanding the implications of performance and reward management in present organizational dynamics through case studies

Lecture 59 - Understanding the implications of performance and reward management in present organizational dynamics through case studies (Continued...)

Lecture 60 - Understanding the implications of performance and reward management in present organizational dynamics through case studies (Continued...)

Lecture 61 - Understanding the implications of performance and reward management in present organizational dynamics through case studies (Continued...)

Lecture 62 - Understanding the implications of performance and reward management in present organizational dynamics through case studies (Continued...)

Lecture 63 - Understanding the implications of performance and reward management in present organizational dynamics through case studies (Continued...)

NPTEL : NOC:The Ethical Corporation (Management)

Co-ordinators : Prof. Chhanda Chakraborti

Lecture 1 - What is a Corporation

Lecture 2 - Ethical Corporation

Lecture 3 - What is Ethics

Lecture 4 - Law and Ethics, and Responsibilities

Lecture 5 - Why should a Corporation be Ethical

Lecture 6 - Normative Ethical Theories : Utilitarianism

Lecture 7 - Normative Ethical Theories : Deontological Ethics

Lecture 8 - Normative Ethical Theories : Rights and Justice

Lecture 9 - Normative Ethical Theories : Virtue Ethics

Lecture 10 - Normative Ethical Theories : Care Ethics

Lecture 11 - Managing Ethics within the Corporation

Lecture 12 - Managing Ethics within the Organization : Formal Approach

Lecture 13 - Managing Ethics within a Corporation : Formal and Informal Approach

Lecture 14 - How to Manage Inter - Personal Ethical Misconduct at Workplace

Lecture 15 - How to Apply Ethics

Lecture 16 - Understanding Corporate Governance

Lecture 17 - Conflicts and Key Elements in Corporate Governance

Lecture 18 - Specific Areas of Concern in Corporate Governance and Countermeasures - I

Lecture 19 - Specific Areas of Concern in Corporate Governance and Countermeasures - II

Lecture 20 - Concluding Session on Corporate Governance

Lecture 21 - Investing in Human relations: Employees as stakeholders and Investors of Human Capital

Lecture 22 - Employer-employee: Duties and rights from both sides

Lecture 23 - Organization model and employer-employee relation

Lecture 24 - Some specific issues in employer-employee relationship

Lecture 25 - Employees All Over the World

Lecture 26 - The Ethical Corporation : Natural Environment

Lecture 27 - Corporate Obligations to Natural Environment through the Laws

Lecture 28 - Corporate Obligations to Natural Environment through Appeal to Business Sense and Strategy

Lecture 29 - Corporate Obligations to Natural Environment on Ethical Grounds

Lecture 30 - Environmental Obligations : What Can an Ethical Corporation Do?

Lecture 31 - Consumers as Stakeholders and Consumer Protection

Lecture 32 - Ethics of Consumer Protection

Lecture 33 - Consumer ethics: Duty of a Corporation in marketing communication and promotion

Lecture 34 - Consumer ethics: Ethical issues in Marketing Management

Lecture 35 - Consumer Ethics: Duty of the Consumers

Lecture 36 - Competitors as Stakeholders and Fiar Competition

Lecture 37 - What is NOT Fair Competition

Lecture 38 - Competitors as Stakeholders; Global Competition

Lecture 39 - Suppliers as Stakeholders : Ethics in Supply Chain

Lecture 40 - Competitors and Suppliers : What can an Ethical Corporation Do?

NPTEL : NOC:Intellectual Property Rights and Competition Law (Management)

Co-ordinators : Prof. Niharika Sahoo Bhattacharya

Lecture 1 - Concept of Intellectual Property Law Patents

Lecture 2 - Trademark

Lecture 3 - Geographical Indications

Lecture 4 - Copyright

Lecture 5 - Industrial Designs

Lecture 6 - Integrated Circuits Layout Designs

Lecture 7 - Trade Secrets or Undisclosd Information

Lecture 8 - Information Competition Law

Lecture 9 - Introduction to Competition Law (Continued...)

Lecture 10 - Introduction Competieion Low Anti-Competitive Practices

Lecture 11 - Bid-Rigging

Lecture 12 - Introduction Competition Law - Vertical Agreements

Lecture 13 - Abuse of Dominance, Combinations

Lecture 14 - Regulation of Combinations

Lecture 15 - Economic Theory of Ip And Competition

Lecture 16 - Interface Between Ip And Competition

Lecture 17 - The United States Anti-Trust Law

Lecture 18 - Tying Arrangements And Intellectual Property Under Sharman Act

Lecture 19 - Unites States Jurisprudence: Unilateral Refusal To License Or Deal

Lecture 20 - Price Fixing And Antitrust Law

Lecture 21 - Market Allocation And Ipr

Lecture 22 - Vertical Restraints

Lecture 23 - Vertical Restraints (Contd)

Lecture 24 - Enforcement of Anti-Trust Law in United States

Lecture 25 - Introduction To EU Competition Policy And IPR

Lecture 26 - IP Based Conduct under Article 101

Lecture 27 - IP Based Conduct under Article 102

Lecture 28 - IP Based Conduct under Article 102

Lecture 29 - Technology Transfer Agreements

Lecture 30 - TTBER and safe harbor provisions

Lecture 31 - Standard Essential Patents and FRAND Terms

Lecture 32 - Introduction to Competition Law in India (Continued...)

Lecture 33 - Introduction to Competition Law in India (Continued...)

Lecture 34 - Introduction to Competition Law in India (Continued...)

Lecture 35 - IP Licensing and Indian Competition Law

Lecture 36 - IP Licensing and Indian Competition Law (Continued...)

Lecture 37 - IP Licensing and Indian Competition Law (Continued...)

Lecture 38 - IP Licensing and Indian Competition Law (Continued...)

Lecture 39 - Patent and Competition Law

Lecture 40 - Trademark, Copyright and Competition Law

Lecture 41 - TRIPS and Competition Law

Lecture 42 - TRIPS and Competition Law (Continued...)

Lecture 43 - Summary

NPTEL : NOC:Patent Search for Engineers and Lawyers (Management)

Co-ordinators : Prof. Shreya Matilal

Lecture 1 - Introduction to IPR

Lecture 2 - IP-Economic Rationale

Lecture 3 - Patentability-Novelty - I

Lecture 4 - Patentability-Novelty - II

Lecture 5 - Non-Obviousness

Lecture 6 - How to read a patent document

Lecture 7 - How to read a patent document

Lecture 8 - Introduction to patent search

Lecture 9 - Introduction to patent search

Lecture 10 - Fundamentals of patent search

Lecture 11 - Fundamentals of patent search

Lecture 12 - Hands on Patent Search

Lecture 13 - Hands on Patent Search

Lecture 14 - Hands on Patent Search - Sequence Search

Lecture 15 - Hands on Patent Search - Emerging areas of Technology

Lecture 16 - Types of patent Search

Lecture 17 - Types of patent Search (Continued...)

Lecture 18 - Types of patent Search (Continued...)

Lecture 19 - Types of patent Search, Validity Search

Lecture 20 - Invalidity Search

Lecture 21 - Types of Patent Search FTO

Lecture 22 - Types of Patent Search

Lecture 23 - Introduction to patent landscape

Lecture 24 - Introduction to patent landscape (Continued...)

Lecture 25 - Introduction to patent landscape (Continued...)

Lecture 26 - Hands on Patent Landscape

Lecture 27 - Hands on Patent Landscape (Continued...)

Lecture 28 - Hands on Patent Landscape (Continued...)

Lecture 29 - Hands on Patent Landscape (Continued...)

Lecture 30 - Hands on Patent Landscape (Continued...)

Lecture 31 - Analytical tools for Patent search and analysis

Lecture 32 - Analytical tools for Patent search and analysis (Continued...)

Lecture 33 - Analytical tools for Patent search and analysis (Continued...)

Lecture 34 - Analytical tools for Patent search and analysis (Continued...)

Lecture 35 - Analytical tools for Patent search and analysis (Continued...)

Lecture 36 - Analytical tools for Patent search and analysis (Continued...)

Lecture 37 - Administrative Enforcement

Lecture 38 - Judicial Enforcement

Lecture 39 - DOE

Lecture 40 - Patent Infringement

NPTEL : NOC:Modelling and Analytics for Supply Chain Management (Management)

Co-ordinators : Prof. Kunal Kanti Ghosh, Prof. Anupam Ghosh

Lecture 1 - Introduction to Modelling and Analytics for Supply Chain Management

Lecture 2 - Introduction to Modelling and Analytics In Supply Network

Lecture 3 - Decisions and Performance Measures In Supply Chain

Lecture 4 - Introduction to Analytics in Supply Chain

Lecture 5 - Analytics Framework Based on SCOR Model

Lecture 6 - Design Options for Distribution Network

Lecture 7 - Supplier selection Analytics

Lecture 8 - Supplier selection Analytics (Continued...)

Lecture 9 - Supplier selection Analytics (Continued...)

Lecture 10 - Supplier selection Analytics (Continued...)

Lecture 11 - Supplier selection Analytics (Continued...)

Lecture 12 - Transportation cost - I

Lecture 13 - Transportation cost - II

Lecture 14 - Transportation cost - III

Lecture 15 - Transportation cost - IV

Lecture 16 - Warehouse location models - I

Lecture 17 - Warehouse location models - II

Lecture 18 - Warehouse location models - III

Lecture 19 - Warehouse location models - IV

Lecture 20 - Warehouse layout

Lecture 21 - Space calculation - I

Lecture 22 - Space calculation - II

Lecture 23 - Performance of the entire supply chain

Lecture 24 - Data envelopment analysis

Lecture 25 - Concepts in inventory management - I

Lecture 26 - Concepts in inventory management - II

Lecture 27 - Concepts in inventory management - III

Lecture 28 - Concepts in inventory management - IV

Lecture 29 - Concepts in inventory management - V

Lecture 30 - Safety Stock and Reorder Level

Lecture 31 - Continuous Review System

Lecture 32 - Continuous Review System (Continued...)

Lecture 33 - Periodic Review System

Lecture 34 - Periodic Review System (Continued...)

Lecture 35 - Transportation system - India and World

Lecture 36 - Transport Costing

Lecture 37 - Public transport costing

Lecture 38 - Fixing Fare for public transportation system

Lecture 39 - Foreign trade logistics

Lecture 40 - Analytical Hierarchy Processing (AHP) Method

Lecture 41 - Technique of Order Preference by Similarity to Ideal Solution (TOPSIS) Method

Lecture 42 - TOPSIS and VIKOR Method

Lecture 43 - VIKOR and ISM Method

Lecture 44 - VIKOR and ISM Method

Lecture 45 - Forecasting Simple and Weighted Average Mean Square Error

Lecture 46 - Forecasting Exponential Smoothing Method

Lecture 47 - Forecasting Seasonality in Forecasting

Lecture 48 - Forecasting Trend Regression and Holt's Method

Lecture 49 - Forecasting Trend Holt's and Winters Method

Lecture 50 - Forecasting Multi Period Forecasting

Lecture 51 - Information Distortions; Coordination and Collaboration Modelling

Lecture 52 - Information Distortions; Coordination and Collaboration Modelling

Lecture 53 - Six Sigma and queuing in Coordination

Lecture 54 - Queuing in Coordination; Measuring the Degree of Coordination

Lecture 55 - Risk Analytics in Supply Network Design

Lecture 56 - Risk Analytics in Supply Network Design (Continued...)

Lecture 57 - Designing the global supply chain : Tax advantages

Lecture 58 - Designing the global supply chain : Tax advantages (Continued...)

Lecture 59 - Designing the global supply chain : Transhipment

Lecture 60 - Designing the global supply chain : Flexibility and Total Cost

Lecture 61 - Designing the global supply chain : Flexibility and Total Cost (Continued...)

Lecture 62 - Designing the global supply chain : Echelons

NPTEL : NOC:Marketing Analytics (Management)

Co-ordinators : Prof. Swagato Chatterjee

Lecture 1 - Introduction to R programming

Lecture 2 - Introduction to R programming (Continued...)

Lecture 3 - Introduction to R programming (Continued...)

Lecture 4 - Introduction to R programming (Continued...)

Lecture 5 - Introduction to R programming (Continued...)

Lecture 6 - Introduction to R programming (Continued...)

Lecture 7 - What Consumers Want

Lecture 8 - What Consumers Want (Continued...)

Lecture 9 - What Consumers Want (Continued...)

Lecture 10 - What Consumers Want (Continued...)

Lecture 11 - What Consumers Want (Continued...)

Lecture 12 - What Consumers Want (Continued...)

Lecture 13 - Segmentation Targeting and Positioning

Lecture 14 - Segmentation Targeting and Positioning (Continued...)

Lecture 15 - Segmentation Targeting and Positioning (Continued...)

Lecture 16 - Segmentation Targeting and Positioning (Continued...)

Lecture 17 - Segmentation Targeting and Positioning (Continued...)

Lecture 18 - Demand Forecasting and Pricing

Lecture 19 - Demand Forecasting and Pricing (Continued...)

Lecture 20 - Demand Forecasting and Pricing (Continued...)

Lecture 21 - Demand Forecasting and Pricing (Continued...)

Lecture 22 - Pricing

Lecture 23 - Pricing (Continued...)

Lecture 24 - Pricing (Continued...)

Lecture 25 - Pricing (Continued...)

Lecture 26 - Pricing (Continued...)

Lecture 27 - Pricing (Continued...)

Lecture 28 - Pricing (Continued...)

Lecture 29 - Marketing Mix Models and Advertising Models

Lecture 30 - Marketing Mix Models and Advertising Models (Continued...)

Lecture 31 - Marketing Mix Models and Advertising Models (Continued...)

Lecture 32 - Marketing Mix Models and Advertising Models (Continued...)

Lecture 33 - Marketing Mix Models and Advertising Models (Continued...)

Lecture 34 - Recommendation Engine and Retail Analytics

Lecture 35 - Recommendation Engine and Retail Analytics (Continued...)

Lecture 36 - Recommendation Engine and Retail Analytics (Continued...)

Lecture 37 - Recommendation Engine and Retail Analytics (Continued...)

Lecture 38 - Recommendation Engine and Retail Analytics (Continued...)

Lecture 39 - Recommendation Engine and Retail Analytics (Continued...)

Lecture 40 - RFM and Market Basket Analysis

Lecture 41 - RFM and Market Basket Analysis (Continued...)

Lecture 42 - RFM and Market Basket Analysis (Continued...)

Lecture 43 - RFM and Market Basket Analysis (Continued...)

Lecture 44 - RFM and Market Basket Analysis (Continued...)

Lecture 45 - Customer Churn and Customer Lifetime Value

Lecture 46 - Customer Churn and Customer Lifetime Value (Continued...)

Lecture 47 - Customer Churn and Customer Lifetime Value (Continued...)

Lecture 48 - Customer Churn and Customer Lifetime Value (Continued...)

Lecture 49 - Customer Churn and Customer Lifetime Value (Continued...)

Lecture 50 - Customer Churn and Customer Lifetime Value (Continued...)

Lecture 51 - Text Mining and Sentiment Analytics

Lecture 52 - Text Mining and Sentiment Analytics (Continued...)

Lecture 53 - Text Mining and Sentiment Analytics (Continued...)

Lecture 54 - Text Mining and Sentiment Analytics (Continued...)

Lecture 55 - Text Mining and Sentiment Analytics (Continued...)

Lecture 56 - Text Mining and Sentiment Analytics (Continued...)

Lecture 57 - Text Mining and Sentiment Analytics (Continued...)

Lecture 58 - Text Mining and Sentiment Analytics (Continued...)

Lecture 59 - Text Mining and Sentiment Analytics (Continued...)

Lecture 60 - Text Mining and Sentiment Analytics (Continued...)

Lecture 61 - Social Network Analysis and Excel Dashboards

Lecture 62 - Social Network Analysis and Excel Dashboards (Continued...)

Lecture 63 - Social Network Analysis and Excel Dashboards (Continued...)

Lecture 64 - Social Network Analysis and Excel Dashboards (Continued...)

Lecture 65 - Social Network Analysis and Excel Dashboards (Continued...)

Lecture 66 - Social Network Analysis and Excel Dashboards (Continued...)

NPTEL : NOC:Management of Commercial Banking (Management)

Co-ordinators : Prof. Jitendra Mahakud

Lecture 1 - Importance and Forms of Commercial Banks

Lecture 2 - Functions, Goals and Constraints of Commercial Banks

Lecture 3 - Regulation of Commercial Banks

Lecture 4 - Financial Statements of Commercial Banks - I

Lecture 5 - Financial Statements of Commercial Banks - II

Lecture 6 - Bank Performance Measures - I

Lecture 7 - Bank Performance Measures - II

Lecture 8 - Bank Performance Measures - III

Lecture 9 - Bank Performance Measures - IV

Lecture 10 - Bank Performance Measures - V

Lecture 11 - Valuation of Bank Stocks - I

Lecture 12 - Valuation of Bank Stocks - II

Lecture 13 - Valuation of Fixed Assets - I

Lecture 14 - Valuation of Fixed Assets - II

Lecture 15 - Valuation of Fixed Assets - III

Lecture 16 - Commercial Bank Risk - I

Lecture 17 - Commercial Bank Risk - II

Lecture 18 - Commercial Bank Risk - III

Lecture 19 - Commercial Bank Risk - IV

Lecture 20 - Commercial Bank Risk - V

Lecture 21 - Overview of Asset Liability Management

Lecture 22 - Dollar Gap Analysis

Lecture 23 - Earnings Sensitivity Analysis

Lecture 24 - Duration Gap Analysis - I

Lecture 25 - Duration Gap Analysis - II

Lecture 26 - Use of Derivatives in ALM - I

Lecture 27 - Use of Derivatives in ALM - II

Lecture 28 - Use of Derivatives in ALM - III

Lecture 29 - Use of Derivatives in ALM - IV

Lecture 30 - Use of Derivatives in ALM - V

Lecture 31 - Management of Lending Activities - I

Lecture 32 - Management of Lending Activities - II

Lecture 33 - Management of Lending Activities - III

Lecture 34 - Management of Lending Activities - IV

Lecture 35 - Management of Lending Activities - V

Lecture 36 - Management of Lending Activities - VI

Lecture 37 - Management of Lending Activities - VII

Lecture 38 - Management of Lending Activities - VIII

Lecture 39 - Management of Lending Activities - IX

Lecture 40 - Management of Lending Activities - X

Lecture 41 - Management Investment Portfolios - I

Lecture 42 - Management Investment Portfolios - II

Lecture 43 - Management Investment Portfolios - III

Lecture 44 - Management Investment Portfolios - IV

Lecture 45 - Management Investment Portfolios - V

Lecture 46 - Managing Liquidity of Commercial Banks - I

Lecture 47 - Managing Liquidity of Commercial Banks - II

Lecture 48 - Managing Liquidity of Commercial Banks - III

Lecture 49 - Managing Liquidity of Commercial Banks - IV

Lecture 50 - Managing Liquidity of Commercial Banks - V

Lecture 51 - Management of Deposits - I

Lecture 52 - Management of Deposits - II

Lecture 53 - Management of Non-Deposit Liabilities

Lecture 54 - Management of Off-Balance Sheet Activities - I

Lecture 55 - Management of Off-Balance Sheet Activities - II

Lecture 56 - Management of Off-Balance Sheet Activities - III

Lecture 57 - Management of Bank Capital - I

Lecture 58 - Management of Bank Capital - II

Lecture 59 - Management of Bank Capital - III

Lecture 60 - Management of Bank Capital - IV

NPTEL : NOC:Behavioral and Personal Finance (Management)

Co-ordinators : Prof. Abhijeet Chandra

Lecture 1 - Introduction to Behavioral Economics and Finance

Lecture 2 - Introduction to Behavioral Economics and Finance (Continued...)

Lecture 3 - Economics of Decision Making

Lecture 4 - Economics of Decision Making (Continued...)

Lecture 5 - Decision Making Under Risk and Uncertainty

Lecture 6 - Decision Making Under Risk and Uncertainty (Continued...)

Lecture 7 - Non-expected Utility Preferences

Lecture 8 - Non-expected Utility Preferences (Continued...)

Lecture 9 - Prospect Theory and Behavioral Biases

Lecture 10 - Prospect Theory and Behavioral Finance

Lecture 11 - Prospect Theory and Behavioral Finance (Continued...)

Lecture 12 - Beliefs, Biases and Heuristics

Lecture 13 - Beliefs, Biases and Heuristics (Continued...)

Lecture 14 - Beliefs, Biases and Heuristics (Continued...)

Lecture 15 - Biases and Financial Decision-Making

Lecture 16 - Biases and Financial Decision-Making (Continued...)

Lecture 17 - Overconfidence and Investor Behavior

Lecture 18 - Valuation of Financial Assets

Lecture 19 - Valuation of Financial Assets (Continued...)

Lecture 20 - Valuation of Financial Assets (Continued...)

Lecture 21 - Portfolio Return and Risk

Lecture 22 - Portfolio Return and Risk (Continued...)

Lecture 23 - Personal Financial Goals

Lecture 24 - Planning Personal Finances

Lecture 25 - Personal Financial Statements

Lecture 26 - Taxes and Financial Planning

Lecture 27 - Taxes and Financial Planning (Continued...)

Lecture 28 - Portfolios for Individual Investors

Lecture 29 - Investment Alternatives for Individual Investors

Lecture 30 - Investing in Mutual Funds

Lecture 31 - Fixed Income Investments

Lecture 32 - Fixed Income Investments (Continued...)

Lecture 33 - Purchasing Decisons

Lecture 34 - Consumer Credit Decisions

Lecture 35 - Loans and Amortization

Lecture 36 - Loans and Amortization (Continued...)

Lecture 37 - Credit Card as Source of Consumer Credit

Lecture 38 - Alternative Investments

Lecture 39 - Alternative Investments (Continued...)

Lecture 40 - Structured Finance: An Overview, Securitization

Lecture 41 - Wealth Managment

NPTEL : NOC:Customer Relationship Management (Management)

Co-ordinators : Prof. Swagato Chatterjee

Lecture 1 - CMR: The Strategic Imperative

Lecture 2 - CMR: The Strategic Imperative (Continued...)

Lecture 3 - CMR: The Strategic Imperative (Continued...)

Lecture 4 - CMR: The Strategic Imperative (Continued...)

Lecture 5 - Co-Creation

Lecture 6 - Co-creation (Continued...)

Lecture 7 - Co-creation (Continued...)

Lecture 8 - Building Customer Relationships

Lecture 9 - Building Customer Relationships (Continued...)

Lecture 10 - Building Customer Relationships (Continued...)

Lecture 11 - Building Customer Relationships (Continued...)

Lecture 12 - Building Customer Relationships (Continued...)

Lecture 13 - Building Customer Relationships (Continued...)

Lecture 14 - Economics of CRM

Lecture 15 - Economics of CRM (Continued...)

Lecture 16 - Economics of CRM (Continued...)

Lecture 17 - Economics of CRM (Continued...)

Lecture 18 - Economics of CRM (Continued...)

Lecture 19 - Economics of CRM (Continued...)

Lecture 20 - Economics of CRM (Continued...)

Lecture 21 - Social CRM

Lecture 22 - Social CRM (Continued...)

Lecture 23 - Social CRM (Continued...)

Lecture 24 - Tchibo Case Study

Lecture 25 - Tchibo Case Study (Continued...)

Lecture 26 - Customer Equity in CRM

Lecture 27 - Customer Equity in CRM (Continued...)

Lecture 28 - CRM in B2C Markets

Lecture 29 - CRM in B2C Markets (Continued...)

Lecture 30 - CRM in B2C Markets (Continued...)

Lecture 31 - CRM in B2C Markets (Continued...)

Lecture 32 - CRM in B2B Markets

Lecture 33 - CRM in B2B Markets (Continued...)

Lecture 34 - CRM in B2B Markets (Continued...)

Lecture 35 - CRM in B2B Markets (Continued...)

Lecture 36 - eCRM: Components and Strategies

Lecture 37 - eCRM: Components and Strategies (Continued...)

Lecture 38 - eCRM: Components and Strategies (Continued...)

Lecture 39 - Contact Centres for CRM

Lecture 40 - Contact Centres for CRM (Continued...)

Lecture 41 - Global CRM

Lecture 42 - Global CRM (Continued...)

NPTEL : NOC:Principles of Management (Management)

Co-ordinators : Prof. S. Srinivasan, Dr. Susmita Mukhopadhyay

Lecture 1 - Definition, Nature, Purpose and Scope of Management

Lecture 2 - Skills, Roles and Functions of Management

Lecture 3 - Principles of Management

Lecture 4 - Scientific Management

Lecture 5 - Evolution of Management Thought

Lecture 6 - Concept, Types, Importance and Process of Planning

Lecture 7 - Characteristics, Nature and Scope and Principles of Planning

Lecture 8 - Traditional objective setting and methods of Planning

Lecture 9 - Strategic Management and Planning

Lecture 10 - Premising and Forecasting of Planning

Lecture 11 - Concept, Types, Importance and Process of Decision Making

Lecture 12 - Different Models of Decision Making

Lecture 13 - Decision Making Styles and Cognitive biases in decision making

Lecture 14 - Barriers of Effective Decision Making

Lecture 15 - Group Decision Making

Lecture 16 - Concept,Importance and Steps of Management by Objectives

Lecture 17 - Concept,Importance and Steps of Management by exception

Lecture 18 - Style of Management (American, Japanese and Indian)

Lecture 19 - Approaches of management including McKinseyâ€™s 7â€™s approach

Lecture 20 - Introduction, strategies, techniques, benefits and rules of Self Management

Lecture 21 - Concept, Importance, Process, Nature, and Principle of Organisation

Lecture 22 - Organisational Design and Structure

Lecture 23 - Coordination in Management

Lecture 24 - Differentiation in management

Lecture 25 - Concept, Types, Importance, Steps, Factors and Advantages of Integration

Lecture 26 - Concept, Types, Importance and Process of Span of Management

Lecture 27 - Concept, types, factors, advantages and disadvantages of Centralisation and Decentralisation

Lecture 28 - Delegation

Lecture 29 - Different issues relating to authority and power

Lecture 30 - Different aspects of line and staff organisation

Lecture 31 - Concept, importance, process and methods of Staffing and HRM

Lecture 32 - Recruitment and Selection

Lecture 33 - Recruitment and Selection (Continued...)

Lecture 34 - Performance Appraisal

Lecture 35 - Performance Appraisal (Continued...)

Lecture 36 - Concept, Types, Importance, Techniques of Career strategy

Lecture 37 - Concept, Types, Importance, Techniques of Career strategy (Continued...)

Lecture 38 - Concept, Types, Importance, Techniques of Career strategy (Continued...)

Lecture 39 - Coordination-Concept, Issues and Techniques

Lecture 40 - Coordination-Concept, Issues and Techniques (Continued...)

Lecture 41 - Concept, importance, elements of organisational change

Lecture 42 - Concept, importance, elements of organisational change (Continued...)

Lecture 43 - Forces and factors of organisational change

Lecture 44 - Resistance to change

Lecture 45 - Theories of change and resistance to change

Lecture 46 - Methods of dealing with change

Lecture 47 - Methods of dealing with change (Continued...)

Lecture 48 - Behavioural reaction to organisational Change

Lecture 49 - Approaches to manage organisational Change

Lecture 50 - Approaches to manage organisational Change

Lecture 51 - Action Research model to manage organisational change

Lecture 52 - Organisational development

Lecture 53 - Leadership, and Its Theories

Lecture 54 - Team and Team Work in Management

Lecture 55 - Human factors and Motivation

Lecture 56 - Communication and Its Barriers

Lecture 57 - Controlling: Issues, Types, Techniques and Importance

Lecture 58 - Budgeting, concept, importance, process and benefits

Lecture 59 - Reporting- concepts, types, importance and advantages

NPTEL : NOC:Decision Support System for Managers (Management)

Co-ordinators : Prof Sujoy Bhattacharya, Prof. Anupam Ghosh, Prof. Kunal Kanti Ghosh

Lecture 1 - Introduction to decision support systems

Lecture 2 - Components of a decision support systems

Lecture 3 - Components of a decision support systems (Continued...)

Lecture 4 - Models in decision support systems

Lecture 5 - Models in decision support systems (Continued...)

Lecture 6 - Structured, Semi-Structured and Unstructured problems; Models

Lecture 7 - Purpose of models; classification of models

Lecture 8 - Solution Techniques - Optimization : Linear Programming

Lecture 9 - Solution Techniques - Optimization : Linear Programming (Continued...)

Lecture 10 - Solution Techniques - Optimization : Integer Programming

Lecture 11 - Decision Support Systems for Forecasting

Lecture 12 - Decision Support Systems for Forecasting (Continued...)

Lecture 13 - Decision Support Systems for Forecasting (Continued...)

Lecture 14 - Decision Support Systems for Forecasting (Continued...)

Lecture 15 - Decision Support Systems for Forecasting (Continued...)

Lecture 16 - Decision Making for Warehouse Location : Factor Rating and Break - Even Method

Lecture 17 - Decision Making for Warehouse Location (Continued..): Centre of gravity; Ardalan heuristic and transportation cost models

Lecture 18 - Estimation of space requirement in a warehouse and concept of economic order quantity (EOQ)

Lecture 19 - Economic order quantity (EOQ) (Continued...)

Lecture 20 - ABC-FSN-VED Analysis; space calculation in a warehouse - for Staging area

Lecture 21 - Space calculation in a warehouse : Space calculation for racks

Lecture 22 - Order Picking; Material handling equipment's

Lecture 23 - Material Safety and Safety Equipment's

Lecture 24 - Automated storage and replenishment systems (AS/RS)

Lecture 25 - Managerial Decision making in the context of warehousing and materials management

Lecture 26 - Issues in HR; Employee Selection

Lecture 27 - Employee Selection, Promotion and Deployment Method - Lp Method

Lecture 28 - Employee Selection, Promotion and Deployment Method - Rating and ranking Method ; Clustering

Lecture 29 - Employee Selection, Promotion and Deployment Method - BCG

Lecture 30 - Strategizing for Business, the SWOT and Porter's Framwork Revisited

Lecture 31 - Fortune at the Bottom of the Pyramid, GE, Rule of Three

Lecture 32 - Self Actualisation Needs, Rural Marketing Challenges

Lecture 33 - Rural Marketing; Balanced ScoreCard

Lecture 34 - Evaluating Investment Proposls : NPV, IRR

Lecture 35 - Costing and Pricing for Public Transport

Lecture 36 - Costing and Pricing for Hospitals

Lecture 37 - Decision Support Systems for Marketing : Decision Support Systems for Media Selection Model

Lecture 38 - Decision Support Systems for Marketing : Decision Support Systems for Media Selection Model (Continued...)

Lecture 39 - Decision Support Systems for Marketing : Decision Support Systems for Product Pricing Model

Lecture 40 - Pricing : Model Selection Using Cross - Validation

Lecture 41 - Taxation and the Distribution Network

Lecture 42 - Transhipment; Flexibility and Six Sigma

Lecture 43 - Flexibility and Total Cost of the Network

Lecture 44 - Risk Analysis for the Distribution Network

Lecture 45 - Echelons in the Network

Lecture 46 - Concept of Variability and Six Sigma

Lecture 47 - Concept of Variability and Six Sigma (Continued...)

Lecture 48 - Roadmap to Six Sigma; Ishikawa Diagram and SIPOC

Lecture 49 - Service Systems : Characteristics; Failure and Recovery

Lecture 50 - Decision Support Systems for Inventory

Lecture 51 - Decision Support Systems for Inventory (Continued...)

Lecture 52 - Decision Support Systems for Inventory (Continued...)

Lecture 53 - Decision Support Systems for Inventory (Continued...)

Lecture 54 - Decision Support Systems for Inventory (Continued...)

Lecture 55 - Decision Support Systems for Operations Management

Lecture 56 - Decision Support Systems for Operations Management (Continued...)

Lecture 57 - Decision Support Systems for Operations Management (Continued...)

Lecture 58 - Decision Support Systems for Operations Management (Continued...)

Lecture 59 - Decision Support Systems for Operations Management (Continued...)

Lecture 60 - DSS for Multi - Item Production - Distribution Planning

NPTEL : NOC:Management Information System (Management)

Co-ordinators : Prof. Kunal Kanti Ghosh, Prof. Surojit Mukherjee, Prof. Saini Das

Lecture 1 - Introduction - Part 1

Lecture 2 - Introduction - Part 2

Lecture 3 - Dimensions of Information System

Lecture 4 - Information Management in the digital world

Lecture 5 - Class discussions and conclusion

Lecture 6 - Data bases and information management

Lecture 7 - Data warehouse and business intelligence

Lecture 8 - Introduction to data mining

Lecture 9 - Data analytics tools and techniques

Lecture 10 - What is ERP ?

Lecture 11 - ERP - Evolution and Benefits

Lecture 12 - Business Benrfits of ERP

Lecture 13 - ERP project management: Challenge, risks and best practices

Lecture 14 - Change management and conclusion

Lecture 15 - Customer relationship management

Lecture 16 - Supply Chain Management - Part 1

Lecture 17 - Supply Chain Management - Part 2

Lecture 18 - Supplier relationship management

Lecture 19 - Product lifecycle maintenance

Lecture 20 - Information Systems for manufacturing management

Lecture 21 - Information Systems for manufacturing management (Continued...)

Lecture 22 - Information Systems for materials management

Lecture 23 - Information Systems for quality management

Lecture 24 - Information Systems for marketing

Lecture 25 - Information Systems for marketing (Continued...)

Lecture 26 - Information Systems for sales and distribution

Lecture 27 - Information Systems for finance and accounting

Lecture 28 - Information Systems for human resource management

Lecture 29 - Information Systems for human resource management (Continued...)

Lecture 30 - Information Systems (IS) strategy

Lecture 31 - Aligning IT with business objectives

Lecture 32 - Balanced Score Card

Lecture 33 - Data Centers, Virtualization and cloud computing

Lecture 34 - Cloud computing and selection of cloud vendor

Lecture 35 - Introduction to E-Commerce

Lecture 36 - B2C Business Models

Lecture 37 - B2C Business Models (Continued...)

Lecture 38 - Unique E-Commerce Business Models

Lecture 39 - Social Commerce and M-Commerce

Lecture 40 - Cloud Computing - Part I

Lecture 41 - Cloud Computing - Part II

Lecture 42 - Internet of Things - Part I

Lecture 43 - Internet of Things - Part II

Lecture 44 - Internet of Things - Part III

Lecture 45 - Big Data and other Emerging Technologies

Lecture 46 - Knowledge Management Systems (KMS)

Lecture 47 - Decision Support Systems

Lecture 48 - Executive Support Systems

Lecture 49 - Expert Systems

Lecture 50 - Learning Management Systems (LMS)

Lecture 51 - Ethical and Social Issues in MIS - I

Lecture 52 - Ethical and Social Issues in MIS - II

Lecture 53 - Security Issues in MIS - I

Lecture 54 - Security Issues in MIS - II

Lecture 55 - Security Issues in MIS - III

Lecture 56 - Managing Global Organization - Globalization - Part 1

Lecture 57 - Global Strategies and Business Organization

Lecture 58 - Shared Services

Lecture 59 - Offshoring/Transitioning Global IT Systems

Lecture 60 - Globalization of Corporates in a Flat World

NPTEL : NOC:Applied Econometrics (Management)

Co-ordinators : Prof. Tutan Ahmed

Lecture 1 - Overview of Module 1 and Introduction of Causality

Lecture 2 - Correlation and Causality

Lecture 3 - Correlation and Causality (Continued...)

Lecture 4 - Correlation and Causality (Continued...)

Lecture 5 - Probability Theory

Lecture 6 - Probability Theory (Continued...)

Lecture 7 - Probability Theory (Continued...)

Lecture 8 - Probability Theory (Continued...)

Lecture 9 - Posterior Probability

Lecture 10 - Bayesian Theorem

Lecture 11 - Bayesian Theorem (Continued...): Repeated Trial

Lecture 12 - Bayesian Theorem (Continued...): Example of Diamond Identification

Lecture 13 - Probability Distribution

Lecture 14 - Double Structure of Variable

Lecture 15 - Probability Distribution (Discrete/Continuous Variable) Random Variable

Lecture 16 - Probability Mass Function (PMF) Probability Density Function (PDF)

Lecture 17 - Expectation, Variance, Covariance

Lecture 18 - Expectation, Variance, Covariance (Continued...)

Lecture 19 - Covariance Rule

Lecture 20 - Bernoulli Distribution

Lecture 21 - Bernoulli Distribution (Continued...)

Lecture 22 - Normal Approximation of Bernoulli Distribution

Lecture 23 - Sampling

Lecture 24 - Sampling (Continued...)

Lecture 25 - Central Limit Theorem

Lecture 26 - Law of Large Numbers LLN

Lecture 27 - Properties of Estimator

Lecture 28 - Conflict Between Unbiasedness and Min Variance

Lecture 29 - T-Distribution

Lecture 30 - Normal Distribution

Lecture 31 - Normal Distribution (Continued...)

Lecture 32 - Hypothesis Testing

Lecture 33 - Decision Rules

Lecture 34 - Level of Significance

Lecture 35 - P Value

Lecture 36 - Power of a Test

Lecture 37 - Confidence Interval

Lecture 38 - Confidence Interval Example

Lecture 39 - Properties of Power of a Test

Lecture 40 - Introduction to Module II

Lecture 41 - Error Term, Coefficient of Determination, Regression Coefficient

Lecture 42 - Error Term, Coefficient of Determination, Regression Coefficient (Continued...)

Lecture 43 - Error Term, Coefficient of Determination, Regression Coefficient (Continued...)

Lecture 44 - Definition : Variable, Parameter and Coefficient

Lecture 45 - Introduction to Regression: Recapitulating Correlation and Causal Thinking

Lecture 46 - Adjusted R-Squared

Lecture 47 - Degrees of Freedom

Lecture 48 - Multiple Regression

Lecture 49 - Multiple Regression (Continued...)

Lecture 50 - Regression Table

Lecture 51 - Regression Table (Continued...)

Lecture 52 - Multicollinearity

Lecture 53 - Multicollinearity (Continued...)

Lecture 54 - Multicollinearity (Continued...)

Lecture 55 - Multicollinearity (Continued...)

Lecture 56 - Multicollinearity (Continued...)

Lecture 57 - Dummy Variable

Lecture 58 - Dummy variable (Continued...)

Lecture 59 - Dummy variable (Continued...)

Lecture 60 - Dummy variable (Continued...)

Lecture 61 - Dummy variable (Continued...)

Lecture 62 - Dummy variable (Continued...)

Lecture 63 - Dummy variable (Continued...)

Lecture 64 - Heteroscedasticity

Lecture 65 - Heteroscedasticity (Continued...)

Lecture 66 - Heteroscedasticity (Continued...)

Lecture 67 - Heteroscedasticity (Continued...)

Lecture 68 - Heteroscedasticity (Continued...)

Lecture 69 - Heteroscedasticity (Continued...)

Lecture 70 - Autocorrelation

Lecture 71 - Autocorrelation (Continued...)

Lecture 72 - Autocorrelation (Continued...)

Lecture 73 - Autocorrelation (Continued...)

Lecture 74 - Autocorrelation (Continued...)

Lecture 75 - Autocorrelation (Continued...)

Lecture 76 - Autocorrelation (Continued...)

Lecture 77 - Autocorrelation (Continued...)

Lecture 78 - Autocorrelation (Continued...)

Lecture 79 - Autocorrelation (Continued...)

Lecture 80 - Autocorrelation (Continued...)

Lecture 81 - Autocorrelation (Continued...)

Lecture 82 - Remedy for Autocorrelation

Lecture 83 - Model Specification

Lecture 84 - Model Specification (Continued...)

Lecture 85 - Model Specification (Continued...)

Lecture 86 - Model Specification (Continued...)

Lecture 87 - Model Specification (Continued...)

Lecture 88 - Model Specification (Continued...)

Lecture 89 - Model Specification (Continued...)

Lecture 90 - Model Specification (Continued...)

Lecture 91 - Continuation with Proxy Variable

Lecture 92 - Ramsey Reset Test

Lecture 93 - Introduction to Module III

Lecture 94 - Non Stochastic Regressor

Lecture 95 - Stochastic Regressor

Lecture 96 - Assumptions for Regression Models with Non-Stochastic Regressor

Lecture 97 - Assumptions for Regression Model with Stochastic Regressor

Lecture 98 - Instrumental Variable

Lecture 99 - Instrumental Variable (Continued...)

Lecture 100 - Asymptotic Property

Lecture 101 - Problem of Endogeneity

Lecture 102 - Simultaneous Equation Model

Lecture 103 - Instrumental Variable for Endogeneity Bias Problem

Lecture 104 - Good Bad and Weak Instrumental Variable

Lecture 105 - Overidentification Underidentification Exact Identification - Instrumental Variable

Lecture 106 - Two Stage Least Square and Instrumental Variable

Lecture 107 - 2SLS and IV with Stata

NPTEL : NOC:Organizational Behaviour - II (Management)

Co-ordinators : Prof. Susmita Mukhopadyay

Lecture 1 - Group and Types, Characteristics

Lecture 2 - Group Properties and Determinants of Group Behaviour

Lecture 3 - Stages, Theories and Models of Group Development

Lecture 4 - Effectiveness of Work Group Behaviour

Lecture 5 - Group Decision Making and Limitations of Group Behaviour

Lecture 6 - Concept and Types of Team

Lecture 7 - How to improve team performance, difference between Team and Group

Lecture 8 - Effectiveness of Teamwork

Lecture 9 - Teamwork Process

Lecture 10 - Teamwork and Leadership

Lecture 11 - Concept and Types of Cooperation and Competition

Lecture 12 - Factors leading to Competition and Cooperation

Lecture 13 - Functions of Cooperation and Competition

Lecture 14 - Models on Competition and Cooperation

Lecture 15 - Benefits and drawbacks of competition and cooperation

Lecture 16 - Communication

Lecture 17 - Communication (Continued...)

Lecture 18 - Communication (Continued...)

Lecture 19 - Communication (Continued...)

Lecture 20 - Communication (Continued...)

Lecture 21 - Conflict

Lecture 22 - Conflict (Continued...)

Lecture 23 - Conflict (Continued...)

Lecture 24 - Conflict (Continued...)

Lecture 25 - Conflict (Continued...)

Lecture 26 - Power and Political Behaviour

Lecture 27 - Power and Political Behaviour (Continued...)

Lecture 28 - Power and Political Behaviour (Continued...)

Lecture 29 - Power and Political Behaviour (Continued...)

Lecture 30 - Power and Political Behaviour (Continued...)

Lecture 31 - Decision making

Lecture 32 - Decision making (Continued...)

Lecture 33 - Decision making (Continued...)

Lecture 34 - Decision making (Continued...)

Lecture 35 - Decision making (Continued...)

Lecture 36 - Leadership Concept Types and Importance

Lecture 37 - Team Leadership Context, Actions

Lecture 38 - Theories of Leadership: Trait, Behavioural, Contingency, LMX, Three Dimensional

Lecture 39 - Leadership Qualities, Techniques and Skills

Lecture 40 - Leadership and Management

Lecture 41 - Problem Solving-Concept, Types and Importance

Lecture 42 - Problem Solving Process, Decision Making and Comparison between

Lecture 43 - Creativity

Lecture 44 - Problem Solving and Creativity in Team

Lecture 45 - Creativity Across Different Paradigms

Lecture 46 - Team and Organization

Lecture 47 - Organizational Culture

Lecture 48 - International Organizational Behaviour

Lecture 49 - Interpersonal Behaviour Across Cultures

Lecture 50 - Organizational Characteristics in Global Context

Lecture 51 - Virtual Team-Concept and importance

Lecture 52 - Virtual Team Models

Lecture 53 - Skills and Competencies of Virtual Team Members

Lecture 54 - Process of Virtual Team Development

Lecture 55 - Factors of Success, Advantages and Disadvantages of Virtual Teams

Lecture 56 - Evaluating Teams

Lecture 57 - Steps of Evaluation

Lecture 58 - Tools, Techniques and Methods of Evaluation

Lecture 59 - Rewarding Teams

Lecture 60 - Rewarding Teams (Continued...)

NPTEL : NOC:Automation in Production Systems and Management (Management)

Co-ordinators : Prof. Pradip Kumar Ray

Lecture 1 - Basic Concepts of Manufacturing Systems, Evolution of Manufacturing Systems

Lecture 2 - Types of Manufacturing Systems and Role of Automation

Lecture 3 - Product-Process-Flexibility Matrices, Four-Plane Concept of Manufacturing

Lecture 4 - Product Design and Manufacturing Systems

Lecture 5 - Definitions and Design Criteria for Production Systems

Lecture 6 - Manufacturing System Components - I

Lecture 7 - Manufacturing System Components - II

Lecture 8 - Industry 4.0

Lecture 9 - Automation Principles and Strategies for Process Improvement

Lecture 10 - Automated Production System Framework

Lecture 11 - Product Development Process: Approaches and stages

Lecture 12 - Mathematical Models for Interaction between Design and Manufacturing

Lecture 13 - Sequential and Concurrent Engineering Approaches for Product Development

Lecture 14 - Characterization of Concurrent Engineering Framework

Lecture 15 - Concurrent Engineering Techniques

Lecture 16 - Introduction to Concept and Application of Numerical Control (NC) Technology

Lecture 17 - Basic Concepts of an NC System

Lecture 18 - NC Coordinate System, NC Motion Control System

Lecture 19 - Features of CNC, Configuration of CNC Machine Control System

Lecture 20 - Numerical Examples

Lecture 21 - Distributed Numerical Control (DNC) and its Configuration

Lecture 22 - NC Part Programming-I (Manual, Computer-assisted)

Lecture 23 - NC Part Programming-II (CAD/CAM, MDI)

Lecture 24 - Interpolation and Part Programming

Lecture 25 - Numerical Examples

Lecture 26 - Group Technology (GT): Concept and Definition

Lecture 27 - Methods and Implementation of GT for Automation

Lecture 28 - Part Family Formation: Tools and Techniques

Lecture 29 - Numerical Examples on Part Family Formation

Lecture 30 - Application of GT for Designing Flexible and Programmable Automation

Lecture 31 - Concept and Definition of Cellular Manufacturing System (CMS)

Lecture 32 - Cell Formation Approaches - I

Lecture 33 - Cell Formation Approaches - II

Lecture 34 - Evaluation of Cell Design, Numerical Examples

Lecture 35 - Production Planning and Control in CMS, Assessment of Solution by Heuristics

Lecture 36 - Types and Definitions of of Flexibility in Manufacturing Systems

Lecture 37 - Volume-Variety Relationships in Production Systems, What is FMS?

Lecture 38 - Basic Features of FMS: PhysicalSsubsystems

Lecture 39 - Basic Features of FMS: Control Subsystems and Manufacturing Control Activities.

Lecture 40 - Types of Problems in FMS

Lecture 41 - Operational Problems in FMS: Tools and Techniques - 1, Problem Formulation

Lecture 42 - Operational Problems in FMS: Tools and Techniques - 2, Numerical Examples

Lecture 43 - Tool Allocation Policies in FMS, Numerical Examples

Lecture 44 - Fixture and Pallet Selection Problems: Numerical Examples

Lecture 45 - Types of FMS Layout, Relative Advantages

Lecture 46 - Fundamentals of Robotics and its Applications

Lecture 47 - Robot Movement and Precision

Lecture 48 - Robot Motion Analysis, Robotic Joints and Links

Lecture 49 - Robot Classification System, Industrial Robot Applications

Lecture 50 - Numerical Examples

Lecture 51 - Definition of Process Planning: Function of Process Plan

Lecture 52 - Basic Steps in Process Plan Development

Lecture 53 - Process Planning Approaches: Manual Experience-based Process Planning

Lecture 54 - Process Planning Approaches: Computer-aided Process Planning

Lecture 55 - CIN and CAPP, Process Optimization and CAPP

Lecture 56 - Process Optimization and CAPP

Lecture 57 - FMS and CAPP

Lecture 58 - Process Optimization and CAPP: Numerical Examples

Lecture 59 - Process Planning and Concurrent Engineering

Lecture 60 - Autonomation (and other TPS Areas and Approaches)

NPTEL : NOC:Corporate Finance (Management)

Co-ordinators : Prof. Abhijeet Chandra

Lecture 1 - Introduction to Corporate Finance

Lecture 2 - Corporate Finance and Corporate Governance

Lecture 3 - Sources of Finance for a Firm

Lecture 4 - Return and Risk

Lecture 5 - Return, Risk and Portfolio Theory

Lecture 6 - Time Value of Money

Lecture 7 - Valuation of Future Cash Flows

Lecture 8 - Valuation of Future Cash Flows (Continued...)

Lecture 9 - Valuation of Bonds

Lecture 10 - Valuation of Stocks

Lecture 11 - Capital Budgeting Decisions

Lecture 12 - Capital Budgeting Decisions (Continued...)

Lecture 13 - Capital Budgeting Techniques - I

Lecture 14 - Capital Budgeting Techniques - II

Lecture 15 - Capital Budgeting Techniques - III

Lecture 16 - Introduction to Cost of Capital

Lecture 17 - Cost of Capital - I

Lecture 18 - Cost of Capital - II

Lecture 19 - Cost of Capital and Firm Value - I

Lecture 20 - Cost of Capital and Firm Value - II

Lecture 21 - Measures of Leverage

Lecture 22 - Measures of Leverage (Continued...)

Lecture 23 - Theories of Capital Structure - I

Lecture 24 - Theories of Capital Structure - II

Lecture 25 - Practical Issues in Capital Structure

Lecture 26 - Working Capital Management - I

Lecture 27 - Working Capital Management - II

Lecture 28 - Measuring Liquidity - I

Lecture 29 - Measuring Liquidity - II

Lecture 30 - Inventory Management - I

Lecture 31 - Inventory Management - II

Lecture 32 - Inventory Management - III

Lecture 33 - Credit Management - I

Lecture 34 - Credit Management - II

Lecture 35 - Credit Management - III

Lecture 36 - Dividend Decisions - I

Lecture 37 - Dividend Decisions - II

Lecture 38 - Applications of Dividend Theories - I

Lecture 39 - Applications of Dividend Theories - II

Lecture 40 - Some Issues in Corporate Finance

NPTEL : NOC:International Marketing (Management)

Co-ordinators : Prof. Biswarup Ghosh

Lecture 1 - Introduction to International Marketing

Lecture 2 - Introduction to International Marketing

Lecture 3 - Introduction to International Marketing

Lecture 4 - Introduction to International Marketing

Lecture 5 - International Business, Entry Modes and Theories

Lecture 6 - International Business, Entry Modes and Theories

Lecture 7 - International Business, Entry Modes and Theories

Lecture 8 - International Business, Entry Modes and Theories

Lecture 9 - International Business, Entry Modes and Theories

Lecture 10 - Hofstede's Cultural Dimensions, Cross-cultural Sales Negotiations

Lecture 11 - Hofstede's Cultural Dimensions, Cross-cultural Sales Negotiations (Continued...)

Lecture 12 - Hofstede's Cultural Dimensions, Cross-cultural Sales Negotiations (Continued...)

Lecture 13 - Hofstede's Cultural Dimensions, Cross-cultural Sales Negotiations (Continued...)

Lecture 14 - Hofstede's Cultural Dimensions, Cross-cultural Sales Negotiations (Continued...)

Lecture 15 - Import Export Procedures

Lecture 16 - Import Export Procedures (Continued...)

Lecture 17 - Import Export Procedures (Continued...)

Lecture 18 - Import Export Procedures (Continued...)

Lecture 19 - Import Export Procedures (Continued...)

Lecture 20 - Designing a Global Marketing Program

Lecture 21 - Designing a Global Marketing Program (Continued...)

Lecture 22 - Designing a Global Marketing Program (Continued...)

Lecture 23 - Designing a Global Marketing Program (Continued...)

Lecture 24 - Designing a Global Marketing Program (Continued...)

Lecture 25 - International Business Case Analysis

Lecture 26 - International Business Case Analysis

Lecture 27 - International Business Case Analysis (Continued...)

Lecture 28 - International Business Case Analysis (Continued...)

Lecture 29 - International Business Case Analysis (Continued...)

Lecture 30 - Learning Session by Practicing Manager

Lecture 31 - Learning session by Practicing Manager (Continued ...)

Lecture 32 - Interaction with Practicing Manager - Question and Answer Session

Lecture 33 - Learning Session by Practicing Manager

Lecture 34 - Learning Session by Practicing Manager followed by Conclusion session

Lecture 35 - Interaction with Practicing Manager

Lecture 36 - Interaction with Practicing Manager (Continued...)

Lecture 37 - Interaction with Practicing Manager (Continued...)

Lecture 38 - Interaction with Practicing Manager (Continued...)

Lecture 39 - Concluding Session

NPTEL : NOC:Retail Management (Management)

Co-ordinators : Prof. Swagato Chatterjee

Lecture 1 - Introduction to Retailing - Part 1

Lecture 2 - Introduction to Retailing - Part 2

Lecture 3 - Introduction to Retailing - Part 3

Lecture 4 - Relationship Management in Retailing

Lecture 5 - Value-based Retailing

Lecture 6 - Retailing Services

Lecture 7 - Loyalty and Reward Programs

Lecture 8 - Strategic Planning in Retailing

Lecture 9 - Global Retailing

Lecture 10 - Retail Business Models by Ownership

Lecture 11 - Franchising in Retail

Lecture 12 - Retail Institutions by Store - Based Strategy Mix

Lecture 13 - Retail Institutions by Store - Based Strategy Mix (Continued...)

Lecture 14 - Retail Institutions by Store - Based Strategy Mix (Continued...)

Lecture 15 - Retail Institutions by Store - Based Strategy Mix (Continued...)

Lecture 16 - Web, Non store-based and Other Forms of Nontraditional Retailing

Lecture 17 - Web, Non store-based and Other Forms of Nontraditional Retailing (Continued...)

Lecture 18 - Identifying and Understanding the Customers

Lecture 19 - Trading Area Analysis

Lecture 20 - Trading Area Analysis (Continued...)

Lecture 21 - Trading Area Analysis (Continued...)

Lecture 22 - Site Selection

Lecture 23 - Site ownership vs Site Leasing

Lecture 24 - Retail Supply Chain Management

Lecture 25 - Retail Supply Chain Management (Continued...)

Lecture 26 - Retail Operations Management - 1

Lecture 27 - Retail Operations Management - 2

Lecture 28 - Retail Operations Management - 3

Lecture 29 - Image in Retail

Lecture 30 - Pricing in Retail

Lecture 31 - Pricing in Retail (Continued...)

Lecture 32 - Pricing in Retail (Continued...)

Lecture 33 - Merchandising in Retail

Lecture 34 - Merchandising in Retail (Continued...)

Lecture 35 - Category Management and Merchandise Planning

Lecture 36 - Retail Promotions

Lecture 37 - Retail Promotions: non-Ad Promotions

Lecture 38 - OBHR Issues in Retail - 1

Lecture 39 - HR Issues in Retail

Lecture 40 - Vendor Negotiations

Lecture 41 - Special Merchandising Contexts - 1

Lecture 42 - Special Merchandising Contexts - 2

Lecture 43 - Store Layout in Retail

Lecture 44 - Retail Operations: Financial Aspects

Lecture 45 - Budgeting and Costing

Lecture 46 - Financial Merchandise Management

Lecture 47 - Merchandise Forecasting, Dollar Control

NPTEL : NOC:Business Law for Managers (Management)

Co-ordinators : Prof. S. Srinivasan, Prof. Kaushik Mukherjee

Lecture 1 - Concept, Definition and Features of Company

Lecture 2 - Various Types of Companies and Their Memberships

Lecture 3 - Meetings of a Company and Memorandum of Associations

Lecture 4 - Corporate Social Responsibility (CSR)

Lecture 5 - Reporting and Various Activities under CSR

Lecture 6 - Concept, Definition and Features of Corporate Governance

Lecture 7 - Effect of Corporate Governance

Lecture 8 - Major Structural Issues

Lecture 9 - Duties and Responsibilities of Directors

Lecture 10 - Corporate Governance a Way Forward

Lecture 11 - Concept, Scope and Features of PIT

Lecture 12 - Investigation and Prohibition on Dealing, Counselling

Lecture 13 - Key Changes in PIT Amendment, 2020

Lecture 14 - Model Code of Conduct for PIT, Trading Initiatives

Lecture 15 - Insider trading examples, PIT Recent Cases and Insider Trading Initiatives

Lecture 16 - Concept, Elements, Importance and Forms of Contracts

Lecture 17 - Concept of Offer, Valid Offer and Essentials of Valid Offer

Lecture 18 - Concept of Fraud, Misrepresentation and Consideration

Lecture 19 - Major Issues related to Contract

Lecture 20 - Law of Insurance

Lecture 21 - Background, Concept and Salient Features of Factories Act

Lecture 22 - Health and Safety

Lecture 23 - Labour Welfare

Lecture 24 - Working Hours

Lecture 25 - Duties of Inspecting Officials

Lecture 26 - Background, Concept and Importance of Legislation for Wages

Lecture 27 - Payment of Wages

Lecture 28 - Minimum Wages

Lecture 29 - Payment of Bonus Act

Lecture 30 - Equal Remuneration Act

Lecture 31 - Social Securities

Lecture 32 - Social securities in unorganised sector

Lecture 33 - The Employeesâ€™ Provident Fund Act

Lecture 34 - Payment of Gratuity Act 1972

Lecture 35 - Employee State Insurance (ESI)

Lecture 36 - Concept and Salient Features of Industries

Lecture 37 - Industrial Relation

Lecture 38 - Industrial Dispute Act

Lecture 39 - Various Authorities under Industrial Dispute Act, 1947

Lecture 40 - Procedure, Power and Duties of Authorities

NPTEL : NOC:Safety and Risk Analytics (Management)

Co-ordinators : Prof. Jhareswar Maiti

Lecture 1 - Introduction to Safety and Risk Management

Lecture 2 - Hazard Triangle

Lecture 3 - Safety Ontology

Lecture 4 - Qualitative Risk Assessment

Lecture 5 - Quantitative Risk Assessment

Lecture 6 - Hazard and Risk Data - I

Lecture 7 - Hazard and Risk Data - II

Lecture 8 - Incident Investigation Data

Lecture 9 - Inspection and Audit Data

Lecture 10 - Behavioral and Organizational Safety Data

Lecture 11 - Data Dimensions and Information Quality

Lecture 12 - Missing Data Handling

Lecture 13 - Data Transformation - I

Lecture 14 - Data Transformation - II

Lecture 15 - Data Reduction - I

Lecture 16 - Data Reduction - II

Lecture 17 - Probability Distribution

Lecture 18 - Sample and Statistics

Lecture 19 - Safety Data Visualization Tools - I

Lecture 20 - Safety Data Visualization Tools - II

Lecture 21 - Safety Data Exploration

Lecture 22 - Leading and Lagging Indicators for Measuring Safety Performance

Lecture 23 - Control Charts for Safety Performance Evaluation and Monitoring

Lecture 24 - Safety Capability Analysis - I

Lecture 25 - Safety Capability Analysis - II

Lecture 26 - Safety Reports and Use of Text Analytics

Lecture 27 - Preprocessing of Text Data - I

Lecture 28 - Preprocessing of Text Data - II

Lecture 29 - Document Classification using KNN

Lecture 30 - Topic Modeling - Latent Dirichlet Allocation

Lecture 31 - Bow-Tie Construction

Lecture 32 - Bow-Tie Quantification - I

Lecture 33 - Bow-Tie Quantification - II: Accident Scenarios/Paths

Lecture 34 - Bow-Tie Quantification - III: Accident Path Quantification

Lecture 35 - Bow-Tie Quantification - IV: Probabilistic Approach using Monte Carlo Simulation

Lecture 36 - Consequence Modeling and Risk Distribution

Lecture 37 - Introduction to Predictive Safety and Risk Analytics

Lecture 38 - Logistic Regression

Lecture 39 - Application of Logistic Regression

Lecture 40 - Classification and Regression Tree (CART)

Lecture 41 - Classification and Regression Tree (CART): Case Study

Lecture 42 - Support Vector Machine

Lecture 43 - Support Vector Machine (Continued...)

Lecture 44 - Application of Support Vector Machine

Lecture 45 - Association Rule Mining

Lecture 46 - Application of Association Rule Mining

Lecture 47 - Statistical Measures of Safety Program Effectiveness - I

Lecture 48 - Statistical Measures of Safety Program Effectiveness - II

Lecture 49 - Statistical Measures of Safety Program Effectiveness - III

Lecture 50 - Intervention Design

Lecture 51 - Risk Based Decision Making - I

Lecture 52 - Risk Based Decision Making - II

Lecture 53 - Risk Based Maintenance - I

Lecture 54 - Risk Based Maintenance - II

Lecture 55 - Introduction to Behavioral Safety

Lecture 56 - Behavioral Safety Data Collection and Preliminary Analysis

Lecture 57 - Causal Modelling - I

Lecture 58 - Causal Modelling - II: Application of Path Model

Lecture 59 - Injury Epidemiology

Lecture 60 - Occupational Safety, Health and Working Conditions Code, 2020 Analytics

NPTEL : NOC:Strategic Management for Competitive Advantage (Management)

Co-ordinators : Prof. Sanjib Chowdhury

Lecture 1 - Introduction and Concept - I

Lecture 2 - Introduction and Concept - II

Lecture 3 - Analysis of micro and macro environment - I

Lecture 4 - Analysis of micro and macro environment - II

Lecture 5 - Competition and Competitive Advantage - I

Lecture 6 - Competition and Competitive Advantage - II

Lecture 7 - Competition and Competitive Advantage - III

Lecture 8 - Framework for Internal Analysis of Firm - I

Lecture 9 - Framework for Internal Analysis of Firm - II

Lecture 10 - Value Chain Analysis

Lecture 11 - Resource-based view of firm and sustainability

Lecture 12 - Strategy Formulation - I

Lecture 13 - Strategy Formulation - II

Lecture 14 - Strategy Formulation - III

Lecture 15 - Diversification - I

Lecture 16 - Diversification - II

Lecture 17 - Mergers and Acquisitions - I

Lecture 18 - Mergers and Acquisitions - II

Lecture 19 - Portfolio Analysis and Display Matrices - I

Lecture 20 - Portfolio Analysis and Display Matrices - II

Lecture 21 - Operating and Financial Analysis

Lecture 22 - Complexities and Challenges of Competing in Global Markets - I

Lecture 23 - Complexities and Challenges of Competing in Global Markets - II

Lecture 24 - Entry Mode Strategies and Main Approaches for International Business

Lecture 25 - Building Competitive Advantage in International Markets

Lecture 26 - Strategies for competing in developing markets, and defending against global giants

Lecture 27 - Resource Allocation

Lecture 28 - 7-S Framework for Organizational Change

Lecture 29 - Strategy Implementation Issues

Lecture 30 - Matching organization structure to strategy

Lecture 31 - Forms of Organization

Lecture 32 - Boundaryless Organization

Lecture 33 - Strategic Leadership - I

Lecture 34 - Strategic Leadership - II

Lecture 35 - Universal Inner Structure of Effective Leaders

Lecture 36 - Strategic Leadership - IV

Lecture 37 - Business and Operational Excellence

Lecture 38 - Strategic and Operational Control

Lecture 39 - Balanced Scorecard Approach

Lecture 40 - Roles and Responsibilities of Board of Directors

Lecture 41 - Strategic Management Role and Style of the Board

Lecture 42 - Composition, structure and other requirements of Board

Lecture 43 - Improve Board Effectiveness, Board and Directorsâ€™ Performance Evaluation

Lecture 44 - Corporate Governance Code

Lecture 45 - Corporate Social Responsibility and Sustainability

Lecture 46 - Social Auditing

Lecture 47 - Innovation for Survival and Growth - I

Lecture 48 - Innovation for Survival and Growth - II

Lecture 49 - Entrepreneurship and Intrapreneurship

Lecture 50 - Technology Management - I

Lecture 51 - Technology Management - II

Lecture 52 - In-house Development of Technology

Lecture 53 - Strategic Importance of Knowledge and Organizational Learning

Lecture 54 - Strategies for Knowledge Management

Lecture 55 - Developing Strategic Plan of a Major Oil Company - I

Lecture 56 - Developing Strategic Plan of a Major Oil Company - II

Lecture 57 - Developing Strategic Plan of a Major Oil Company - III

Lecture 58 - Summary of Modules 1-6

Lecture 59 - Summary of Modules 7-11

Lecture 60 - Summary of Modules 12-18

NPTEL : NOC:Human Factors Engineering (Management)

Co-ordinators : Prof. Virendra Kumar Tewari, Prof. Pradip Kumar Ray

Lecture 1 - Definition, purpose, and development of Human Factors and Ergonomics

Lecture 2 - Types and components of worksystems, their interactions and evaluations

Lecture 3 - Human components, machine components and environment components of worksystems

Lecture 4 - Modern worksystems, FMJ vs FJM

Lecture 5 - Contribution of human factors in systems design, engineering and management

Lecture 6 - Anthropometry in product/process design, MHD, anthropometric design motto

Lecture 7 - Types of anthropometric data, principles of applied anthropometry

Lecture 8 - Examples of anthropometric design, numerical exercises

Lecture 9 - Working Posture Analysis, Postural Triangle, Design for Seated and Standing Workers - Part 1

Lecture 10 - Working Posture Analysis, Postural Triangle, Design for Seated and Standing Workers - Part 2

Lecture 11 - Metabolism during work, Aerobic and anaerobic work, oxygen uptake

Lecture 12 - Physical work capacity and energy expenditure, Individual differences, RWL, MOW

Lecture 13 - MOE expenditure, Subjective measures of physical effort, Borg RPE scale, Factors

Lecture 14 - EE of various operations in agriculture, construction and manufacturing industry - I

Lecture 15 - EE of various operations in agriculture, construction and manufacturing industry - II

Lecture 16 - Types of Injury Problems in Manual Handling Tasks, Types of Activities and Body Movements

Lecture 17 - Biomechanical Modelling and Analysis of Manual Lifting

Lecture 18 - Definitions and Standards of Lifting: NIOSH Lifting Equation

Lecture 19 - EC Guidelines, UK Health and Safety Commission Guidelines

Lecture 20 - Use of Material Handling Aids, Types of Material Handling Devices, Numerical Problems

Lecture 21 - Ergonomic Problems in Computer Workstations, Design Elements of Computer Workstation

Lecture 22 - Specifications of Computer Workstation Design Elements

Lecture 23 - Methods to Reduce Glare/Reflection on Screen

Lecture 24 - Design of Human-Computer Interaction

Lecture 25 - Evolution of Technology in Computer Screen, Numerical Problems

Lecture 26 - Work Postures and Related Complaints, Work Postures for Different Tasks, Task Analysis

Lecture 27 - Power Law of Practice, Learning Curve, Numerical Pro

Lecture 28 - Work Posture Assessment, Rapid Entire Body Assessment (REBA), MSDs/RMIs

Lecture 29 - Hand tool design: Fitting the task, user and hand, Usage of hand tools and types of

Lecture 30 - Design guidelines for hand tools

Lecture 31 - Environment Component in Worksystems, Ergonomic Design of Physical Environment

Lecture 32 - Ergonomic Design Framework for Environment, Importance of Illumination

Lecture 33 - Measurement of Illuminance, Luminance, and Contrast

Lecture 34 - Measures of Contrast, Contrast Ratio under Different Work Situations

Lecture 35 - Direct and Indirect Glare or Reflection, Illumination for Inspection and Quality

Lecture 36 - Problem of Heat Stress at Workplaces, Thermoregulation Process, Acclimation and

Lecture 37 - Thermal Balance Equation and Heat Stress

Lecture 38 - Quality of Thermal Environment, Evaluation of Thermal Environment

Lecture 39 - Whole Body Vibration and Sources of Vibration Discomfort

Lecture 40 - Design guidelines for hand tools

Lecture 41 - Auditory Environment and Human Performance, Measurement of Sound and Noise Exposure

Lecture 42 - Noise Exposure and Hearing Loss, Noise Analysis and Noise Reduction using Engineering

Lecture 43 - Effects of Noise on Performance, Broadbent and Poulton Theories, Interference of Noise

Lecture 44 - Octave bands and examples

Lecture 45 - Ergonomic design ofauditory environmentin different workplaces

Lecture 46 - Concepts of Design for Manufacturing (DFM), Design for Assembly (DHA), and Design

Lecture 47 - Product Design Assessment and Important Measures, Manual Assembly Design Efficiency

Lecture 48 - Assembly Time Determination with PMTS Methods, Human Factors Principles in DHA

Lecture 49 - Maintenance in Manufacturing/Production System - Important Ergonomic Design Issues - Part I

Lecture 50 - Maintenance in Manufacturing/Production System - Important Ergonomic Design Issues - Part II

Lecture 51 - Definition of Shift Work, Problems with Shift Work, Effect on Circadian Rhythms

Lecture 52 - Problems of shift workers, Shift Work and Human Performance

Lecture 53 - Recommended Shift Work Schedules

Lecture 54 - Major Ergonomic Issues and Problems in Shift Work Design - Part 1

Lecture 55 - Major Ergonomic Issues and Problems in Shift Work Design - Part 2

Lecture 56 - Concepts of Ergonomic Performance and its Indicators

Lecture 57 - EPI Assessment Tool Development

Lecture 58 - Factors and their level of assessment

Lecture 59 - Application of EPI Model in Different Worksystems

Lecture 60 - Epilogue

NPTEL : NOC:Organizational Design Change and Transformation (Management)

Co-ordinators : Prof. S. Srinivasan, Prof. Susmita Mukhopadhyay, Prof. Sangeeta Sahney

Lecture 1 - Introduction to Organizational Design

Lecture 2 - Introduction to Organizational Design

Lecture 3 - Introduction to Organizational Design

Lecture 4 - Introduction to Organizational Design

Lecture 5 - Introduction to Organizational Design

Lecture 6 - Organizational Environment

Lecture 7 - Organizational Environment

Lecture 8 - Organizational Environment

Lecture 9 - Organizational Environment

Lecture 10 - Organizational Environment

Lecture 11 - Organizational Structure

Lecture 12 - Organizational Structure

Lecture 13 - Organizational Structure

Lecture 14 - Organizational Structure

Lecture 15 - Organizational Structure

Lecture 16 - Organizational Design and Strategy in a changing Global environment

Lecture 17 - Organizational Design and Strategy in a changing Global environment

Lecture 18 - Organizational Design and Strategy in a changing Global environment

Lecture 19 - Organizational Design and Strategy in a changing Global environment

Lecture 20 - Organizational Design and Strategy in a changing Global environment

Lecture 21 - Organizational Change

Lecture 22 - Organizational Change

Lecture 23 - Organizational Change

Lecture 24 - Organizational Change

Lecture 25 - Organizational Change

Lecture 26 - Managing Conflict, Power, and Politics

Lecture 27 - Managing Conflict, Power, and Politics

Lecture 28 - Managing Conflict, Power, and Politics

Lecture 29 - Managing Conflict, Power, and Politics

Lecture 30 - Managing Conflict, Power, and Politics

Lecture 31 - Organizational culture

Lecture 32 - Organizational culture and socialization

Lecture 33 - Organizational culture and climate

Lecture 34 - Managing organizational culture

Lecture 35 - International aspects of organizational culture

Lecture 36 - Organizational design and technology

Lecture 37 - Technologies and organizational structure

Lecture 38 - Technological theories and organizational design

Lecture 39 - Organizational design and technology: Challenges

Lecture 40 - Organizational competencies

Lecture 41 - Decision making

Lecture 42 - Learning

Lecture 43 - Knowledge management

Lecture 44 - IT and IS

Lecture 45 - IT in Management and Organization

Lecture 46 - Organizational Birth and Growth

Lecture 47 - Organizational Decline and Death

Lecture 48 - Organizational Inertia and Resilience

Lecture 49 - Organizational Transformation

Lecture 50 - Organizational Development and Intervention

Lecture 51 - Innovation: Concept, Types

Lecture 52 - Innovation Framework Model

Lecture 53 - Intrapreneurship

Lecture 54 - Creativity

Lecture 55 - Creativity and Related Issues

Lecture 56 - Creativity and Design Thinking

Lecture 57 - Turnaround Situation: Strategic, Operational and Cultural

Lecture 58 - IT and ICT Intervention

Lecture 59 - Human Resource Intervention

Lecture 60 - Organizational Culture, Transformation and Ethical Values

Lecture 61 - Future Trends for Organizational Transformation

NPTEL : NOC:Mergers, Acquisitions and Corporate Restructuring (Management)

Co-ordinators : Prof. Chandra Sekhar Mishra

Lecture 1 - Introduction to Mergers and Acquisitions - I

Lecture 2 - Introduction to Mergers and Acquisitions - II

Lecture 3 - Theories of Mergers and Acquisitions

Lecture 4 - Legal Environment of M and A in India

Lecture 5 - Case Studies - DO M and A PAY ?

Lecture 6 - Takeover Tactics and Anti-takeover Defenses - 1

Lecture 7 - Takeover Tactics and Anti-takeover Defenses - 1

Lecture 8 - Takeover Tactics and Anti-takeover Defenses - 2

Lecture 9 - Takeover Tactics and Anti-takeover Defenses - 3

Lecture 10 - Acquisition Search and Due Diligence - 1

Lecture 11 - Acquisition Search and Due Diligence - 2

Lecture 12 - Valuation in M and A: Cash Flow Based Approach - 1

Lecture 13 - Valuation in M and A: Cash Flow Based Approach - 3 (Cost of Capital)

Lecture 14 - Valuation in M and A: Cash Flow Based Approach - 4 (Dividend Discount Model)

Lecture 15 - Valuation in M and A: Cash Flow Based Approach - 4 (Dividend Discount Model)

Lecture 16 - Valuation in M and A: Cash Flow Based Approach - 5 (Free Cash Flow Models)

Lecture 17 - Valuation in M and A: Cash Flow Based Approach - 6 (Free Cash Flow Models) (Continued...)

Lecture 18 - Valuation in M and A: Valuation of Synergies - 1

Lecture 19 - Valuation in M and A: Valuation of Synergies - 2

Lecture 20 - Valuation in M and A: Asset Based Valuation

Lecture 21 - Valuation in M and A: Relative Valuation - 1

Lecture 22 - Valuation in M and A: Relative Valuation - 2

Lecture 23 - Alternative Exit and Restructuring Strategies - 1

Lecture 24 - Alternative Exit and Restructuring Strategies - 2

Lecture 25 - Alternative Exit and Restructuring Strategies - 3

Lecture 26 - M and A Deal Structuring - 1

Lecture 27 - M and A Deal Structuring - 2

Lecture 28 - M and A Deal Structuring - 3

Lecture 29 - M and A Deal Structuring - 4

Lecture 30 - M and A Deal Structuring - 5

Lecture 31 - Legal Aspects of M and A - 1

Lecture 32 - Legal Aspects of M and A - 2

Lecture 33 - Legal Aspects of M and A - 3

Lecture 34 - Accounting Aspects of M and A - I

Lecture 35 - Accounting Aspects of M and A - II

Lecture 36 - Alternative Exit and Restructuring Strategies - 1

Lecture 37 - Alternative Exit and Restructuring Strategies - 2

Lecture 38 - Alternative Exit and Restructuring Strategies - 3

Lecture 39 - Leveraged Buyouts

Lecture 40 - Alternative Exit and Restructuring Strategies - Insolvency and Bankruptcy

NPTEL : NOC:Invest Management (Management)

Co-ordinators : Prof. Abhijeet Chandra

Lecture 1 - Investment Management as a Process

Lecture 2 - Role of Financial Markets and Institutions

Lecture 3 - Types of Investments

Lecture 4 - Ecology of Financial Markets

Lecture 5 - Investment Philosophies

Lecture 6 - Present and Future Values of Investments

Lecture 7 - Bonds as an Investment

Lecture 8 - Pricing and Valuation of Bonds

Lecture 9 - Pricing and Valuation of Bonds (Continued...)

Lecture 10 - Prices, Yields, and Duration of Bonds

Lecture 11 - Equity as an Asset Class

Lecture 12 - Equity Valuation Models

Lecture 13 - Equity Valuation Models (Continued...)

Lecture 14 - Equity Valuation Ratios

Lecture 15 - Equity Investment Strategies

Lecture 16 - Portfolio Theory - Primer

Lecture 17 - Capital Asset Pricing Model

Lecture 18 - The CAPM and Index Models

Lecture 19 - The CAPM and Index Models (Continued...)

Lecture 20 - Consumption-Based Asset Pricing

Lecture 21 - Two-fund Theorem

Lecture 22 - Mutual Fund Basics

Lecture 23 - Mutual Fund Basics (Continued...)

Lecture 24 - Risk Indicator of a Mutual Fund

Lecture 25 - Risk Indicator of a Mutual Fund (Continued...)

Lecture 26 - Market Efficiency

Lecture 27 - Market Efficiency (Continued...)

Lecture 28 - Fundamental Analysis of Securities

Lecture 29 - Value Investing using PV Models

Lecture 30 - Asset Allocation and Portfolio Strategies

Lecture 31 - Exchange Traded Funds (ETFs)

Lecture 32 - Forming Portfolio with ETFs

Lecture 33 - Forming Portfolio with ETFs (Continued...)

Lecture 34 - Cryptocurrencies

Lecture 35 - Cryptocurrencies (Continued...)

Lecture 36 - Behavioral Anomalies in Investments

Lecture 37 - Behavioral Anomalies in Investments (Continued...)

Lecture 38 - Portfolio Evaluation

Lecture 39 - Portfolio Evaluation (Continued...)

Lecture 40 - Wrapping up

NPTEL : NOC:Project Management: Planning, Execution, Evaluation and Control (Management)

Co-ordinators : Prof. Sanjib Chowdhury

Lecture 1 - Basic Concepts and Introduction

Lecture 2 - Drivers of Project Management

Lecture 3 - Linkages between Organization Strategy and Projects

Lecture 4 - Project Governance and Design of Project Portfolio System

Lecture 5 - Non-Financial and Multi-Criteria Project Selection Models

Lecture 6 - Organization Structure

Lecture 7 - Organization Culture

Lecture 8 - Project Scope of Work and Deliverables

Lecture 9 - Responsibility Matrices and Project Communication Plan

Lecture 10 - Estimating Guidilines and Methods, Top-down Estimation

Lecture 11 - Level of Details, Type of Costs and Refining Estimates

Lecture 12 - Concept of Project Network and Development Rules

Lecture 13 - Construction of Netwrok and Computation Process

Lecture 14 - Extended Network Techniques to Represent Reality

Lecture 15 - Probabilty of Completion of Project on Time

Lecture 16 - Managing Risk and Risk Identification

Lecture 17 - Risk Assessment

Lecture 18 - Risk Response Development and Contingency Planning

Lecture 19 - Risk Response Control and Change Control Management

Lecture 20 - Risk Assessment of Capital projects

Lecture 21 - Classification of Scheduling Problems: Time-constrained Project

Lecture 22 - Resource-constrained Project

Lecture 23 - Time-phased Budget, Critical Chain Project Management

Lecture 24 - Rationale and Options for Project Crashing

Lecture 25 - Crashing - Reducing Project Duration

Lecture 26 - Reducing Project Duration - Solving Numerical

Lecture 27 - Project Monitoring and Control Process

Lecture 28 - Development of Performance Indexes for Monitoring

Lecture 29 - Forecasting Project Completion Time and Cost

Lecture 30 - Strategic Dimensions and Decision Logic of Outsourcing

Lecture 31 - Best Practices in Outsourcing Project Work

Lecture 32 - Partnering and Traditional Approaches for Managing Relations

Lecture 33 - The Art of Negotiating

Lecture 34 - Customer's Satisfaction and Managing Customer Relations

Lecture 35 - Types of Contract and their Salient Features

Lecture 36 - Preparation and Evaluation of RFP: Best Practices

Lecture 37 - Project Closure Activities and Post-Implementation Evaluation

Lecture 38 - Retrospectives

Lecture 39 - Oversight Activities and Levels

Lecture 40 - Phase Gate System, Project Management Maturity Model

NPTEL : NOC:Commodity Derivatives and Risk Management (2023) (Management)

Co-ordinators : Prof. Prabina Rajib

Lecture 1 - Introduction to Commodity Market

Lecture 2 - Commodity Spot Market and Different Types of Auction

Lecture 3 - Commodity Spot Market and Different Types of Auction

Lecture 4 - Introduction to forward contract

Lecture 5 - Introduction to Futures Contract

Lecture 6 - Futures Contract Specification

Lecture 7 - Futures Contract Specification (Continued...)

Lecture 8 - Futures Contract Specification (Continued...)

Lecture 9 - Futures Contract (Different Types of Margins)

Lecture 10 - Futures Contract (Mark-to-Market/MTM Margin)

Lecture 11 - Hedgers Vs. Speculators

Lecture 12 - Measures of Speculation

Lecture 13 - Spot Price, Futures Price and Basis Risk

Lecture 14 - Spot Price, Futures Price and Basis Risk (Continued...)

Lecture 15 - Pricing of Futures

Lecture 16 - Pricing of Futures (Continued...)

Lecture 17 - Convenience Yield, Minimum Variance Hedge Ratio

Lecture 18 - Hedge Effectiveness, Cross Hedge, Stack and Roll Vs. Strip Hedge

Lecture 19 - Calendar Spread, Valuation of Futures vs. Forwards, Commodity Swaps

Lecture 20 - Commodity Swaps

Lecture 21 - Commodity Index

Lecture 22 - Commodity Index (Continued...)

Lecture 23 - Commodity options

Lecture 24 - Introduction to Commodity Options (Continued...), Hedgers vs. Speculators

Lecture 25 - Pricing of Commodity Options

Lecture 26 - Commodity Options (Continued...), Put-Call Parity and Put-Call Ratio

Lecture 27 - Put-Call Parity, Implied Volatility, Swaptions

Lecture 28 - Commodity Swaption (Continued...) and Asian Options on Commodities

Lecture 29 - Commodity Derivatives Market : Value Proposition

Lecture 30 - Commodity Derivatives Market : Value Proposition

Lecture 31 - Agricultural Commodity Price Risk Management

Lecture 32 - Agricultural Commodity Price Risk Management (Continued...)

Lecture 33 - Agricommodities Price Risk, Seasonality, Crush Spread Futures

Lecture 34 - Agri-commodity Seasonality, Crush Spread Futures, Salmon Futures

Lecture 35 - Crush Spread Futures, Salmon Futures, Agri-commodity risk Management Practices

Lecture 36 - Gold and other Precious Metal Derivatives

Lecture 37 - Gold as Asset, LBMA Spot Price Fix

Lecture 38 - Gold as Asset, ETF, Gold-Silver Ratio

Lecture 39 - Gold Price Risk Management, Dehedge, Zero Cost Derivatives

Lecture 40 - Gold Quanto Futures, Delta Hedge Trap

Lecture 41 - Crude oil and Crude oil Derivatives Price Risk Management

Lecture 42 - Crude oil and Crude oil Derivatives Price Risk Management (Continued...)

Lecture 43 - Crack Spread Futures, Spread Options and Crude Oil Price Risk

Lecture 44 - Crude Oil Price Risk Management: 3-Way Collar, Spread Options and Swaps

Lecture 45 - Swaps, Calendar Spreads: Crude Oil and Natural Gas Risk Management

Lecture 46 - Weather Derivatives

Lecture 47 - Weather Derivatives (Continued...)

Lecture 48 - Weather Derivatives (Snowfall, Rainfall and Hurricane)

Lecture 49 - Weather Derivatives (Rainfall and Hurricane)

Lecture 50 - Spot and Derivatives Contracts on Electricity

Lecture 51 - Electricity Trading in Day Ahead Market (DAM)

Lecture 52 - Spot and Derivatives in Electricity (System Price and Area Clearing Price)

Lecture 53 - Spot and Derivatives in Electricity (Green DAM, Duck Curve, Dark/Spark Spread)

Lecture 54 - Carbon Credits and Carbon Credit Derivatives Market

Lecture 55 - Carbon Credits (CDM, JI, RGGI, REC, ESCerts)

Lecture 56 - Carbon Credits (REC, ESCerts,CORSIA) and Carbon Derivatives

Lecture 57 - Freight Rates Derivatives

Lecture 58 - Freight Rates Derivatives (Continued...)

Lecture 59 - Water Derivatives

Lecture 60 - Real Estate Derivatives and Derivatives Losses

NPTEL : NOC:Service Management: Integrating Strategy, Operations, and Technology (Management)

Co-ordinators : Prof. Sanjib Chowdhury

Lecture 1 - The Role of Services in an Economy - 1

Lecture 2 - The Role of Services in an Economy - 2

Lecture 3 - The Nature of Services - 1

Lecture 4 - The Nature of Services - 2

Lecture 5 - The Nature of Services - 3

Lecture 6 - Strategic Service Vision, and Competitive Advantage

Lecture 7 - Generic Strategies for Competitive Advantage (Continued...)

Lecture 8 - Five-forces Model, and SWOT Analysis

Lecture 9 - Winning Customers, Sustainability, and Role of Information in Services

Lecture 10 - Virtual Value Chain, Limits in the Use of Information, and Service Firm Competitiveness

Lecture 11 - Sources of Growth and Innovations in Service Sector

Lecture 12 - Design and Development of New Service

Lecture 13 - Taxonomy and Generic Approaches to Service System Design

Lecture 14 - Role of Technology in Services and Service Encounter Triad

Lecture 15 - Service Encounter (Continued...)

Lecture 16 - Service Profit Chain

Lecture 17 - Servicescapes and Facility Design

Lecture 18 - Process Flows

Lecture 19 - Product Layout: Work Allocation Problem

Lecture 20 - Process Layout: Relative Location Problem

Lecture 21 - Process Layout: Relative Location Problem (Continued...)

Lecture 22 - Defining and Measuring Service Quality

Lecture 23 - Quality Service by Design

Lecture 24 - Unconditional Service Guarantee and Service Recovery

Lecture 25 - Statistical Process Control - I

Lecture 26 - Statistical Process Control - II

Lecture 27 - Statistical Process Control - III

Lecture 28 - Statistical Process Control - IV

Lecture 29 - Foundation of Continuous Improvement

Lecture 30 - Quality Improvement Programs - I

Lecture 31 - Quality Improvement Programs - II

Lecture 32 - Domestic Growth and Expansion Strategies

Lecture 33 - Generic International Strategies

Lecture 34 - Transnational Operations and Global Service Strategies

Lecture 35 - Strategic Location Considerations

Lecture 36 - Facility Location Modelling

Lecture 37 - Facility Location Techniques: Locational Cost-Profit-Volume analysis

Lecture 38 - Facility Location Techniques: Cross-Median Approach

Lecture 39 - Facility Location Techniques: Huff Retail Location Model - I

Lecture 40 - Facility Location Techniques: Huff Retail Location Model - II

Lecture 41 - Strategies for Managing Demand - I

Lecture 42 - Strategies for Managing Demand - II

Lecture 43 - Strategies for Managing Demand - III

Lecture 44 - Strategies for Managing Capacity - I

Lecture 45 - Strategies for Managing Capacity - II

Lecture 46 - Yield Management - I

Lecture 47 - Yield Management - II

Lecture 48 - Strategies for Managing Customer Waiting

Lecture 49 - Essential Features of Queuing Systems

Lecture 50 - Relationship between negative Exponential and Poisson distribution

Lecture 51 - Strategic Roles of Capacity Planning, and Queuing - Terminology

Lecture 52 - Queuing Models - Operating System Characteristics

Lecture 53 - Queuing System Cost Trade-off

Lecture 54 - Basic Concepts and Approach to Managing Project

Lecture 55 - Developing Project Plan using PERT/CPM

Lecture 56 - Construction of Network and Network Computation Process

Lecture 57 - Uncertain Activities, and Probability of Completion of Project on Time

Lecture 58 - The Role of Inventory in Services, and Inventory Models

Lecture 59 - Economic Order Quantity and Special Inventory Models

Lecture 60 - Inventory Management under Uncertainity

Lecture 61 - Inventory Control Systems and ABC Analysis

NPTEL : NOC:Financial Management (in Hindi) (Management)

Co-ordinators : Prof. Abhijeet Chandra

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Infrastructure Finance (Management)

Co-ordinators : Dr. A. Thillai Rajan

Lecture 1 - Introduction

Lecture 2 - Overview on Infrastructure Financing Sources

Lecture 3 - Basics of Financial Management - Part-1

Lecture 4 - Basics of Financial Management - Part-2

Lecture 5 - Basics of Financial Management - Part-3

Lecture 6 - Basics of Financial Management - Part-4

Lecture 7 - Analysis of company Performance - Part-1

Lecture 8 - Analysis of company Performance - Part-2

Lecture 9 - Analysis of Project Viability Time value of money

Lecture 10 - Analysis of Project Viability Cost of Capital

Lecture 11 - Analysis of Project Viability Capital Budgeting Techniques - I

Lecture 12 - Analysis of Project Viability Capital Budgeting Guidelines - II

Lecture 13 - Analysis of Project Viability Capital Budgeting Guidelines - III

Lecture 14 - Analysis of Project Viability Capital Budgeting Guidelines - IV

Lecture 15 - Overview and introduction to project finance

Lecture 16 - Project Financing Attributes and Motivations - I

Lecture 17 - Project Financing Attributes and Motivations - II

Lecture 18 - Project Finance Markets - I

Lecture 19 - Project Finance Markets - II

Lecture 20 - Project Finance Markets - III

Lecture 21 - Project Finance Markets Mezzanine / Sub-ordinated Debt

Lecture 22 - Project Finance Markets - Type of Dept and Leasing

Lecture 23 - Project Finance Markets - Financial Intermediation

Lecture 24 - Project Finance Markets - Loan Refinancing

Lecture 25 - Project Finance Markets - Project Bonds - I

Lecture 26 - Project Finance Markets - Project Bonds - II

Lecture 27 - Public Private Partnerships

Lecture 28 - Risk Management - I

Lecture 29 - Risk Management - II

Lecture 30 - Risk Management - III

Lecture 31 - Risk Management - Market Risks

Lecture 32 - Risk Management - Country / Political risks - I

Lecture 33 - Risk Management - Country / Political risks - II

Lecture 34 - Risk Management - Country / Political risks - III

Lecture 35 - Risk Management - Country / Political risks - IV

Lecture 36 - Context of infrastructure development - I

Lecture 37 - Context of infrastructure development - II

Lecture 38 - Context of infrastructure development - III

Lecture 39 - Context of infrastructure development - IV

Lecture 40 - Context of infrastructure development - V

NPTEL : Manufacturing Systems Management (Management)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Introduction to Manufacturing Systems Management

Lecture 2 - Different types of Manufacturing Systems

Lecture 3 - Introduction to Cellular Manufacturing

Lecture 4 - Cellular Manufacturing Applications, Production Flow Analysis

Lecture 5 - Production Flow Analysis

Lecture 6 - Cellular Manufacturing - Unidirectional flow, Capacity Planning, Layout

Lecture 7 - Exercise on Production Flow Analysis

Lecture 8 - Rank Order Clustering, Similarity Coefficient based algorithm

Lecture 9 - Similarity Coefficient based clustering algorithm

Lecture 10 - Hierarchical and Non hierarchical clustering algorithms

Lecture 11 - Optimization based algorithms

Lecture 12 - Optimization based algorithms, Assignment based algorithm

Lecture 13 - Assignment model, Algorithm considering sequence of visit of machines

Lecture 14 - Algorithm considering sequence of visit of machines

Lecture 15 - Algorithm considering cell load data, alternate process plans

Lecture 16 - Reducing Intercell moves

Lecture 17 - Part subcontracting, Incremental cell formation

Lecture 18 - Product based cells

Lecture 19 - Branching algorithm for product based cells, Operator and task assignment

Lecture 20 - Operator and task assignment

Lecture 21 - Operator and task assignment continued

Lecture 22 - Static and dynamic Operator allocation, Multiple products and incremental cells

Lecture 23 - Cell scheduling and sequencing

Lecture 24 - Cell scheduling and sequencing continued

Lecture 25 - Single piece transportation

Lecture 26 - Cell Layout, Introduction to Just-in-time manufacturing

Lecture 27 - Cell control and JIT

Lecture 28 - Basic elements of JIT, Kanban systems

Lecture 29 - Role of basic elements, Critical success factors

Lecture 30 - Models in JIT

Lecture 31 - Models in JIT continued

Lecture 32 - CONWIP, Introduction to synchronous manufacturing

Lecture 33 - Theory of constraints, Product mix problem

Lecture 34 - Statistical Fluctuations, Random events, principles of SM

Lecture 35 - Scheduling in SM

Lecture 36 - Drum Buffer Rope system

Lecture 37 - Flexible Manufacturing System, Part selection problem

Lecture 38 - FMS Loading problem

Lecture 39 - FMS Loading, multiple batches and changeover times

Lecture 40 - FMS Loading and scheduling, Summary of the course contents

NPTEL : Operations and Supply Chain Management (Management)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Introduction - (Challenges, Methodologies)

Lecture 2 - Forecasting - Time series models - Simple Exponential smoothing

Lecture 3 - Forecasting - Linear Models, Regression, Holtâ€™s , seasonality

Lecture 4 - Forecasting - Winterâ€™s model, causal models, Goodness of forecast, Aggregate Planning, Tabular method

Lecture 5 - Aggregate Planning, Tabular method, Linear Programming

Lecture 6 - Aggregate Planning, Transportation model

Lecture 7 - Aggregate Planning, Dynamic Programming, backordering

Lecture 8 - Aggregate Planning, Quadratic model, Demand and capacity planning

Lecture 9 - Inventory Models - Costs, EOQ model

Lecture 10 - Inventory - EOQ model graphs, with backordering

Lecture 11 - Inventory - Models for all quantity and marginal quantity Discount

Lecture 12 - Multiple Quantity Discount, Multiple item inventory - Constraint on numbers of orders

Lecture 13 - Multiple item inventory - Constraint on money value, space, equal number of orders

Lecture 14 - Multiple item inventory - combining orders, production consumption model

Lecture 15 - Inventory - Production consumption model with backordering, Economic lot scheduling problem

Lecture 16 - Economic lot scheduling problem, Supply Chain inventory

Lecture 17 - Lot sizing

Lecture 18 - Lot sizing - heuristics

Lecture 19 - Disaggregation

Lecture 20 - Disaggregation - time varying demand, Safety stock - ROL for discrete demand distribution

Lecture 21 - Safety stock - ROL for normal distribution of lead time demand

Lecture 22 - Integrated model, ROL for normal distribution of LTD and given mean

Lecture 23 - Safety stock reduction â€“ delayed Product differentiation, substitution. MOM

Lecture 24 - Sequencing and scheduling â€“ Assumptions, objectives and shop settings

Lecture 25 - Single machine sequencing. Two machine flow shop â€“ Johnsonâ€™s algorithm

Lecture 26 - Flow shop scheduling - Three machines, Johnsonâ€™s algorithm and Branch and bound algorithm

Lecture 27 - Flow shop scheduling - heuristics â€“ Palmer, Campbell Dudek Smith algorithm

Lecture 28 - Job shop scheduling - Gantt chart, Different dispatching rules

Lecture 29 - Job shop scheduling - Shifting bottleneck heuristic

Lecture 30 - Job shop scheduling - Shifting bottleneck heuristic. Line Balancing

Lecture 31 - Line Balancing

Lecture 32 - Location problems - p median problem, Fixed charge problem

Lecture 33 - Location allocation problems in supply chain. Layout

Lecture 34 - Quantitative models for layout, Summary

Lecture 35 - Introduction to Supply Chain Management

Lecture 36 - Location Problems

Lecture 37 - Transportation and Distribution Models

Lecture 38 - Transportation and Distribution Models(continued)

Lecture 39 - Bin Packing and Travelling Salesman Problems

Lecture 40 - Vehicle Routeing Problems

Lecture 41 - Value of Information

NPTEL : Business Analysis for Engineers (Management)

Co-ordinators : Dr. S. Vaidhyasubramaniam

Lecture 1 - Introduction to Business Analysis for Engineers

Lecture 2 - Introduction to Accounting

Lecture 3 - Accounting Principles - 1

Lecture 4 - Balance Sheet Fundamentals

Lecture 5 - Balance Sheet Fundamentals

Lecture 6 - Accounting Principles - 2

Lecture 7 - Introduction to Income Statement & Double Entry

Lecture 8 - Double Entry Examples - 1

Lecture 9 - Double Entry Examples - 2

Lecture 10 - Preparation of Financial Statement

Lecture 11 - Cash Flow Statement - 1

Lecture 12 - Cash Flow Statement - 2

Lecture 13 - Special Accounts Illustrations

Lecture 14 - Final Illustrative Example

Lecture 15 - Summary of Financial Accounting

Lecture 16 - Introduction to Management Accounting & Behaviour of Cost

Lecture 17 - Cost-Volume Relationship

Lecture 18 - Cost-Objects & Variance

Lecture 19 - Labour & Over Heads Variance Analysis

Lecture 20 - Cash Conversion Cycle

Lecture 21 - Inventory Management

Lecture 22 - What is Strategy?

Lecture 23 - Poter's Diamond Model

Lecture 24 - Industry Analysis

Lecture 25 - Industry Analysis & Sources of Strategy

Lecture 26 - The Need for Value

Lecture 27 - Value Chain Analysis

Lecture 28 - Corporate Portfolio Analysis

Lecture 29 - External & Internal Environ Analysis

Lecture 30 - Models for Strategy,Ansoff matrix

Lecture 31 - Porter's Generic Strategy

Lecture 32 - Prahlad's Core Competency

Lecture 33 - Case study to understand strategy

Lecture 34 - Case study to understand strategy

Lecture 35 - Blue ocean and conclusion

Lecture 36 - Introduction to Economics

Lecture 37 - Introduction to GDP

Lecture 38 - Supply vs Demand

Lecture 39 - Price & Income Elasticity and Utility

Lecture 40 - Macroeconomic Variables

Lecture 41 - Fiscal & Monetary Policy

Lecture 42 - Union Budget & Conclusion

NPTEL : NOC:Introduction to Operations Research (Management)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Linear Programming Introduction and formulations - Product Mix problem and Notations

Lecture 2 - Linear Programming Introduction and formulations - Manpower and Production planning formulations

Lecture 3 - Linear Programming Introduction and formulations - Media selection problem and Bicycle problem

Lecture 4 - Linear Programming Introduction and formulations - Caterer problem

Lecture 5 - Linear Programming Introduction and formulations - Maximum flow and bin packing problems

Lecture 6 - Graphical and Algebraic methods - Graphical method (maximization)

Lecture 7 - Graphical and Algebraic methods - Graphical method (minimization)

Lecture 8 - Graphical and Algebraic methods - Algebraic method (maximization)

Lecture 9 - Graphical and Algebraic methods - Algebraic method (minimization)

Lecture 10 - Graphical and Algebraic methods - Comparing graphical and algebraic methods

Lecture 11 - Simplex Algorithm - Algebraic form of simplex algorithm

Lecture 12 - Simplex Algorithm - Tabular form of simplex (maximization)

Lecture 13 - Simplex Algorithm - Tabular form (minimization)

Lecture 14 - Simplex Algorithm - Unboundedness

Lecture 15 - Simplex Algorithm - Infeasibility

Lecture 16 - Dual - Motivation to the dual

Lecture 17 - Dual - Writing the dual for a general LP

Lecture 18 - Dual - Writing the dual for a general LP (Continued...)

Lecture 19 - Dual - Duality theorems

Lecture 20 - Dual - Complimentary slackness theorem

Lecture 21 - Primal dual relationships - Dual solution using complimentary slackness

Lecture 22 - Primal dual relationships - Dual solution from simplex table; economic interpretation of dual

Lecture 23 - Primal dual relationships - Economic Interpretation of the dual; Dual Simplex algorithm

Lecture 24 - Primal dual relationships - Solving LPs with mixed type of constraints

Lecture 25 - Primal dual relationships - Matrix method for LP problems

Lecture 26 - Introducing the transportation problem

Lecture 27 - North West corner Rule and minimum cost method

Lecture 28 - Penalty cost method

Lecture 29 - Stepping stone method and Modified Distribution method

Lecture 30 - MODI method; Dual of the transportation problem and the optimality of the MODI method

Lecture 31 - Introducing the Assignment problem

Lecture 32 - Solving the Assignment problem

Lecture 33 - Hungarian algorithm; Alternate optimum

Lecture 34 - Unequal number of rows and columns; Dual of the assignment problem

Lecture 35 - Optimality of the Hungarian algorithm

Lecture 36 - Setting up the problem and solving simple LP problems

Lecture 37 - Unboundedness and infeasibility

Lecture 38 - Solving other formulations

Lecture 39 - Solving a transportation problem

Lecture 40 - Solving an assignment problem

NPTEL : NOC:Introduction to Data Analytics (Management)

Co-ordinators : Dr. Nandan Sudarsanam, Dr. Balaraman Ravindran

Lecture 1 - Course Overview

Lecture 2 - Course Overview (Continued...)

Lecture 3 - Descriptive Statistics - Graphical Approaches

Lecture 4 - Descriptive Statistics - Measures of Central Tendency

Lecture 5 - Descriptive Statistics - Measures of Dispersion

Lecture 6 - Random Variables and Probability Distributions

Lecture 7 - Probability Distributions (Continued...)

Lecture 8 - Probability Distributions (Continued...)

Lecture 9 - Inferential Statistics - Motivation

Lecture 10 - Inferential Statistics - Single sample tests

Lecture 11 - Two Sample tests

Lecture 12 - Type 1 and Type 2 Errors

Lecture 13 - Confidence Intervals

Lecture 14 - ANOVA and Test of Independence

Lecture 15 - Short Introduction to Regression

Lecture 16 - Introduction to Machine Learning

Lecture 17 - Supervised Learning

Lecture 18 - Unsupervised Learning

Lecture 19 - Ordinary Least Squares Regression

Lecture 20 - Simple and Multiple Regression in Excel and Matlab

Lecture 21 - Regularization/ Coefficients Shrinkage

Lecture 22 - Data Modelling and Algorithmic Modelling Approaches

Lecture 23 - Logistic Regression

Lecture 24 - Training a Logistic Regression Classifier

Lecture 25 - Classification and Regression Trees

Lecture 26 - Classification and Regression Trees (Continued...)

Lecture 27 - Bias Variance Dichotomy

Lecture 28 - Model Assessment and Selection

Lecture 29 - Support Vector Machines

Lecture 30 - Support Vector Machines (Continued...)

Lecture 31 - Support Vector Machines for Non Linearly Separable Data

Lecture 32 - Support Vector Machines and Kernel Transformations

Lecture 33 - Ensemble Methods and Random Forests

Lecture 34 - Artificial Neural Networks

Lecture 35 - Artificial Neural Networks (Continued...)

Lecture 36 - Deep Learning

Lecture 37 - Associative Rule Mining

Lecture 38 - Association Rule Mining (Continued...)

Lecture 39 - Big Data - A small introduction

Lecture 40 - Big Data - A small introduction (Continued...)

Lecture 41 - Clustering Analysis

Lecture 42 - Clustering Analysis (Continued...)

Lecture 43 - Introduction to Experimentation and Active Learning

Lecture 44 - Introduction to Experimentation and Active Learning (Continued...)

Lecture 45 - An Introduction to Online Learning - Reinforcement Learning

Lecture 46 - An Introduction to Online Learning - Reinforcement Learning (Continued...)

Lecture 47 - Summary + Insights into the Final Exam

NPTEL : NOC:Introduction to Data analytics (Management)

Co-ordinators : Dr. Nandan Sudarsanam, Dr. Balaraman Ravindran

Lecture 1 - Course Overview

Lecture 2 - Course Overview (Continued...)

Lecture 3 - Descriptive Statistics - Graphical Approaches

Lecture 4 - Descriptive Statistics - Measures of Central Tendency

Lecture 5 - Descriptive Statistics - Measures of Dispersion

Lecture 6 - Random Variables and Probability Distributions

Lecture 7 - Probability Distributions (Continued...)

Lecture 8 - Probability Distributions (Continued...)

Lecture 9 - Inferential Statistics - Motivation

Lecture 10 - Inferential Statistics - Single sample tests

Lecture 11 - Two Sample tests

Lecture 12 - Type 1 and Type 2 Errors

Lecture 13 - Confidence Intervals

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Lecture 25 - Classification and Regression Trees

Lecture 26 - Classification and Regression Trees (Continued...)

Lecture 27 - Bias Variance Dichotomy

Lecture 28 - Model Assessment and Selection

Lecture 29 - Support Vector Machines

Lecture 30 - Support Vector Machines (Continued...)

Lecture 31 - Support Vector Machines for Non Linearly Separable Data

Lecture 32 - Support Vector Machines and Kernel Transformations

Lecture 33 - Ensemble Methods and Random Forests

Lecture 34 - Artificial Neural Networks

Lecture 35 - Artificial Neural Networks (Continued...)

Lecture 36 - Deep Learning

Lecture 37 - Associative Rule Mining

Lecture 38 - Association Rule Mining (Continued...)

Lecture 39 - Big Data, A small introduction

Lecture 40 - Big Data, A small introduction (Continued...)

Lecture 41 - Clustering Analysis

Lecture 42 - Clustering Analysis (Continued...)

Lecture 43 - Introduction to Experimentation and Active Learning

Lecture 44 - Introduction to Experimentation and Active Learning (Continued...)

Lecture 45 - An Introduction to Online Learning - Reinforcement Learning

Lecture 46 - An Introduction to Online Learning - Reinforcement Learning (Continued...)

Lecture 47 - Summary - Insights into the Final Exam

Lecture 48 - Tutorial on weka

Lecture 49 - Tutorial on Decision Trees

Lecture 50 - Big Data - A Small Introduction (Continued...)

NPTEL : NOC:Patent Law for Engineers and Scientists (Management)

Co-ordinators : Prof. Feroze Ali

Lecture 1 - Patent Law as Concepts

Lecture 2 - Understanding the Patents Act and the Rules

Lecture 3 - Preliminary Sections

Lecture 4 - Preliminary Rules

Lecture 5 - Patents (Amendment) Rules, 2016

Lecture 6 - Easy way to read the Patents Act and Rules

Lecture 7 - What can be Patented?

Lecture 8 - Inventions not Patentable

Lecture 9 - Novelty

Lecture 10 - Anticipation

Lecture 11 - Inventive Step

Lecture 12 - Capable of Industrial Application

Lecture 13 - Person Skilled in the Art

Lecture 14 - Complete and Provisional Specifications

Lecture 15 - Contents of Specifications

Lecture 16 - Structure of a Patent Specification

Lecture 17 - Reading a Patent Specification

Lecture 18 - Introduction to Patent Drafting: Provisional Specification

Lecture 19 - Introduction to Patent Drafting: Complete Specification

Lecture 20 - Who Can Apply for a Patent?

Lecture 21 - Form of Application

Lecture 22 - Patent Application: Making, What to include, and Types

Lecture 23 - Powers of Controller: Generally

Lecture 24 - Patents of Addition

Lecture 25 - Priority Dates

Lecture 26 - Professor's Interaction 01

Lecture 27 - Publication of Application

Lecture 28 - Request for Examination

Lecture 29 - Examination of Application

Lecture 30 - Expedited Examination of Application

Lecture 31 - Search for Anticipation

Lecture 32 - Procedure in case of Anticipation

Lecture 33 - Consideration of Report of Examiner

Lecture 34 - Refuse, Require Amendment, and Division of Applications

Lecture 35 - Dating of Application and Anticipation

Lecture 36 - Potential Infringement

Lecture 37 - Orders Regarding Substitution of Applicants

Lecture 38 - Putting Applications in Order for Grant

Lecture 39 - Amendments during Prosecution

Lecture 40 - Introduction to Opposition to Grant of Patents

Lecture 41 - Pre-Grant Opposition

Lecture 42 - Post-Grant Opposition

Lecture 43 - Obtained Invention

Lecture 44 - Mention of Inventor

Lecture 45 - Opposition in General

Lecture 46 - Secrecy Provisions

Lecture 47 - Grant of Patents

Lecture 48 - Rights conferred by Grant

Lecture 49 - Rights of Co-Owners of Patents and Power of Controller to give directions

Lecture 50 - Patent obtained by Fraud of True and First Inventor

Lecture 51 - Term of Patent

Lecture 52 - Restoration of Lapsed Patents

Lecture 53 - Surrender of Patents

Lecture 54 - Revocation of Patents

Lecture 55 - Register of Patents

Lecture 56 - Patent Office and its Establishment

Lecture 57 - Patent Agents

Lecture 58 - Use and Acquisition by Government

Lecture 59 - Penalties

Lecture 60 - Introduction to Compulsory Licensing

Lecture 61 - Working of Patents

Lecture 62 - Compulsory Licenses

Lecture 63 - Revocation of Patents 1

Lecture 64 - Powers of Controller

Lecture 65 - Licensing of Related Patents

Lecture 66 - Compulsory License on Notification by Central Government

Lecture 67 - Compulsory License for Export of Pharma Products

Lecture 68 - Termination of Compulsory License, Related Rules

Lecture 69 - Intellectual Property Appellate Board

Lecture 70 - Infringement Suits and Defences

Lecture 71 - Reliefs in Suit for Infringement

Lecture 72 - Declaration as to Non-Infringement

Lecture 73 - Groundless threat of Infringement Proceedings

Lecture 74 - Certificate of Validity

Lecture 75 - Scientific Advisors

Lecture 76 - International Arrangements

Lecture 77 - Miscellaneous

Lecture 78 - Fees

NPTEL : NOC:Design Thinking - A Primer (Management)

Co-ordinators : Dr. Ashwin Mahalingam, Prof. Bala Ramadurai

Lecture 1 - Design Thinking - A Primer Start - Part 1

Lecture 2 - Design Thinking - A Primer Start - Part 2

Lecture 3 - Design Thinking - A Primer Start - Part 3

Lecture 4 - Intro to Design Thinking

Lecture 5 - Case Study - Arcturus IV by John E. Arnold

Lecture 6 - Course Preview and History of Design Thinking

Lecture 7 - Discussion - Intro to Demo Problem

Lecture 8 - Empathize - Lecture 1

Lecture 9 - Empathize - Workshop 1

Lecture 10 - Empathize - Workshop 2

Lecture 11 - Empathize - Skit

Lecture 12 - Interviews

Lecture 13 - Analyze - Lecture-1 5 Whys

Lecture 14 - Analyze - 5ys - IIT Stadium levels

Lecture 15 - Analyze - Lecture 2 Conflict of Interest

Lecture 16 - Analyze - Workshop - Part 1

Lecture 17 - Analyze - Workshop - Part 2

Lecture 18 - Solve - Tea cup story

Lecture 19 - Solve - Lecture 1

Lecture 20 - Solve - Workshop 1

Lecture 21 - Elephant and blind men

Lecture 22 - Test - Lecture 1

Lecture 23 - Test - Workshop 1

Lecture 24 - Test - Customer reactions to prototype

Lecture 25 - The END - Part 1

Lecture 26 - The END - Part 2

Lecture 27 - Finale and Appeal for proposals

NPTEL : NOC:Decision-Making Under Uncertainty (Management)

Co-ordinators : Prof. N. Gautam

Lecture 1 - Tutorial - How to Install Octave and using Octave

Lecture 2 - Background and relevance

Lecture 3 - Examples of managing uncertainty and making decisions

Lecture 4 - Risk, uncertainty and variability

Lecture 5 - Probability: Events, Conditioning and Total Probability

Lecture 6 - Discrete random variables

Lecture 7 - Continuous random variables: characterisitcs and examples

Lecture 8 - Expected Value: Mean, Variance and Functions

Lecture 9 - Multiple Random Variables: Discrete and Continuous

Lecture 10 - Criteria, Objectives and Settings for Decisions

Lecture 11 - Introduction to one-time decisions

Lecture 12 - Solving the secretary problem

Lecture 13 - Which option to gamble just once?

Lecture 14 - Utility Function

Lecture 15 - Nested one-time decisions

Lecture 16 - Decision Trees

Lecture 17 - Decisions in Game Shows: Final Jeopardy

Lecture 18 - Decisions in Game Shows: Monte Hall

Lecture 19 - Project Network and Analysis

Lecture 20 - Newsvendor Problem: Background, Model and Analysis

Lecture 21 - Newsvendor Problem: Example and Proof

Lecture 22 - Buffers to Cushion for Fluctuations

Lecture 23 - Safety Stock for Inventories

Lecture 24 - Safety Stock: Example and Derivation

Lecture 25 - Route Planning

Lecture 26 - Exploration and Exploitation

Lecture 27 - Introduction to sequential decision making

Lecture 28 - Costs, Ratings, Options and Choices for both Restaurants

Lecture 29 - Two Stage Stochastic Optimization

Lecture 30 - Concluding Remarks and Simpson's Paradox

Lecture 31 - Markov Chains for Decisions

Lecture 32 - DTMC Modeling and Analysis

Lecture 33 - Markov Decision Process Set Up

Lecture 34 - Analyzing the four policies

NPTEL : NOC:Decision making using Financial Accounting (Management)

Co-ordinators : Prof. G Arun Kumar

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Two Finacial Statements

Lecture 4 - Two Finacial Statements (Continued...)

Lecture 5 - Two Finacial Statements (Continued...)

Lecture 6 - Three Finacial Statements

Lecture 7 - Three Finacial Statements (Continued...)

Lecture 8 - Three Finacial Statements (Continued...)

Lecture 9 - Transaction and Finacial Statements

Lecture 10 - Transaction and Finacial Statements (Continued...)

Lecture 11 - Transaction and Finacial Statements (Continued...)

Lecture 12 - Lone Pine Cafe (Case)

Lecture 13 - Lone Pine Cafe (Case)

Lecture 14 - Journal - 1

Lecture 15 - Journal - 2

Lecture 16 - Journal - 3

Lecture 17 - Ledger Posting Part - 1

Lecture 18 - Ledger Posting Part - 2

Lecture 19 - Final Accounts

Lecture 20 - Cash Flow Statements - 1

Lecture 21 - Cash Flow Statements - 2

Lecture 22 - Cash Flow Statements - 3

Lecture 23 - Cash Flow Statements - 4

Lecture 24 - Cash Flow Statements - 5

Lecture 25 - Reading the Financial Statements of a Annual Report - 1

Lecture 26 - Reading the Financial Statements of a Annual Report - 2

Lecture 27 - Reading the Financial Statements of a Annual Report - 3

Lecture 28 - Financial Statement Analysis - 1

Lecture 29 - Financial Statement Analysis - 2

Lecture 30 - Financial Statement Analysis - 3

Lecture 31 - Financial Statement Analysis - 4

Lecture 32 - Recap

Lecture 33 - Ratios Analysis

Lecture 34 - Ratios Analysis

NPTEL : NOC:Entrepreneurship (Management)

Co-ordinators : Prof. C Bhaktavatsala Rao

Lecture 1 - Entrepreneurial Journey - Part 1

Lecture 2 - Entrepreneurial Journey - Part 2

Lecture 3 - Entrepreneurial Journey - Part 3

Lecture 4 - Entrepreneurial Discovery - Part 1

Lecture 5 - Entrepreneurial Discovery - Part 2

Lecture 6 - Entrepreneurial Discovery - Part 3

Lecture 7 - Entrepreneurial Discovery - Part 4

Lecture 8 - Ideation and Prototyping - Part 1

Lecture 9 - Ideation and Prototyping - Part 2

Lecture 10 - Ideation and Prototyping - Part 3

Lecture 11 - Ideation and Prototyping - Part 4

Lecture 12 - Ideation and Prototyping - Part 5

Lecture 13 - Ideation and Prototyping - Part 6

Lecture 14 - Testing and Validation - Part 1

Lecture 15 - Testing and Validation - Part 2

Lecture 16 - Commercialisation and Disruption as Success Drivers - Part 1

Lecture 17 - Commercialisation and Disruption as Success Drivers - Part 2

Lecture 18 - Commercialisation and Disruption as Success Drivers - Part 3

Lecture 19 - Commercialisation and Disruption as Success Drivers - Part 4

Lecture 20 - Commercialisation and Disruption as Success Drivers - Part 5

Lecture 21 - Technological Innovation and Entrepreneurship - Part 1

Lecture 22 - Technological Innovation and Entrepreneurship - Part 2

Lecture 23 - Technological Innovation and Entrepreneurship - Part 3

Lecture 24 - Technological Innovation and Entrepreneurship - Part 4

Lecture 25 - Technological Innovation and Entrepreneurship - Part 5

Lecture 26 - Technology, Business, and Operations Strategies - Part 1

Lecture 27 - Technology, Business, and Operations Strategies - Part 2

Lecture 28 - Technology, Business, and Operations Strategies - Part 3

Lecture 29 - Technology, Business, and Operations Strategies - Part 4

Lecture 30 - Technology, Business, and Operations Strategies - Part 5

Lecture 31 - Raising Finances and Developing Financial Strategy - Part 1

Lecture 32 - Raising Finances and Developing Financial Strategy - Part 2

Lecture 33 - Raising Finances and Developing Financial Strategy - Part 3

Lecture 34 - Raising Finances and Developing Financial Strategy - Part 4

Lecture 35 - Raising Finances and Developing Financial Strategy - Part 5

Lecture 36 - Education and Entrepreneurship - Part 1

Lecture 37 - Education and Entrepreneurship - Part 2

Lecture 38 - Education and Entrepreneurship - Part 3

Lecture 39 - Beyond Founders and Founder-Families - Part 1

Lecture 40 - Beyond Founders and Founder-Families - Part 2

Lecture 41 - Beyond Founders and Founder-Families - Part 3

Lecture 42 - Beyond Founders and Founder-Families - Part 4

Lecture 43 - India as A Start-up Nation - Part 1

Lecture 44 - India as A Start-up Nation - Part 2

Lecture 45 - India as A Start-up Nation - Part 3

Lecture 46 - National Entrepreneurial Culture - Part 1

Lecture 47 - National Entrepreneurial Culture - Part 2

Lecture 48 - Entrepreneurial Thermodynamics - Part 1

Lecture 49 - Entrepreneurial Thermodynamics - Part 2

Lecture 50 - Human Resources Strategy

Lecture 51 - Entrepreneurship and Employment - Part 1

Lecture 52 - Entrepreneurship and Employment - Part 2

Lecture 53 - Entrepreneurship and Employment - Part 3

Lecture 54 - Entrepreneurship and Employment - Part 4

Lecture 55 - Corporate Governance

Lecture 56 - Marketing Strategy

Lecture 57 - Start-up Case Studies - Part 1

Lecture 58 - Start-up Case Studies - Part 2

Lecture 59 - Start-up Case Studies - Part 3

Lecture 60 - Start-up Case Studies - Part 4

Lecture 61 - In Closing

NPTEL : NOC:Organizational Behaviour (Management)

Co-ordinators : Prof. M. P. Ganesh

Lecture 1 - Introduction to Organizational Behaviour - Part 1

Lecture 2 - Introduction to Organizational Behaviour - Part 2

Lecture 3 - Introduction to Organizational Behaviour - Part 3

Lecture 4 - Introduction to Organizational Behaviour - Part 4

Lecture 5 - Introduction to Organizational Behaviour - Part 5

Lecture 6 - Perception - Part 1

Lecture 7 - Perception - Part 2

Lecture 8 - Perception - Part 3

Lecture 9 - Perception - Part 4

Lecture 10 - Personality - Part 1

Lecture 11 - Personality - Part 2

Lecture 12 - Personality - Part 3

Lecture 13 - Personality - Part 4

Lecture 14 - Personality - Part 5

Lecture 15 - Personality - Part 6

Lecture 16 - Personality - Part 7

Lecture 17 - Learning - Part 1

Lecture 18 - Learning - Part 2

Lecture 19 - Attitudes - Part 1

Lecture 20 - Attitudes - Part 2

Lecture 21 - Attitudes - Part 3

Lecture 22 - Attitudes - Part 4

Lecture 23 - Emotions - Part 1

Lecture 24 - Emotions - Part 2

Lecture 25 - Emotions - Part 3

Lecture 26 - Motivation - Part 1

Lecture 27 - Motivation - Part 2

Lecture 28 - Motivation - Part 3

Lecture 29 - Motivation - Part 4

Lecture 30 - Motivation - Part 5

Lecture 31 - Motivation - Part 6

Lecture 32 - Interpersonal Relationships - Part 1

Lecture 33 - Interpersonal Relationships - Part 2

Lecture 34 - Interpersonal Relationships - Part 3

Lecture 35 - Interpersonal Relationships - Part 4

Lecture 36 - Communication - Part 1

Lecture 37 - Communication - Part 2

Lecture 38 - Communication - Part 3

Lecture 39 - Decision Making - Part 1

Lecture 40 - Decision Making - Part 2

Lecture 41 - Decision Making - Part 3

Lecture 42 - Decision Making - Part 4

Lecture 43 - Power and Leadership - Part 1

Lecture 44 - Power and Leadership - Part 2

Lecture 45 - Power and Leadership - Part 3

Lecture 46 - Power and Leadership - Part 4

Lecture 47 - Power and Leadership - Part 5

Lecture 48 - Group Dynamics - Part 1

Lecture 49 - Group Dynamics - Part 2

Lecture 50 - Group Dynamics - Part 3

Lecture 51 - Organizational Culture - Part 1

Lecture 52 - Organizational Culture - Part 2

Lecture 53 - Organizational Change

Lecture 54 - Organizational Structure - Part 1

Lecture 55 - Organizational Structure - Part 2

Lecture 56 - Organizational Structure - Part 3

NPTEL : NOC:The Future of Manufacturing Business: Role of Additive Manufacturing (Management)

Co-ordinators : Prof. R. K. Amit, Prof. U. Chandrasekhar

Lecture 1 - What is Manufacturing ?

Lecture 2 - Manufacturing and Industrial Revolution

Lecture 3 - Manufacturing Processes and Era of Mass Production

Lecture 4 - Mass Production to Mass Customization

Lecture 5 - Laws of Manufacturing - I

Lecture 6 - Laws of Manufacturing - II

Lecture 7 - Business Models

Lecture 8 - Manufacturing Radar - I

Lecture 9 - Manufacturing Radar - II

Lecture 10 - Agile Manufacturing - I

Lecture 11 - Agile Manufacturing - II

Lecture 12 - Technology and Manufacturing

Lecture 13 - AM Implementation and SC Configuration - I

Lecture 14 - AM Implementation and SC Configuration - II

Lecture 15 - Manufacturing and IIoT - I

Lecture 16 - Manufacturing and IIoT - II

Lecture 17 - Digital Supply Network - I

Lecture 18 - Digital Supply Network - II

Lecture 19 - Machine Intelligence

Lecture 20 - Blockchains and Use Cases

Lecture 21 - Additive Manufacturing Technologies and Categorization

Lecture 22 - Process Chain for AM of Plastics and Metals

Lecture 23 - Design for Additive manufacturing (DFAM) for Metal printing

Lecture 24 - Supply chain for Additive Manufacturing

Lecture 25 - Design for Laser Powder Bed fusion (LPBF)

Lecture 26 - Additive Manufacturing Application for Prototype, Tooling and Part Repair

Lecture 27 - AM Materials and Metallurgy in LPBF

Lecture 28 - Additive Parameter Development

Lecture 29 - Quality in Additive Manufacturing

Lecture 30 - Extrusion AM for Industrial Application

Lecture 31 - Design for LPBF - Case Studies

Lecture 32 - Metal Powder Manufacturing and Characterisation

NPTEL : NOC:Financial Accounting (IIT Mandi) (Management)

Co-ordinators : Prof. Puran Singh

Lecture 1 - Introduction to Financial Accounting

Lecture 2 - Company form of business

Lecture 3 - Accounting as an information system

Lecture 4 - Key accounting terms - I

Lecture 5 - Key accounting terms - II

Lecture 6 - Tutorial - Key accounting terms

Lecture 7 - Accounting Equation

Lecture 8 - Walkthrough of Balance Sheet - I

Lecture 9 - Walkthrough of Balance Sheet - II

Lecture 10 - Walkthrough of Balance Sheet - III

Lecture 11 - Walkthrough of Income Statement - I

Lecture 12 - Generally Accepted Accounting Principles - I

Lecture 13 - Generally Accepted Accounting Principles - II

Lecture 14 - Recap and way forward

Lecture 15 - Types of Accounts

Lecture 16 - Tutorial - Types of Accounts - Part I

Lecture 17 - Tutorial - Types of Accounts - Part II

Lecture 18 - Debit and Credit

Lecture 19 - Tutorial - Debit and Credit

Lecture 20 - Rules of debit and credit

Lecture 21 - Entering transactions in Journal - Part I

Lecture 22 - Entering transactions in Journal - Part II

Lecture 23 - Entering transactions in Journal - Part III

Lecture 24 - Tutorial - Entering transactions in Journal I - Part I

Lecture 25 - Tutorial - Entering transactions in Journal I - Part II

Lecture 26 - Tutorial - Entering transactions in Journal I - Part III

Lecture 27 - Key Trends in Journalizing

Lecture 28 - Journalizing complex transactions

Lecture 29 - Practice Problem - I

Lecture 30 - Recap and way forward

Lecture 31 - Introduction to Ledger

Lecture 32 - Process of Ledger Posting - Part 1

Lecture 33 - Process of Ledger Posting - Part 2

Lecture 34 - Process of Ledger Posting - Part 3

Lecture 35 - Balancing the Accounts

Lecture 36 - Debit and Credit Balances

Lecture 37 - Tutorial - Identifying balances - Part 1

Lecture 38 - Tutorial - Identifying balances - Part 2

Lecture 39 - Tutorial - Identifying balances - Part 3

Lecture 40 - Tutorial - Identifying balances - Part 4

Lecture 41 - Practice Problem - I

Lecture 42 - Practice Problem - II

Lecture 43 - Practice Problem - III

Lecture 44 - Recap and way forward

Lecture 45 - Introduction to Trial Balance

Lecture 46 - Preparation of Trial Balance

Lecture 47 - Practice Problem - 1

Lecture 48 - Practice Problem - 2

Lecture 49 - Errors in Trial Balance

Lecture 50 - Recap and way forward

Lecture 51 - Introduction to Final Accounts

Lecture 52 - Tutorial - Identifying direct and indirect expenses

Lecture 53 - Tutorial - Mapping operating and non operating items to direct and indirect items

Lecture 54 - Preparation of Final Accounts

Lecture 55 - Tutorial - Preparation of Final Accounts

Lecture 56 - Tutorial - Preparation of Trading Account

Lecture 57 - Tutorial - Preparation of P&L Account

Lecture 58 - Tutorial - Preparation of Balance Sheet

Lecture 59 - Practice Problem

Lecture 60 - Adjustments in Final Accounts

Lecture 61 - Transactions to be adjusted in Final Accounts - Part 1

Lecture 62 - Transactions to be adjusted in Final Accounts - Part 2

Lecture 63 - Tutorial - Adjustments in Final Accounts

Lecture 64 - Tutorial - Calculating Cost of Goods Sold

Lecture 65 - Tutorial - Outstanding Expenses

Lecture 66 - Tutorial - Prepaid Expenses

Lecture 67 - Validating the learning - Balance Sheet

Lecture 68 - Validating the learning - Income Statement

Lecture 69 - Recap and way forward

Lecture 70 - Introduction to Financial Statement Analysis

Lecture 71 - Liquidity Ratios

Lecture 72 - Tutorial - Liquidity Ratios

Lecture 73 - Solvency Ratios

Lecture 74 - Tutorial - Solvency Ratios

Lecture 75 - Profitability Ratios

Lecture 76 - Tutorial - Profitability Ratios - Part 1

Lecture 77 - Tutorial - Profitability Ratios - Part 2

Lecture 78 - Efficiency Ratios

Lecture 79 - Tutorial - Efficiency Ratios

Lecture 80 - Validating the learning - Walkthrough of RIL's Annual Report

Lecture 81 - Online Resources for Financial Analysis

Lecture 82 - Practice Problem - Liquidity Position

Lecture 83 - Practice Problem - Solvency Position

Lecture 84 - Practice Problem - Profitability Position

Lecture 85 - Practice Problem - Profitability Position

Lecture 86 - Practice Problem - Interpretation of Ratios

Lecture 87 - Practice Problem - Arithmetic problems

Lecture 88 - Recap and way forward

Lecture 89 - Types of Cash Flows

Lecture 90 - Tutorial - Types of Cash Flows

Lecture 91 - Walkthough of Cash Flow Statement of RIL

Lecture 92 - Profit and Loss Appropriation Account

Lecture 93 - Cash Flows from Operating Activities - Part 1

Lecture 94 - Cash Flows from Operating Activities - Part 2

Lecture 95 - Tutorial - Changes in working capital

Lecture 96 - Tutorial - Cash Flows from Operating Activities - Part 1

Lecture 97 - Cash Flows from Investing Activities

Lecture 98 - Tutorial - Cash Flows from Investing Activities

Lecture 99 - Cash Flows from Financing Activities

Lecture 100 - Tutorial - Cash Flows from Financing Activities

Lecture 101 - Preparing Cash Flow Statement

Lecture 102 - Identifying hidden information - Part 1

Lecture 103 - Identifying hidden information - Part 2

Lecture 104 - Identifying hidden information - Part 3

Lecture 105 - Practice Problem - Part 1

Lecture 106 - Practice Problem - Part 2

Lecture 107 - Need of Break Even Analysis

Lecture 108 - Understanding the nature of costs

Lecture 109 - Contribution Margin

Lecture 110 - Tutorial - Contribution

Lecture 111 - Break Even Point

Lecture 112 - Tutorial - Break Even Point

Lecture 113 - Tutorial - Break Even Point

Lecture 114 - Visualizing the Break Even Point

Lecture 115 - Tutorial - Break Even Analysis

Lecture 116 - Case - Break Even Analysis

Lecture 117 - Introduction to Inventory Management

Lecture 118 - Economic Order Quantity

Lecture 119 - ABC Analysis

Lecture 120 - Methods of stock valuation

NPTEL : NOC:Technology Forecasting for Strategic Decision Making - An Introduction (Management)

Co-ordinators : Prof. Dmitry Kucharavy, Prof. Bala Ramadurai

Lecture 1 - Introduction to Tech Forecasting for Strategic Decision Making

Lecture 2 - Famous forecasts which missed the mark

Lecture 3 - Why do we need technology forecasts? - Innovation vs Invention Efficiency vs Effectiveness

Lecture 5 - Why do we need technology forecasts? - Limiting Resources

Lecture 6 - Why do we need technology forecasts? - Why is it difficult to forecast?

Lecture 7 - Why do we need technology forecasts? - General stages of forecasting?

Lecture 9 - Failure and Success Startup Stories

Lecture 10 - Strategic, Tactical and Operational Decision Making

Lecture 11 - Quiz about Strategic, Tactical and Operational decision making

Lecture 12 - Answer to the quiz on Strategic, Tactical and operational decision making

Lecture 13 - Introduction to Vacuum forming case study and FORMAT handbook

Lecture 14 - Quiz on systems and set

Lecture 15 - Quiz on functions

Lecture 16 - Technology Lifecycle - Example case study - Transportation

Lecture 17 - Technology Lifecycle - Seasons, Clockspeed - Part 1

Lecture 18 - Technology Lifecycle - Seasons, Clockspeed - Part 2

Lecture 19 - Technology Lifecycle - Seasons, Clockspeed - Part 3

Lecture 20 - Technology Lifecycle - Seasons, Clockspeed - Part 4

Lecture 21 - Technology Lifecycle - Seasons, Clockspeed - Part 5

Lecture 22 - Aryabhata's experience in modeling and Live Solar Eclipse

Lecture 23 - Alternatives to forecasting in scope of technology management

Lecture 24 - Alternatives to forecasting in scope of technology management - Q&A

Lecture 25 - Element-Name-Value Model

Lecture 26 - System Operator

Lecture 27 - How to collect problems for mapping

Lecture 28 - How to formalize our knowledge about problems?

Lecture 29 - System function - What's function 1 Energy for cooking

Lecture 30 - System function - What's the function 2 Mosquito repellant

Lecture 31 - System function - What's the function 3 Pancake (Dosa) batter

Lecture 32 - Technological roadmaps

Lecture 33 - Maps of contradiction for forecasting

Lecture 34 - Quantitative forecasting

Lecture 35 - Demo of S-curve fitting software

Lecture 36 - Forecasting and Forecast

NPTEL : NOC:Leadership for India Inc: Practical Concepts and Constructs (Management)

Co-ordinators : Prof. C Bhaktavatsala Rao

Lecture 1 - Leadership: Business Context

Lecture 2 - Leadership and Management

Lecture 3 - Management Thought - 1

Lecture 4 - Management Thought - 2

Lecture 5 - Management Thought - 3

Lecture 6 - Trait Theory

Lecture 7 - Behavioural Theory

Lecture 8 - Situational Theory

Lecture 9 - Path-Goal Theory

Lecture 10 - Leader-Member Exchange Theory

Lecture 11 - Technology Leadership

Lecture 12 - Climate Leadership

Lecture 13 - Resource Leadership

Lecture 14 - Global Leadership

Lecture 15 - Crisis Leadership

Lecture 16 - Leadership Attributes

Lecture 17 - Apex Leadership Attributes

Lecture 18 - Leadership Essentials

Lecture 19 - Learning to Lead

Lecture 20 - Indian Leader Competencies

Lecture 21 - Self-actualization

Lecture 22 - Leadership Balance

Lecture 23 - Paradox Management

Lecture 24 - Agile and Precise

Lecture 25 - Adaptive Processes

Lecture 26 - Stature versus Title

Lecture 27 - Vision, Strategy, Structure and Execution

Lecture 28 - Organization Structures

Lecture 29 - Effective Execution

Lecture 30 - Building Perpetual Corporations

Lecture 31 - Enablement as Development

Lecture 32 - Instilling Development Passion

Lecture 33 - CEO Succession

Lecture 34 - Success Factors for Succession

Lecture 35 - Stage and Stature

Lecture 36 - R&D Leadership

Lecture 37 - Operations Leadership

Lecture 38 - Marketing Leadership

Lecture 39 - Finance Leadership

Lecture 40 - Human Resources Leadership

Lecture 41 - Pioneering Leadership Model

Lecture 42 - Performance Leadership Model

Lecture 43 - Corporate Longevity Model

Lecture 44 - Intellectual Leadership Model

Lecture 45 - Leadership Accountability Model

Lecture 46 - Charismatic Leadership Model

Lecture 47 - People Leadership Model

Lecture 48 - Follower Leadership Model

Lecture 49 - Dependence-Independence Model

Lecture 50 - Connected Leadership Model

Lecture 51 - Leadership Sensibilities

Lecture 52 - Leadership Mistakes

Lecture 53 - Lonely at the Top

Lecture 54 - Leadership Emotions

Lecture 55 - Organizational Totalitarianism

Lecture 56 - Dr A P J Abdul Kalam President without Precedent

Lecture 57 - Dr C K Prahalad Timeless in Strategy, Tireless in Creativity

Lecture 58 - Steve Jobs Technology Visionary Par Excellence

Lecture 59 - Dr KallamAnjiReddy Game Changing Pharma Entrepreneur

Lecture 60 - J R D Tata Conglomerate Leadership Beyond Compare

Lecture 61 - Mahatma Gandhi Leadership Beyond Compare

Lecture 62 - In Closing

NPTEL : NOC:Strategy and Technology: A Practical Primer (Management)

Co-ordinators : Prof. C Bhaktavatsala Rao

Lecture 1 - External analysis

Lecture 2 - Industry evolution

Lecture 3 - Five forces model

Lecture 4 - Generic competitive strategies

Lecture 5 - Position analyses

Lecture 6 - Competitive Dynamics

Lecture 7 - Business Portfolio Analysis

Lecture 8 - Global Strategy

Lecture 9 - Creative Strategy

Lecture 10 - Balanced Scorecard

Lecture 11 - Execution overview

Lecture 12 - Structure as enabler

Lecture 13 - Execution

Lecture 14 - Execution case study

Lecture 15 - Strategic management

Lecture 16 - Competitive strategy overview

Lecture 17 - Economic forces

Lecture 18 - Liquidity as the sixth force

Lecture 19 - The six forces model

Lecture 20 - Strategic groups

Lecture 21 - Buyer power

Lecture 22 - Supplier power

Lecture 23 - Competitive moves

Lecture 24 - Market signaling

Lecture 25 - Competitor clusters and analysis

Lecture 26 - Generic strategies

Lecture 27 - Structural analysis and competitive strategy

Lecture 28 - Quality, Cost and value

Lecture 29 - Differentiation and De-commoditization

Lecture 30 - Niche as a core competence

Lecture 31 - Generic industry environments

Lecture 32 - Integration, Expansion, and Diversification

Lecture 33 - Comparators and responders

Lecture 34 - Strategic balance

Lecture 35 - Technology and collaboration

Lecture 36 - Technology strategy

Lecture 37 - Competition in technology prism

Lecture 38 - Technological competence

Lecture 39 - Generic technology strategies

Lecture 40 - Innovation and generic strategies

Lecture 41 - Technology and Differentiation

Lecture 42 - Technology and Followership

Lecture 43 - Technology in five forces prism

Lecture 44 - Technology and Patenting

Lecture 45 - Technology and Change

Lecture 46 - Customised product design

Lecture 47 - Technology and functionality

Lecture 48 - Technological behaviour

Lecture 49 - Technology and public policy

Lecture 50 - Technology and transformation

Lecture 51 - Strategic shifts

Lecture 52 - Business models

Lecture 53 - Retro - Futurism

Lecture 54 - Innovation strategy and process

Lecture 55 - High technology business companies

Lecture 56 - Renewables and electric vehicles

Lecture 57 - Dyson and 3M

Lecture 58 - GE and DuPont

Lecture 59 - NVIDIA and Bose

Lecture 60 - Fitbit and apple

Lecture 61 - In closing

NPTEL : NOC:Business Development: From Start to Scale (Management)

Co-ordinators : Prof. C Bhaktavatsala Rao

Lecture 1 - Understanding Business Development

Lecture 2 - Marketing and Business Development

Lecture 3 - Markets and Marketing

Lecture 4 - Strategy Formulation

Lecture 5 - Business Development Cases

Lecture 6 - Successful Business

Lecture 7 - Industry and Market

Lecture 8 - Vision, Mission and Strategy

Lecture 9 - Goals

Lecture 10 - Case Study of Business Development Excellence

Lecture 11 - Industry and Business

Lecture 12 - Porter's Five Forces Theory

Lecture 13 - Industrial Transformations

Lecture 14 - Competitive Strategies

Lecture 15 - Company Analysis

Lecture 16 - Industry, Market and Business

Lecture 17 - Industry and Market Analysis

Lecture 18 - Market Structures

Lecture 19 - Demand Forecasting

Lecture 20 - Competitor Analysis

Lecture 21 - Customer Characteristics

Lecture 22 - Customer Typologies

Lecture 23 - Market Research and Design Thinking

Lecture 24 - Customer Bonding

Lecture 25 - Customer Relationship Management

Lecture 26 - Market and Market Descriptors

Lecture 27 - Market and Product Segmentation

Lecture 28 - Product-Market Segmentation

Lecture 29 - Segmentation Deep Dive

Lecture 30 - Market Attractivenesss and competitive positioning

Lecture 31 - Branding

Lecture 32 - Brand Organization

Lecture 33 - Advertising and Communication

Lecture 34 - Servitization

Lecture 35 - Pricing

Lecture 36 - A New IT Start-up

Lecture 37 - An FMCG Start-up

Lecture 38 - A logistics start-up

Lecture 39 - A Nutraceuticals Start-up

Lecture 40 - A Telecom Fightback

Lecture 41 - Collaborations

Lecture 42 - Strategic Alliances

Lecture 43 - Joint Ventures

Lecture 44 - Subsidiaries

Lecture 45 - Mergers and Acquisitions

Lecture 46 - Value Chain Competencies

Lecture 47 - Functional Competencies

Lecture 48 - Negotiating Skills

Lecture 49 - Cultural Skills

Lecture 50 - Leadership Attributes

Lecture 51 - Growth Strategies

Lecture 52 - Growth Examples

Lecture 53 - Fragmented Industries and Emerging Industries

Lecture 54 - Mature Industries and Declining Industries

Lecture 55 - Global Industries and New Businesses

Lecture 56 - A Pharma Transformation

Lecture 57 - Pharma Strategic Alliances

Lecture 58 - Business Turbulence

Lecture 59 - Creating Value

Lecture 60 - From Starting to scale in Closing

NPTEL : NOC:Applied Econometrics (2023) (Management)

Co-ordinators : Prof. Sabuj Kumar Mandal

Lecture 1 - Instrumental Variable Estimation - Part I

Lecture 2 - Instrumental Variable Estimation - Part II

Lecture 3 - Instrumental Variable Estimation - Part III

Lecture 4 - Instrumental Variable Estimation - Part IV

Lecture 5 - Instrumental Variable Estimation - Part V

Lecture 6 - Instrumental Variable Estimation - Part VI

Lecture 7 - Instrumental Variable Estimation - Part VII

Lecture 8 - Instrumental Variable Estimation - Part VIII

Lecture 9 - Instrumental Variable Estimation - Part IX

Lecture 10 - Instrumental Variable Estimation - Part X

Lecture 11 - Instrumental Variable Estimation - Part XI

Lecture 12 - Simultaneous Equation Model - Part I

Lecture 13 - Simultaneous Equation Model - Part II

Lecture 14 - Simultaneous Equation Model - Part III

Lecture 15 - Simultaneous Equation Model - Part IV

Lecture 16 - Simultaneous Equation Model - Part V

Lecture 17 - Simultaneous Equation Model - Part VI

Lecture 18 - Simultaneous Equation Model - Part VII

Lecture 19 - Simultaneous Equation Model - Part VIII

Lecture 20 - Pooled Data and Panel Data Model Estimation - Part I

Lecture 21 - Pooled Data and Panel Data Model Estimation - Part II

Lecture 22 - Pooled Data and Panel Data Model Estimation - Part III

Lecture 23 - Pooled Data and Panel Data Model Estimation - Part IV

Lecture 24 - Pooled Data and Panel Data Model Estimation - Part V

Lecture 25 - Pooled Data and Panel Data Model Estimation - Part VI

Lecture 26 - Panel Data Model Estimation - Part VII

Lecture 27 - Panel Data Model Estimation - Part IX

Lecture 28 - Qualitative Response Model - Part I

Lecture 29 - Qualitative Response Model - Part II

Lecture 30 - Qualitative Response Model - Part III

Lecture 31 - Qualitative Response Model - Part IV

Lecture 32 - Qualitative Response Model - Part V

Lecture 33 - Qualitative Response Model - Part VI

Lecture 34 - Multinomial Regression Model - Part I

Lecture 35 - Multinomial Regression Model - Part II

Lecture 36 - Multinomial Regression Model - Part III

Lecture 37 - Multinomial Regression Model - Part IV

Lecture 38 - Dynamic Panel data Model - Part I

Lecture 39 - Dynamic Panel data Model - Part II

Lecture 40 - Dynamic Panel data Model - Part III

Lecture 41 - Dynamic Panel data Model - Part IV

Lecture 42 - Dynamic Panel data Model - Part V

Lecture 43 - Dynamic Panel data Model - Part VI

Lecture 44 - Dynamic Panel data Model - Part VII

Lecture 45 - Dynamic Panel data Model - Part VIII

Lecture 46 - Dynamic Panel data Model - Part IX

Lecture 47 - Dynamic Panel data Model - Part X

Lecture 48 - Dynamic Panel data Model - Part XI

Lecture 49 - Dynamic Panel data Model - Part XII

Lecture 50 - Dynamic Panel data Model - Part XIII

Lecture 51 - Dynamic Panel data Model - Part XIV

Lecture 52 - Dynamic Panel data Model - Part XV

Lecture 53 - Dynamic Panel data Model - Part XVI

Lecture 54 - Dynamic Panel data Model - Part XVII

Lecture 55 - Dynamic Panel data Model - Part XVIII

Lecture 56 - Dynamic Panel data Model - Part XIX

Lecture 57 - Dynamic Panel data Model - Part XX

Lecture 58 - Course outline for Applied Econometrics

NPTEL : NOC:Working in Contemporary Teams (Management)

Co-ordinators : Prof.Chitra Dey, Prof.M. P Ganesh

Lecture 1 - Introduction to contemporary teams

Lecture 2 - Introduction to virtual teams

Lecture 3 - Virtual teams

Lecture 4 - Factors affecting virtual teams

Lecture 5 - Managing virtualness

Lecture 6 - Cross-cultural teams

Lecture 7 - Factors affecting cross-cultural teams

Lecture 8 - Introduction to start-up teams

Lecture 9 - Factors affecting start-up teams

Lecture 10 - Introduction to IPO model in teams

Lecture 11 - Introduction to Human-AI teams

Lecture 12 - Inputs and Processes in Human-AI teams

Lecture 13 - States and Outcomes in Human-AI teams

Lecture 14 - Multiple Team Membership and Multi-team Systems

Lecture 15 - Introduction to Agile teams

Lecture 16 - Team Dynamics in Agile teams

Lecture 17 - Remote work teams

NPTEL : NOC:Foundations of Accounting and Finance (Management)

Co-ordinators : Prof. Arun Kumar Gopalaswamy

Lecture 1 - Introduction to Financial Accounting and Cost Accounting

Lecture 2 - Introduction to Corporate Finance

Lecture 3 - Contents of Income Statement and Balance Sheet - Part I

Lecture 4 - Contents of Income Statement and Balance Sheet - Part II

Lecture 5 - Interaction between Income Statement and Balance Sheet

Lecture 6 - Preparation of Income Statement and Balance Sheet: Example - Part I

Lecture 7 - Preparation of Income Statement and Balance Sheet: Example - Part II

Lecture 8 - Preparation of Income Statement and Balance Sheet: Example - Part III

Lecture 9 - Preparation of Balance Sheet: Lone Pine Cafe A - Part I

Lecture 10 - Preparation of Balance Sheet: Lone Pine Cafe A - Part II

Lecture 11 - Preparation of Income Statement: Lone Pine Cafe B

Lecture 12 - Cash Flow Statement: Concept and Example (Direct Method) - Lone Pine Cafe

Lecture 13 - Classification of Balance Sheet Items: Maynard Company A

Lecture 14 - Preparation of Income Statement: Maynard Company B

Lecture 15 - Preparation of Cash Flow Statement: Lone Pine Cafe (Indirect Method)

Lecture 16 - Preparation of Cash Flow Statement: Lori Crump (Indirect Method)

Lecture 17 - Preparation of cash flow statement: An example (Direct Method)

Lecture 18 - Preparation of cash flow statement: An example (Indirect Method)

Lecture 19 - Ratio Analysis - Part I - Analysis of financial statements

Lecture 20 - Ratio Analysis - Part II - Profitability Ratios

Lecture 21 - Ratio Analysis - Part III - Dividend and Liquidity Ratios

Lecture 22 - Ratio Analysis - Part IV - Efficiency Ratios

Lecture 23 - Cost, Costing and Cost Accounting

Lecture 24 - Classification of Costs

Lecture 25 - Preparation of Cost Sheet - Part I

Lecture 26 - Preparation of Cost Sheet - Part II

Lecture 27 - Allocation and Apportionment of Cost

Lecture 28 - Primary and Secondary Distribution of Overhead

Lecture 29 - Activity Based Costing - Part I

Lecture 30 - Activity Based Costing - Part II

Lecture 31 - Break-Even Analysis

Lecture 32 - Decision Making using Cost Accounting Informations - Examples - Part I

Lecture 33 - Decision Making using Cost Accounting Informations - Examples - Part II

Lecture 34 - Decision Making using Cost Accounting Informations - Examples - Part III

Lecture 35 - Decision Making using Cost Accounting Informations - Examples - Part IV

Lecture 36 - Decision Making using Cost Accounting Informations - Examples - Part V

Lecture 37 - Introduction to Budgeting: Preparation of Budgets - Part I

Lecture 38 - Introduction to Budgeting: Preparation of Budgets - Part II

Lecture 39 - Introduction to Budgeting: Preparation of Budgets - Part III

Lecture 40 - Flexible Budget and Variance Analysis

Lecture 41 - Foundations of Corporate Finance - Part I

Lecture 42 - Foundations of Corporate Finance - Part II

Lecture 43 - Time Value of Money: Present Value and Future Value in Single and Multiperiod case

Lecture 44 - Simplification of Cash Flows: Annuity, Growing Annuity, Perpetuity and Growing Perpetuity

Lecture 45 - Bond Valuation - Part I

Lecture 46 - Bond Valuation - Part II

Lecture 47 - Stock Valuation

Lecture 48 - Numericals on Bond and Stock Valuation

Lecture 49 - Technique of Evaluating Capital Investment Decisions

Lecture 50 - Numericals on Technique of Evaluating Capital Investment Decisions

Lecture 51 - Risk and Return - Part I

Lecture 52 - Risk and Return - Part II

Lecture 53 - Risk and Return: Individual Securities

Lecture 54 - Risk and Return: Portfolio

Lecture 55 - Cost of Capital and Valuation - Part I

Lecture 56 - Cost of Capital and Valuation - Part II

Lecture 57 - Valuation and Capital Structure

Lecture 58 - Dividend and Other Payouts

NPTEL : NOC:Strategic Sourcing (Management)

Co-ordinators : Prof. Arshinder Kaur

Lecture 1 - Evolution of Sourcing and changing paradigms

Lecture 2 - Changing Expectations leading to Supply Management and Strategic Sourcing

Lecture 3 - Supply Chains and Supply Networks

Lecture 4 - Return on Assets

Lecture 5 - Strategic sourcing and Organisation's Strategy Importance of supply management

Lecture 6 - Procure to Pay cycle

Lecture 7 - Recognition of need

Lecture 8 - Purchasing and supply process - 1

Lecture 9 - Purchasing and supply process - 2

Lecture 10 - Need identification and types - 1

Lecture 11 - Need identification and types - 2

Lecture 12 - Indirect contributions of Supply

Lecture 13 - Aligning supply objectives with organisation's strategy

Lecture 14 - Procurement in Organizations - 1

Lecture 15 - Procurement in Organizations - 2

Lecture 16 - Developing supply strategy - 1

Lecture 17 - Developing Sourcing/Supply strategy - 1

Lecture 18 - Developing Sourcing/Supply strategy - 2

Lecture 19 - Technology in Sourcing

Lecture 20 - Reverse Auctions

Lecture 21 - Success stories about technologies in Sourcing

Lecture 22 - Strategic cost management - 1

Lecture 23 - Strategic cost management - 2

Lecture 24 - Strategic cost management - Cost analysis

Lecture 25 - Sustainability in Supply management - 1

Lecture 26 - Sustainability in Supply management - 2

Lecture 27 - Science Based Targets

Lecture 28 - Negotiation supply management

Lecture 29 - Planning for negotiation

Lecture 30 - Negotiation strategy

Lecture 31 - Negotiation strategy (Continued...)

Lecture 32 - Supply Contracts

Lecture 33 - Types of supply contracts - 1

Lecture 34 - Types of supply contracts - 2

Lecture 35 - Supplier selection and evaluation - 1

Lecture 36 - Supplier selection and evaluation - 2

Lecture 37 - Supplier selection and evaluation - 3

Lecture 38 - Outsourcing decisions - 1

Lecture 39 - Outsourcing decisions - 2

Lecture 40 - TOPSIS

Lecture 41 - Goal Programming

Lecture 42 - Interpretive structural model - 1

Lecture 43 - Interpretive structural model - 2

Lecture 44 - Supply risk management

Lecture 45 - Risk management framework

Lecture 46 - Supply risk examples

Lecture 47 - Assessment of risk

Lecture 48 - Risk metrics

NPTEL : NOC:Fundamentals of Cost Accounting (Management)

Co-ordinators : Prof. Arindam Banerjee

Lecture 1 - Introduction to Cost Accounting - Part I

Lecture 2 - Introduction to Cost Accounting - Part II

Lecture 3 - Material Cost - Part I

Lecture 4 - Material Cost - Part II

Lecture 5 - Labour Cost - Part I

Lecture 6 - Labour Cost - Part II

Lecture 7 - Overhead - Part I

Lecture 8 - Overhead - Part II

Lecture 9 - Cost Sheet - Part I

Lecture 10 - Cost Sheet - Part II

Lecture 11 - Job Costing - Part I

Lecture 12 - Job Costing - Part II

Lecture 13 - Service / Operating Costing - Part I

Lecture 14 - Service / Operating Costing - Part II

Lecture 15 - Contract Costing - Part I

Lecture 16 - Contract Costing - Part II

Lecture 17 - Process Costing - Part I

Lecture 18 - Process Costing - Part II

Lecture 19 - Cost Volume Profit Analysis - Part I

Lecture 20 - Cost Volume Profit Analysis - Part II

Lecture 21 - Cost Volume Profit Analysis - Part III

Lecture 22 - Cost Volume Profit Analysis - Part IV

Lecture 23 - Decision Making - Part I

Lecture 24 - Decision Making - Part II

Lecture 25 - Decision Making - Part III

Lecture 26 - Decision Making - Part IV

Lecture 27 - Decision Making - Part V

Lecture 28 - Budgetary Control - Part I

Lecture 29 - Budgetary Control - Part II

Lecture 30 - Budgetary Control - Part III

Lecture 31 - Budgetary control - Part IV

Lecture 32 - Budgetary control - Part V

Lecture 33 - Budgetary control - Part VI

Lecture 34 - Standard Costing - Part I

Lecture 35 - Variance Analysis - Part I

Lecture 36 - Variance Analysis - Part II

Lecture 37 - Variance Analysis - Part III

Lecture 38 - Variance Analysis - Part IV

Lecture 39 - Variance Analysis - Part V

Lecture 40 - Interaction with CFO

NPTEL : NOC:Introduction to GST (Management)

Co-ordinators : Prof. Anil Sharma

Lecture 1 - Concept of GST and difference between Direct tax and Indirect tax - Part 1

Lecture 2 - Concept of GST and difference between Direct tax and Indirect tax - Part 2

Lecture 3 - Concept of GST and difference between Direct tax and Indirect tax - Part 3

Lecture 4 - Concept of GST and difference between Direct tax and Indirect tax - Part 4

Lecture 5 - Registration - Part 1

Lecture 6 - Registration - Part 2

Lecture 7 - Registration - Part 3

Lecture 8 - Registration - Part 4

Lecture 9 - Place of Supply - Part 1

Lecture 10 - Place of Supply - Part 2

Lecture 11 - Place of Supply - Part 3

Lecture 12 - Place of Supply - Part 4

Lecture 13 - Place of Supply - Part 5

Lecture 14 - Value of Supply - Part 1

Lecture 15 - Value of Supply - Part 2

Lecture 16 - Value of Supply - Part 3

Lecture 17 - Value of Supply - Part 4

Lecture 18 - Value of Supply - Part 5

Lecture 19 - Input Tax Credit 1 - Part 1

Lecture 20 - Input Tax Credit 1 - Part 2

Lecture 21 - Input Tax Credit 1 - Part 3

Lecture 22 - Input Tax Credit 1 - Part 4

Lecture 23 - Input Tax Credit 1 - Part 5

Lecture 24 - Input Tax Credit 2 - Part 1

Lecture 25 - Input Tax Credit 2 - Part 2

Lecture 26 - Payment of Taxes - Part 1

Lecture 27 - Payment of Taxes - Part 2

Lecture 28 - Returns - Part 1

Lecture 29 - Returns - Part 2

Lecture 30 - Returns - Part 3

Lecture 31 - Returns - Part 4

Lecture 32 - Overview of GST portal - Part 1

Lecture 33 - Overview of GST portal - Part 2

Lecture 34 - Overview of GST portal - Part 3

Lecture 35 - Overview of GST portal - Part 4

Lecture 36 - Overview of GST portal - Part 5

NPTEL : NOC:Research for Marketing Decisions (Management)

Co-ordinators : Prof. Vaibhav Chawla

Lecture 1 - What is Market and Marketing?

Lecture 2 - Research, Marketing Research and its Types

Lecture 3 - Introduction to Marketing Research Process

Lecture 4 - Step #1 Problem Definition Discussion with Decision Maker

Lecture 5 - Step #1 Problem Definition Problem Audit, Interview with Experts, Qualitative Research

Lecture 6 - Step #1 Problem Definition Marketing Research Problem and an Example

Lecture 7 - Step #2 Developing an approach to the problem Understanding a Theory

Lecture 8 - Step #2 Developing an approach to the problem Components of an approach

Lecture 9 - Step #2 Developing an approach to the problem Examples

Lecture 10 - Case Studies for Problem Definition Process

Lecture 11 - Research Design: An Introduction

Lecture 12 - Exploratory and Descriptive Research Design: An Introduction

Lecture 13 - Exploratory Research Techniques: Secondary Data and Thematic Analysis

Lecture 14 - Exploratory Research Techniques: Secondary Data and Qualitative Research - Focus Group Discussion

Lecture 15 - Exploratory Research Techniques: Focus Group Discussion Videos

Lecture 16 - Exploratory Research Techniques: Depth Interviews

Lecture 17 - Exploratory Research Techniques: Projective Techniques

Lecture 18 - Descriptive Research Techniques

Lecture 19 - Causal Research Design: Experiments and Confounding Variables

Lecture 20 - Causal Research Design: Experiments and Related Terminologies

Lecture 21 - Causal Research Design: Experiments and its Types

Lecture 22 - Measurement and Scaling: Levels of Measurement

Lecture 23 - Measurement and Scaling: Comparative and Non Comparative Scaling

Lecture 24 - Measurement and Scaling: Non Comparative Scaling - Likert Item Scales

Lecture 25 - Measurement and Scaling: Semantic Differential Scale and Other Scale Decisions

Lecture 26 - Measurement and Scaling: Multi item Scales

Lecture 27 - Measurement and Scaling: Multi item Scales, Conceptual and Operational Definitions

Lecture 28 - Questionnaire Design: Initial Steps 1 to 5

Lecture 29 - Questionnaire Design: Steps 6 onwards and Other Issues

Lecture 30 - Questionnaire Design: Framing Common Demographic and Screener Questions

Lecture 31 - Data Analysis using SPSS: Entering the Data

Lecture 32 - Data Analysis using SPSS: Data Cleaning and Descriptive Statistics

Lecture 33 - Data Analysis using SPSS: Charts, Outliers, and Descriptive Statistics

Lecture 34 - Data Analysis using SPSS: Cross Tabs

Lecture 35 - Data Analysis using SPSS: Hypothesis Testing for Association

Lecture 36 - Data Analysis using SPSS: Hypothesis Testing for Differences in Means P value, Sampling Distribution

Lecture 37 - Data Analysis using SPSS: Hypothesis Testing for Differences in Means (Independent Sample T test)

Lecture 38 - Analysis using SPSS: Hypothesis Testing for Differences in Means Paired Sample T test, One way ANOVA

NPTEL : NOC:Financial Statement Analysis and Reporting (Management)

Co-ordinators : Prof. Anil K. Sharma

Lecture 1 - Introduction

Lecture 2 - Accounting Process

Lecture 3 - Accounting Concepts

Lecture 4 - Trial Balance and its Relevance

Lecture 5 - Relevant Accounting Statements

Lecture 6 - Journal (Part-I) - The first and original book of accounting

Lecture 7 - Journal (Part-II) - The first and original book of accounting

Lecture 8 - Ledger-The second book of accounts

Lecture 9 - Financial Statements

Lecture 10 - Financial Statements - Income Statement

Lecture 11 - Financial Statements - Balance Sheet

Lecture 12 - Financial Statements with Adjustments (Part-1)

Lecture 13 - Financial Statements with Adjustments (Part-2)

Lecture 14 - Financial Statements with Adjustments (Part-3)

Lecture 15 - Financial Statements with Adjustments (Part-4)

Lecture 16 - Financial Statements with Adjustments (Part-5)

Lecture 17 - Financial Statements with Adjustments (Part-6)

Lecture 18 - Financial Statements with Adjustments (Part-7)

Lecture 19 - Financial Statements with Adjustments (Part-8)

Lecture 20 - Financial Statements with Adjustments (Part-9)

Lecture 21 - Financial Statements with Adjustments (Part-10)

Lecture 22 - Financial Statements with Adjustments (Part-11)

Lecture 23 - Financial Statements with Adjustments (Part-12)

Lecture 24 - Financial Statements with Adjustments (Part-13)

Lecture 25 - Corporate Financial Statements (Part-1)

Lecture 26 - Corporate Financial Statements (Part-2)

Lecture 27 - Corporate Financial Statements (Part-3)

Lecture 28 - Corporate Financial Statements (Part-4)

Lecture 29 - Corporate Financial Statements (Part-5)

Lecture 30 - Corporate Financial Statements (Part-6)

Lecture 31 - Corporate Financial Statements (Part-7)

Lecture 32 - Corporate Financial Statements (Part-8)

Lecture 33 - Corporate Financial Statements (Part-9)

Lecture 34 - Financial Statement Analysis

Lecture 35 - Ratio Analysis (Part-1)

Lecture 36 - Ratio Analysis (Part-2)

Lecture 37 - Ratio Analysis (Part-3)

Lecture 38 - Different Sets of Ratios (Part-1)

Lecture 39 - Different Sets of Ratios (Part-2)

Lecture 40 - Ratio Analysis - A case of Grasim Industries (Part-1)

Lecture 41 - Ratio Analysis - A case of Grasim Industries (Part-2)

Lecture 42 - Liquidity Ratios - Grasim Industries (Part-1)

Lecture 43 - Liquidity Ratios - Grasim Industries (Part-2)

Lecture 44 - Liquidity Ratios - Grasim Industries (Part-3)

Lecture 45 - Profitability Ratios- Grasim Industries (Part-1)

Lecture 46 - Profitability Ratios- Grasim Industries (Part-2)

Lecture 47 - Profitability Ratios- Grasim Industries (Part-3)

Lecture 48 - DuPont Ratios (Part-1)

Lecture 49 - DuPont Ratios (Part-2)

Lecture 50 - Valuation or Capital Market Ratios (Part-1)

Lecture 51 - Valuation or Capital Market Ratios (Part-2)

Lecture 52 - Cash Flow Statement - Introduction (Part-1)

Lecture 53 - Cash Flow Statement (Part-2)

Lecture 54 - Preparation of Cash Flow Statement- Basic Cash Flow Statement

Lecture 55 - Cash Flow Statement - Further Analysis (Part-1)

Lecture 56 - Cash Flow Statement - Further Analysis (Part-2)

Lecture 57 - Final Cash Flow Statement (Part-1)

Lecture 58 - Final Cash Flow Statement (Part-2)

Lecture 59 - Financial Reporting (Part-1)

Lecture 60 - Financial Reporting (Part-2)

NPTEL : NOC:Supply Chain Analytics (Management)

Co-ordinators : Prof. Rajat Agrawal

Lecture 1 - Introduction to Supply Chain Management

Lecture 2 - Evolution of Supply Chain Management

Lecture 3 - Analytics in Supply Chain Management

Lecture 4 - Supply Chain Planning

Lecture 5 - Different views of Supply Chain

Lecture 6 - Supply Chain Strategy

Lecture 7 - Supply Chain Drivers

Lecture 8 - Developing Supply Chain Strategy

Lecture 9 - Strategic Fit in Supply Chain

Lecture 10 - Demand Forecasting in Supply Chain

Lecture 11 - Bullwhip Effect and Time Series Analysis

Lecture 12 - Exponential Smoothing Method of Forecasting

Lecture 13 - Measures of Forecasting Errors

Lecture 14 - Tracking Signal and Seasonality Models

Lecture 15 - Forecasting using multiple characteristics in Demand Data and Inventory Management in Supply Chain

Lecture 16 - Inventory Management in Supply Chain

Lecture 17 - Multi echelon Inventory Management

Lecture 18 - Multi echelon Inventory Management (Continued...)

Lecture 19 - Multi echelon Inventory Management for four stations

Lecture 20 - Multi echelon Inventory Management for four stations (Numerical Example)

Lecture 21 - Multi echelon Inventory Management for four stations (Numerical Example) (Continued...)

Lecture 22 - Network Design in Supply Chain

Lecture 23 - Network Design of Global Supply Chain

Lecture 24 - Alternative channels of Distribution

Lecture 25 - Location Decisions in Supply Chain

Lecture 26 - Network Optimization Models

Lecture 27 - Using Excel Solver for Network Optimization

Lecture 28 - Uncertainty in Network Design

Lecture 29 - Network Design in Uncertain Environment and Flexibility

Lecture 30 - Flexibility in Supply Chain

Lecture 31 - Optimal Level of Product Availability in Supply chain

Lecture 32 - Time Value of money in Supply Chain

Lecture 33 - Different types of Analytics in Supply Chain

Lecture 34 - Predictive Modelling in Forecasting in Supply Chain

Lecture 35 - Representation on Uncertainty in Supply Chain

Lecture 36 - Using Decision Tree for handling Uncertainty

Lecture 37 - Example of using Decision Tree incorporating Uncertainty in Single Factor

Lecture 38 - Example of using Decision Tree incorporating Uncertainty in two Key Factors

Lecture 39 - Modelling Flexibility in Supply Chain

Lecture 40 - Trends, Challenges and Future of Supply Chain

NPTEL : NOC:Marketing Research and Analysis (Management)

Co-ordinators : Dr. Jogendra Kumar Nayak

Lecture 1 - Introduction to Marketing Research

Lecture 2 - Defining Research Problem

Lecture 3 - Developing Research Approach and Developing Research Design: Non- Conclusive

Lecture 4 - Research Design: Conclusive

Lecture 5 - Qualitative Research: Nature and Approaches

Lecture 6 - Qualitative Research: Depth Interview, Focus Group Discussion

Lecture 7 - Projective Technique, Case Study

Lecture 8 - Case Study, Descriptive Research Design and Research Errors

Lecture 9 - Primary and Secondary Data, Research Error

Lecture 10 - Measurement and Scaling: Comparative and Non-comparative Scaling

Lecture 11 - Scale Development Process

Lecture 12 - Questionnaire and Form Design

Lecture 13 - Causal Research and Types

Lecture 14 - Experimental Design and Sampling

Lecture 15 - Sampling Design and Procedure

Lecture 16 - Sampling and Sample Size Determination

Lecture 17 - Hypothesis Development: Null and Alternate, Type I and Type II Errors

Lecture 18 - Data Preparation

Lecture 19 - Hypothesis Testing: T-Test, Z-Test

Lecture 20 - T, Z and F Test

Lecture 21 - Hypothesis Testing: Anova and Manova

Lecture 22 - Cross Tabulation and Chi Square Test

Lecture 23 - Correlation and Regression

Lecture 24 - Regression

Lecture 25 - Factor Analysis

Lecture 26 - Factor Analysis

Lecture 27 - SEM and CFA - 1

Lecture 28 - SEM and CFA - 2

Lecture 29 - SEM and CFA - 3

Lecture 30 - Cluster Analysis - I

Lecture 31 - Cluster Analysis - II

Lecture 32 - Discriminant Analysis

Lecture 33 - Discriminant Analysis - 1

Lecture 34 - Researching Rural Market

Lecture 35 - International Marketing Research

Lecture 36 - Ethics in Marketing Research

Lecture 37 - Ethics in Marketing Research - 1

Lecture 38 - Report Preparation and Presentation

Lecture 39 - Multi Dimentional Scaling

Lecture 40 - Conjoint Analysis

NPTEL : NOC:Project Management for Managers (Management)

Co-ordinators : S. K. Gupta, Prof. Mukesh Kumar Barua

Lecture 1 - Introduction of Project Management

Lecture 2 - Project Success

Lecture 3 - Types of Structure Organizations

Lecture 4 - Project Management Office

Lecture 5 - Stakeholders Management

Lecture 6 - Types of Projects and Project Life Cycle

Lecture 7 - Project Life Cycle Phases and Project Appraisal

Lecture 8 - Methods of Project Selection - I

Lecture 9 - Methods of Project Selection - II

Lecture 10 - Methods of Project Selection - MCDM-I

Lecture 11 - Methods of Project Selection - MCDM-II

Lecture 12 - Methods of Project Selection - MCDM-III

Lecture 13 - Market and Demand Analysis - I

Lecture 14 - Market and Demand Analysis - II

Lecture 15 - Financial Analysis

Lecture 16 - Capital Budgeting Techniques - I

Lecture 17 - Capital Budgeting Techniques - II

Lecture 18 - Financing of Projects

Lecture 19 - Risk Management - I

Lecture 20 - Risk Management - II

Lecture 21 - Risk Management (Control and Documentation)

Lecture 22 - Stand Alone Risk Analysis - I

Lecture 23 - Stand Alone Risk Analysis - II

Lecture 24 - Hillier Model

Lecture 25 - Simulation Analysis

Lecture 26 - Decision Tree Analysis - I

Lecture 27 - Decision Tree Analysis - II

Lecture 28 - Abandonment Analysis

Lecture 29 - Technical Analysis

Lecture 30 - Product Mix and Plant Capacity Analysis

Lecture 31 - Project Team Building, Conflict and Negotiation

Lecture 32 - HRM Issues and time Management

Lecture 33 - Project Time Management - Introduction

Lecture 34 - Project Time Management - Project Scheduling

Lecture 35 - Project time Management - Numbering of Nodes

Lecture 36 - Project Time Management - PERT Networks

Lecture 37 - Project Time Management - CPM

Lecture 38 - Project Time Management - Laddering in PERT/CPM

Lecture 39 - Probability Models in Networks - I

Lecture 40 - Probability Models in Networks - II

Lecture 41 - Probability Models in Networks - III

Lecture 42 - Probability Models in Networks - IV

Lecture 43 - Simulation of Networks - I

Lecture 44 - Simulation of Networks - II

Lecture 45 - Slacks and Floats - I

Lecture 46 - Slacks and Floats - II

Lecture 47 - Time and Cost Relationship

Lecture 48 - Crashing of Networks - I

Lecture 49 - Crashing of Networks - II

Lecture 50 - Crashing of Networks - III (Free Float Method)

Lecture 51 - Crashing of Networks - IV

Lecture 52 - Introduction to Project Cost Management

Lecture 53 - Cost Control (Tools and Techniques)

Lecture 54 - Cost Estimation

Lecture 55 - Introduction to Quality Management

Lecture 56 - Cost of Quality

Lecture 57 - Quality Management (Source of variability and Six Sigma)

Lecture 58 - Quality Management (Six Sigma Tools)

Lecture 59 - Procurement Management- I

Lecture 60 - Procurement Management- II and Project Termination

NPTEL : NOC:Business Analytics and Data Mining Modeling using R (Management)

Co-ordinators : Dr. Gaurav Dixit

Lecture 1 - Introduction

Lecture 2 - Data Mining Process

Lecture 3 - Introduction To R

Lecture 4 - Basic Statistics

Lecture 5 - Basic Statistics - Part 2

Lecture 6 - Partitioning Process

Lecture 7 - Visualization Techniques

Lecture 8 - Visualization Techniques - Part 2

Lecture 9 - Visualization Techniques - Part 3

Lecture 10 - Visualization Techniques - Part 4

Lecture 11 - Visualization Techniques - Part 5

Lecture 12 - Visualization Techniques - Part 6

Lecture 13 - Dimension Reduction Techniques

Lecture 14 - Dimension Reduction Techniques - Part 2

Lecture 15 - Dimension Reduction Techniques - Part 3

Lecture 16 - Performance Metrics

Lecture 17 - Performance Metrics - Part 2

Lecture 18 - Performance Metrics - Part 3

Lecture 19 - Performance Metrics - Part 4

Lecture 20 - Performance Metrics - Part 5

Lecture 21 - Prediction Performance

Lecture 22 - Multiple Linear Regression

Lecture 23 - Multiple Linear Regression - Part 2

Lecture 24 - Multiple Linear Regression - Part 3

Lecture 25 - Multiple Linear Regression - Part 4

Lecture 26 - Multiple Linear Regression - Part 5

Lecture 27 - Multiple Linear Regression - Part 6

Lecture 28 - Machine Learning Technique K-Nn

Lecture 29 - Machine Learning Technique K-Nn - Part 2

Lecture 30 - Machine Learning Technique K-Nn - Part 3

Lecture 31 - Naive Bayes

Lecture 32 - Naive Bayes - Part 2

Lecture 33 - Naive Bayes - Part 3

Lecture 34 - Naive Bayes - Part 4

Lecture 35 - Naive Bayes - Part 5

Lecture 36 - Classification And Regression Trees

Lecture 37 - Classification And Regression Trees - Part 2

Lecture 38 - Classification And Regression Trees - Part 3

Lecture 39 - Classification And Regression Trees - Part 4

Lecture 40 - Classification And Regression Trees - Part 5

Lecture 41 - Classification And Regression Trees - Part 6

Lecture 42 - Pruning Process

Lecture 43 - Pruning Process - Part 2

Lecture 44 - Pruning Process - Part 3

Lecture 45 - Regression Trees

Lecture 46 - Logistic Regression

Lecture 47 - Logistic Regression - Part 2

Lecture 48 - Logistic Regression - Part 3

Lecture 49 - Logistic Regression - Part 4

Lecture 50 - Logistic Regression - Part 5

Lecture 51 - Logistic Regression - Part 6

Lecture 52 - Logistic Regression - Part 7

Lecture 53 - Artificial Neural Networks

Lecture 54 - Artificial Neural Network - Part 2

Lecture 55 - Artificial Neural Network - Part 3

Lecture 56 - Artificial Neural Network - Part 4

Lecture 57 - Artificial Neural Network - Part 5

Lecture 58 - Artificial Neural Network - Part 6

Lecture 59 - Discriminant Analysis

Lecture 60 - Discriminant Analysis - Part 2

NPTEL : NOC:Working Capital Management (Management)

Co-ordinators : Prof. Anil K. Sharma

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Nature of the Working Capital Management

Lecture 4 - Approaches of Working Capital Management - I

Lecture 5 - Approaches of Working Capital Management - II

Lecture 6 - Trade off between Profitability and Risk - I

Lecture 7 - Trade off between Profitability and Risk - II

Lecture 8 - Working Capital Management in Indian Business - I

Lecture 9 - Working Capital Management in Indian Business - II

Lecture 10 - Operating Cycle

Lecture 11 - Weighted Operating Cycle

Lecture 12 - Working Capital Requirement Assessment - I

Lecture 13 - Working Capital Requirement Assessment - II

Lecture 14 - Assessing Working Capital Requirements - Problem 2 and 5

Lecture 15 - Working Capital Requirement- The Conclusion

Lecture 16 - Working Capital Leverage

Lecture 17 - Risk and Cost of Holding Inventory

Lecture 18 - Inventory Costs

Lecture 19 - Inventory Behaviour

Lecture 20 - Inventory Management - Methods and Strategies

Lecture 21 - EOQ Technique of Inventory Management

Lecture 22 - Stockouts cause Walkouts

Lecture 23 - Rationing of Working Capital - I

Lecture 24 - Rationing of Working Capital - II

Lecture 25 - Different Modes of Bank Finance

Lecture 26 - Incremental Inventory - I

Lecture 27 - Incremental Inventory - II

Lecture 28 - Management of Accounts Receivables - I

Lecture 29 - Management of Accounts Receivables - II

Lecture 30 - Management of Accounts Receivables - III

Lecture 31 - Motives of Credit Sale - I

Lecture 32 - Motives of Credit Sale - II

Lecture 33 - Limitations of Credit Time Period

Lecture 34 - Written Credit Policy - I

Lecture 35 - Written Credit Policy - II

Lecture 36 - Goals and Functions of Accounts Receivables Management

Lecture 37 - Valuation of Receivables at Cost or Sales Value

Lecture 38 - Credit Policy Changes - I

Lecture 39 - Credit Policy Changes - II

Lecture 40 - Credit Policy Changes - III

Lecture 41 - Optimum Credit Policy

Lecture 42 - Credit Risk Analysis - I

Lecture 43 - Credit Risk Analysis - II

Lecture 44 - Credit Risk Analysis - III

Lecture 45 - Credit Policy Variables

Lecture 46 - Cash Management

Lecture 47 - Cash Flow Presentation

Lecture 48 - Models of Cash Management- Certainty Model by Baumol

Lecture 49 - Certainty Model by Baumol Continued

Lecture 50 - Uncertainty Model by Miller and Orr

Lecture 51 - Miller and Orr (Continued...) and Cash Management Techniques

Lecture 52 - Measures of Liquidity

Lecture 53 - Window Dressing and Management of Current Liabilities

Lecture 54 - Management of Accounts Payable

Lecture 55 - Cost of Stretching Accounts Payable - I

Lecture 56 - Cost of Stretching Accounts Payable - II

Lecture 57 - Other Accruals and Overtrading

Lecture 58 - Bank Finance - Introduction

Lecture 59 - Recommendations of Tondon and Chore Committees

Lecture 60 - Deciding a Suitable Mix

NPTEL : NOC:Innovation, Business Models and Entrepreneurship (Management)

Co-ordinators : Prof. Vinay Sharma, Prof. Rajat Agrawal

Lecture 1 - Analizing the Current Bussiness Scenario

Lecture 2 - Innovation and Creativity - An Introduction

Lecture 3 - Innovation in Current Environment

Lecture 4 - Types of Innovation

Lecture 5 - School of Innovation

Lecture 6 - Challenges of Innovation

Lecture 7 - Steps of Innovation Management

Lecture 8 - Idea Management System

Lecture 9 - Divergent v/s Convergent Thinking

Lecture 10 - Design Thinking and Entrepreneurship

Lecture 11 - Experimentation in Innovation Management

Lecture 12 - Idea Championship

Lecture 13 - Participation for Innovation

Lecture 14 - Co-creation for Innovation

Lecture 15 - Prototyping to Incubation

Lecture 16 - What is Business Model ?

Lecture 17 - Who is an Entrepreneur ?

Lecture 18 - Social Entrepreneurship ?

Lecture 19 - Blue Ocean Strategy - I

Lecture 20 - Blue Ocean Strategy - II

Lecture 21 - Marketing of Innovation

Lecture 22 - Technology Innovation Process

Lecture 23 - Technological Innovation Management Planning

Lecture 24 - Technological Innovation Management Strategies

Lecture 25 - Technology Forecasting

Lecture 26 - Sustainability Innovation and Entrepreneurship

Lecture 27 - Innovation Sustainable Conditions

Lecture 28 - Innovation: Context and Patterns

Lecture 29 - SMEâ€™S strategic involvement in sustainable development

Lecture 30 - Insight and Entrepreneurship

Lecture 31 - Management of Innovation, creation of IPR - I

Lecture 32 - Management of Innovation, creation of IPR - II

Lecture 33 - Types of IPR

Lecture 34 - Patents and Copyrights

Lecture 35 - Patents in India

Lecture 36 - Business Models and value proposition

Lecture 37 - Business Model Failure: Reasons and Remedies

Lecture 38 - Incubators: Business Vs Technology

Lecture 39 - Managing Investors for Innovation

Lecture 40 - Future markets and Innovation needs for India

NPTEL : NOC:Business Analytics and Data Mining Modeling Using R - Part II (Management)

Co-ordinators : Dr. Gaurav Dixit

Lecture 1 - Association Rules - Part I

Lecture 2 - Association Rules - Part II

Lecture 3 - Association Rules - Part III

Lecture 4 - Association Rules - Part IV

Lecture 5 - Cluster Analysis - Part I

Lecture 6 - Cluster Analysis - Part II

Lecture 7 - Cluster Analysis - Part III

Lecture 8 - Cluster Analysis - Part IV

Lecture 9 - Cluster Analysis - Part V

Lecture 10 - Cluster Analysis - Part VI

Lecture 11 - Cluster Analysis - Part VII

Lecture 12 - Understanding Time Series - Part I

Lecture 13 - Understanding Time Series - Part II

Lecture 14 - Understanding Time Series - Part III

Lecture 15 - Understanding Time Series - Part IV

Lecture 16 - Regression Based Forecasting Methods - Part I

Lecture 17 - Regression Based Forecasting Methods - Part II

Lecture 18 - Regression Based Forecasting Methods - Part III

Lecture 19 - Time Series Forecasting - Smoothing Methods - Part I

Lecture 20 - Time Series Forecasting - Smoothing Methods - Part II

NPTEL : NOC:Global Marketing Management (Management)

Co-ordinators : Prof. Z. Rahman

Lecture 1 - Globalization - Part 1

Lecture 2 - Globalization - Part 2

Lecture 3 - Global Economic Environment - Part 1

Lecture 4 - Global Economic Environment - Part 2

Lecture 5 - Global Economic Environment - Part 3

Lecture 6 - Financial Environment - Part 1

Lecture 7 - Financial Environment - Part 2

Lecture 8 - Cultural Issues and Buying Behavior - Part 1

Lecture 9 - Cultural Issues and Buying Behavior - Part 2

Lecture 10 - Political/ Legal Environment - Part 1

Lecture 11 - Political/ Legal Environment - Part 2

Lecture 12 - Global Marketing Research - Part 1

Lecture 13 - Global Marketing Research - Part 2

Lecture 14 - Global Segmentation and Positioning - Part 1

Lecture 15 - Global Segmentation and Positioning - Part 2

Lecture 16 - Global Marketing Strategies - Part 1

Lecture 17 - Global Marketing Strategies - Part 2

Lecture 18 - Global Market Entry Modes - Part 1

Lecture 19 - Global Market Entry Modes - Part 2

Lecture 20 - Global Product Development - Part 1

Lecture 21 - Global Product Development - Part 2

Lecture 22 - Marketing Products and Services - Part 1

Lecture 23 - Marketing Products and Services - Part 2

Lecture 24 - Global Pricing - Part 1

Lecture 25 - Global Pricing - Part 2

Lecture 26 - Communicating with the World Consumer - Part 1

Lecture 27 - Communicating with the World Consumer - Part 2

Lecture 28 - Sales Management - Part 1

Lecture 29 - Sales Management - Part 2

Lecture 30 - Global Logistics and Distribution - Part 1

Lecture 31 - Global Logistics and Distribution - Part 2

Lecture 32 - Export/Import Management - Part 1

Lecture 33 - Export/Import Management - Part 2

Lecture 34 - Export/Import Management - Part 3

Lecture 35 - Planning, Organization and Control of Global Marketing Operations - Part 1

Lecture 36 - Planning, Organization and Control of Global Marketing Operations - Part 2

Lecture 37 - Marketing in Emerging Markets - Part 1

Lecture 38 - Marketing in Emerging Markets - Part 2

Lecture 39 - Global Marketing and the Internet - Part 1

Lecture 40 - Global Marketing and the Internet - Part 2

NPTEL : NOC:Marketing Research and Analysis-II (Management)

Co-ordinators : Dr. Jogendra Kumar Nayak

Lecture 1 - Introduction to Marketing Research - I

Lecture 2 - Introduction to Marketing Research - II

Lecture 3 - Marketing Research Process - I

Lecture 4 - Marketing Research Process - II

Lecture 5 - Marketing Research Process - III

Lecture 6 - Marketing Research Process - IV

Lecture 7 - Hypothesis and Research Question - I (with real life example)

Lecture 8 - Hypothesis and Research Question - II (with real life example)

Lecture 9 - Hypothesis Development - I (with a real life case)

Lecture 10 - Hypothesis Development - II (with a real life case)

Lecture 11 - Research Design - I

Lecture 12 - Research Design - II

Lecture 13 - Research Design - III

Lecture 14 - Research Design - IV

Lecture 15 - Research Design - V

Lecture 16 - Research Design - VI

Lecture 17 - Data Purification and handling - I

Lecture 18 - Data Purification and handling - II

Lecture 19 - Data Purification and handling - III

Lecture 20 - Data Purification and handling - IV

Lecture 21 - Power of a Test and Sample Size Calculation (Problem Solving)

Lecture 22 - Sample Size Calculation and Hypothesis Testing (Problem Solving)

Lecture 23 - Hypothesis Testing - I (Problem Solving)

Lecture 24 - Hypothesis Testing - II (Problem Solving)

Lecture 25 - Non-Parametric Test - I

Lecture 26 - Non-Parametric Test - II

Lecture 27 - Non-Parametric Test - III

Lecture 28 - Non-Parametric Test - IV

Lecture 29 - Non-Parametric Test - V

Lecture 30 - Non-Parametric Test - VI

Lecture 31 - Non-Parametric Test - VII

Lecture 32 - Non-Parametric Test - VIII

Lecture 33 - Introduction to ANOVA and ANCOVA

Lecture 34 - Conducting one-way ANOVA

Lecture 35 - Solving n-way ANOVA - I

Lecture 36 - Solving n-way ANOVA - II

Lecture 37 - N-way ANOVA and MANOVA in SPSS

Lecture 38 - MANOVA and ANCOVA in SPSS

Lecture 39 - ANCOVA in SPSS

Lecture 40 - ANCOVA and MANCOVA in SPSS

Lecture 41 - Covariance and Correlation

Lecture 42 - Correlation in SPSS

Lecture 43 - Partial and Multiple Correlation

Lecture 44 - Simple Regression Analysis in SPSS

Lecture 45 - Multiple Regression Analysis in SPSS - I

Lecture 46 - Multiple Regression Analysis in SPSS - II

Lecture 47 - Stepwise Regression and Hierarchical Regression

Lecture 48 - Hierarchical Regression and Dummy Variable Regression

Lecture 49 - Logistic Regression Analysis

Lecture 50 - Discriminant Analysis in SPSS

Lecture 51 - Factor Analysis in SPSS - I

Lecture 52 - Factor Analysis in SPSS - II

Lecture 53 - Exploratory Factor Analysis in SPSS

Lecture 54 - Confirmatory Factor Analysis in SPSS - I

Lecture 55 - Confirmatory Factor Analysis in SPSS - II

Lecture 56 - Confirmatory Factor Analysis in SPSS - III

Lecture 57 - Structural Equation Modelling in SPSS

Lecture 58 - Mediation and Moderation Analysis in SPSS

Lecture 59 - Cluster Analysis in Practice - I

Lecture 60 - Cluster Analysis in Practice - II

NPTEL : NOC:Business Statistics (Management)

Co-ordinators : Prof. Mukesh Kumar Barua

Lecture 1 - Introduction to Statistics and Data

Lecture 2 - Types of Statistics, types of Data and sources of Data, Population vs Sample

Lecture 3 - Scales of Measurement

Lecture 4 - Data representation techniques - Part 1

Lecture 5 - Data representation techniques - Part 2 and measures of central tendency - Part 1

Lecture 6 - Measures of Central Tendency - Part 2

Lecture 7 - Examples of introduction to data and data representation techniques

Lecture 8 - Measures of Variation

Lecture 9 - Applications of Measures of Central Tendency and Measures of Variation

Lecture 10 - Chapter concepts- Measures of central tendency and measures of variation, Outliers, and shape of a distribution

Lecture 11 - Numerical Descriptive Measures

Lecture 12 - Covariance and Coefficient of Correlation, Introduction to Probability

Lecture 13 - Probability - Part 1

Lecture 14 - Probability - Part 2

Lecture 15 - Probability - Part 3

Lecture 16 - Probability Distributions - Part 1

Lecture 17 - Probability Distributions - Part 2

Lecture 18 - Probability Distributions - Part 3

Lecture 19 - Examples for Standardized Normal Distribution

Lecture 20 - Evaluating Normality, Exponential Probability Distribution

Lecture 21 - Chapter Concepts - Probability Distributions

Lecture 22 - Sampling and Sampling Techniques

Lecture 23 - Sampling Distribution - I

Lecture 24 - Sampling Distribution - II

Lecture 25 - Sampling Distribution - III

Lecture 26 - Method of Estimation

Lecture 27 - Interval Estimation

Lecture 28 - Confidence Interval - I

Lecture 29 - Confidence Interval - II

Lecture 30 - Types of Hypothesis Testing

Lecture 31 - Hypothesis Testing Process - I

Lecture 32 - Hypothesis Testing Process - II

Lecture 33 - Hypothesis Testing Examples

Lecture 34 - Hypothesis Testing of Proportions - I

Lecture 35 - Hypothesis Testing of Proportions - II

Lecture 36 - Hypothesis Testing-One sample Test

Lecture 37 - Hypothesis Testing using Minitab

Lecture 38 - Hypothesis Testing of Proportions using Minitab

Lecture 39 - Hypothesis Testing Two Sample Test - I

Lecture 40 - Hypothesis Testing Two Sample Test - II

Lecture 41 - Hypothesis Testing Two sample Test - III

Lecture 42 - Paired Sample Test

Lecture 43 - Hypothesis Testing of Proportion

Lecture 44 - Example of Hypothesis Testing

Lecture 45 - Design of Experiment

Lecture 46 - Analysis of variance - I

Lecture 47 - Analysis of variance - II

Lecture 48 - Analysis of variance - III

Lecture 49 - Tukey Kramer test

Lecture 50 - Randomized Blocked Design

Lecture 51 - A Factorial Design - I

Lecture 52 - A Factorial Design - II

Lecture 53 - Chi-square test goodness of fit - I

Lecture 54 - Chi-square test goodness of fit - II

Lecture 55 - Chi-square test of independence

Lecture 56 - Simple linear regression - I

Lecture 57 - Simple linear regression - II

Lecture 58 - Assumption of Regression

Lecture 59 - Multiple Regression

Lecture 60 - Example of multiple Regression

NPTEL : NOC:MCDM Techniques Using R (Management)

Co-ordinators : Dr. Gaurav Dixit

Lecture 1 - Introduction to MCDM Techniques - Part I

Lecture 2 - Introduction to MCDM Techniques - Part II

Lecture 3 - Introduction to MCDM Techniques - Part III

Lecture 4 - Analytic Hierarchy Process (AHP) - Part I

Lecture 5 - Analytic Hierarchy Process (AHP) - Part II

Lecture 6 - Analytic Hierarchy Process (AHP) - Part III

Lecture 7 - Analytic Hierarchy Process (AHP) - Part IV

Lecture 8 - ELECTRE - Part I

Lecture 9 - ELECTRE - Part II

Lecture 10 - ELECTRE - Part III

Lecture 11 - ELECTRE - Part IV

Lecture 12 - ELECTRE - Part V

Lecture 13 - Introduction of TOPSIS - Part I

Lecture 14 - TOPSIS - Part II

Lecture 15 - VIKOR - Part I

Lecture 16 - VIKOR - Part II

Lecture 17 - Introduction of Fuzzy Sets

Lecture 18 - Fuzzy AHP - Part I

Lecture 19 - Fuzzy AHP - Part II

Lecture 20 - Sensitivity Analysis

NPTEL : NOC:Manufacturing Strategy (Management)

Co-ordinators : Prof. Rajat Agarwal

Lecture 1 - Output of Manufacturing

Lecture 2 - Operations Systems

Lecture 3 - Operations Strategy

Lecture 4 - Functional Strategy Within Context of a Firm

Lecture 5 - Functional Dominance within Corporate Strategy

Lecture 6 - World Class Manufacturing Organization

Lecture 7 - Ps of Manufacturing Strategy

Lecture 8 - Contribution of Skinner and Hayes and Wheelwright

Lecture 9 - Alternative Paradigm of Manufacturing Strategy

Lecture 10 - Some Generic Manufacturing Strategies - I

Lecture 11 - Developing Manufacturing Strategy

Lecture 12 - Understanding Markets

Lecture 13 - Concept of Order Winner and Qualifiers

Lecture 14 - Basic Characteristics and Specific Dimensions of Order Winners and Qualifiers

Lecture 15 - Some Specific Order Winners and Qualifiers - I

Lecture 16 - Some Specific Order Winners and Qualifiers - II

Lecture 17 - Some Specific Order Winners and Qualifiers - III

Lecture 18 - Some Specific Order Winners and Qualifiers (non operation related criteria)

Lecture 19 - Developing an Operations Strategy: Methodology

Lecture 20 - Developing an Operations Strategy

Lecture 21 - Developing an Operations Strategy: Roth and Miller Classification

Lecture 22 - Enlightened View of Manufacturing

Lecture 23 - Manufacturing Strategy Taxonomy: Some Evidences from China

Lecture 24 - Quality Management and Manufacturing Excellence

Lecture 25 - Total Quality Management and Manufacturing Excellence

Lecture 26 - Deming's Approach to Quality

Lecture 27 - Business Excellence Awards

Lecture 28 - Process Choice

Lecture 29 - Process Choice: 3 Dimensional View

Lecture 30 - Product Profiling

Lecture 31 - Critical Success Factor for World Class Manufacturing

Lecture 32 - Value Added Engineering

Lecture 33 - Total Employee Involvement

Lecture 34 - HR Theories for Operation Strategy

Lecture 35 - Flexible Manufacturing System

Lecture 36 - Concept of Focus

Lecture 37 - Toyota Production System - I

Lecture 38 - Toyota Production System - II

Lecture 39 - World Class Manufacturing and India

Lecture 40 - Achieving World Class Status

NPTEL : NOC:Training of Trainers (Management)

Co-ordinators : Prof. Santosh Rangnekar

Lecture 1 - Introduction to training - 1

Lecture 2 - Introduction to training - 2

Lecture 3 - Introduction to training - 3

Lecture 4 - Introduction to training - 4

Lecture 5 - Training Needs Assessment

Lecture 6 - Methods of Training Needs Assessment - 1

Lecture 7 - Methods of Training Needs Assessment - 2

Lecture 8 - Methods of Training Needs Assessment - 3

Lecture 9 - Trainings Design and Types of Training - 1

Lecture 10 - Trainings Design and Types of Training - 2

Lecture 11 - Trainings Design and Types of Training - 3

Lecture 12 - Trainings Design and Types of Training - 4

Lecture 13 - Design thinking in training

Lecture 14 - Role of Technology - 1

Lecture 15 - Role of Technology - 2

Lecture 16 - Digital Pedagogy in training

Lecture 17 - Introduction to Training Methods - 1

Lecture 18 - Introduction to Training Methods - 2

Lecture 19 - Choosing a Training Method

Lecture 20 - Examples of Training

Lecture 21 - Understanding training groups and its dynamics

Lecture 22 - Training Methods - Case Study - 1

Lecture 23 - Training Methods - Case Study - 2

Lecture 24 - Training Methods - Case Study - 3

Lecture 25 - Training Methods - Case Study - 4

Lecture 26 - Training Methods - Business Game - 1

Lecture 27 - Training Methods - Business Game - 2

Lecture 28 - Training Methods - Business Game - 3

Lecture 29 - Training Methods - Role Play - 1

Lecture 30 - Training Methods - Role Play - 2

Lecture 31 - Training Methods - Role Play - 3

Lecture 32 - Training Methods - Behavior Modelling - 1

Lecture 33 - Training Methods - Behavior Modelling - 2

Lecture 34 - Training Methods - Behavior Modelling - 3

Lecture 35 - Cost benefit Analysis

Lecture 36 - Training Methods - Decision Making - 1

Lecture 37 - Training Methods - Decision Making - 2

Lecture 38 - Training Methods - Decision Making - 3

Lecture 39 - Training Methods - Exercise

Lecture 40 - Introduction to group training methods

Lecture 41 - Training Methods - Brainstorming

Lecture 42 - Training Methods - Group discussion

Lecture 43 - Training methods - Panel Discussion

Lecture 44 - A Research Approach in Training - 1

Lecture 45 - A Research Approach in Training - 2

Lecture 46 - Training evaluation - 1

Lecture 47 - Training evaluation - 2

Lecture 48 - Training response

NPTEL : NOC:Management Accounting (Management)

Co-ordinators : Prof. Anil K. Sharma

Lecture 1 - An Introduction - I

Lecture 2 - An Introduction - II

Lecture 3 - Branches of Accounting and Cost Sheet

Lecture 4 - Statement of Cost- An introduction

Lecture 5 - Fundamentals of Management Accounting - I

Lecture 6 - Fundamentals of Management Accounting - II

Lecture 7 - Cost Sheet - Role and Relevance in Management Decision Making - I

Lecture 8 - Cost Sheet - Role and Relevance in Management Decision Making - II

Lecture 9 - Preparation and Analysis of Cost Sheet - I

Lecture 10 - Preparation and Analysis of Cost Sheet - II

Lecture 11 - Preparation and Analysis of Cost Sheet - III

Lecture 12 - Budget and Budgetary Control - I

Lecture 13 - Budget and Budgetary Control - II

Lecture 14 - Preparation of Budgets

Lecture 15 - Preparation of Master Budget

Lecture 16 - Cash Budget - I

Lecture 17 - Cash Budget - II

Lecture 18 - Cash Budget - III

Lecture 19 - Cash Budget - IV

Lecture 20 - Financial Budget

Lecture 21 - Master Budget - A Mini Case - I

Lecture 22 - Master Budget - A Mini Case - II

Lecture 23 - Master Budget - A Mini Case - III

Lecture 24 - Flexible Budget and Variance Analysis - I

Lecture 25 - Flexible Budget and Variance Analysis - II

Lecture 26 - Flexible Budget and Variance Analysis - III

Lecture 27 - Flexible Budget - A Mini Case - I

Lecture 28 - Flexible Budget - A Mini Case - II

Lecture 29 - Standard Costing and Variance Analysis

Lecture 30 - Pre-Requisites to Standard Costing

Lecture 31 - Variance Analysis

Lecture 32 - Material Variances - I

Lecture 33 - Material Variances - II

Lecture 34 - Material Variances - III

Lecture 35 - Material Variances - IV

Lecture 36 - Material Variances - V

Lecture 37 - Labor Variances - I

Lecture 38 - Labor Variances - II

Lecture 39 - Labor Variances - III

Lecture 40 - Labor Variances - IV

Lecture 41 - Labor Variances - V

Lecture 42 - Overhead Variances

Lecture 43 - Marginal Costing - I

Lecture 44 - Marginal Costing - II

Lecture 45 - Marginal Costing - III

Lecture 46 - Tools of Marginal Costing

Lecture 47 - CVP Analysis

Lecture 48 - Applications of Marginal Costing - I

Lecture 49 - Applications of Marginal Costing - II

Lecture 50 - Applications of Marginal Costing - III

Lecture 51 - Activity Based Costing- An Introduction

Lecture 52 - Cost Management System and Activity Based Costing - I

Lecture 53 - Cost Management System and Activity Based Costing - II

Lecture 54 - Designing of ABC System

Lecture 55 - Applications of ABC - I

Lecture 56 - Applications of ABC - II

Lecture 57 - Management Control System and Responsibility Accounting - I

Lecture 58 - Management Control System and Responsibility Accounting - II

Lecture 59 - Implementation of Management Control Systems - I

Lecture 60 - Implementation of Management Control Systems - II

NPTEL : NOC:Financial Derivatives and Risk Management (Management)

Co-ordinators : Prof. J. P. Singh

Lecture 1 - Overview of Derivatives

Lecture 2 - Forwards: Introduction and Pricing

Lecture 3 - Forwards: Pricing and Arbitrage

Lecture 4 - Forwards Pricing: Consumption Assets

Lecture 5 - Futures: Introduction and Salient Features

Lecture 6 - Futures: Margining and MTM

Lecture 7 - Forwards and Futures Prices, Exposure

Lecture 8 - Exposure and Risk

Lecture 9 - Basics of Futures Hedging

Lecture 10 - Futures Hedging: Nuances

Lecture 11 - Futures Hedging: No of Contracts

Lecture 12 - Futures Hedging: Examples

Lecture 13 - Mean Variance Portfolio Theory

Lecture 14 - Capital Asset Pricing Model

Lecture 15 - Systematic and Unsystematic Risk

Lecture 16 - Index Futures: Basic Theory

Lecture 17 - Hedging with Index Futures

Lecture 18 - Index Futures: Arbitrage, Examples

Lecture 19 - Spot Interest Rates and YTM

Lecture 20 - YTM, Other Yield Measures

Lecture 21 - Interest Rate Risk

Lecture 22 - Duration and Price Sensitivities, Immunization

Lecture 23 - Interest Rate Futures: Salient Features

Lecture 24 - T-Bill Futures: Applications

Lecture 25 - T-Bill Futures: Hedging

Lecture 26 - T-Bill Futures: Arbitrage; Eurodollar Futures

Lecture 27 - Tailing the Hedge; Clean and Dirty Price

Lecture 28 - US T-Bond Futures: Salient Features, Pricing

Lecture 29 - US T-Bond Futures: Conversion Factor; Options

Lecture 30 - Options: Basic Theory

Lecture 31 - Options: Put-Call Parity

Lecture 32 - Options: Price Bounds, American Options

Lecture 33 - American Options: Properties

Lecture 34 - Basic Option Trading Strategies

Lecture 35 - Option Strategies (Continued...)

Lecture 36 - Option Spread Strategies

Lecture 37 - Stochastic Processes: Random Walk

Lecture 38 - Stochastic Processes: Brownian Motion

Lecture 39 - Stochastic Processes: Diffusion Equation

Lecture 40 - Stochastic Processes: Central Limit Theorem, Stochastic Calculus

Lecture 41 - Stochastic Calculus: Itoâ€™s Equation

Lecture 42 - Stock Price Distributions; Fokker Planck Equation and Solution

Lecture 43 - Lognormal Distribution

Lecture 44 - Option Pricing: Binomial Model, Risk Neutral Valuation

Lecture 45 - Option Pricing: Binomial Model Contd

Lecture 46 - Girsanov Theorem; Black Scholes Model

Lecture 47 - Black Scholes Model (Continued...)

Lecture 48 - Features of BS Model

Lecture 49 - Solution of BS PDE; Option Greeks

Lecture 50 - Option Greeks: Definition and Properties

Lecture 51 - Option Greeks: Further Properties

Lecture 52 - Option Greeks: Further Properties, Role in Trading Strategies

Lecture 53 - Option Greeks: Further Properties, Role in Trading Strategies (Continued...)

Lecture 54 - Option Greeks: Role in Trading Strategies (Continued...); Swaps

Lecture 55 - Forward Rate Agreements; Swaps

Lecture 56 - Swaps: Theory of Swaps

Lecture 57 - Swaps: Valuation of Interest Rate Swaps

Lecture 58 - Currency Swaps; Value at Risk

Lecture 59 - Value at Risk: Definition and Computation

Lecture 60 - Value at Risk: Computation for Bond and Derivative Portfolios

NPTEL : NOC:Business Analytics and Text Mining Modeling Using Python (Management)

Co-ordinators : Dr. Gaurav Dixit

Lecture 1 - Introduction - Part I

Lecture 2 - Introduction - Part II

Lecture 3 - Introduction - Part III

Lecture 4 - Python for Analytics - Part I

Lecture 5 - Python for Analytics - Part II

Lecture 6 - Python for Analytics - Part III

Lecture 7 - Python for Analytics - Part IV

Lecture 8 - Python for Analytics - Part V

Lecture 9 - Built in Capabilities of Python - Part I

Lecture 10 - Built in Capabilities of Python - Part II

Lecture 11 - Built in Capabilities of Python - Part III

Lecture 12 - Built in Capabilities of Python - Part IV

Lecture 13 - Built in Capabilities of Python - Part V

Lecture 14 - Built in Capabilities of Python - Part VI

Lecture 15 - Built in Capabilities of Python - Part VII

Lecture 16 - Built in Capabilities of Python - Part VIII

Lecture 17 - Built in Capabilities of Python - Part IX

Lecture 18 - Built in Capabilities of Python - Part X

Lecture 19 - Numerical Python - Part I

Lecture 20 - Numerical Python - Part II

Lecture 21 - Numerical Python - Part III

Lecture 22 - Numerical Python - Part IV

Lecture 23 - Numerical Python - Part V

Lecture 24 - Numerical Python - Part VI

Lecture 25 - Numerical Python - Part VII

Lecture 26 - Database Using Python Pandas - Part I

Lecture 27 - Database Using Python Pandas - Part II

Lecture 28 - Database Using Python Pandas - Part III

Lecture 29 - Database Using Python Pandas - Part IV

Lecture 30 - Python Working with Data - Part I

Lecture 31 - Python Working with Data - Part II

Lecture 32 - Python Working with Data - Part III

Lecture 33 - String and Text Processing - Part I

Lecture 34 - String and Text Processing - Part II

Lecture 35 - Data Visualization Using Python

Lecture 36 - Text Collection and Transformation - Part I

Lecture 37 - Text Collection and Transformation - Part II

Lecture 38 - Text Mining and Modeling - Part I

Lecture 39 - Text Mining and Modeling - Part II

Lecture 40 - Text Mining and Modeling - Part III

NPTEL : NOC:Toyota Production System (Management)

Co-ordinators : Prof. Rajat Agarwal

Lecture 1 - Manufacturing Excellence

Lecture 2 - Global Environment

Lecture 3 - Production System

Lecture 4 - Operation Strategy

Lecture 5 - The Heart of the TPS : Eliminating Waste

Lecture 6 - Principles of Toyota Way

Lecture 7 - Culture Behind Toyota Way

Lecture 8 - Toyota Way in Action

Lecture 9 - Long Term Philosophy

Lecture 10 - Create Continuous Flow

Lecture 11 - Pull System

Lecture 12 - Leveling Workload

Lecture 13 - Get Quality Right the First Time

Lecture 14 - Standardization of Task

Lecture 15 - Use of Visual Control

Lecture 16 - Use of Reliable Technology

Lecture 17 - Role of Leaders in Manufacturing Philosophy

Lecture 18 - Developing Exceptional Teams

Lecture 19 - Challenge and Respect Extended Networks

Lecture 20 - See Yourself to Understand the Situation

Lecture 21 - Developing Decisions with Consensus

Lecture 22 - Become a Learning Organization

Lecture 23 - Become a Learning Organization : Continuous Improvement

Lecture 24 - Using Toyota Way for Other Organizations (Service and Technical)

Lecture 25 - Lean Manufacturing

Lecture 26 - Lean Vs Agile Manufacturing

Lecture 27 - Sustainable Manufacturing - I

Lecture 28 - Sustainable Manufacturing - II

Lecture 29 - Flexible Manufacturing System

Lecture 30 - Benchmarking

Lecture 31 - Cultural Issues in Lean

Lecture 32 - Overview of Lean Implementation

Lecture 33 - The Significance of Lead Time

Lecture 34 - Techniques to Reduce Lead Time

Lecture 35 - Value Stream Mapping

Lecture 36 - Kanban Approach

Lecture 37 - Kanban Calculation - I

Lecture 38 - Kanban Calculation - II

Lecture 39 - Theory of Constraints

Lecture 40 - Different Business Excellence Models

NPTEL : NOC:Production and Operation Management (Prof. Rajat Agarwal) (Management)

Co-ordinators : Prof. Rajat Agarwal

Lecture 1 - Introduction to Production

Lecture 2 - Global Environment

Lecture 3 - Operations and Productivity

Lecture 4 - Types and Characteristics of Manufacturing Systems

Lecture 5 - Types and Characteristics of Services Systems

Lecture 6 - Product Design

Lecture 7 - Introduction To Forecasting

Lecture 8 - Time Series Forecasting

Lecture 9 - Time Series Forecasting - Exponential Smoothing - I (Brief)

Lecture 10 - Time Series Forecasting - Exponential Smoothing - II (Classification)

Lecture 11 - Time Series Forecasting - Working Example Of Exponential Smoothing - I

Lecture 12 - Time Series Forecasting - Working Example Of Exponential Smoothing - II

Lecture 13 - Time Series Forecasting - Working Example Of Exponential Smoothing - III

Lecture 14 - Forecasting Errors

Lecture 15 - Causal Or Explanatory Methods

Lecture 16 - Inventory Planning and control

Lecture 17 - Basic Inventory Model

Lecture 18 - Different Variations in Basic EOQ Model

Lecture 19 - Safety Stock and Fixed Time Inventory Model

Lecture 20 - Examples of Safety Stock Calculation

Lecture 21 - Single Period Inventory Model - I (Theory)

Lecture 22 - Single Period Inventory Model - II (Numerical)

Lecture 23 - Inventory Control and Management

Lecture 24 - Material Requirements Planning (MRP)

Lecture 25 - Improvements in the MRP system

Lecture 26 - Lot Sizing in MRP Systems

Lecture 27 - Material Requirements Planning (MRP): Examples - I

Lecture 28 - Material Requirements Planning (MRP): Examples - II

Lecture 29 - Aggregate Sales and Operations Planning - I (Intermediate and Aggregate Planning)

Lecture 30 - Aggregate Sales and Operations Planning - II (Demand and Supply Options)

Lecture 31 - Aggregate planning Techniques - I (Introduction)

Lecture 32 - Aggregate planning Techniques - II (Examples)

Lecture 33 - Aggregate planning Techniques - III (Problems)

Lecture 34 - Production Planning Problems using LP

Lecture 35 - Nature of Quality and Evolution of Quality Management - I (Product Quality Dimensions)

Lecture 36 - Nature of Quality and Evolution of Quality Management - II (Service Quality Dimensions)

Lecture 37 - Modern Quality Management and Total Quality Management

Lecture 38 - Total Quality Management

Lecture 39 - Statistical Concepts in Quality Control - I (Overview of Control Charts)

Lecture 40 - Statistical Concepts in Quality Control - II (p-chart and Examples)

Lecture 41 - Statistical Concepts in Quality Control - III (c-chart and Examples)

Lecture 42 - Statistical Concepts in Quality Control - IV (Run Test and Examples)

Lecture 43 - 7 QC Tools

Lecture 44 - Acceptance Sampling

Lecture 45 - Process Capability

Lecture 46 - Six Sigma

Lecture 47 - Some Current Issues In Quality Management

Lecture 48 - Facility Layout - I (Introduction)

Lecture 49 - Facility Layout - II (Group Technology and other layouts)

Lecture 50 - Facility Layout - III (Layout design and Precedence diagram)

Lecture 51 - Introduction to Project Management

Lecture 52 - PERT and CPM

Lecture 53 - PERT and Crashing

Lecture 54 - Maintenance Management

Lecture 55 - Maintenance Performance Measures and OEE calculations

Lecture 56 - Manufacturing Operations Scheduling - I (Scheduling and Gantt Charts)

Lecture 57 - Manufacturing Operations Scheduling - II (Order Sequencing)

Lecture 58 - JIT and Lean Operations

Lecture 59 - Work Method Analysis, Work Measurement and Learning Curve

Lecture 60 - Some Latest and Future Issues

NPTEL : NOC:Services Marketing: Integrating People, Technology, Strategy (Management)

Co-ordinators : Prof. Z. Rahman

Lecture 1 - New Perspectives on Marketing in the Service Economy - Part 1

Lecture 2 - New Perspectives on Marketing in the Service Economy - Part 2

Lecture 3 - New Perspectives on Marketing in the Service Economy - Part 3

Lecture 4 - Consumer Behavior in the Service Context - Part 1

Lecture 5 - Consumer Behavior in the Service Context - Part 2

Lecture 6 - Consumer Behavior in the Service Context - Part 3

Lecture 7 - Positioning Services in Competitive Markets - Part 1

Lecture 8 - Positioning Services in Competitive Markets - Part 2

Lecture 9 - Developing Service Products - Part 1

Lecture 10 - Developing Service Products - Part 2

Lecture 11 - Developing Service Products - Part 3

Lecture 12 - Distributing Services through Physical and Electronic Channels - Part 1

Lecture 13 - Distributing Services through Physical and Electronic Channels - Part 2

Lecture 14 - Setting Prices and Implementing Revenue Management - Part 1

Lecture 15 - Setting Prices and Implementing Revenue Management - Part 2

Lecture 16 - Setting Prices and Implementing Revenue Management - Part 3

Lecture 17 - Promoting Services and Educating Customers - Part 1

Lecture 18 - Promoting Services and Educating Customers - Part 2

Lecture 19 - Promoting Services and Educating Customers - Part 3

Lecture 20 - Designing and Managing Service Processes - Part 1

Lecture 21 - Designing and Managing Service Processes - Part 2

Lecture 22 - Balancing Demand and Productive Capacity - Part 1

Lecture 23 - Balancing Demand and Productive Capacity - Part 2

Lecture 24 - Balancing Demand and Productive Capacity - Part 3

Lecture 25 - Crafting Service Environment - Part 1

Lecture 26 - Crafting Service Environment - Part 2

Lecture 27 - Managing People for Service Advantage - Part 1

Lecture 28 - Managing People for Service Advantage - Part 2

Lecture 29 - Managing Relationships and Building Loyalty - Part 3

Lecture 30 - Managing Relationships and Building Loyalty - Part 1

Lecture 31 - Managing Relationships and Building Loyalty - Part 2

Lecture 32 - Managing Relationships and Building Loyalty - Part 3

Lecture 33 - Complaint Handling and Service Recovery - Part 1

Lecture 34 - Complaint Handling and Service Recovery - Part 2

Lecture 35 - Complaint Handling and Service Recovery - Part 3

Lecture 36 - Improving Service Quality and Productivity - Part 1

Lecture 37 - Improving Service Quality and Productivity - Part 2

Lecture 38 - Improving Service Quality and Productivity - Part 3

Lecture 39 - Striving for Service Leadership and Creating the Seamless Service Firms - Part 1

Lecture 40 - Striving for Service Leadership and Creating the Seamless Service Firms - Part 2

Lecture 41 - Listening Customers Through Research - Part 1

Lecture 42 - Listening Customers Through Research - Part 2

Lecture 43 - Customer-Focused Organization: Structure, Resources and Service Process - Part 1

Lecture 44 - Customer-Focused Organization: Structure, Resources and Service Process - Part 2

Lecture 45 - Customer-defined service standards - Part 1

Lecture 46 - Customer-defined service standards - Part 2

Lecture 47 - Service Innovation and Design - Part 1

Lecture 48 - Service Innovation and Design - Part 2

Lecture 49 - Service Innovation and Design - Part 3

Lecture 50 - Management of public and private nonprofit service organizations - Part 1

Lecture 51 - Management of public and private nonprofit service organizations - Part 2

Lecture 52 - The Financial and Economic Impact of Service - Part 1

Lecture 53 - The Financial and Economic Impact of Service - Part 2

Lecture 54 - The Financial and Economic Impact of Service - Part 3

Lecture 55 - Globalization of Services: Service Management in the International arena

Lecture 56 - Technology and its Impact on Service and their Management - Part 1

Lecture 57 - Technology and its Impact on Service and their Management - Part 2

Lecture 58 - Technology and its Impact on Service and their Management - Part 3

Lecture 59 - Transforming a Manufacturing Firm into a Service Business - Part 1

Lecture 60 - Transforming a Manufacturing Firm into a Service Business - Part 2

NPTEL : NOC:Production and Operation Management (Prof. Santosh Rangnekar) (Management)

Co-ordinators : Prof. Santosh Rangnekar

Lecture 1 - Relational Development and Maintenance - I

Lecture 2 - Relational Development and Maintenance - II

Lecture 3 - Relational Development and Maintenance - III

Lecture 4 - Relational Development and Maintenance - IV

Lecture 5 - Fundamental Interpersonal Relationship Orientation - Behavior - I

Lecture 6 - Fundamental Interpersonal Relationship Orientation - Behavior - II

Lecture 7 - Forgiveness - I

Lecture 8 - Forgiveness - II

Lecture 9 - Happiness at Workplace - I

Lecture 10 - Happiness at Workplace - II

Lecture 11 - Trust - I

Lecture 12 - Trust - II

Lecture 13 - Employee Recognition - I

Lecture 14 - Employee Recognition - II

Lecture 15 - Psychological Ownership - I

Lecture 16 - Psychological Ownership - II

Lecture 17 - Managerial Effectiveness - I

Lecture 18 - Managerial Effectiveness - II

Lecture 19 - Managerial Effectiveness - III

Lecture 20 - Servant Leadership

Lecture 21 - Moods and Emotions - I

Lecture 22 - Moods and Emotions - II

Lecture 23 - Moods and Emotions - III

Lecture 24 - Optimism - I

Lecture 25 - Optimism - II

Lecture 26 - Career Engagement - I

Lecture 27 - Career Engagement - II

Lecture 28 - Adaptability - I

Lecture 29 - Adaptability - II

Lecture 30 - Spiritual Intelligence - I

Lecture 31 - Spiritual Intelligence - II

Lecture 32 - Spiritual Intelligence - III

Lecture 33 - Insult and Interpersonal Dynamics

Lecture 34 - Work motivation - I

Lecture 35 - Work motivation - II

Lecture 36 - Employee Involvement

Lecture 37 - Humour at Workplace

Lecture 38 - Preparedness and performance

Lecture 39 - Maturity at Workplace

Lecture 40 - Hope

Lecture 41 - Ego Defense Mechanism and Group Dynamics

Lecture 42 - Dyadic Relationship at Workplace

Lecture 43 - Emotional Negotiation - I

Lecture 44 - Emotional Negotiation - II

Lecture 45 - Anger, Anxiety and Depression - I

Lecture 46 - Anger, Anxiety and Depression - II

Lecture 47 - Expectations

Lecture 48 - Thinking Process

Lecture 49 - Managerial Flexibility

Lecture 50 - Reinstating Relationships

Lecture 51 - Buddhist approach to MSID - I

Lecture 52 - Buddhist approach to MSID - II

Lecture 53 - Panchatantra and Interpersonal Dynamics

Lecture 54 - Emotion, Nutrition and Brain

Lecture 55 - Bhagwat Gita and Interpersonal Dynamics

Lecture 56 - Flexibility, Quality of Life and Work family Enrichment - I

Lecture 57 - Flexibility, Quality of Life and Work family Enrichment - II

Lecture 58 - Employee Loyalty - I

Lecture 59 - Employee Loyalty - II

Lecture 60 - Chanakya and Interpersonal Dynamics

NPTEL : NOC:Financial Management for Managers (Management)

Co-ordinators : Prof. Anil K. Sharma

Lecture 1 - Fundamentals of Financial Management - Part I

Lecture 2 - Fundamentals of Financial Management - Part II

Lecture 3 - Fundamentals of Financial Management - Part III

Lecture 4 - Fundamentals of Financial Management - Part IV

Lecture 5 - Fundamentals of Financial Management - Part V

Lecture 6 - Financial Planning and Forecasting - Part I

Lecture 7 - Financial Planning and Forecasting - Part II

Lecture 8 - Financial Planning and Forecasting - Part III

Lecture 9 - Financial Planning and Forecasting - Part IV

Lecture 10 - Time Value of Money - Part I

Lecture 11 - Time Value of Money - Part II

Lecture 12 - Time Value of Money - Part III

Lecture 13 - Time Value of Money - Part IV

Lecture 14 - Time Value of Money - Part V

Lecture 15 - Time Value of Money - Part VI

Lecture 16 - Time Value of Money - Part VII

Lecture 17 - Capital Budgeting - Part I

Lecture 18 - Capital Budgeting - Part II

Lecture 19 - Capital Budgeting - Part III

Lecture 20 - Capital Budgeting - Part IV

Lecture 21 - Capital Budgeting - Part V

Lecture 22 - Capital Budgeting - Part VI

Lecture 23 - Capital Budgeting - Part VII

Lecture 24 - Capital Budgeting - Part VIII

Lecture 25 - Capital Budgeting - Part IX

Lecture 26 - Capital Budgeting - Part X

Lecture 27 - Capital Budgeting - Part XI

Lecture 28 - Capital Budgeting - Part XII

Lecture 29 - Estimation of Project Cash Flows - Part I

Lecture 30 - Estimation of Project Cash Flows - Part II

Lecture 31 - Estimation of Project Cash Flows - Part III

Lecture 32 - Estimation of Project Cash Flows - Part IV

Lecture 33 - Estimation of Project Cash Flows - Part V

Lecture 34 - Estimation of Project Cash Flows - Part VI

Lecture 35 - Estimation of Project Cash Flows - Part VII

Lecture 36 - Estimation of Project Cash Flows - Part VIII

Lecture 37 - Estimation of Project Cash Flows - Part IX

Lecture 38 - Estimation of Project Cash Flows - Part X

Lecture 39 - Estimation of Project Cash Flows - Part XI

Lecture 40 - Risk Analysis in Capital Budgeting - Part I

Lecture 41 - Risk Analysis in Capital Budgeting - Part II

Lecture 42 - Risk Analysis in Capital Budgeting - Part III

Lecture 43 - Risk Analysis in Capital Budgeting - Part IV

Lecture 44 - Risk Analysis in Capital Budgeting - Part V

Lecture 45 - Risk Analysis in Capital Budgeting - Part VI

Lecture 46 - Risk Analysis in Capital Budgeting - Part VII

Lecture 47 - Cost of Capital - Part I

Lecture 48 - Cost of Capital - Part II

Lecture 49 - Cost of Capital - Part III

Lecture 50 - Cost of Capital - Part IV

Lecture 51 - Cost of Capital - Part V

Lecture 52 - Cost of Capital - Part VI

Lecture 53 - Cost of Capital - Part VII

Lecture 54 - Capital Structure - Part I

Lecture 55 - Capital Structure - Part II

Lecture 56 - Capital Structure - Part III

Lecture 57 - Capital Structure - Part IV

Lecture 58 - Capital Structure - Part V

Lecture 59 - Dividend Decisions - Part I

Lecture 60 - Dividend Decisions - Part II

NPTEL : NOC:International Business (Management)

Co-ordinators : Dr. Jogendra Kumar Nayak

Lecture 1 - Introduction to International Business

Lecture 2 - Importance, Nature and Scope

Lecture 3 - Modes of Entry - I

Lecture 4 - Modes of Entry - II

Lecture 5 - Challenges and Approaches, EPRG Framework

Lecture 6 - New Economic Policy, LPG Framework

Lecture 7 - Patterns of International Trade, Trade Theories, Export-Import

Lecture 8 - International Trade Theories - I

Lecture 9 - International Trade Theories - II

Lecture 10 - Leonteiff's Paradox, PLC Theory, National Competitive Advantage and Factor Mobility Theory

Lecture 11 - Trade and Factor Mobility, Bangladesh Textile Case

Lecture 12 - Multiplier Effect, Types and its Characteristics

Lecture 13 - Multiplier Effect with Numericals

Lecture 14 - Commercial/Trade Policy, Business Cycle, Tariff Barriers, Subsidies

Lecture 15 - Non-Tariff Barriers, India's Foreign Trade Policy, Make in India, Trade Protectionism

Lecture 16 - International Business Environment, PESTEL Analysis, Culture and Business

Lecture 17 - Language, Religion, Behavioural Practices, Communication

Lecture 18 - Political Environment, Beliefs, Types of Democracy

Lecture 19 - Political Systems, Beliefs, Risks

Lecture 20 - Legal Environment, Legal Protection, Legal Systems, IPR

Lecture 21 - Economic Factors, Economic Environment

Lecture 22 - Components of an Economy, Inflation, Unemployment, Debt

Lecture 23 - Income Distribution, Poverty, Productivity

Lecture 24 - BOP, Components, Economic Freedom, Economic Transitions

Lecture 25 - Technology and Its Impact, IT, Technology Transfer

Lecture 26 - Hofstede's Cultural Dimensions

Lecture 27 - BOP, Balance of Trade

Lecture 28 - BOP, Capital Account, Financial Account, Numericals, Reserve Account, SDR

Lecture 29 - Foreign Exchange, Foreign Exchange Market, Features, Participants

Lecture 30 - Functions of Foreign Exchange Market, Interest Rate, Relative Inflation Rate

Lecture 31 - Factors Affecting Exchange Rate, Current Account Deficit, Government Debt, Exchange Rate

Lecture 32 - Exchange Rate Systems, Currency Convertibility, Types

Lecture 33 - Currency Convertibility, Theories of Exchange Rate, Purchasing Power Parity

Lecture 34 - PPP Theory, Interest Rate Parity Theory, Fischer Effect, Numericals

Lecture 35 - Foreign Exchange Exposure, Type Of Exposure

Lecture 36 - Exposure Management Theory, Hedging, FERA and FEMA, RBI and its Power

Lecture 37 - Financial Market, Importance and its Function, Financial Intermediaries, Money Market

Lecture 38 - International Money Market, Euro Credit, Capital Market, Features, Component, ADR and GDR

Lecture 39 - Trade Promotion, Foreign Trade Regulations in India, Exporting, Stages, Difficulties

Lecture 40 - Export-Import Plan, Foreign Trade Promotion Measures, Schemes, Trade Regulations

Lecture 41 - Trade Promotions, Institution Involved in Export Finance, Foreign Trade Organisations

Lecture 42 - Foreign Trade Organizations, PNB Scam

Lecture 43 - Bretton Woods Agreement, IMF, Its Role and Function

Lecture 44 - World Bank

Lecture 45 - WTO, GATT, Origin and Functions, MFN Principles, Agreements

Lecture 46 - Uruguay Round Agreement on Agriculture, GATS

Lecture 47 - TRIMS, TRIPS, Patents, Copyrights

Lecture 48 - Multifiber Agreement, Agreement on Textiles and Clothing, UNCTAD, GSP, GSTP

Lecture 49 - Regional Economic Integration

Lecture 50 - Regionalism, Multilateralism, NAFTA, EU, EURO

Lecture 51 - International Marketing, Segmentation, Positioning

Lecture 52 - Product Strategies, Product Adaptations, Pricing, Communication, Logistics

Lecture 53 - Global Firms Success Strategies

Lecture 54 - Marketing Orientations, Market Research

Lecture 55 - Estimating Market Demand, Pitfalls in Research

Lecture 56 - Survey Methods For International Research

Lecture 57 - Supply Chain Management, Global Production and Distribution, Manufacturing Strategy

Lecture 58 - Global Sourcing, Distribution System, Role Of Interest

Lecture 59 - International HRM

Lecture 60 - Recruitment and Training in International HRM

NPTEL : NOC:Path Integral Methods in Physics and Finance (Management)

Co-ordinators : Prof. J. P. Singh

Lecture 1 - Setting The Scene

Lecture 2 - Introduction to the Path Integral

Lecture 3 - Probability Fundamentals, Generating Functions

Lecture 4 - Generating Functions, Gaussian Distribution

Lecture 5 - Gaussian Distribution, Gaussian Integration

Lecture 6 - Gaussian Integration, Central Limit Theorem

Lecture 7 - Elementary Theory of Stochastic Processes

Lecture 8 - Evolutionary Equations of Stochastic Processes

Lecture 9 - Brownian Motion

Lecture 10 - Diffusion Equation

Lecture 11 - Diffusion Equation Path Integral - 1

Lecture 12 - Diffusion Equation Path Integral - 2, Autocorrelators

Lecture 13 - Schrodinger Equation Path Integral, Langevin Equation

Lecture 14 - Langevin- Equation

Lecture 15 - Statistical Formalism of Path Integral

Lecture 16 - Langevin Equation Path Integral - 1

Lecture 17 - Langevin Equation Path Integral - 2

Lecture 18 - Langevin and Fokker Planck Equation; CLT Example

Lecture 19 - Basic Machinery of Quantum Mechanics

Lecture 20 - Quantum Mechanical Path Integral

Lecture 21 - Harmonic Oscillator Path Integral

Lecture 22 - Free Particle Path Integral

Lecture 23 - Equivalence of Schrodinger and Path Integral Formalisms, Matrix Elements of Operators

Lecture 24 - Ground State Expectation Values

Lecture 25 - Vacuum Persistence Amplitude

Lecture 26 - Harmonic Oscillator 2-Point Problem

Lecture 27 - Relativistic Path Integral

Lecture 28 - Interpretation of Path Integral

Lecture 29 - Need For Quantum Field Theory

Lecture 30 - Quantum Field Theory, Introduction

Lecture 31 - Field Theory Basics

Lecture 32 - Field Theory In Zero Dimensions - 1

Lecture 33 - Field Theory In Zero Dimensions - 2

Lecture 34 - Schwinger Dyson Eqs, Convergence Of Integrals

Lecture 35 - Sde, Feynman Diagrams

Lecture 36 - Feynman Diagrams and Sde

Lecture 37 - Effective Action, Renormalization

Lecture 38 - Renormalization In 0-d

Lecture 39 - Field Theory In 1-D - 1

Lecture 40 - Field Theory in 1-d - 2

Lecture 41 - Euclidean Field Theory - 1

Lecture 42 - Euclidean Field Theory - 2

Lecture 43 - Euclidean Field Theory - 3

Lecture 44 - Field Theory In Minkowski Space

Lecture 45 - Propagator In Minkowski Space

Lecture 46 - Propagator Properties In Minkowski Space

Lecture 47 - Interactive Field Theory In Minkowski Space

Lecture 48 - Causality, Sde In Minkowski Space

Lecture 49 - Sde For Field Theory In Minkowski Space

Lecture 50 - Spinor Fields Path Integral

Lecture 51 - Gauge Fields - 1

Lecture 52 - Gauge Fields - 2

Lecture 53 - Ito Equation, Stock Price Modelling

Lecture 54 - Financial Derivatives

Lecture 55 - Properties Of Options

Lecture 56 - Pricing Of Options: Binomial Model - 1

Lecture 57 - Pricing Of Options: Binomial Model - 2

Lecture 58 - Black Scholes Model

Lecture 59 - Path Integral Solution Of Black Scholes Pde

Lecture 60 - Misc Financial Applications Of Path Integrals

NPTEL : NOC:Introduction to Marketing Essentials (Management)

Co-ordinators : Prof. Zillur Rahman

Lecture 1 - Creating Customer Relationships and Value through Marketing - 1

Lecture 2 - Creating Customer Relationships and Value through Marketing - 2

Lecture 3 - The new realities of marketing

Lecture 4 - Developing Successful Marketing and Organizational Strategies - 1

Lecture 5 - Developing Successful Marketing and Organizational Strategies - 2

Lecture 6 - Organizing and managing marketing department

Lecture 7 - Developing marketing strategy

Lecture 8 - Understanding the Marketing Environment, Ethical Behavior, and Social Responsibility - 1

Lecture 9 - Understanding the Marketing Environment, Ethical Behavior, and Social Responsibility - 2

Lecture 10 - Understanding Consumer Behavior - 1

Lecture 11 - Understanding Consumer Behavior - 2

Lecture 12 - Understanding Consumer Behavior - 3

Lecture 13 - Understanding Organizations as Customers - 1

Lecture 14 - Understanding Organizations as Customers - 2

Lecture 15 - Understanding Organizations as Customers - 3

Lecture 16 - Understanding and Reaching Global Consumers and Markets - 1

Lecture 17 - Understanding and Reaching Global Consumers and Markets - 2

Lecture 18 - Understanding and Reaching Global Consumers and Markets - 3

Lecture 19 - Marketing Research: From Customer Insights to Actions - 1

Lecture 20 - Marketing Research: From Customer Insights to Actions - 2

Lecture 21 - Market Segmentation, Targeting, and Positioning - 1

Lecture 22 - Market Segmentation, Targeting, and Positioning - 2

Lecture 23 - Market Segmentation, Targeting, and Positioning - 3

Lecture 24 - Crafting customer value proposition, sustainable competitive advantage and positioning - 1

Lecture 25 - Crafting customer value proposition, sustainable competitive advantage and positioning - 2

Lecture 26 - Developing New Products and Services - 1

Lecture 27 - Developing New Products and Services - 2

Lecture 28 - Developing New Products and Services - 3

Lecture 29 - Developing New Products and Services - 4

Lecture 30 - Developing New Products and Services - 5

Lecture 31 - Developing New Products and Services - 6

Lecture 32 - Developing New Products and Services - 7

Lecture 33 - Managing Successful Products, Services, and Brands - 1

Lecture 34 - Managing Successful Products, Services, and Brands - 2

Lecture 35 - Managing Successful Products, Services, and Brands - 3

Lecture 36 - Managing Successful Products, Services, and Brands - 4

Lecture 37 - Managing Successful Products, Services, and Brands - 5

Lecture 38 - Pricing Products and Services - 1

Lecture 39 - Pricing Products and Services - 2

Lecture 40 - Pricing Products and Services - 3

Lecture 41 - Managing Marketing Channels and Supply Chains - 1

Lecture 42 - Managing Marketing Channels and Supply Chains - 2

Lecture 43 - Retailing and Wholesaling - 1

Lecture 44 - Retailing and Wholesaling - 2

Lecture 45 - Retailing and Wholesaling - 3

Lecture 46 - Integrated Marketing Communications and Direct Marketing - 1

Lecture 47 - Integrated Marketing Communications and Direct Marketing - 2

Lecture 48 - Advertising, Sales Promotion, and Public Relations - 1

Lecture 49 - Advertising, Sales Promotion, and Public Relations - 2

Lecture 50 - Using Social Media to Connect with Consumers - 1

Lecture 51 - Using Social Media to Connect with Consumers - 2

Lecture 52 - Personal Selling and Sales Management - 1

Lecture 53 - Personal Selling and Sales Management - 2

Lecture 54 - Implementing Interactive and Multichannel Marketing - 1

Lecture 55 - Implementing Interactive and Multichannel Marketing - 2

Lecture 56 - Addressing Competition And Driving Growth - 1

Lecture 57 - Addressing Competition And Driving Growth - 2

Lecture 58 - Building Customer Loyalty - 1

Lecture 59 - Building Customer Loyalty - 2

Lecture 60 - Socially Responsible Marketing

NPTEL : NOC:Principles of Management (2021) (Management)

Co-ordinators : Prof. Usha Lenka

Lecture 1 - Introduction to Management - I

Lecture 2 - Introduction to Management - II

Lecture 3 - Introduction to Management - III

Lecture 4 - Introduction to Management - IV

Lecture 5 - Evolution of Management - I

Lecture 6 - Evolution of Management - II

Lecture 7 - Evolution of Management - III

Lecture 8 - Evolution of Management - IV

Lecture 9 - Planning - I

Lecture 10 - Planning - II

Lecture 11 - Planning - III

Lecture 12 - Planning - IV

Lecture 13 - Planning - V

Lecture 14 - Forecasting and Premising - I

Lecture 15 - Forecasting and Premising - II

Lecture 16 - Forecasting and Premising - III

Lecture 17 - Forecasting and Premising - IV

Lecture 18 - Decision Making - I

Lecture 19 - Decision Making - II

Lecture 20 - Decision Making - III

Lecture 21 - Decision Making - IV

Lecture 22 - Decision Making - V

Lecture 23 - Management by Objectives - I

Lecture 24 - Management by Objectives - II

Lecture 25 - Management by Objectives - III

Lecture 26 - Styles of Management - I

Lecture 27 - Styles of Management - II

Lecture 28 - Styles of Management - III

Lecture 29 - Organizing and Directing - I

Lecture 30 - Organizing and Directing - II

Lecture 31 - Organizing and Directing - III

Lecture 32 - Organizing and Directing - IV

Lecture 33 - Organizing and Directing - V

Lecture 34 - Staffing and Coordination - I

Lecture 35 - Staffing and Coordination - II

Lecture 36 - Staffing and Coordination - III

Lecture 37 - Staffing and Coordination - IV

Lecture 38 - Staffing and Coordination - V

Lecture 39 - Staffing and Coordination - VI

Lecture 40 - Staffing and Coordination - VII

Lecture 41 - Staffing and Coordination - VIII

Lecture 42 - Career Development Strategy - I

Lecture 43 - Career Development Strategy - II

Lecture 44 - Career Development Strategy - III

Lecture 45 - Career Development Strategy - IV

Lecture 46 - Career Development Strategy - V

Lecture 47 - Leadership Styles of Managers - I

Lecture 48 - Leadership Styles of Managers - II

Lecture 49 - Leadership Styles of Managers - III

Lecture 50 - Leadership Styles of Managers - IV

Lecture 51 - Organizational Communication - I

Lecture 52 - Organizational Communication - II

Lecture 53 - Organizational Communication - III

Lecture 54 - Organizational Communication - IV

Lecture 55 - Organizational Communication - V

Lecture 56 - Change Management - I

Lecture 57 - Change Management - II

Lecture 58 - Change Management - III

Lecture 59 - Change Management - IV

Lecture 60 - Change Management - V

Lecture 61 - Change Management - VI

Lecture 62 - Change Management - VII

NPTEL : NOC:Organization Theory-Structure and Design (2021) (Management)

Co-ordinators : Prof. Zillur Rahman

Lecture 1 - An Overview - Part 1

Lecture 2 - An Overview - Part 2

Lecture 3 - The Evolution of Organization Theory - Part 1

Lecture 4 - The Evolution of Organization Theory - Part 2

Lecture 5 - Organizational Effectiveness - Part 1

Lecture 6 - Organizational Effectiveness - Part 2

Lecture 7 - Organizational Effectiveness - Part 3

Lecture 8 - Dimensions of Organization Structure - Part 1

Lecture 9 - Dimensions of Organization Structure - Part 2

Lecture 10 - Dimensions of Organization Structure - Part 3

Lecture 11 - Strategy - Part 1

Lecture 12 - Strategy - Part 2

Lecture 13 - Strategy - Part 3

Lecture 14 - Organization Size - Part 1

Lecture 15 - Organization Size - Part 2

Lecture 16 - Technology - Part 1

Lecture 17 - Technology - Part 2

Lecture 18 - Environment - Part 1

Lecture 19 - Environment - Part 2

Lecture 20 - Environment - Part 3

Lecture 21 - Power Control - Part 1

Lecture 22 - Power Control - Part 2

Lecture 23 - Power Control - Part 3

Lecture 24 - Organizational Design Options - Part 1

Lecture 25 - Organizational Design Options - Part 2

Lecture 26 - Organizational Design Options - Part 3

Lecture 27 - Bureaucracy - Part 1

Lecture 28 - Bureaucracy - Part 2

Lecture 29 - Adhocracy - Part 1

Lecture 30 - Adhocracy - Part 2

Lecture 31 - Managing the Environment - Part 1

Lecture 32 - Managing the Environment - Part 2

Lecture 33 - Managing Organizational Change - Part 1

Lecture 34 - Managing Organizational Change - Part 2

Lecture 35 - Managing Organizational Conflict - Part 1

Lecture 36 - Managing Organizational Conflict - Part 2

Lecture 37 - Managing Organizational Culture - Part 1

Lecture 38 - Managing Organizational Culture - Part 2

Lecture 39 - Managing Organizational Evolution - Part 1

Lecture 40 - Managing Organizational Evolution - Part 2

NPTEL : NOC:Talent Acquisition and Management (Management)

Co-ordinators : Prof. S. Rangnekar

Lecture 1 - Introduction to Talent Acquisition and Management - I

Lecture 2 - Introduction to talent Acquisition and Management - II

Lecture 3 - Introduction to Talent Acquisition and Management - III

Lecture 4 - Introduction to Talent Acquisition and Management - IV

Lecture 5 - Nurturing the Leaders of Tomorrow

Lecture 6 - Talent Acquisition

Lecture 7 - Talent Acquisition Practices - Infosys

Lecture 8 - Talent Acquisition Practices - IBM

Lecture 9 - Talent Acquisition and Attracting Talent at Fedex

Lecture 10 - Talent Acquisition and Attracting Talent at Google

Lecture 11 - Introduction of Psychometric Test

Lecture 12 - Six principles of Talent Management

Lecture 13 - Employee Engagement

Lecture 14 - Employer Brand

Lecture 15 - Employee Retention

Lecture 16 - The Zinger Model of Employee Engagement

Lecture 17 - Integrating Competencies into Talent Process

Lecture 18 - Integrated Talent Management

Lecture 19 - Global Talent Management - Drivers-I

Lecture 20 - Global Talent Management - Drivers-II

Lecture 21 - Global Leadership Competencies - I

Lecture 22 - Global Leadership Competencies - II

Lecture 23 - Global Leadership Competencies - III

Lecture 24 - Global Leadership Competencies - IV

Lecture 25 - Talent Analytics

Lecture 26 - Talent Management Challenges - In the near Future

Lecture 27 - Talent Development

Lecture 28 - Talent Enhancement

Lecture 29 - Talent Mobility

Lecture 30 - Rewards Programs in Talent Management

Lecture 31 - Integrated Talent Management Models - I

Lecture 32 - Integrated Talent Management Models - II

Lecture 33 - Rewards Strategy for Talent Management - I

Lecture 34 - Rewards Strategy for Talent Management - II

Lecture 35 - Coaching and Development

Lecture 36 - Talent Development - I

Lecture 37 - Talent Development - II

Lecture 38 - Talent Development - III

Lecture 39 - Meta Analysis and Talent Analytics - I

Lecture 40 - Meta Analysis and Talent Analytics - II

Lecture 41 - Organization Culture - I

Lecture 42 - Organization Culture - II

Lecture 43 - Organization Culture - III

Lecture 44 - Coaching with Compassion - I

Lecture 45 - Coaching with Compassion - II

Lecture 46 - Talent Success Drivers

Lecture 47 - Talent Acquisition Strategy - I

Lecture 48 - Talent Acquisition Strategy - II

Lecture 49 - Talent Management at PepsiCo - I

Lecture 50 - Talent Management at PepsiCo - II

Lecture 51 - Automated Screening - Talent Analytics

Lecture 52 - Big Data - Talent Analytics

Lecture 53 - Management in the New Economy

Lecture 54 - Employment to Consultation

Lecture 55 - Embedding and Sustaining Talent Power

Lecture 56 - Talent Enhancement and Drivers of Success

Lecture 57 - Building Sustainable Talent through Talent Management

Lecture 58 - Talent Powered Organization

Lecture 59 - Critical issues in Talent Management

Lecture 60 - Feeling and Sentiments Analysis

NPTEL : NOC:Econometric Modelling (Management)

Co-ordinators : Prof. Sujata Kar

Lecture 1 - An Overview

Lecture 2 - Formulation of Econometric Modelling

Lecture 3 - Review of Basic Concepts - I

Lecture 4 - Review of Basic Concepts - II

Lecture 5 - Types of Data

Lecture 6 - Simple Regression - I

Lecture 7 - Simple Regression - II

Lecture 8 - Assumptions of Classical Linear Regression

Lecture 9 - Properties of OLS Estimators

Lecture 10 - Hypothesis Testing

Lecture 11 - Multiple Regression - I

Lecture 12 - Multiple Regression - II

Lecture 13 - Multiple Regression - III

Lecture 14 - Problem of Multicollinearity

Lecture 15 - Omitted Variables and Parameter Stability - I

Lecture 16 - Omitted Variables and Parameter Stability - II

Lecture 17 - Problem of Heteroscedasticity - I

Lecture 18 - Problem of Heteroscedasticity - II

Lecture 19 - T- Test

Lecture 20 - Wald Test

Lecture 21 - F-test - I

Lecture 22 - F-Test - II

Lecture 23 - Chow Test

Lecture 24 - Problem of Serial Correlation - I

Lecture 25 - Problem of Serial Correlation - II

Lecture 26 - AR, MA and ARMA Processes - I

Lecture 27 - AR, MA and ARMA Processes - II

Lecture 28 - Modelling Trend and Seasonal Variations - I

Lecture 29 - Modelling Trend and Seasonal Variations - II

Lecture 30 - Spline function and Categorical Variables

Lecture 31 - Linear Probability Model

Lecture 32 - Probit and Logit Models

Lecture 33 - Tobit and Multinomial Logit Models

Lecture 34 - Panel Data Methods

Lecture 35 - Simultaneous Equations System - I

Lecture 36 - Simultaneous Equations System - II

Lecture 37 - Introduction to VARs

Lecture 38 - Stationarity and Unit Root Testing - I

Lecture 39 - Stationarity and Unit Root Testing - II

Lecture 40 - Basics of Cointegeration

NPTEL : NOC:Security Analysis and Portfolio Management (Management)

Co-ordinators : Prof. J. P. Singh

Lecture 1 - Overview and Introduction

Lecture 2 - Introduction (Debt and Equity)

Lecture 3 - Introduction (Derivatives I)

Lecture 4 - Introduction (Derivatives II)

Lecture 5 - Financial Risk

Lecture 6 - Risk and Arbitrage - I

Lecture 7 - Risk and Arbitrage - II

Lecture 8 - Arbitrage Theorems, EMH, Money Markets

Lecture 9 - Money Market Instruments, Bond Terminology

Lecture 10 - Intrinsic Value of Bonds

Lecture 11 - Yield to Maturity - I

Lecture 12 - Yield to Maturity - II

Lecture 13 - Yield to Maturity - III

Lecture 14 - Yield to Maturity - IV

Lecture 15 - Yield to Maturity - V

Lecture 16 - Holding Period Yield etc.

Lecture 17 - Clean and Dirty Price, Interest Rate Risk - I

Lecture 18 - Interest Rate Risk - II

Lecture 19 - Interest Rate Risk - III

Lecture 20 - Immunization

Lecture 21 - Immunization Example

Lecture 22 - Price Sensitivities, Key Rates

Lecture 23 - Term Structure of Interest Rates

Lecture 24 - Yield Spreads, Equity Valuation - I

Lecture 25 - Equity Valuation - II

Lecture 26 - Equity Valuation - III

Lecture 27 - Equity Valuation - IV

Lecture 28 - Equity Valuation - V

Lecture 29 - Equity Valuation - VI

Lecture 30 - Equity Valuation - VII

Lecture 31 - Equity Valuation - VIII

Lecture 32 - Equity Valuation - IX

Lecture 33 - Fundamental Analysis

Lecture 34 - Balance Sheet Analysis - I

Lecture 35 - Balance Sheet Analysis - II

Lecture 36 - Balance Sheet Analysis - III

Lecture 37 - Balance Sheet Analysis - IV

Lecture 38 - Balance Sheet Analysis - V

Lecture 39 - Balance Sheet Analysis - VI

Lecture 40 - Income Statement, Cash Flow Statement, Ratio Analysis

Lecture 41 - Mean Variance Portfolio Optimization - I

Lecture 42 - Mean Variance Portfolio Optimization - II

Lecture 43 - Mean Variance Portfolio Optimization - III

Lecture 44 - Mean Variance Portfolio Optimization - IV

Lecture 45 - Mean Variance Portfolio Optimization - V

Lecture 46 - Mean Variance Portfolio Optimization - VI

Lecture 47 - Mean Variance Portfolio Optimization - VII

Lecture 48 - Mean Variance Portfolio Optimization - VIII

Lecture 49 - Single Index Model - I

Lecture 50 - Single Index Model - II

Lecture 51 - Capital Asset Pricing Model - I

Lecture 52 - Capital Asset Pricing Model - II

Lecture 53 - Capital Asset Pricing Model - III

Lecture 54 - Arbitrage Pricing Model - I

Lecture 55 - Arbitrage Pricing Model - II

Lecture 56 - Arbitrage Pricing Model - III, Portfolio Performance Evaluation

Lecture 57 - Efficient Market Hypothesis - I

Lecture 58 - Efficient Market Hypothesis - II, Financial Derivatives - I

Lecture 59 - Financial Derivatives - II

Lecture 60 - Financial Derivatives - III

NPTEL : NOC:Decision Making with Spreadsheet (Management)

Co-ordinators : Prof. Ramesh Anbanandam

Lecture 1 - Introduction

Lecture 2 - Cost, Revenue, and Profit Models, Break Even Analysis

Lecture 3 - Linear Programming Problem: Formulation and Assumptions

Lecture 4 - Linear Programming Problem: Graphical Solution Method

Lecture 5 - Graphical Calculator and Excel Solver for solving LPP

Lecture 6 - Sensitivity Analysis - 1

Lecture 7 - Sensitivity Analysis - 2

Lecture 8 - Sensitivity Analysis - 3

Lecture 9 - LPP Applications in Marketing

Lecture 10 - LPP Applications in Finance

Lecture 11 - LPP Applications in Operations - 1

Lecture 12 - LPP Applications in Operations - 2

Lecture 13 - LPP Applications in Operations - 3

Lecture 14 - Advanced LP Applications - Data Envelopment Analysis

Lecture 15 - Game Theory - 1

Lecture 16 - Game Theory - 2

Lecture 17 - Portfolio Management

Lecture 18 - Revenue Management

Lecture 19 - Distribution and Network Problems: Transportation Problem

Lecture 20 - Assignment and Shortest Path Problem

Lecture 21 - Maximal Flow, Production and Inventory Application, Scheduling and Assignment Problems

Lecture 22 - Integer Linear Programming

Lecture 23 - Integer Programming Distribution Problem

Lecture 24 - Nonlinear Optimization Models - I

Lecture 25 - Nonlinear Optimization Models - II

Lecture 26 - Nonlinear Optimization Models - III

Lecture 27 - Nonlinear Optimization Models - IV

Lecture 28 - Nonlinear Optimization Models - V

Lecture 29 - Project Scheduling: PERT/CPM - I

Lecture 30 - Project Scheduling: PERT/CPM - II

Lecture 31 - Project Scheduling For Uncertain Activity Duration: PERT/CPM - III

Lecture 32 - Project Scheduling: PERT/CPM - IV

Lecture 33 - Inventory Models: Economic Order Quantity (EOQ) Model - I

Lecture 34 - Inventory Models: Economic Order Quantity (EOQ) Model - Iâ€‹I

Lecture 35 - Economic Production Lot Size Model

Lecture 36 - Inventory Model with Planned Shortages

Lecture 37 - Inventory Model - III

Lecture 38 - Single-period Inventory model with Probabilistic demand

Lecture 39 - Multi-period Order-Quantity, Reorder Point Model with Probabilistic Demand

Lecture 40 - Periodic Review Model (P-type) with Probabilistic Demand

Lecture 41 - Financial risks associated with the development of a new product - I

Lecture 42 - Financial risks associated with the development of a new product - II

Lecture 43 - Inventory Simulation

Lecture 44 - Simulation - III

Lecture 45 - Simulation - IV

Lecture 46 - Decision Analysis - I

Lecture 47 - Decision Analysis - II

Lecture 48 - Decision Analysis - III

Lecture 49 - Decision Analysis - IV

Lecture 50 - Decision Analysis - V

Lecture 51 - Formulation Of Goal Programming - I

Lecture 52 - Formulation Of Goal Programming - II

Lecture 53 - Multicriteria Decisions - I

Lecture 54 - Multicriteria Decisions - II

Lecture 55 - Multicriteria Decisions - III

Lecture 56 - Time Series Analysis and Forecasting - I

Lecture 57 - Time Series Analysis and Forecasting - II

Lecture 58 - Time Series Analysis and Forecasting - III

Lecture 59 - Time Series Analysis and Forecasting - IV

Lecture 60 - Time Series Analysis and Forecasting - V

NPTEL : NOC:Integrated Marketing Communication (Management)

Co-ordinators : Prof. Vinay Sharma

Lecture 1 - Introduction to Integrated Marketing Communication (IMC)

Lecture 2 - Defining Marketing Communication, Marketing and IMC

Lecture 3 - Relationship with Marketing and IMC

Lecture 4 - Effective Marketing Communication

Lecture 5 - Emerging trends in IMC - Part I

Lecture 6 - Emerging Trends in IMC - Part II

Lecture 7 - Design Thinking in IMC - Part I

Lecture 8 - Design Thinking in IMC - Part II

Lecture 9 - Effectiveness of Communication - Part I

Lecture 10 - Effectiveness of Communication - Part II

Lecture 11 - Communication Process and Reflexivity in IMC

Lecture 12 - Role of Consumer Behaviour in IMC

Lecture 13 - Consumer Decision Making Process - Part I

Lecture 14 - Consumer Decision Making Process - Part II

Lecture 15 - Relationship Between Consumer Behaviour and IMC

Lecture 16 - Role of Persuasion in IMC

Lecture 17 - Objectives and Budgeting

Lecture 18 - IMC as a Strategic Tool - Part I

Lecture 19 - IMC as a Strategic Tool - Part II

Lecture 20 - IMC and Branding

Lecture 21 - History of Advertising

Lecture 22 - History of Advertising Indian Perspective

Lecture 23 - Contribution of IMC in Brand Attitude

Lecture 24 - Advertising Agencies

Lecture 25 - Association of Research with IMC

Lecture 26 - Advertising Research Methods

Lecture 27 - IMC Planning - Part I

Lecture 28 - IMC Planning - Part II

Lecture 29 - IMC Planning - Part III

Lecture 30 - Case Studies

Lecture 31 - Advertising and Marketing Mix

Lecture 32 - Advertising and Support Media

Lecture 33 - Media Planning - Part I

Lecture 34 - Media Planning - Part II

Lecture 35 - Introduction to Creativity

Lecture 36 - Creativity Elements - Part I

Lecture 37 - Creativity Elements - Part II

Lecture 38 - Creative Execution in Advertising - Part I

Lecture 39 - Creative Execution in Advertising - Part II

Lecture 40 - Creative Execution in Print Advertising

Lecture 41 - Sales Promotion - Part I

Lecture 42 - Sales Promotion - Part II

Lecture 43 - Sales Promotion - Part III

Lecture 44 - Personal Selling - Part I

Lecture 45 - Personal Selling - Part II

Lecture 46 - Direct Marketing - Part I

Lecture 47 - Direct Marketing - Part II

Lecture 48 - Cause-Related Marketing

Lecture 49 - Public Relations

Lecture 50 - Word-of-Mouth and Corporate Advertising

Lecture 51 - Digital Advertising

Lecture 52 - Search Engine Optimization (SEO)

Lecture 53 - Social Media Advertising - Part I

Lecture 54 - Social Media Advertising - Part II

Lecture 55 - Social Media Advertising - Part III

Lecture 56 - Content Marketing

Lecture 57 - Ethics and Marketing Communications

Lecture 58 - Measuring Effectiveness of IMC - Part I

Lecture 59 - Measuring Effectiveness of IMC - Part II

Lecture 60 - Conclusion

NPTEL : NOC:Leadership and Team Effectiveness (Management)

Co-ordinators : Prof. Santosh Rangnekar

Lecture 1 - Introduction to Leadership and Team Management

Lecture 2 - Leadership Myths and Facts - I

Lecture 3 - Leadership Myths and Facts - II

Lecture 4 - Interactional Framework for Analyzing Leadership

Lecture 5 - Leadership Development: The First 90 Days as a Leader

Lecture 6 - Leader Development: The Action-Observation-Reflection Model

Lecture 7 - Leaderâ€“Member Exchange (LMX) Theory

Lecture 8 - Normative Decision Model

Lecture 9 - Situational Leadership Model

Lecture 10 - Contingency Model and Path-Goal Theory

Lecture 11 - Charismatic and Transformational Leadership

Lecture 12 - Leadership for Tomorrow

Lecture 13 - Leadership Attributes

Lecture 14 - Personality Traits and Leadership

Lecture 15 - Personality Types and Leadership

Lecture 16 - Intelligence and Leadership

Lecture 17 - Emotional Intelligence and Leadership

Lecture 18 - Power and Leadership

Lecture 19 - The Art of Influence in Leadership

Lecture 20 - Leadership and â€œDoing the Right Things

Lecture 21 - Character Based Approach to Leadership

Lecture 22 - Role of Ethics and Values in Organisational Leadership

Lecture 23 - Leadership Behaviour

Lecture 24 - Leadership Pipeline

Lecture 25 - Assessing Leadership Behaviors: Multi-rater feedback instruments

Lecture 26 - The Dark Side of Leadership- Destructive Leadership

Lecture 27 - Managerial Incompetence and Derailment

Lecture 28 - Negotiation and Leadership

Lecture 29 - Leadership in Crisis Situation

Lecture 30 - The Situation and The Environment

Lecture 31 - Culture and Leadership

Lecture 32 - Global Leadership

Lecture 33 - Motivation and Leadership

Lecture 34 - Introduction to Groups and Teams

Lecture 35 - Characteristics of Leader, Follower and Situation

Lecture 36 - Group Dynamics

Lecture 37 - Team Formation

Lecture 38 - Delegation and Empowerment

Lecture 39 - Leading Teams: Enhancing Teamwork within a Group

Lecture 40 - The Leaderâ€™s Role in Team-Based Organizations

Lecture 41 - Leader Actions That Foster Team Effectiveness

Lecture 42 - Offsite Training and Team Development

Lecture 43 - Understanding Team Processes and Team Coaching

Lecture 44 - Team Decision Making and Conflict Management

Lecture 45 - Virtual teams

Lecture 46 - Managing Multicultural Teams

Lecture 47 - Building Great Teams

Lecture 48 - Experiential Learning

Lecture 49 - Action Learning

Lecture 50 - Development Planning: GAPS Analysis

Lecture 51 - Coaching and Mentoring

Lecture 52 - Women in Leadership Roles

Lecture 53 - Building Effective Relationship with Subordinates and Peers

Lecture 54 - Fostering Followers Satisfaction

Lecture 55 - The Art of Communication

Lecture 56 - Setting Goals and Providing Constructive Feedback

Lecture 57 - Enhancing Creativity Problem Solving Skills

Lecture 58 - Building High-Performance Teams: The Rocket Model

Lecture 59 - Building Credibility and Trust

Lecture 60 - Skills for Developing Others

NPTEL : NOC:Product and Brand Management (Management)

Co-ordinators : Prof. Vinay Sharma

Lecture 1 - Introduction to Product and Brand Management

Lecture 2 - Defining Product

Lecture 3 - Terminologies Associated with Product - 1

Lecture 4 - Terminologies Associated with Product - 2

Lecture 5 - Terminologies Associated with Product - 3

Lecture 6 - Terminologies Associated with Product - 4

Lecture 7 - Product Management and Concepts Associated with Product

Lecture 8 - Product Classification

Lecture 9 - Product Differentiation and its Elements - 1

Lecture 10 - Product Differentiation and its Elements - 2

Lecture 11 - Product Positioning - 1

Lecture 12 - Product Positioning - 2

Lecture 13 - Product Life cycle - 1

Lecture 14 - Product Life Cycle - 2

Lecture 15 - Product Life Cycle - 3

Lecture 16 - Saddle Effect and Relationship of Product with Marketing Mix Elements

Lecture 17 - Market and Product Planning - 1

Lecture 18 - Market and Product Planning - 2

Lecture 19 - Product Strategy and Decisions - 1

Lecture 20 - Product Strategy and Decisions - 2

Lecture 21 - Product Decisions

Lecture 22 - Product Portfolio Management

Lecture 23 - Product Category Management

Lecture 24 - Customer Analysis

Lecture 25 - Competitors Analysis

Lecture 26 - Product Pricing

Lecture 27 - Product Pricing and Packaging

Lecture 28 - Product Distribution

Lecture 29 - Design Thinking - 1

Lecture 30 - Design Thinking - 2

Lecture 31 - Design Thinking - 3

Lecture 32 - Product Innovation - 1

Lecture 33 - Product Innovation - 2

Lecture 34 - New Product Development

Lecture 35 - Reflexivity, Insight, and Value Co-Creation

Lecture 36 - Brand Management

Lecture 37 - Defining Brand

Lecture 38 - Strategic Brand Management Process

Lecture 39 - Brand Proposition

Lecture 40 - Customer-based Brand Equity - 1

Lecture 41 - Customer-based Brand Equity - 2

Lecture 42 - Brand Positioning

Lecture 43 - Brand Resonance Model

Lecture 44 - Brand Value Chain - 1

Lecture 45 - Brand Value Chain - 2

Lecture 46 - Brand Equity Elements - 1

Lecture 47 - Brand Equity Elements - 2

Lecture 48 - Designing Marketing Programs to Build Brand Equity

Lecture 49 - Secondary Brand Associations

Lecture 50 - Brand Audit and Research

Lecture 51 - Brand Architecture Strategies And Brand Portfolio

Lecture 52 - Brand Portfolio And Brand Hierarchies

Lecture 53 - Brand Equity: Measuring Outcomes - 1

Lecture 54 - Brand Equity: Measuring Outcomes - 2

Lecture 55 - Brand Extension

Lecture 56 - Brand Experience and Brand Loyalty

Lecture 57 - Brand Continuum and Brand Reinforcement

Lecture 58 - Brand Revitalization and Repositioning

Lecture 59 - Rebranding, Brand Demise and Brand Lifecycle

Lecture 60 - Product and Brand Management - Conclusion

NPTEL : NOC:Quantitative Investment Management (Management)

Co-ordinators : Prof. J P Singh

Lecture 1 - Overview and Introduction, Debt and Equity

Lecture 2 - Hybrids, Derivatives

Lecture 3 - Financial Risk

Lecture 4 - Arbitrage

Lecture 5 - Arbitrage Free Pricing

Lecture 6 - Arbitrage Free Pricing of Bonds

Lecture 7 - Forward Rates, Bond Pricing with Forward Rates

Lecture 8 - Binomial Interest Rate Tree

Lecture 9 - Bond Pricing with Binomial Trees

Lecture 10 - Bond Pricing (Continued...)

Lecture 11 - Valuation of Bonds with Embedded Options

Lecture 12 - Features of Option Embedded Bonds

Lecture 13 - Yield to Maturity

Lecture 14 - Bond Yields and Yield Spreads

Lecture 15 - Z Spread and Option Adjusted Spread (OAS)

Lecture 16 - Yield Spreads

Lecture 17 - Interest Rate Risk

Lecture 18 - Duration and Immunization

Lecture 19 - Immunization and Bond Dynamics

Lecture 20 - Duration: Properties

Lecture 21 - Effective Duration

Lecture 22 - Key Rate Duration

Lecture 23 - One Sided Duration

Lecture 24 - Modeling of Fixed Income Returns

Lecture 25 - Immunizing a Single Liability

Lecture 26 - The Barbell Strategy - 1

Lecture 27 - The Barbell Strategy - 2

Lecture 28 - Yield Shifts and Immunization

Lecture 29 - Fixed Income Portfolio Strategies - 1

Lecture 30 - Fixed Income Portfolio Strategies - 2

Lecture 31 - Fixed Income Portfolio Strategies - 3

Lecture 32 - Floaters, Caps and Floors

Lecture 33 - Derivatives, A Recapitulation

Lecture 34 - Forward Pricing - Investment Assets

Lecture 35 - Forward Pricing - Consumption Assets

Lecture 36 - Introduction to Options

Lecture 37 - Put Call Parity and Arbitrage

Lecture 38 - American Options - 1

Lecture 39 - American Options - 2

Lecture 40 - Option Trading Strategies - 1

Lecture 41 - Option Trading Strategies - 2

Lecture 42 - Option Trading Strategies - 3

Lecture 43 - Option Pricing - Binomial Model - 1

Lecture 44 - Option Pricing - Binomial Model - 2

Lecture 45 - Option Pricing - American Options

Lecture 46 - Random Walks

Lecture 47 - Brownian Motion

Lecture 48 - Stochastic Calculus

Lecture 49 - Stock Price Modelling

Lecture 50 - Black Scholes Model

Lecture 51 - Futures - 1

Lecture 52 - Futures - 2

Lecture 53 - Forward vs Futures Prices

Lecture 54 - Futures Hedging

Lecture 55 - Issues in Futures Hedging

Lecture 56 - Perfect Futures Hedge, Cross Hedge, Tailing the Hedge

Lecture 57 - Stock Index Futures - 1

Lecture 58 - Stock Index Futures - 2

Lecture 59 - Interest Rate Futures - 1

Lecture 60 - Interest Rate Futures - 2

NPTEL : NOC:Strategic Sales Management (Management)

Co-ordinators : Prof. Kalpak Kulkarni, Prof. Sourabh Arora

Lecture 1 - Breaking the Myths and Learning the Basics

Lecture 2 - Evolution and Role of Sales Management

Lecture 3 - Tactical Role of Sales Management

Lecture 4 - Complexities in Sales Management and Characteristics of Modern Selling

Lecture 5 - Difference Between Sales and Marketing

Lecture 6 - Selling in a VUCA World

Lecture 7 - Place of Selling in Overall Marketing Plan

Lecture 8 - Use of Marketing Principles in Creating Strategic Sales Plan

Lecture 9 - Sales Forecasting Methods for Informed Decision-Making

Lecture 10 - Tools to Assess Market While Developing Strategic Sales Plan

Lecture 11 - Models of Sales planning

Lecture 12 - Types of sales man and what makes a good sales man

Lecture 13 - Buying Centre and stages of sales call

Lecture 14 - Transformative Factors And Evolved Selling Process And Theories

Lecture 15 - Miller Heiman approach and virtual framework strategic selling

Lecture 16 - Miller Heiman Approach And Virtual Framework Strategic Selling (Continued...)

Lecture 17 - Buyer Persona and Consumer and B2B Decision Making process

Lecture 18 - Consumer and B2B Decision Making process Selling and Consumer Behavior

Lecture 19 - B2B Decision Making Process and Difference in B2B and B2C Selling

Lecture 20 - Key Account Management and Customer Centric Selling

Lecture 21 - Key Account Management, Customer Centric Selling and CRM Strategies (Continued...)

Lecture 22 - Key Responsibilities of Salespeople

Lecture 23 - Preparing for a Sales Role

Lecture 24 - Preparing for a Sales Role (Continued...)

Lecture 25 - Personal Selling Skills and Motivating Sales Team

Lecture 26 - Personal Selling Skills and Motivating Sales Team (Continued...)

Lecture 27 - Meaning and Role of Sales Intelligence

Lecture 28 - Data for Sales intelligence

Lecture 29 - Ideal Customer Profile

Lecture 30 - Data-Driven Approaches to Selling

Lecture 31 - Social Media for Lead Generation

Lecture 32 - Understanding International Selling

Lecture 33 - Global Sales Dynamics and Sales Force Management

Lecture 34 - Do's and Don'ts of International Selling

Lecture 35 - Role of culture in International Selling

Lecture 36 - Challenges of Selling in International Markets

Lecture 37 - Role of technology management in selling

Lecture 38 - Use of Sales force Automation for Effective Selling

Lecture 39 - Role of AR/VR and AI in Selling

Lecture 40 - Managing a Diversified Sales-force

Lecture 41 - Ethical and Social issues in Selling

NPTEL : NOC:Retail Marketing Strategy (Management)

Co-ordinators : Prof. Sourabh Arora

Lecture 1 - Understanding Retailing from a Strategic Standpoint

Lecture 2 - Why is Retailing so Important: Strategic Perspectives

Lecture 3 - Strategic Standpoint and Evolution of Retailing

Lecture 4 - Evolution of Retailing

Lecture 5 - Value Creation

Lecture 6 - Retailing Theories Role in Supply Chain

Lecture 7 - Retailing Theories and Retailers Role in Supply Chain

Lecture 8 - Retailers Role in Supply Chain and Retail Management Decision Process

Lecture 9 - Retail Management Decision Process (Continued...) and Kahn's Retailing Success Matrix

Lecture 10 - Retail Management Decision Process and Kahn's Retailing Success Matrix

Lecture 11 - Retail Management Decision Process, Kahn's Retailing Success Matrix and Success Factors

Lecture 12 - Kahn's Retailing Success Matrix and Success Factors for Retailing

Lecture 13 - Success Factors for Retailing and View of Consumer Decision Making Processes

Lecture 14 - Success Factors for Retailing and View of Consumer Decision Making Processes (Continued...)

Lecture 15 - Consumer Decision Making Processes (Continued...)

Lecture 16 - Consumer Decision Making Processes (Continued...)

Lecture 17 - Consumer Decision Making Processes (Continued...) and Consumer Motives

Lecture 18 - Tenets of Customer Centric Approach: A Retailers Perspective

Lecture 19 - Private Label Brands

Lecture 20 - Types of Private Label Brands and Introduction to Multi and Omni-Channel Retail

Lecture 21 - Introduction to Multi and Omni-Channel Retail

Lecture 22 - Introduction to Multi and Omni-Channel Retail (Continued...)

Lecture 23 - Introduction to Multi and Omni-Channel Retail (Continued...)

Lecture 24 - Formulating a Successful Retail Strategy

Lecture 25 - Formulating a Successful Retail Strategy

Lecture 26 - Formulating a Successful Retail Strategy (Continued...)

Lecture 27 - Formulating a Successful Retail Strategy (Continued...)

Lecture 28 - Formulating a Successful Retail Strategy (Continued...)

Lecture 29 - Formulating a Successful Retail Strategy (Continued...)

Lecture 30 - Formulating a Successful Retail Strategy (Continued...)

Lecture 31 - Location Decisions

Lecture 32 - Location Decisions

Lecture 33 - Pricing Decisions

Lecture 34 - Merchandise Management and Planning

Lecture 35 - Merchandise Management and Planning (Continued...)

Lecture 36 - Role of HRM in Retailing

Lecture 37 - Role of HRM in Retailing (Continued...)

Lecture 38 - Motivating Employees

Lecture 39 - Showrooming and Webrooming

Lecture 40 - Showrooming and Webrooming

Lecture 41 - Virtual Reality, Augmented Reality and Artificial Intelligence in Retailing

NPTEL : NOC:Business to Business Marketing (B2B) (Management)

Co-ordinators : Prof. Jogendra Nayak

Lecture 1 - Introduction to Business to Business Marketing

Lecture 2 - Classification of Products and Customers in B2B

Lecture 3 - B2B vs B2C Marketing - 1

Lecture 4 - B2B vs B2C Marketing - 2

Lecture 5 - Some Important Concepts and Case Study

Lecture 6 - Value Chain Analysis, Core Competence and Outsourcing

Lecture 7 - Introduction to Organisational Buying Behaviour

Lecture 8 - Howard's Seth Model

Lecture 9 - Seth's Model

Lecture 10 - Webster and Wind Model, Buying Center and Buygrid Framework

Lecture 11 - Purchasing function Goals and Kralijic's Model

Lecture 12 - Purchasing Cycle and Procurement Development Process

Lecture 13 - Strategic Sourcing and Case Study

Lecture 14 - E-Procurement and Supplier Assesment

Lecture 15 - B2B Marketing Strategy Formulation

Lecture 16 - B2B Marketing Strategy Formulation and Balance Scorecard

Lecture 17 - Balance Scorecard, Strategy Maps and Case Study

Lecture 18 - Managing Products in B2B Markets: PLC Approach

Lecture 19 - Managing Products in B2B Markets: TA Life Cycle Approach

Lecture 20 - Managing Services in B2B Markets

Lecture 21 - Introduction to STP

Lecture 22 - Segmentation in B2B Markets

Lecture 23 - Bonama and Shapiro's Nested Approach and Targeting in B2B

Lecture 24 - Target Market Strategies

Lecture 25 - Positioning in B2B Markets

Lecture 26 - B2B Positioning Strategies

Lecture 27 - Business Market Communication: Personal Selling

Lecture 28 - Business Market Communication: Sales Force Management

Lecture 29 - Business Market Communication: Advertising

Lecture 30 - Business Market Communication: Social Media, Trade shows and more

Lecture 31 - Business Market Communication: Promotional Budgeting

Lecture 32 - Demand Forecasting in B2B Markets: Introduction

Lecture 33 - Demand Forecasting in B2B Markets: Qualitative Methods

Lecture 34 - Demand Forecasting in B2B Markets: Quantitative Methods - 1

Lecture 35 - Demand Forecasting in B2B Markets: Quantitative Methods - 2

Lecture 36 - B2B Product Management: New Product Development

Lecture 37 - B2B Product Management: Identifying New Products

Lecture 38 - B2B Product Management: Customer Value, Product Launch and more

Lecture 39 - B2B Product Management: Branding

Lecture 40 - B2B Pricing: Introduction

Lecture 41 - B2B Pricing: Price Setting Process - 1

Lecture 42 - B2B Pricing: Price Setting Process - 2

Lecture 43 - B2B Pricing: Pricing Methods

Lecture 44 - B2B Pricing: Geographical and Value Based Pricing

Lecture 45 - B2B Pricing: Competitive Bidding

Lecture 46 - Introduction to Relationship Management in B2B Markets

Lecture 47 - Types of Relationships in B2B Markets and Customer Profitability

Lecture 48 - Customer Relationship Management

Lecture 49 - Customer Lifetime Value

Lecture 50 - B2B Marketing Research: Introduction

Lecture 51 - B2B Marketing Research: Research Methods

Lecture 52 - Business Marketing Channels: Introduction and its Types

Lecture 53 - Business Marketing Channels: Types of Participants

Lecture 54 - Business Marketing Channels: E-Commerce

Lecture 55 - Supply Chain Management and its Drivers

Lecture 56 - Approaches to SCM and Logistics Management

Lecture 57 - Strategic Business Units (SBU) and BCG Matrix

Lecture 58 - GE Matrix and McKinsey 7S Framework

Lecture 59 - Marketing Techniques Implementation and Control

Lecture 60 - A Comprehensive Case Study

NPTEL : NOC:Designing Work Organization (Management)

Co-ordinators : Prof. Santosh Rangnekar

Lecture 1 - Introduction to Organization Design

Lecture 2 - Evolution of Organization Theory and Design

Lecture 3 - Approaches to Design Based on Different Models

Lecture 4 - Role of Strategy in Organization Design

Lecture 5 - A Framework for Selecting Strategy and Design

Lecture 6 - Assessing Organizational Effectiveness - 1

Lecture 7 - Assessing Organizational Effectiveness - 2

Lecture 8 - Understanding Organizational Structure

Lecture 9 - Dimension of Organization Structure - 1

Lecture 10 - Dimension of Organization Structure - 2

Lecture 11 - Dimension of Organization Structure - 3

Lecture 12 - Interorganizational Relationship - 1

Lecture 13 - Interorganizational Relationship - 2

Lecture 14 - The Impact of External Environment

Lecture 15 - Framework for Response to Environmental Change

Lecture 16 - Organization Resilience and Adaptability

Lecture 17 - Introduction to Organization Decision-making

Lecture 18 - Models of Organizational decision-making

Lecture 19 - Contingency Decision-Making Framework

Lecture 20 - Role of IT in decision making

Lecture 21 - Strategic Role of Change

Lecture 22 - Model of Change Management

Lecture 23 - Managing Technology Change

Lecture 24 - Leading in VUCA World

Lecture 25 - Enhancing Organizational Readiness for Change

Lecture 26 - Designing Organizations for Competitive Success

Lecture 27 - Understanding and Developing Organization culture

Lecture 28 - Managing Culture by Design

Lecture 29 - Learning Organization

Lecture 30 - Ethical values and Social Responsibility

Lecture 31 - Organizational Design Challenges

Lecture 32 - Interdepartmental Conflict in Organization

Lecture 33 - Power and Organization

Lecture 34 - Political Processes in an organization

Lecture 35 - Communications Structure of Organization

Lecture 36 - Leadership in Organization Design

Lecture 37 - The strategic value of Information Technology

Lecture 38 - E-business Organization Design

Lecture 39 - Workplace Technology and Design - 1

Lecture 40 - Workplace Technology and Design - 2

Lecture 41 - Innovation Management and its Principles

Lecture 42 - Models of Organizational Innovation

Lecture 43 - Innovation for Impact

Lecture 44 - Design Thinking for Innovation - 1

Lecture 45 - Design Thinking for Innovation - 2

Lecture 46 - Growth and Organization Life cycle

Lecture 47 - Organization Size and Complexity of Organization

Lecture 48 - Organization Bureaucracy and Control

Lecture 49 - Organization Development and Tools - 1

Lecture 50 - Organization Development and Tools - 2

Lecture 51 - Understanding Global Organizational Design

Lecture 52 - Designing Structure to Fit Global Strategy

Lecture 53 - Building Global Capabilities

Lecture 54 - Sustainable Organization Design

Lecture 55 - Job Crafting

Lecture 56 - Workplace Design for Well-being

Lecture 57 - Organization Building in Context of Employee Engagement

Lecture 58 - The Experience-Centric Organization

Lecture 59 - The Wheel of Experience Centricity

Lecture 60 - Designing Organization for Meaningful Experiences

NPTEL : NOC:Project Management (2024) (Management)

Co-ordinators : Prof. Ramesh Anbanandam

Lecture 1 - Introduction to Project Management - I

Lecture 2 - Introduction to Project Management - II

Lecture 3 - Agile Project Management

Lecture 4 - Project Selection Models

Lecture 5 - Examples of Project Selection Models

Lecture 6 - Project Manager

Lecture 7 - Attributes of Effective Project Manager

Lecture 8 - Managing for Stakeholders

Lecture 9 - Resolving Conflicts

Lecture 10 - Negotiation

Lecture 11 - Project in the Organization structure

Lecture 12 - Human factors and the Project Team

Lecture 13 - Traditional Project Activity Planning

Lecture 14 - Agile Project Planning, Project Charter

Lecture 15 - Coordination through Integration Management

Lecture 16 - Project Feasibility Analysis

Lecture 17 - Estimating Project Budgets

Lecture 18 - Project Risk Management

Lecture 19 - Quantitative Risk Assessment Methodologies

Lecture 20 - Critical Path Method (CPM)

Lecture 21 - Programme Evaluation And Review Technique PERT

Lecture 22 - Risk Analysis with simulation for scheduling

Lecture 23 - Gantt Chart and Scheduling with scrum

Lecture 24 - Crashing a project

Lecture 25 - Resource Loading

Lecture 26 - Resource Levelling

Lecture 27 - Goldratt's critical chain

Lecture 28 - Planning monitoring controlling cycle

Lecture 29 - Earned value analysis

Lecture 30 - Agile tools for tracking project

Lecture 31 - Three types of Project Controlling

Lecture 32 - Control of change scope and scope creep

Lecture 33 - Project Audit

Lecture 34 - Essentials of an audit evaluation

Lecture 35 - When to close a project ?

Lecture 36 - Benefits realization, Case study on the success of Chandrayan 3

Lecture 37 - Software for Project Management

Lecture 38 - Demo on project management software

Lecture 39 - Simulations Software for Project Management

Lecture 40 - Course Summary

NPTEL : NOC:AI in Marketing (Management)

Co-ordinators : Prof. Zillur Rahman

Lecture 1 - Understanding the basics of AI in Marketing - I

Lecture 2 - Understanding the basics of AI in Marketing - II

Lecture 3 - Understanding the basics of AI in Marketing - III

Lecture 4 - Introduction to AI Algorithms

Lecture 5 - Designs of AI, Transition process and AI matrix

Lecture 6 - Customer value and Role of AI in Value Delivery Process

Lecture 7 - Transforming Marketing Strategy using AI - I

Lecture 8 - Transforming Marketing Strategy using AI - II

Lecture 9 - Transforming Marketing Strategy using AI - III

Lecture 10 - Transforming Marketing Strategy using AI - IV

Lecture 11 - Transforming Marketing Strategy using AI - V

Lecture 12 - Using AI for STP

Lecture 13 - Application of AI in Marketing Mix - I

Lecture 14 - Application of AI in Marketing Mix - II

Lecture 15 - Marketing Information Systems and its Components

Lecture 16 - What is Marketing Research - I

Lecture 17 - What is Marketing Research - II

Lecture 18 - Individual Dynamics and its influence on Consumer Behaviour

Lecture 19 - Consumer Buying Decision Process

Lecture 20 - Understanding Customer Journey - I

Lecture 21 - Understanding Customer Journey - II

Lecture 22 - Customer Experience: Meaning and Characteristics

Lecture 23 - Personalization: Going Beyond Segmentation - I

Lecture 24 - Personalization: Going Beyond Segmentation - II

Lecture 25 - Avatar marketing

Lecture 26 - Standardization, Personalization and Relationalization of Brands using AI

Lecture 27 - Understanding Networks and Brand Network Effect

Lecture 28 - Understanding the Use of AI for Addressing Competition

Lecture 29 - AI and Brand Equity

Lecture 30 - AI and New Brand Realities - I

Lecture 31 - AI and New Brand Realities - II

Lecture 32 - AI for Value Creation and Product Development

Lecture 33 - Personalization and hyper-personalization Using AI - I

Lecture 34 - Personalization and hyper-personalization Using AI - II

Lecture 35 - Personalization and hyper-personalization Using AI - III

Lecture 36 - Personalization and hyper-personalization Using AI - IV

Lecture 37 - Personalization and hyper-personalization Using AI - V

Lecture 38 - Implementation of AI by Product Managers

Lecture 39 - AI in Service

Lecture 40 - Pricing Strategies Using AI - I

Lecture 41 - Pricing Strategies Using AI - II

Lecture 42 - Pricing Strategies Using AI - III

Lecture 43 - Pricing Strategies Using AI - IV

Lecture 44 - Role of AI in Advertising - I

Lecture 45 - Role of AI in Advertising - II

Lecture 46 - AI in Sales promotion and Direct Marketing

Lecture 47 - AI in PR and Publicity and Social Media Marketing - I

Lecture 48 - AI in PR and Publicity and Social Media Marketing - II

Lecture 49 - Personal Selling using AI

Lecture 50 - Sales management using AI

Lecture 51 - AI and Marketing Channel Management

Lecture 52 - Omnichannel Marketing and Retailing

Lecture 53 - Changing face of Retailing in the age of AI

Lecture 54 - AI in Logistics Management - I

Lecture 55 - AI in Logistics Management - II

Lecture 56 - Navigating Ethical Challenges in AI - I

Lecture 57 - Navigating Ethical Challenges in AI - II

Lecture 58 - Navigating Ethical Challenges in AI - III

Lecture 59 - Navigating Ethical Challenges in AI - IV

Lecture 60 - AI and Sustainability

NPTEL : NOC:Innovation in Marketing and Marketing of Innovation (Management)

Co-ordinators : Prof. Vinay Sharma

Lecture 1 - Introduction

Lecture 2 - Innovation

Lecture 3 - Innovations in Marketing and Marketing of Innovations

Lecture 4 - Innovations in Marketing

Lecture 5 - Need for Innovations in Marketing - 1

Lecture 6 - Need for Innovations in Marketing - 2

Lecture 7 - Change in Consumer Behaviour - 1

Lecture 8 - Change in Consumer Behaviour - 2

Lecture 9 - Innovative Perspectives about 4Pâ€™s for Innovation

Lecture 10 - Innovator's Dilemma

Lecture 11 - Go-To-Market Strategy

Lecture 12 - Targeting - Evolutionary Perspective

Lecture 13 - Innovations in Targeting and Positioning

Lecture 14 - Changing Concepts in Marketing of Products and Services

Lecture 15 - Changing Concepts of Marketing and Innovations in Service Marketing

Lecture 16 - Countering Commoditization: An Innovative Perspective

Lecture 17 - Innovations and Branding

Lecture 18 - Innovation in Pricing and Factors Affecting Pricing Innovations

Lecture 19 - Innovation in Pricing

Lecture 20 - Innovation in Pricing Strategies - 1

Lecture 21 - Innovation in Pricing Strategies - 2

Lecture 22 - Innovation in Distribution Channels

Lecture 23 - Innovation in Channel Management

Lecture 24 - Innovation in Retailing - 1

Lecture 25 - Innovation in Retailing - 2

Lecture 26 - Influence of distribution innovation on Marketing Mix

Lecture 27 - Innovation in Marketing Communication - 1

Lecture 28 - Innovation in Marketing Communication - 2

Lecture 29 - Innovation in Marketing Communication - 3

Lecture 30 - Innovative Marketing Communications: Direct Marketing

Lecture 31 - Innovative Marketing Communications: Sales Promotion and Public Relations

Lecture 32 - Innovative Marketing Communications: Advertising - Print, Radio and Television

Lecture 33 - Innovative Marketing Communications: Digital and Social Media Marketing

Lecture 34 - Influence of Innovation in Marketing Communications on the Marketing Mix

Lecture 35 - Co-Creation of Value and Value Co-Creation

Lecture 36 - Innovation and Value Chains - 1

Lecture 37 - Innovation and Value Chains - 2

Lecture 38 - Beyond Business

Lecture 39 - What is Marketing of Innovation? - Part 1

Lecture 40 - What is Marketing of Innovation? - Part 2

Lecture 41 - What is Marketing of Innovation? - Part 3

Lecture 42 - Marketing of Innovation - new products/new usage/ new services/ new perspective?

Lecture 43 - Marketing Research on Marketing of Innovation - Part 1

Lecture 44 - Marketing Research on Marketing of Innovation - Part 2

Lecture 45 - Marketing of Innovation - A fundamental change of thought process

Lecture 46 - Introduction to Innovation

Lecture 47 - Sources and Principles of Innovation

Lecture 48 - Strategy and Innovation

Lecture 49 - Connecting Innovation to Strategy

Lecture 50 - Understanding Consumers

Lecture 51 - Consumer Behavior and Innovations

Lecture 52 - Product Life Cycle in case of Innovations; Is it different?

Lecture 53 - Branding of Innovation

Lecture 54 - Marketing of Innovation in Service Industry - Part 1

Lecture 55 - Marketing of Innovation in Service Industry - Part 2

Lecture 56 - Positioning of Innovation

Lecture 57 - New Product Development

Lecture 58 - Monetizing and Delivering Innovation

Lecture 59 - What if it did not happen?

Lecture 60 - Conclusion

NPTEL : NOC:Strategic Services Marketing (Management)

Co-ordinators : Prof. Kalpak Kulkarni

Lecture 1 - Services and their Unique Characteristics

Lecture 2 - Services in Modern Economy

Lecture 3 - Trends and Challenges in Services Marketing

Lecture 4 - Service Marketing Mix and Value Creation

Lecture 5 - Services Ecosystem and Stakeholder Analysis

Lecture 6 - Customer Journey Mapping and Touchpoint Analysis

Lecture 7 - Designing memorable customer experiences

Lecture 8 - Personalization and Customization in Services

Lecture 9 - Emotional and Sensory marketing in Services

Lecture 10 - Technology-enabled customer experiences

Lecture 11 - Service Design Thinking and Design-driven Innovation

Lecture 12 - Open Innovation and Collaboration in Services

Lecture 13 - Crowdsourcing and customer involvement in service development

Lecture 14 - Managing Service Failures and Service Recovery Strategies

Lecture 15 - Leveraging Customer Feedback for Continuous Improvement

Lecture 16 - Digitalization of Services and Digital Service Platforms

Lecture 17 - Online Customer Engagement and Social Media Marketing

Lecture 18 - Mobile Marketing and Location-based Services

Lecture 19 - Artificial Intelligence and Chatbot Integration in Services

Lecture 20 - Blockchain and its application in service industries

Lecture 21 - Data-driven Decision-making in Services Marketing

Lecture 22 - Customer Analytics and Segmentation Strategies

Lecture 23 - Predictive Analytics for Personalized Marketing

Lecture 24 - Sentiment Analysis and Social Listening in Services

Lecture 25 - Ethical Considerations in Handling Customer Data

Lecture 26 - Building a Strong Service Brand Identity

Lecture 27 - Brand Positioning and Differentiation Strategies

Lecture 28 - Online Brand Management and Reputation Monitoring

Lecture 29 - Managing Brand Extensions and Brand Partnerships

Lecture 30 - Internal Branding and Aligning Employees with the Brand

Lecture 31 - Measuring and Improving Service Quality

Lecture 32 - SERVQUAL and Other Service Quality Measurement Tools

Lecture 33 - Service Guarantees and Service-level Agreements

Lecture 34 - Service Recovery Strategies and Complaint Handling

Lecture 35 - Cultivating a Culture of Service Excellence

Lecture 36 - Pricing Strategies for Services and Value-based Pricing

Lecture 37 - Dynamic Pricing and Revenue Optimization Techniques

Lecture 38 - Bundling and Packaging Strategies in Service Pricing

Lecture 39 - Subscription Models and Revenue Diversification

Lecture 40 - Pricing Strategies for Freemium and Subscription-based Services

Lecture 41 - Cultural Nuances and Their Impact on Service Marketing

Lecture 42 - Adapting Services for Different Cultural Contexts

Lecture 43 - Global Branding and Localization Strategies

Lecture 44 - Managing Diversity and Inclusivity in Service Delivery

Lecture 45 - Cross-cultural Communication and Customer Relationship Management

Lecture 46 - Sustainable practices and corporate social responsibility in services

Lecture 47 - Environmental consciousness and green marketing

Lecture 48 - Eco-friendly service design and operations

Lecture 49 - Ethical sourcing and responsible supply chain management

Lecture 50 - Consumer attitudes towards sustainable services

Lecture 51 - Developing service leadership skills

Lecture 52 - Motivating and empowering service employees

Lecture 53 - Service culture and service-oriented organizational behaviour

Lecture 54 - Training and development for service excellence

Lecture 55 - Managing service teams and fostering collaboration

Lecture 56 - Innovations in Service Delivery and Technology

Lecture 57 - Augmented Reality and Virtual Reality in Services

Lecture 58 - Internet of Things (IoT) in Service Ecosystem

Lecture 59 - Servitization and Product-Service Systems

Lecture 60 - Future Prospects and Challenges in Services Marketing

NPTEL : NOC:HR Analytics (Management)

Co-ordinators : Prof. Santosh Rangnekar, Prof. Abhishek Singh

Lecture 1 - Introduction to HR Analytics

Lecture 2 - HR Data Preparation and Development of HR metrics

Lecture 3 - Data science framework

Lecture 4 - Pitfalls of data science framework and Basics of data visualization

Lecture 5 - Developing HR analytics unit and culture

Lecture 6 - List of books

Lecture 7 - Introduction to data visualization

Lecture 8 - Data Visualization Power BI - 1

Lecture 9 - Data Visualization Power BI - 2

Lecture 10 - Data Visualization Power BI - 3

Lecture 11 - Data Visualization Excel - 1

Lecture 12 - Data Visualization Excel - 2

Lecture 13 - Steps of recruitment

Lecture 14 - Managerial challenges of recruitment - 1

Lecture 15 - Managerial challenges of recruitment - 2

Lecture 16 - Recruitment Analytics - 1

Lecture 17 - Recruitment Analytics - 2

Lecture 18 - Recruitment Analytics - 3

Lecture 19 - Recruitment Analytics - 4

Lecture 20 - Steps of employee selection process

Lecture 21 - Managerial challenges of employee selection - 1

Lecture 22 - Managerial challenges of employee selection - 2

Lecture 23 - Selection Analytics - 1

Lecture 24 - Selection Analytics - 2

Lecture 25 - Selection Analytics - 3

Lecture 26 - Selection Analytics - 4

Lecture 27 - Data Visualization of Recruitment and Selection

Lecture 28 - Steps of training

Lecture 29 - Managerial challenges of employee training - 1

Lecture 30 - Managerial challenges of employee training - 2

Lecture 31 - Training Analytics - 1

Lecture 32 - Training Analytics - 2

Lecture 33 - Training Analytics - 3

Lecture 34 - Training Analytics - 4

Lecture 35 - Steps of Employee Development

Lecture 36 - Managerial Challenges of Employee Development - 1

Lecture 37 - Managerial challenges of employee development - 2

Lecture 38 - Employee Development Analytics - 1

Lecture 39 - Employee Development Analytics - 2

Lecture 40 - Employee Development Analytics - 3

Lecture 41 - Employee Development Analytics - 4

Lecture 42 - Data Visualization of Training and Development

Lecture 43 - Steps of performance management

Lecture 44 - Managerial challenges of performance management - 1

Lecture 45 - Managerial challenges of performance management - 2

Lecture 46 - Performance Analytics - 1

Lecture 47 - Performance Analytics - 2

Lecture 48 - Performance Analytics - 3

Lecture 49 - Performance Analytics - 4

Lecture 50 - Steps of compensation management

Lecture 51 - Managerial challenges of compensation management - 1

Lecture 52 - Managerial challenges of compensation management - 2

Lecture 53 - Compensation Analytics - 1

Lecture 54 - Compensation Analytics - 2

Lecture 55 - Compensation Analytics - 3

Lecture 56 - Compensation Analytics - 4

Lecture 57 - Data Visualization of Performance and Compensation

Lecture 58 - Data Visualization Tableau - 1

Lecture 59 - Data Visualization Tableau - 2

Lecture 60 - Data Visualization Tableau - 3

Lecture 61 - Data Visualization Tableau - 4

Lecture 62 - Data Visualization Tableau - 5

NPTEL : NOC:Strategic Management (Management)

Co-ordinators : Prof. Vinay Sharma

Lecture 1 - What is Strategic Management?

Lecture 2 - Concepts of Strategy - 1

Lecture 3 - Concepts of Strategy - 2

Lecture 4 - Concepts of Strategy - 3

Lecture 5 - Strategy, Strategic Plan and Tactics

Lecture 6 - Strategic Planning, Thinking and Business Policy

Lecture 7 - Importance of Strategic Management

Lecture 8 - Corporate Culture

Lecture 9 - Leadership - 1

Lecture 10 - Leadership - 2

Lecture 11 - Developing and Communicating a Strategic Vision

Lecture 12 - Communicating a Strategic Vision

Lecture 13 - Developing a Companyâ€™s Mission Statement and Linking it with Companyâ€™s Core Values

Lecture 14 - Strategic Management Process - 1

Lecture 15 - Strategic Management Process - 2

Lecture 16 - Concept of Organizational Life Cycle

Lecture 17 - Generic Competitive Strategies - 1

Lecture 18 - Generic Competitive Strategies - 2

Lecture 19 - Ethics as a Strategy - 1

Lecture 20 - Ethics as a Strategy - 2

Lecture 21 - Sustainability as a Strategic Approach - 1

Lecture 22 - Sustainability as a Strategic Approach - 2

Lecture 23 - Environment and Strategy - 1

Lecture 24 - Environment and Strategy - 2

Lecture 25 - Internal Environment

Lecture 26 - Environmental Analysis - Resource Based Model

Lecture 27 - I/O Model, Resources, Capabilities, Core Competencies and Value Chain

Lecture 28 - Industry Life Cycle

Lecture 29 - Competition as Basis for Strategy Formulation and Red Ocean Strategy

Lecture 30 - Blue Ocean Strategy - 1

Lecture 31 - Blue Ocean Strategy - 2

Lecture 32 - Blue Ocean Strategy - 3

Lecture 33 - Blue Ocean Strategy - 4

Lecture 34 - Blue Ocean Strategy - 5

Lecture 35 - Strategic Entrepreneurship

Lecture 36 - Strategy for Value Creation

Lecture 37 - Strategy from Different Perspectives: Fortune at the Bottom of the Pyramid

Lecture 38 - Strategy from Different Perspectives: Capitalism at the Crossroads

Lecture 39 - Strategy from Different Perspectives: Sustainable Value Framework

Lecture 40 - Strategy from Different Perspectives: Development as Freedom

Lecture 41 - Designing Business Level Strategies

Lecture 42 - Designing and Strengthening Business Strategies

Lecture 43 - Corporate Level Strategy - 1

Lecture 44 - Corporate Level Strategy - 2

Lecture 45 - Designing Corporate Level Strategy

Lecture 46 - Designing and Strengthening Corporate Level Strategy

Lecture 47 - Strengthening Companyâ€™s Competitive Position - 1

Lecture 48 - Strengthening Companyâ€™s Competitive Position - 2

Lecture 49 - Mergers and Acquisitions - 1

Lecture 50 - Mergers and Acquisitions - 2

Lecture 51 - Corporate Governance - 1

Lecture 52 - Corporate Governance - 2

Lecture 53 - Corporate Governance - 3

Lecture 54 - Managing Internal Operations

Lecture 55 - Strategy Implementation

Lecture 56 - Strategy Evaluation

Lecture 57 - The Black Swan

Lecture 58 - ESG and SDG

Lecture 59 - Stop Predicting

Lecture 60 - Conclusion

NPTEL : Strategic Management (Management)

Co-ordinators : Prof. R. Srinivasan

Lecture 1 - Introduction to Strategic Management

Lecture 2 - Concept of Corporate Strategy

Lecture 3 - Strategic Management Process - 1

Lecture 4 - Strategic Management Process - 2

Lecture 5 - The 7-S Framework

Lecture 6 - Corporate Policy and Planning in India

Lecture 7 - Board of Directors - Role and Functions

Lecture 8 - Board of Directors - Role and Functions, Top Management - Role and Skills, Board Functioning - Indian Context

Lecture 9 - Board Functioning - Indian Context and Environmental Scanning

Lecture 10 - Environmental Scanning and Industry Analysis

Lecture 11 - The synthesis of External Factors and External Factors Analysis Summary (EFAS)

Lecture 12 - Internal Corporate Analysis and Impact Matrix

Lecture 13 - Value Chain Analysis

Lecture 14 - Synthesis of Internal Factors - 1

Lecture 15 - Synthesis of Internal Factors - 2

Lecture 16 - Internal Factors Analysis Summary (IFAS) and Case Study - 1

Lecture 17 - Case Analysis

Lecture 18 - Key Financial Ratios

Lecture 19 - Case Analysis - 2 and SFAS Matrix

Lecture 20 - Business Strategy

Lecture 21 - Corporate Strategy - 1

Lecture 22 - Corporate Strategy - 2

Lecture 23 - Corporate Strategy - 3 and Functional Strategy

Lecture 24 - Functional Strategy - 1

Lecture 25 - Functional Strategy - 2

Lecture 26 - Functional Strategy - 3 and Strategic Choice

Lecture 27 - Strategy Implementation - 1

Lecture 28 - Strategy Implementation - 2

Lecture 29 - Evaluation and Control

Lecture 30 - Strategic Information Systems - 1

Lecture 31 - Strategic Information Systems - 2

Lecture 32 - Other Strategic Issues - 1

Lecture 33 - Other Strategic Issues - 2

Lecture 34 - Small and Medium Enterprises

Lecture 35 - Non- Profit Organizations

Lecture 36 - Summary - 1

Lecture 37 - Summary - 2

NPTEL : Global Supply Chain Management (Management)

Co-ordinators : Prof. N. Viswanadham

Lecture 1 - Introduction to Global Supply Chain Networks Part - 1

Lecture 2 - Introduction to Global Supply Chain Networks Part - 2

Lecture 3 - Zara - fast fashion

Lecture 4 - The Supply Chain Eco-System Framework

Lecture 5 - Supply Chain Eco-System Framework: Supply Chains & Resources

Lecture 6 - Supply Chain Eco-System Framework: Delivery services & Institutions

Lecture 7 - Metro Cash and Carry

Lecture 8 - Performance Analysis

Lecture 9 - Supply Chain Risk - Part-1

Lecture 10 - Supply Chain Risk - Part-2

Lecture 11 - Supply Chain Risk - Part-3

Lecture 12 - Mattel Toy Recalls and Supply Chain Management

Lecture 13 - Innovation in Emerging markets

Lecture 14 - Innovations in Supply Chain Ecosystem

Lecture 15 - Indian Telecom and Bharti Airtel

Lecture 16 - CEMEX - Part-1

Lecture 17 - CEMEX - Part-2

Lecture 18 - Governance

Lecture 19 - Governance of networked organizations

Lecture 20 - The Orchestration Governance Model

Lecture 21 - Orchestration-Examples

Lecture 22 - Li & Fung - Part-1

Lecture 23 - Li & Fung - Part-2

Lecture 24 - Supply Chain Design - Part-1

Lecture 25 - Supply Chain Design - Part-2

Lecture 26 - Green supply chain design - Part-1

Lecture 27 - Green supply chain design - Part-2

Lecture 28 - Green Supply Chain Ecosystem Analysis

Lecture 29 - GRIP Framework

Lecture 30 - Location Selection

Lecture 31 - Ecosystem Aware Location Analysis

Lecture 32 - Food supply chain in India

Lecture 33 - Food supply chain ecosystem - Grip frame work

Lecture 34 - Food Security in India

Lecture 35 - Smart Villages and Cities - Part-1

Lecture 36 - Smart Villages and Cities - Part-2

Lecture 37 - Overview of the Course

Lecture 38 - How to use the Video lectures

NPTEL : NOC:Integrated Marketing Management (Management)

Co-ordinators : Prof. R. Srinivasan

Lecture 1 - Evolution of Marketing

Lecture 2 - Marketing Management

Lecture 3 - Marketing in India

Lecture 4 - Role of Marketing

Lecture 5 - Case Analysis

Lecture 6 - Case Analysis

Lecture 7 - Case of Suryodaya

Lecture 8 - Marketing System

Lecture 9 - Input-Output Map

Lecture 10 - Competition

Lecture 11 - Consumer Behaviour Model

Lecture 12 - BCG Matrix, Strategic Marketing

Lecture 13 - Marketing Strategy

Lecture 14 - Market Segmentation, VALS Model

Lecture 15 - Sales Function and Marketing Mix

Lecture 16 - B-B Markets, Macro Environment

Lecture 17 - Analytical Marketing System

Lecture 18 - Decision Models

Lecture 19 - E-Business

Lecture 20 - Market Demand, Concept Testing

Lecture 21 - Product, Product Mix, PLC

Lecture 22 - PLC (Continued...)

Lecture 23 - Pricing Strategies

Lecture 24 - Brands, Channels

Lecture 25 - Channel Management, Marketing Communication

Lecture 26 - Advertising, Marketing Organisation

Lecture 27 - Role of Product Manager, Industrial Buying

Lecture 28 - Sales Forecasting, Marketing Control

Lecture 29 - Marketing Expense Analysis

Lecture 30 - Toyota Strategy

Lecture 31 - Cafe Coffee Day(CCD)

Lecture 32 - CCD (Continued...)

Lecture 33 - I flex (OFSS)

Lecture 34 - OFSS

Lecture 35 - Oilseeds Growers Cooperative Society (OGCS)

Lecture 36 - OGCS

NPTEL : NOC:Strategic Management - The Competitive Edge (Management)

Co-ordinators : Prof. R Srinivasan

Lecture 1 - Long Range/Strategic Planning

Lecture 2 - Purpose, Mission, Goals

Lecture 3 - Different types of Strategies

Lecture 4 - Different types of Strategies

Lecture 5 - Strategic Management Process (SMP)

Lecture 6 - Modes of Strategic decisions

Lecture 7 - 7-S Frame work

Lecture 8 - Director, powers

Lecture 9 - Functions of BoD

Lecture 10 - Responsibilities of Business

Lecture 11 - Taxonomy of Company Environment

Lecture 12 - Competitive Landscape

Lecture 13 - Global Uncertainty Internal Corporate Analysis

Lecture 14 - Industry structure, Competitor Analysis

Lecture 15 - Firm's value chain

Lecture 16 - Key factors of Success, Porter's Industry Competition Model

Lecture 17 - S and W Profile Analysis

Lecture 18 - Competitive Advantage(CA), IFAS,SFAS

Lecture 19 - Case Analysis

Lecture 20 - Case Analysis (Continued...)

Lecture 21 - Case Study - 1

Lecture 22 - Case Study - 2

Lecture 23 - Business Strategy

Lecture 24 - BEA, Doom Loops, Corporate Strategy, Portfolio Analysis

Lecture 25 - Corporate Strategy, Display Matrices

Lecture 26 - Display Matrices

Lecture 27 - Display Matrices

Lecture 28 - National Diamond

Lecture 29 - Functional Strategy

Lecture 30 - Strategic Choice

Lecture 31 - Stage I, II, III, IV organizations

Lecture 32 - Risk, Corporate Diversification

Lecture 33 - Mergers and Acquisitions

Lecture 34 - Model for Evaluation

Lecture 35 - Rewards

Lecture 36 - Technology Road Map

Lecture 37 - IT and Strategy, R&D Strategy

Lecture 38 - Summary

NPTEL : Elementary Numerical Analysis (Mathematics)

Co-ordinators : Prof. Rekha P. Kulkarni

Lecture 1 - Introduction

Lecture 2 - Polynomial Approximation

Lecture 3 - Interpolating Polynomials

Lecture 4 - Properties of Divided Difference

Lecture 5 - Error in the Interpolating polynomial

Lecture 6 - Cubic Hermite Interpolation

Lecture 7 - Piecewise Polynomial Approximation

Lecture 8 - Cubic Spline Interpolation

Lecture 9 - Tutorial 1

Lecture 10 - Numerical Integration: Basic Rules

Lecture 11 - Composite Numerical Integration

Lecture 12 - Gauss 2-point Rule: Construction

Lecture 13 - Gauss 2-point Rule: Error

Lecture 14 - Convergence of Gaussian Integration

Lecture 15 - Tutorial 2

Lecture 16 - Numerical Differentiation

Lecture 17 - Gauss Elimination

Lecture 18 - L U decomposition

Lecture 19 - Cholesky decomposition

Lecture 20 - Gauss Elimination with partial pivoting

Lecture 21 - Vector and Matrix Norms

Lecture 22 - Perturbed Linear Systems

Lecture 23 - Ill-conditioned Linear System

Lecture 24 - Tutorial 3

Lecture 25 - Effect of Small Pivots

Lecture 26 - Solution of Non-linear Equations

Lecture 27 - Quadratic Convergence of Newton's Method

Lecture 28 - Jacobi Method

Lecture 29 - Gauss-Seidel Method

Lecture 30 - Tutorial 4

Lecture 31 - Initial Value Problem

Lecture 32 - Multi-step Methods

Lecture 33 - Predictor-Corrector Formulae

Lecture 34 - Boundary Value Problems

Lecture 35 - Eigenvalues and Eigenvectors

Lecture 36 - Spectral Theorem

Lecture 37 - Power Method

Lecture 38 - Inverse Power Method

Lecture 39 - Q R Decomposition

Lecture 40 - Q R Method

NPTEL : Measure and Integration (Mathematics)

Co-ordinators : Prof. Inder K Rana

Lecture 1 - Introduction, Extended Real numbers

Lecture 2 - Algebra and Sigma Algebra of a subset of a set

Lecture 3 - Sigma Algebra generated by a class

Lecture 4 - Monotone Class

Lecture 5 - Set function

Lecture 6 - The Length function and its properties

Lecture 7 - Countably additive set functions on intervals

Lecture 8 - Uniqueness Problem for Measure

Lecture 9 - Extension of measure

Lecture 10 - Outer measure and its properties

Lecture 11 - Measurable sets

Lecture 12 - Lebesgue measure and its properties

Lecture 13 - Characterization of Lebesque measurable sets

Lecture 14 - Measurable functions

Lecture 15 - Properties of measurable functions

Lecture 16 - Measurable functions on measure spaces

Lecture 17 - Integral of non negative simple measurable functions

Lecture 18 - Properties of non negative simple measurable functions

Lecture 19 - Monotone convergence theorem & Fatou's Lemma

Lecture 20 - Properties of Integral functions & Dominated Convergence Theorem

Lecture 21 - Dominated Convergence Theorem and applications

Lecture 22 - Lebesgue Integral and its properties

Lecture 23 - Denseness of continuous function

Lecture 24 - Product measures, an Introduction

Lecture 25 - Construction of Product Measure

Lecture 26 - Computation of Product Measure - I

Lecture 27 - Computation of Product Measure - II

Lecture 28 - Integration on Product spaces

Lecture 29 - Fubini's Theorems

Lecture 30 - Lebesgue Measure and integral on R2

Lecture 31 - Properties of Lebesgue Measure and integral on Rn

Lecture 32 - Lebesgue integral on R2

Lecture 33 - Integrating complex-valued functions

Lecture 34 - Lp - spaces

Lecture 35 - L2(X,S,mue)

Lecture 36 - Fundamental Theorem of calculas for Lebesgue Integral - I

Lecture 37 - Fundamental Theorem of calculus for Lebesgue Integral - II

Lecture 38 - Absolutely continuous measures

Lecture 39 - Modes of convergence

Lecture 40 - Convergence in Measure

NPTEL : Mathematics in India - From Vedic Period to Modern Times (Mathematics)

Co-ordinators : Prof. M.D. Srinivas, Prof. K. Ramasubramanian, Prof. M.S. Sriram

Lecture 1 - Indian Mathematics: An Overview

Lecture 2 - Vedas and Sulbasutras - Part 1

Lecture 3 - Vedas and Sulbasutras - Part 2

Lecture 4 - Panini's Astadhyayi

Lecture 5 - Pingala's Chandahsastra

Lecture 6 - Decimal place value system

Lecture 7 - Aryabhatiya of Aryabhata - Part 1

Lecture 8 - Aryabhatiya of Aryabhata - Part 2

Lecture 9 - Aryabhatiya of Aryabhata - Part 3

Lecture 10 - Aryabhatiya of Aryabhata - Part 4 and Introduction to Jaina Mathematics

Lecture 11 - Brahmasphutasiddhanta of Brahmagupta - Part 1

Lecture 12 - Brahmasphutasiddhanta of Brahmagupta - Part 2

Lecture 13 - Brahmasphutasiddhanta of Brahmagupta - Part 3

Lecture 14 - Brahmasphutasiddhanta of Brahmagupta - Part 4 and The Bakhshali Manuscript

Lecture 15 - Mahaviras Ganitasarasangraha - Part 1

Lecture 16 - Mahaviras Ganitasarasangraha - Part 2

Lecture 17 - Mahaviras Ganitasarasangraha - Part 3

Lecture 18 - Development of Combinatorics - Part 1

Lecture 19 - Development of Combinatorics - Part 2

Lecture 20 - Lilavati of Bhaskaracarya - Part 1

Lecture 21 - Lilavati of Bhaskaracarya - Part 2

Lecture 22 - Lilavati of Bhaskaracarya - Part 3

Lecture 23 - Bijaganita of Bhaskaracarya - Part 1

Lecture 24 - Bijaganita of Bhaskaracarya - Part 2

Lecture 25 - Ganitakaumudi of Narayana Pandita - Part 1

Lecture 26 - Ganitakaumudi of Narayana Pandita - Part 2

Lecture 27 - Ganitakaumudi of Narayana Pandita - Part 3

Lecture 28 - Magic Squares - Part 1

Lecture 29 - Magic Squares - Part 2

Lecture 30 - Development of Calculus in India - Part 1

Lecture 31 - Development of Calculus in India - Part 2

Lecture 32 - Jyanayanam: Computation of Rsines

Lecture 33 - Trigonometry and Spherical Trigonometry - Part 1

Lecture 34 - Trigonometry and Spherical Trigonometry - Part 2

Lecture 35 - Trigonometry and Spherical Trigonometry - Part 3

Lecture 36 - Proofs in Indian Mathematics - Part 1

Lecture 37 - Proofs in Indian Mathematics - Part 2

Lecture 38 - Proofs in Indian Mathematics - Part 3

Lecture 39 - Mathematics in Modern India - Part 1

Lecture 40 - Mathematics in Modern India - Part 2

NPTEL : NOC:Measure Theory (Mathematics)

Co-ordinators : Prof. Inder K Rana

Lecture 1 - (1A) Introduction, Extended Real Numbers

Lecture 2 - (1B) Introduction, Extended Real Numbers

Lecture 3 - (2A) Algebra and Sigma Algebra of Subsets of a Set

Lecture 4 - (2B) Algebra and Sigma Algebra of Subsets of a Set

Lecture 5 - (3A) Sigma Algebra generated by a Class

Lecture 6 - (3B) Sigma Algebra generated by a Class

Lecture 7 - (4A) Monotone Class

Lecture 8 - (4B) Monotone Class

Lecture 9 - (5A) Set Functions

Lecture 10 - (5B) Set Functions

Lecture 11 - (6A) The Length Function and its Properties

Lecture 12 - (6B) The Length Function and its Properties

Lecture 13 - (7A) Countably Additive Set Functions on Intervals

Lecture 14 - (7B) Countably Additive Set Functions on Intervals

Lecture 15 - (8A) Uniqueness Problem for Measure

Lecture 16 - (8B) Uniqueness Problem for Measure

Lecture 17 - (9A) Extension of Measure

Lecture 18 - (9B) Extension of Measure

Lecture 19 - (10A) Outer Measure and its Properties

Lecture 20 - (10B) Outer Measure and its Properties

Lecture 21 - (11A) Measurable Sets

Lecture 22 - (11B) Measurable Sets

Lecture 23 - (12A) Lebesgue Measure and its Properties

Lecture 24 - (12B) Lebesgue Measure and its Properties

Lecture 25 - (13A) Characterization of Lebesgue Measurable Sets

Lecture 26 - (13B) Characterization of Lebesgue Measurable Sets

Lecture 27 - (14A) Measurable Functions

Lecture 28 - (14B) Measurable Functions

Lecture 29 - (15A) Properties of Measurable Functions

Lecture 30 - (15B) Properties of Measurable Functions

Lecture 31 - (16A) Measurable Functions on Measure Spaces

Lecture 32 - (16B) Measurable Functions on Measure Spaces

Lecture 33 - (17A) Integral of Nonnegative Simple Measurable Functions

Lecture 34 - (17B) Integral of Nonnegative Simple Measurable Functions

Lecture 35 - (18A) Properties of Nonnegative Simple Measurable Functions

Lecture 36 - (18B) Properties of Nonnegative Simple Measurable Functions

Lecture 37 - (19A) Monotone Convergence Theorem and Fatou's Lemma

Lecture 38 - (19B) Monotone Convergence Theorem and Fatou's Lemma

Lecture 39 - (20A) Properties of Integrable Functions and Dominated Convergence Theorem

Lecture 40 - (20B) Properties of Integrable Functions and Dominated Convergence Theorem

Lecture 41 - (21A) Dominated Convergence Theorem and Applications

Lecture 42 - (21B) Dominated Convergence Theorem and Applications

Lecture 43 - (22A) Lebesgue Integral and its Properties

Lecture 44 - (22B) Lebesgue Integral and its Properties

Lecture 45 - (23A) Product Measure, an Introduction

Lecture 46 - (23B) Product Measure, an Introduction

Lecture 47 - (24A) Construction of Product Measures

Lecture 48 - (24B) Construction of Product Measures

Lecture 49 - (25A) Computation of Product Measure - I

Lecture 50 - (25B) Computation of Product Measure - I

Lecture 51 - (26A) Computation of Product Measure - II

Lecture 52 - (26B) Computation of Product Measure - II

Lecture 53 - (27A) Integration on Product Spaces

Lecture 54 - (27B) Integration on Product Spaces

Lecture 55 - (28A) Fubini's Theorems

Lecture 56 - (28B) Fubini's Theorems

Lecture 57 - (29A) Lebesgue Measure and Integral on R2

Lecture 58 - (29B) Lebesgue Measure and Integral on R2

Lecture 59 - (30A) Properties of Lebesgue Measure on R2

Lecture 60 - (30B) Properties of Lebesgue Measure on R2

Lecture 61 - (31A) Lebesgue Integral on R2

Lecture 62 - (31B) Lebesgue Integral on R2

NPTEL : NOC:Calculus for Economics, Commerce and Management (Mathematics)

Co-ordinators : Prof.Inder Kumar Rana

Lecture 1 - Introduction to the Course

Lecture 2 - Concept of a Set, Ways of Representing Sets

Lecture 3 - Venn Diagrams, Operations on Sets

Lecture 4 - Operations on Sets, Cardinal Number, Real Numbers

Lecture 5 - Real Numbers, Sequences

Lecture 6 - Sequences, Convergent Sequences, Bounded Sequences

Lecture 7 - Limit Theorems, Sandwich Theorem, Monotone Sequences, Completeness of Real Numbers

Lecture 8 - Relations and Functions

Lecture 9 - Functions, Graph of a Functions, Function Formulas

Lecture 10 - Function Formulas, Linear Models

Lecture 11 - Linear Models, Elasticity, Linear Functions, Nonlinear Models, Quadratic Functions

Lecture 12 - Quadratic Functions, Quadratic Models, Power Function, Exponential Function

Lecture 13 - Exponential Function, Exponential Models, Logarithmic Function

Lecture 14 - Limit of a Function at a Point, Continuous Functions

Lecture 15 - Limit of a Function at a Point

Lecture 16 - Limit of a Function at a Point, Left and Right Limits

Lecture 17 - Computing Limits, Continuous Functions

Lecture 18 - Applications of Continuous Functions

Lecture 19 - Applications of Continuous Functions, Marginal of a Function

Lecture 20 - Rate of Change, Differentiation

Lecture 21 - Rules of Differentiation

Lecture 22 - Derivatives of Some Functions, Marginal, Elasticity

Lecture 23 - Elasticity, Increasing and Decreasing Functions, Optimization, Mean Value Theorem

Lecture 24 - Mean Value Theorem, Marginal Analysis, Local Maxima and Minima

Lecture 25 - Local Maxima and Minima

Lecture 26 - Local Maxima and Minima, Continuity Test, First Derivative Test, Successive Differentiation

Lecture 27 - Successive Differentiation, Second Derivative Test

Lecture 28 - Average and Marginal Product, Marginal of Revenue and Cost, Absolute Maximum and Minimum

Lecture 29 - Absolute Maximum and Minimum

Lecture 30 - Monopoly Market, Revenue and Elasticity

Lecture 31 - Property of Marginals, Monopoly Market, Publisher v/s Author Problem

Lecture 32 - Convex and Concave Functions

Lecture 33 - Derivative Tests for Convexity, Concavity and Points of Inflection, Higher Order Derivative Conditions

Lecture 34 - Convex and Concave Functions, Asymptotes

Lecture 35 - Asymptotes, Curve Sketching

Lecture 36 - Functions of Two Variables, Visualizing Graph, Level Curves, Contour Lines

Lecture 37 - Partial Derivatives and Application to Marginal Analysis

Lecture 38 - Marginals in Cobb-Douglas model, partial derivatives and elasticity, chain rules

Lecture 39 - Chain Rules, Higher Order Partial Derivatives, Local Maxima and Minima, Critical Points

Lecture 40 - Saddle Points, Derivative Tests, Absolute Maxima and Minima

Lecture 41 - Some Examples, Constrained Maxima and Minima

NPTEL : NOC:Basic Linear Algebra (Mathematics)

Co-ordinators : Prof.Inder Kumar Rana

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Introduction - III

Lecture 4 - Systems of Linear Equations - I

Lecture 5 - Systems of Linear Equations - II

Lecture 6 - Systems of Linear Equations - III

Lecture 7 - Reduced Row Echelon Form and Rank - I

Lecture 8 - Reduced Row Echelon Form and Rank - II

Lecture 9 - Reduced Row Echelon Form and Rank - III

Lecture 10 - Solvability of a Linear System, Linear Span, Basis - I

Lecture 11 - Solvability of a Linear System, Linear Span, Basis - II

Lecture 12 - Solvability of a Linear System, Linear Span, Basis - III

Lecture 13 - Linear Span, Linear Independence and Basis - I

Lecture 14 - Linear Span, Linear Independence and Basis - II

Lecture 15 - Linear Span, Linear Independence and Basis - III

Lecture 16 - Row Space, Column Space, Rank-Nullity Theorem - I

Lecture 17 - Row Space, Column Space, Rank-Nullity Theorem - II

Lecture 18 - Row Space, Column Space, Rank-Nullity Theorem - III

Lecture 19 - Determinants and their Properties - I

Lecture 20 - Determinants and their Properties - II

Lecture 21 - Determinants and their Properties - III

Lecture 22 - Linear Transformations - I

Lecture 23 - Linear Transformations - II

Lecture 24 - Linear Transformations - III

Lecture 25 - Orthonormal Basis, Geometry in R^2 - I

Lecture 26 - Orthonormal Basis, Geometry in R^2 - II

Lecture 27 - Orthonormal Basis, Geometry in R^2 - III

Lecture 28 - Isometries, Eigenvalues and Eigenvectors - I

Lecture 29 - Isometries, Eigenvalues and Eigenvectors - II

Lecture 30 - Isometries, Eigenvalues and Eigenvectors - III

Lecture 31 - Diagonalization and Real Symmetric Matrices - I

Lecture 32 - Diagonalization and Real Symmetric Matrices - II

Lecture 33 - Diagonalization and Real Symmetric Matrices - III

Lecture 34 - Diagonalization and its Applications - I

Lecture 35 - Diagonalization and its Applications - II

Lecture 36 - Diagonalization and its Applications - III

Lecture 37 - Abstract Vector Spaces - I

Lecture 38 - Abstract Vector Spaces - II

Lecture 39 - Abstract Vector Spaces - III

Lecture 40 - Inner Product Spaces - I

Lecture 41 - Inner Product Spaces - II

NPTEL : NOC:Commutative Algebra (Mathematics)

Co-ordinators : Prof. Dilip P. Patil

Lecture 1 - Zariski Topology and K-Spectrum

Lecture 2 - Algebraic Varieties and Classical Nullstelensatz

Lecture 3 - Motivation for Krulls Dimension

Lecture 4 - Chevalleys dimension

Lecture 5 - Associated Prime Ideals of a Module

Lecture 6 - Support of a Module

Lecture 7 - Primary Decomposition

Lecture 8 - Primary Decomposition (Continued...)

Lecture 9 - Uniqueness of Primary Decomposition

Lecture 10 - Modules of Finite Length

Lecture 11 - Modules of Finite Length (Continued...)

Lecture 12 - Introduction to KrullÃ¢â‚¬â„¢s Dimension

Lecture 13 - Noether Normalization Lemma (Classical Version)

Lecture 14 - Consequences of Noether Normalization Lemma

Lecture 15 - Nil Radical and Jacobson Radical of Finite type Algebras over a Field and digression of Integral Extension

Lecture 16 - NagataÃ¢â‚¬â„¢s version of NNL

Lecture 17 - Dimensions of Polynomial ring over Noetherian rings

Lecture 18 - Dimension of Polynomial Algebra over arbitrary Rings

Lecture 19 - Dimension Inequalities

Lecture 20 - HilbertÃ¢â‚¬â„¢s Nullstelensatz

Lecture 21 - Computational rules for PoincarÃƒÂ© Series

Lecture 22 - Graded Rings, Modules and PoincarÃƒÂ© Series

Lecture 23 - Hilbert-Samuel Polynomials

Lecture 24 - Hilbert-Samuel Polynomials (Continued...)

Lecture 25 - Numerical Function of polynomial type

Lecture 26 - Hilbert-Samuel Polynomial of a Local ring

Lecture 27 - Filtration on a Module

Lecture 28 - Artin-Rees Lemma

Lecture 29 - Dimension Theorem

Lecture 30 - Dimension Theorem (Continued...)

Lecture 31 - Consequences of Dimension Theorem

Lecture 32 - Generalized KrullÃ¢â‚¬â„¢s Principal Ideal Theorem

Lecture 33 - Second proof of KrullÃ¢â‚¬â„¢s Principal Ideal Theorem

Lecture 34 - The Spec Functor

Lecture 35 - Prime ideals in Polynomial rings

Lecture 36 - Characterization of Equidimensional Affine Algebra

Lecture 37 - Connection between Regular local rings and associated graded rings

Lecture 38 - Statement of the Jacobian Criterion for Regularity

Lecture 39 - Hilbert function for Affine Algebra

Lecture 40 - Hilbert Serre Theorem

Lecture 41 - Jacobian Matrix and its Rank

Lecture 42 - Jacobian Matrix and its Rank (Continued...)

Lecture 43 - Proof of Jacobian Critrerion

Lecture 44 - Proof of Jacobian Critrerion (Continued...)

Lecture 45 - Preparation for Homological Dimension

Lecture 46 - Complexes of Modules and Homology

Lecture 47 - Projective Modules

Lecture 48 - Homological Dimension and Projective module

Lecture 49 - Global Dimension

Lecture 50 - Homological characterization of Regular Local Rings (RLR)

Lecture 51 - Homological characterization of Regular Local Rings (Continued...)

Lecture 52 - Homological Characterization of Regular Local Rings (Continued...)

Lecture 53 - Regular Local Rings are UFD

Lecture 54 - RLR-Prime ideals of height 1

Lecture 55 - Discrete Valuation Ring

Lecture 56 - Discrete Valuation Ring (Continued...)

Lecture 57 - Dedekind Domains

Lecture 58 - Fractionary Ideals and Dedekind Domains

Lecture 59 - Characterization of Dedekind Domain

Lecture 60 - Dedekind Domains and prime factorization of ideals

NPTEL : NOC:Galois Theory (Mathematics)

Co-ordinators : Prof. Dilip P. Patil

Lecture 1 - Historical Perspectives

Lecture 2 - Examples of Fields

Lecture 3 - Polynomials and Basic properties

Lecture 4 - Polynomial Rings

Lecture 5 - Unit and Unit Groups

Lecture 6 - Division with remainder and prime factorization

Lecture 7 - Zeroes of Polynomials

Lecture 8 - Polynomial functions

Lecture 9 - Algebraically closed Fields and statement of FTA

Lecture 10 - GaussÃ¢â‚¬â„¢s Theorem(Uniqueness of factorization)

Lecture 11 - Digression on Rings homomorphism, Algebras

Lecture 12 - Kernel of homomorphisms and ideals in K[X],Z

Lecture 13 - Algebraic elements

Lecture 14 - Examples

Lecture 15 - Minimal Polynomials

Lecture 16 - Characterization of Algebraic elements

Lecture 17 - Theorem of Kronecker

Lecture 18 - Examples

Lecture 19 - Digression on Groups

Lecture 20 - Some examples and Characteristic of a Ring

Lecture 21 - Finite subGroups of the Unit Group of a Field

Lecture 22 - Construction of Finite Fields

Lecture 23 - Digression on Group action - I

Lecture 24 - Automorphism Groups of a Field Extension

Lecture 25 - Dedekind-Artin Theorem

Lecture 26 - Galois Extension

Lecture 27 - Examples of Galois extension

Lecture 28 - Examples of Automorphism Groups

Lecture 29 - Digression on Linear Algebra

Lecture 30 - Minimal and Characteristic Polynomials, Norms, Trace of elements

Lecture 31 - Primitive Element Theorem for Galois Extension

Lecture 32 - Fundamental Theorem of Galois Theory

Lecture 33 - Fundamental Theorem of Galois Theory (Continued...)

Lecture 34 - Cyclotomic extensions

Lecture 35 - Cyclotomic Polynomials

Lecture 36 - Irreducibility of Cyclotomic Polynomials over Q

Lecture 37 - Reducibility of Cyclotomic Polynomials over Finite Fields

Lecture 38 - Galois Group of Cyclotomic Polynomials

Lecture 39 - Extension over a fixed Field of a finite subGroup is Galois Extension

Lecture 40 - Digression on Group action - II

Lecture 41 - Correspondence of Normal SubGroups and Galois sub-extensions

Lecture 42 - Correspondence of Normal SubGroups and Galois sub-extensions (Continued...)

Lecture 43 - Inverse Galois problem for Abelian Groups

Lecture 44 - Elementary Symmetric Polynomials

Lecture 45 - Fundamental Theorem on Symmetric Polynomials

Lecture 46 - Gal (K[X1,X2,Ã¢â,¬Â¦,Xn]/K[S1,S2,...,Sn])

Lecture 47 - Digression on Symmetric and Alternating Group

Lecture 48 - Discriminant of a Polynomial

Lecture 49 - Zeroes and Embeddings

Lecture 50 - Normal Extensions

Lecture 51 - Existence of Algebraic Closure

Lecture 52 - Uniqueness of Algebraic Closure

Lecture 53 - Proof of The Fundamental Theorem of Algebra

Lecture 54 - Galois Group of a Polynomial

Lecture 55 - Perfect Fields

Lecture 56 - Embeddings

Lecture 57 - Characterization of finite Separable extension

Lecture 58 - Primitive Element Theorem

Lecture 59 - Equivalence of Galois extensions and Normal-Separable extensions

Lecture 60 - Operation of Galois Group of Polynomial on the set of zeroes

Lecture 61 - Discriminants

Lecture 62 - Examples for further study

NPTEL : NOC:Basic Real Analysis (Mathematics)

Co-ordinators : Prof. I. K. Rana

Lecture 1 - Real Numbers and Sequences - Part I

Lecture 2 - Real Numbers and Sequences - Part II

Lecture 3 - Real Numbers and Sequences - Part III

Lecture 4 - Convergence of Sequences - Part I

Lecture 5 - Convergence of Sequences - Part II

Lecture 6 - Convergence of Sequences - Part III

Lecture 7 - The LUB Property and Consequences - Part I

Lecture 8 - The LUB Property and Consequences - Part II

Lecture 9 - The LUB Property and Consequences - Part III

Lecture 10 - Topology of Real Numbers: Closed Sets - Part I

Lecture 11 - Topology of Real Numbers: Closed Sets - Part II

Lecture 12 - Topology of Real Numbers: Closed Sets - Part III

Lecture 13 - Topology of Real Numbers: Limit Points, Interior Points, Open Sets and Compact Sets - Part I

Lecture 14 - Topology of Real Numbers: Limit Points, Interior Points, Open Sets and Compact Sets - Part II

Lecture 15 - Topology of Real Numbers: Limit Points, Interior Points, Open Sets and Compact Sets - Part III

Lecture 16 - Topology of Real Numbers: Compact Sets and Connected Sets - Part I

Lecture 17 - Topology of Real Numbers: Compact Sets and Connected Sets - Part II

Lecture 18 - Topology of Real Numbers: Compact Sets and Connected Sets - Part III

Lecture 19 - Topology of Real Numbers: Connected Sets; Limits and Continuity - Part I

Lecture 20 - Topology of Real Numbers: Connected Sets; Limits and Continuity - Part II

Lecture 21 - Topology of Real Numbers: Connected Sets; Limits and Continuity - Part III

Lecture 22 - Continuity and Uniform continuity - Part I

Lecture 23 - Continuity and Uniform continuity - Part II

Lecture 24 - Continuity and Uniform continuity - Part III

Lecture 25 - Uniform continuity and connected sets - Part I

Lecture 26 - Uniform continuity and connected sets - Part II

Lecture 27 - Uniform continuity and connected sets - Part III

Lecture 28 - Connected sets and continuity - Part I

Lecture 29 - Connected sets and continuity - Part II

Lecture 30 - Connected sets and continuity - Part III

Lecture 31 - Differentiability - Part I

Lecture 32 - Differentiability - Part II

Lecture 33 - Differentiability - Part III

Lecture 34 - Differentiability - Part IV

Lecture 35 - Differentiability - Part V

Lecture 36 - Differentiability - Part VI

Lecture 37 - Riemann Integration - Part I

Lecture 38 - Riemann Integration - Part II

Lecture 39 - Riemann Integration - Part III

Lecture 40 - Riemann Integration - Part IV

Lecture 41 - Riemann Integration - Part V

Lecture 42 - Riemann Integration - Part VI

Lecture 43 - Riemann Sum and Riemann Integrals - Part I

Lecture 44 - Riemann Sum and Riemann Integrals - Part II

Lecture 45 - Riemann Sum and Riemann Integrals - Part III

Lecture 46 - Optimization in several variables - Part I

Lecture 47 - Optimization in several variables - Part II

Lecture 48 - Optimization in several variables - Part III

Lecture 49 - Integration in several variables - Part I

Lecture 50 - Integration in several variables - Part II

Lecture 51 - Integration in several variables - Part III

Lecture 52 - Change of variables - Part I

Lecture 53 - Change of variables - Part II

Lecture 54 - Change of variables - Part III

Lecture 55 - Change of variables - Part IV

Lecture 56 - Metric Spaces - Part I

Lecture 57 - Metric Spaces - Part II

Lecture 58 - Metric Spaces - Part III

Lecture 59 - L^p Metrics - Part I

Lecture 60 - L^p Metrics - Part II

Lecture 61 - L^p Metrics - Part III

Lecture 62 - Pointwise and Uniform convergence - Part I

Lecture 63 - Pointwise and Uniform convergence - Part II

Lecture 64 - Pointwise and Uniform convergence - Part III

Lecture 65 - Pointwise and Uniform convergence - Part IV

Lecture 66 - Series of Numbers - Part I

Lecture 67 - Series of Numbers - Part II

Lecture 68 - Series of Numbers - Part III

Lecture 69 - Alternating Series and Power Series

NPTEL : NOC:A Basic Course in Number Theory (Mathematics)

Co-ordinators : Prof. Shripad Garge

Lecture 1 - Integers

Lecture 2 - Divisibility and primes

Lecture 3 - Infinitude of primes

Lecture 4 - Division algorithm and the GCD

Lecture 5 - Computing the GCD and Euclidâ€™s lemma

Lecture 6 - Fundamental theorem of arithmetic

Lecture 7 - Stories around primes

Lecture 8 - Winding up on `Primes' and introducing Congruences'

Lecture 9 - Basic results in congruences

Lecture 10 - Residue classes modulo n

Lecture 11 - Arithmetic modulo n, theory and examples

Lecture 12 - Arithmetic modulo n, more examples

Lecture 13 - Solving linear polynomials modulo n - I

Lecture 14 - Solving linear polynomials modulo n - II

Lecture 15 - Solving linear polynomials modulo n - III

Lecture 16 - Solving linear polynomials modulo n - IV

Lecture 17 - Chinese remainder theorem, the initial cases

Lecture 18 - Chinese remainder theorem, the general case and examples

Lecture 19 - Chinese remainder theorem, more examples

Lecture 20 - Using the CRT, square roots of 1 in â„¤n

Lecture 21 - Wilson's theorem

Lecture 22 - Roots of polynomials over â„¤p

Lecture 23 - Euler ðœ‘-function - I

Lecture 24 - Euler ðœ‘-function - II

Lecture 25 - Primitive roots - I

Lecture 26 - Primitive roots - II

Lecture 27 - Primitive roots - III

Lecture 28 - Primitive roots - IV

Lecture 29 - Structure of Un - I

Lecture 30 - Structure of Un - II

Lecture 31 - Quadratic residues

Lecture 32 - The Legendre symbol

Lecture 33 - Quadratic reciprocity law - I

Lecture 34 - Quadratic reciprocity law - II

Lecture 35 - Quadratic reciprocity law - III

Lecture 36 - Quadratic reciprocity law - IV

Lecture 37 - The Jacobi symbol

Lecture 38 - Binary quadratic forms

Lecture 39 - Equivalence of binary quadratic forms

Lecture 40 - Discriminant of a binary quadratic form

Lecture 41 - Reduction theory of integral binary quadratic forms

Lecture 42 - Reduced forms up to equivalence - I

Lecture 43 - Reduced forms up to equivalence - II

Lecture 44 - Reduced forms up to equivalence - III

Lecture 45 - Sums of squares - I

Lecture 46 - Sums of squares - II

Lecture 47 - Sums of squares - III

Lecture 48 - Beyond sums of squares - I

Lecture 49 - Beyond sums of squares - II

Lecture 50 - Continued fractions - basic results

Lecture 51 - Dirichlet's approximation theorem

Lecture 52 - Good rational approximations

Lecture 53 - Continued fraction expansion for real numbers - I

Lecture 54 - Continued fraction expansion for real numbers - II

Lecture 55 - Convergents give better approximations

Lecture 56 - Convergents are the best approximations - I

Lecture 57 - Convergents are the best approximations - II

Lecture 58 - Quadratic irrationals as continued fractions

Lecture 59 - Some basics of algebraic number theory

Lecture 60 - Units in quadratic fields: the imaginary case

Lecture 61 - Units in quadratic fields: the real case

Lecture 62 - Brahmagupta-Pell equations

Lecture 63 - Tying some loose ends

NPTEL : NOC:Introduction to Algebraic Topology - Part I (Mathematics)

Co-ordinators : Prof. Anant R. Shastri

Lecture 1 - Basic Problem in Topology

Lecture 2 - Concept of homotopy

Lecture 3 - Bird's eye-view of the course

Lecture 4 - Path Homotopy

Lecture 5 - Composition of paths

Lecture 6 - Fundamental group Ï€1

Lecture 7 - Computation of Fund. Group of a circle

Lecture 8 - Computation (Continued...)

Lecture 9 - Computation concluded

Lecture 10 - Van-Kampen's Theorem

Lecture 11 - Function Spaces

Lecture 12 - Quotient Maps

Lecture 13 - Group Actions

Lecture 14 - Examples of Group Actions

Lecture 15 - Assorted Results on Quotient Spaces

Lecture 16 - Quotient Constructions Typical to Alg. Top

Lecture 17 - Quotient Constructions (Continued...)

Lecture 18 - Relative Homotopy

Lecture 19 - Construction of a typical SDR

Lecture 20 - Generalized construction of SDRs

Lecture 21 - A theoretical application

Lecture 22 - The Harvest

Lecture 23 - NDR pairs

Lecture 24 - General Remarks

Lecture 25 - Basics A ne Geometry

Lecture 26 - Abstract Simplicial Complex

Lecture 27 - Geometric Realization

Lecture 28 - Topology on |K|

Lecture 29 - Simplical maps

Lecture 30 - Polyhedrons

Lecture 31 - Point Set topological Aspects

Lecture 32 - Barycentric Subdivision

Lecture 33 - Finer Subdivisions

Lecture 34 - Simplical Approximation

Lecture 35 - Sperner Lemma

Lecture 36 - Invariance of domain

Lecture 37 - Proof of controled homotopy

Lecture 38 - Links and Stars

Lecture 39 - Homotopical Aspects of Simplicial Complexes

Lecture 40 - Homotopical Aspects

Lecture 41 - Covering Spaces and Fund. Groups

Lecture 42 - Lifting Properties

Lecture 43 - Homotopy Lifting

Lecture 44 - Relation with the fund. Group

Lecture 45 - Regular covering

Lecture 46 - Lifting Problem

Lecture 47 - Classification of Coverings

Lecture 48 - Classification

Lecture 49 - Existence of Simply connected coverings

Lecture 50 - Construction of Simply connected covering

Lecture 51 - Properties Shared by total space and base

Lecture 52 - Examples

Lecture 53 - G-coverings

Lecture 54 - Pull-backs

Lecture 55 - Classification of G-coverings

Lecture 56 - Proof of classification

Lecture 57 - Pushouts and Free products

Lecture 58 - Existence of Free Products, pushouts

Lecture 59 - Free Products and free groups

Lecture 60 - Seifert-Van Kampen Theorems

Lecture 61 - Applications

Lecture 62 - Applications (Continued...)

NPTEL : NOC:Introduction to Algebraic Topology - Part II (Mathematics)

Co-ordinators : Prof. Anant R. Shastri

Lecture 1 - Introduction

Lecture 2 - Attaching cells

Lecture 3 - Subcomplexes and Examples

Lecture 4 - More examples

Lecture 5 - More Examples

Lecture 6 - Topological Properties

Lecture 7 - Coinduced Topology

Lecture 8 - Compactly generated topology on Products

Lecture 9 - Product of Cell complexes

Lecture 10 - Product of Cell complexes (Continued...)

Lecture 11 - Partition of Unity on CW-complexes

Lecture 12 - Partition of Unity (Continued...)

Lecture 13 - Homotopical Aspects

Lecture 14 - Homotopical Aspects (Continued...)

Lecture 15 - Cellular Maps

Lecture 16 - Cellular Maps (Continued...)

Lecture 17 - Homotopy exact sequence of a pair

Lecture 18 - Homotopy exact sequence of a fibration

Lecture 19 - Categories-Definitions and Examples

Lecture 20 - More Examples

Lecture 21 - Functors

Lecture 22 - Equivalence of Functors (Continued...)

Lecture 23 - Universal Objects

Lecture 24 - Basic Homological Algebra

Lecture 25 - Diagram-Chasing

Lecture 26 - Homology of Chain Complexes

Lecture 27 - Euler Characteristics

Lecture 28 - Singular Homology Groups

Lecture 29 - Basic Properties of Singular Homology

Lecture 30 - Excision

Lecture 31 - Examples of Excision-Mayer Vietoris

Lecture 32 - Applications

Lecture 33 - Applications (Continued...)

Lecture 34 - The Singular Simplicial Homology

Lecture 35 - Simplicial Homology

Lecture 36 - Simplicial Homology (Continued...)

Lecture 37 - CW-Homology and Cellular Singular Homology

Lecture 38 - Construction of CW-chain complex

Lecture 39 - CW structure and CW homology of Lens Spaces

Lecture 40 - Assorted Topics

Lecture 41 - Some Applications of Homology

Lecture 42 - Applications of LFT

Lecture 43 - Jordan-Brouwer

Lecture 44 - Proof of Lemmas

Lecture 45 - Relation between ?1 and H1

Lecture 46 - All Postponed Proofs

Lecture 47 - Proofs (Continued...)

Lecture 48 - Definitions and Examples

Lecture 49 - Paracompactness

Lecture 50 - Manifolds with Boundary

Lecture 51 - Embeddings and Homotopical Aspects

Lecture 52 - Homotopical Aspects (Continued...)

Lecture 53 - Classification of 1-manifolds

Lecture 54 - Classification of 1-manifolds (Continued...)

Lecture 55 - Triangulation of Manifolds

Lecture 56 - Pseudo-Manifolds

Lecture 57 - One result due to PoincaÅ•e and another due to Munkres

Lecture 58 - Some General Remarks

Lecture 59 - Classification of Compact Surface

Lecture 60 - Final Reduction-Completion of the Proof

Lecture 61 - Proof of Part B

Lecture 62 - Orientability

NPTEL : NOC:Partial Differential Equations (Mathematics)

Co-ordinators : Prof. Sivaji Ganesh

Lecture 1 - Partial Differential Equations - Basic concepts and Nomenclature

Lecture 2 - First Order Partial Differential Equations- How they arise? Cauchy Problems, IVPs, IBVPs

Lecture 3 - First order Partial Differential Equations - Geometry of Quasilinear equations

Lecture 4 - FOPDE's - General Solutions to Linear and Semilinear equations

Lecture 5 - First order Partial Differential Equations- Lagrange's method for Quasilinear equations

Lecture 6 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations

Lecture 7 - Relation between Characteristic curves and Integral surfaces for Quasilinear equations

Lecture 8 - FOPDE's - Method of characteristics for Quasilinear equations - 1

Lecture 9 - First order Partial Differential Equations - Failure of transversality condition

Lecture 10 - First order Partial Differential Equations - Tutorial of Quasilinear equations

Lecture 11 - FOPDE's - General nonlinear equations 1 - Search for a characteristic direction

Lecture 12 - FOPDE's - General nonlinear equations 2 - Characteristic direction and characteristic strip

Lecture 13 - FOPDE's - General nonlinear equations 3 - Finding an initial strip

Lecture 14 - FOPDE's - General nonlinear equations 4 - Local existence and uniqueness theorem

Lecture 15 - First order Partial Differential Equations - Tutorial on General nonlinear equations

Lecture 16 - First order Partial Differential Equations - Initial value problems for Burgers equation

Lecture 17 - FOPDE's - Conservation laws with a view towards global solutions to Burgers equation

Lecture 18 - Second Order Partial Differential Equations - Special Curves associated to a PDE

Lecture 19 - Second Order Partial Differential Equations - Curves of discontinuity

Lecture 20 - Second Order Partial Differential Equations - Classification

Lecture 21 - SOPDE's - Canonical form for an equation of Hyperbolic type

Lecture 22 - SOPDE's - Canonical form for an equation of Parabolic type

Lecture 23 - SOPDE's - Canonical form for an equation of Elliptic type

Lecture 24 - Second Order Partial Differential Equations - Characteristic Surfaces

Lecture 25 - SOPDE's - Canonical forms for constant coefficient PDEs

Lecture 26 - Wave Equation - A mathematical model for vibrating strings

Lecture 27 - Wave Equation in one space dimension - d'Alembert formula

Lecture 28 - Tutorial on One dimensional wave equation

Lecture 29 - Wave Equation in d space dimensions - Equivalent Cauchy problems via Spherical means

Lecture 30 - Cauchy problem for Wave Equation in 3 space dimensions - Poisson-Kirchhoff formulae

Lecture 31 - Cauchy problem for Wave Equation in 2 space dimensions - Hadamard's method of descent

Lecture 32 - Nonhomogeneous Wave Equation - Duhamel principle

Lecture 33 - Wellposedness of Cauchy problem for Wave Equation

Lecture 34 - Wave Equation on an interval in? - Solution to an IBVP from first principles

Lecture 35 - Tutorial on IBVPs for wave equation

Lecture 36 - IBVP for Wave Equation - Separation of Variables Method

Lecture 37 - Tutorial on Separation of variables method for wave equation

Lecture 38 - Qualitative analysis of Wave equation - Parallelogram identity

Lecture 39 - Qualitative analysis of Wave equation - Domain of dependence, domain of influence

Lecture 40 - Qualitative analysis of Wave equation - Causality Principle, Finite speed of propagation

Lecture 41 - Qualitative analysis of Wave equation - Uniqueness by Energy method

Lecture 42 - Qualitative analysis of Wave equation - Huygens Principle

Lecture 43 - Qualitative analysis of Wave equation - Generalized solutions to Wave equation

Lecture 44 - Qualitative analysis of Wave equation - Propagation of waves

Lecture 45 - Laplace equation - Associated Boundary value problems

Lecture 46 - Laplace equation - Fundamental solution

Lecture 47 - Dirichlet BVP for Laplace equation - Green's function and Poisson's formula

Lecture 48 - Laplace equation - Weak maximum principle and its applications

Lecture 49 - Laplace equation - Dirichlet BVP on a disk in R2 for Laplace equations

Lecture 50 - Tutorial 1 on Laplace equation

Lecture 51 - Laplace equation - Mean value property

Lecture 52 - Laplace equation - More qualitative properties

Lecture 53 - Laplace equation - Strong Maximum Principle and Dirichlet Principle

Lecture 54 - Tutorial 2 on Laplace equation

Lecture 55 - Cauchy Problem for Heat Equation - 1

Lecture 56 - Cauchy Problem for Heat Equation - 2

Lecture 57 - IBVP for Heat equation Subtitle: Method of Separation of Variables

Lecture 58 - Maximum principle for heat equation

Lecture 59 - Tutorial on heat equation

Lecture 60 - Heat equation Subheading : Infinite speed of propagation, Energy, Backward Problem

NPTEL : NOC:An Introduction to Point-Set-Topology - Part I (Mathematics)

Co-ordinators : Prof. Anant R Shastri

Lecture 1 - Introduction

Lecture 2 - Introduction

Lecture 3 - Introduction

Lecture 4 - Introduction

Lecture 5 - Introduction

Lecture 6 - Introduction

Lecture 7 - Introduction

Lecture 8 - Introduction

Lecture 9 - Introduction

Lecture 10 - Introduction

Lecture 11 - Introduction

Lecture 12 - Introduction

Lecture 13 - Introduction

Lecture 14 - Introduction

Lecture 15 - Introduction

Lecture 16 - Introduction

Lecture 17 - Introduction

Lecture 18 - Introduction

Lecture 19 - Introduction

Lecture 20 - Introduction

Lecture 21 - Introduction

Lecture 22 - Creating New Spaces

Lecture 23 - Creating New Spaces

Lecture 24 - Creating New Spaces

Lecture 25 - Creating New Spaces

Lecture 26 - Creating New Spaces

Lecture 27 - Creating New Spaces

Lecture 28 - Creating New Spaces

Lecture 29 - Creating New Spaces

Lecture 30 - Creating New Spaces

Lecture 31 - Creating New Spaces

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38 - Smallness Properties of Topological Spaces

Lecture 39 - Smallness Properties of Topological Spaces

Lecture 40 - Smallness Properties of Topological Spaces

Lecture 41 - Smallness Properties of Topological Spaces

Lecture 42 - Smallness Properties of Topological Spaces

Lecture 43 - Smallness Properties of Topological Spaces

Lecture 44 - Smallness Properties of Topological Spaces

Lecture 45 - Smallness Properties of Topological Spaces

Lecture 46 - Smallness Properties of Topological Spaces

Lecture 47 - Largeness properties

Lecture 48 - Largeness properties

Lecture 49 - Largeness properties

Lecture 50 - Largeness properties

Lecture 51 - Largeness properties

Lecture 52 - Largeness properties

Lecture 53 - Largeness properties

Lecture 54 - Largeness properties

Lecture 55 - Largeness properties

Lecture 56

Lecture 57

Lecture 58

Lecture 59

Lecture 60

Lecture 61

NPTEL : NOC:An Introduction to Point-Set-Topology - Part II (Mathematics)

Co-ordinators : Prof. Anant R Shastri

Lecture 1 - Welcome Speech

Lecture 2 - Preliminaries from Banach spaces

Lecture 3 - Differentiation on Banach spaces

Lecture 4 - Preliminaries from one-variable real analysis

Lecture 5 - Implicit and Inverse function theorems

Lecture 6 - Compact Hausdorff spaces

Lecture 7 - Local Compactness

Lecture 8 - Local Compactness (Continued...)

Lecture 9 - The retraction functor k(X)

Lecture 10 - Compactly generated spaces

Lecture 11 - Paracompactness

Lecture 12 - Partition of Unity

Lecture 13 - Paracompactness (Continued...)

Lecture 14 - Paracompactness (Continued...)

Lecture 15 - Various Notions of Compactness

Lecture 16 - Total Boundedness

Lecture 17 - Arzel`a- Ascoli Theorem

Lecture 18 - Generalities on Compactification

Lecture 19 - AlexandroffÃ¢'s compactifiction

Lecture 20 - Proper maps

Lecture 21 - Stone-Cech compactification

Lecture 22 - Stone-WeierstrassÃ¢'s Theorems

Lecture 23 - Real Stone-Weierstrass Theorem

Lecture 24 - Complex and extended Stone-Weierstrass theorem

Lecture 25 - (Missing)

Lecture 26 - UrysohnÃ¢'s Metrization theorem

Lecture 27 - Nagata Smyrnov Metrization theorem

Lecture 28 - Nets

Lecture 29 - Cofinal families subnets

Lecture 30 - Basics of Filters

Lecture 31 - Convergence Properties of Filters

Lecture 32 - Ultrafilters and TychonoffÃ¢'s theorem

Lecture 33 - Ultraclosed filters

Lecture 34 - Wallman compactification

Lecture 35 - Wallman compactification (Continued...)

Lecture 36 - Global Separation of Sets

Lecture 37 - More examples

Lecture 38 - Knaster-Kuratowski Example

Lecture 39 - Separation of Sets (Continued...)

Lecture 40 - Definition of dimension and examples

Lecture 41 - Dimensions of subspaces and Unions

Lecture 42 - Sum theorem for higher dimensions

Lecture 43 - Analytic Proof of BrouwerÃ¢'s Fixed Point Theorem

Lecture 44 - Local Separation to Global Separation

Lecture 45 - Partially Ordered sets

Lecture 46 - Principle of Transfinite Induction

Lecture 47 - Order topology

Lecture 48 - Ordinals

Lecture 49 - Ordinal Topology (Continued...)

Lecture 50 - The Long Line

Lecture 51 - Motivation and definition

Lecture 52 - The Exponential Correspondence

Lecture 53 - An Application to Quotient Maps

Lecture 54 - Groups of Homeomoprhisms

Lecture 55 - Definition and Exampels of Manifolds

Lecture 56 - Manifolds with Boundary

Lecture 57 - Homogeneity

Lecture 58 - Homogeneity (Continued...)

Lecture 59 - Classification of 1-dim. manifolds

Lecture 60 - Classification of 1-dim. Manifolds (Continued...)

Lecture 61 - Surfaces

Lecture 62 - Connected Sum

NPTEL : NOC:Fourier Analysis and its Applications (Mathematics)

Co-ordinators : Prof. G. K Srinivasan

Lecture 1 - Genesis and a little history

Lecture 2 - Basic convergence theorem

Lecture 3 - Riemann Lebesgue Lemma

Lecture 4 - The ubiquitous Gaussian

Lecture 5 - Jacobi theta function identity

Lecture 6 - The Riemann zeta function

Lecture 7 - Bessel's functions of the first kind

Lecture 8 - Least square approximation

Lecture 9 - Parseval formula. Isoperimetric theorem

Lecture 10 - Dirichlet problem for a disc

Lecture 11 - The Poisson kernel

Lecture 12 - Cesaro summability and Fejer's theorem

Lecture 13 - Fejer's theorem (Continued...)

Lecture 14 - Kronecker's theorem

Lecture 15 - Weyl's equidistribution theorem

Lecture 16 - Borel's theorem and beyond

Lecture 17 - Fourier transform and Schwartz space

Lecture 18 - Hermite's differential equation

Lecture 19 - Fourier inversion theorem Riemann Lebesgue lemma

Lecture 20 - Plancherel's Theorem

Lecture 21 - Heat equation. The heat kernel

Lecture 22 - The Airy's function

Lecture 23 - Exercises on Fourier Transform

Lecture 24 - Principle of equipartitioning of energy

Lecture 25 - A formula of Srinivasa Ramanujan

Lecture 26 - Sturm Liouville problems. Orthogonal systems

Lecture 27 - Vibrations of a circular membrane

Lecture 28 - Fourier Bessel Series

Lecture 29 - Properties of Legendre Polynomials

Lecture 30 - Properties of Legendre polynomials (Continued...)

Lecture 31 - Legendre polynomials - interlacing of zeros

Lecture 32 - Laplace's integrals for Legendre polynomials

Lecture 33 - Regular Sturm-Liouville problems

Lecture 34 - Variational properties of eigen-values

Lecture 35 - The Dirichlet principle

Lecture 36 - Regular Sturm-Liouville problems - Existence of eigen-values

Lecture 37 - The Bergman space

Lecture 38 - The Banach Steinhaus' Theorem

Lecture 39 - Hilbert space basics

Lecture 40 - Completeness of Hermite functions

Lecture 41 - Hermite, Laugerre and Tchebycheff's polynomials

Lecture 42 - Orthonormal bases in Hilbert spaces

Lecture 43 - Non-separable Hilbert-spaces. Almost periodic functions

Lecture 44 - Hilbert-Schmidt operators. Green's functions

Lecture 45 - Spectrum of a bounded linear operator

Lecture 46 - Weak (sequential) compactness of the closed unit ball

Lecture 47 - Compact self-adjoint operators. Existence of eigen values

Lecture 48 - Compact self-adjoint operators. Existence of eigen values (Continued...)

Lecture 49 - Celestial Mechanics

Lecture 50 - Inverting the Kepler equation using Fourier series

Lecture 51 - Odds and Ends

Lecture 52 - Dirichlet's Theorem on Fourier Series

Lecture 53 - Dirichlet's Theorem on Fourier Series (Continued...)

Lecture 54 - Topology on the Schwartz space

Lecture 55 - Examples of tempered distributions

Lecture 56 - Operations on distributions

Lecture 57 - Fourier Transform of tempered distribution

Lecture 58 - Support of a Distribution. Distributions with point support

Lecture 59 - Distributional solutions of ODEs. Continuity of the Fourier transform and differentiation

Lecture 60 - The Poisson summation formula

NPTEL : NOC:Numerical Analysis (2023) (Mathematics)

Co-ordinators : Prof. S. Baskar

Lecture 1 - Introduction

Lecture 2 - Mathematical Preliminaries: Taylor Approximation

Lecture 3 - Mathematical Preliminaries: Order of Convergence

Lecture 4 - Arithmetic Error: Floating-point Approximation

Lecture 5 - Arithmetic Error: Significant Digits

Lecture 6 - Arithmetic Error: Condition Number and Stable Computation

Lecture 7 - Tutorial Session-1: Problem Solving

Lecture 8 - Python Coding: Introduction

Lecture 9 - Linear Systems: Gaussian Elimination Method

Lecture 10 - Linear Systems: LU-Factorization (Doolittle and Crout)

Lecture 11 - Linear Systems: LU-Factorization (Cholesky)

Lecture 12 - Linear Systems: Operation Count for Direct Methods

Lecture 13 - Tutorial Session-2: Python Coding for Naive Gaussian Elimination Method

Lecture 14 - Tutorial Session-3: Python Coding for Thomas Algorithm

Lecture 15 - Matrix Norms: Subordinate Matrix Norms

Lecture 16 - Matrix Norms: Condition Number of a Matrix

Lecture 17 - Iterative Methods: Jacobi Method

Lecture 18 - Iterative Methods: Convergence of Jacobi Method

Lecture 19 - Iterative Methods: Gauss-Seidel Method

Lecture 20 - Iterative Methods: Convergence Analysis of Iterative Methods

Lecture 21 - Iterative Methods: Successive Over Relaxation Method

Lecture 22 - Tutorial Session-4: Python implementation of Jacobi Method

Lecture 23 - Eigenvalues and Eigenvectors: Power Method (Construction)

Lecture 24 - Eigenvalues and Eigenvectors: Power Method (Convergence Theorem)

Lecture 25 - Eigenvalues and Eigenvectors: Gerschgorin's Theorem and Applications

Lecture 26 - Eigenvalues and Eigenvectors: Power Method (Inverse and Shifted Methods)

Lecture 27 - Nonlinear Equations: Overview

Lecture 28 - Nonlinear Equations: Bisection Method

Lecture 29 - Tutorial Session-5: Implementation of Bisection Method

Lecture 30 - Nonlinear Equations: Regula-falsi and Secant Methods

Lecture 31 - Nonlinear Equations: Convergence Theorem of Secant Method

Lecture 32 - Nonlinear Equations: Newton-Raphson's method

Lecture 33 - Nonlinear Equations: Newton-Raphson's method (Convergence Theorem)

Lecture 34 - Nonlinear Equations: Fixed-point Iteration Methods

Lecture 35 - Nonlinear Equations: Fixed-point Iteration Methods (Convergence) and Modified Newton's Method

Lecture 36 - Nonlinear Equations: System of Nonlinear Equations

Lecture 37 - Nonlinear Equations: Implementation of Newton-Raphson's Method as Python Code

Lecture 38 - Polynomial Interpolation: Existence and Uniqueness

Lecture 39 - Polynomial Interpolation: Lagrange and Newton Forms

Lecture 40 - Polynomial Interpolation: Newtonâ€™s Divided Difference Formula

Lecture 41 - Polynomial Interpolation: Mathematical Error in Interpolating Polynomial

Lecture 42 - Polynomial Interpolation: Arithmetic Error in Interpolating Polynomials

Lecture 43 - Polynomial Interpolation: Implementation of Lagrange Form as Python Code

Lecture 44 - Polynomial Interpolation: Runge Phenomenon and Piecewise Polynomial Interpolation

Lecture 45 - Polynomial Interpolation: Hermite Interpolation

Lecture 46 - Polynomial Interpolation: Cubic Spline Interpolation

Lecture 47 - Polynomial Interpolation: Tutorial Session

Lecture 48 - Numerical Integration: Rectangle Rule

Lecture 49 - Numerical Integration: Trapezoidal Rule

Lecture 50 - Numerical Integration: Simpson's Rule

Lecture 51 - Numerical Integration: Gaussian Quadrature Rule

Lecture 52 - Numerical Integration: Tutorial Session

Lecture 53 - Numerical Differentiation: Primitive Finite Difference Formulae

Lecture 54 - Numerical Differentiation: Method of Undetermined Coefficients and Arithmetic Error

Lecture 55 - Numerical ODEs: Euler Methods

Lecture 56 - Numerical ODEs: Euler Methods (Error Analysis)

Lecture 57 - Numerical ODEs: Runge-Kutta Methods

Lecture 58 - Numerical ODEs: Modified Euler's Methods

Lecture 59 - Numerical ODEs: Multistep Methods

Lecture 60 - Numerical ODEs: Stability Analysis

Lecture 61 - Numerical ODEs: Two-point Boundary Value Problems

NPTEL : NOC:Point Set Topology (Mathematics)

Co-ordinators : Prof. Ronnie Sebastian

Lecture 1 - Definition and examples of topological spaces

Lecture 2 - Examples of topological spaces

Lecture 3 - Basis for topology

Lecture 4 - Subspace Topology

Lecture 5 - Product Topology

Lecture 6 - Product Topology (Continued...)

Lecture 7 - Continuous maps

Lecture 8 - Continuity of addition and multiplication maps

Lecture 9 - Continuous maps to a product

Lecture 10 - Projection from a point

Lecture 11 - Closed subsets

Lecture 12 - Closure

Lecture 13 - Joining continuous maps

Lecture 14 - Metric spaces

Lecture 15 - Connectedness

Lecture 16 - Connectedness (Continued...)

Lecture 17 - Connectedness (Continued...)

Lecture 18 - Connected components

Lecture 19 - Path connectedness

Lecture 20 - Path connectedness (Continued...)

Lecture 21 - Connectedness of GL(n,R)^+ (math symbol)

Lecture 22 - Connectedness of GL(n,C), SL(n,C), SL(n,R)

Lecture 23 - Compactness

Lecture 24 - Compactness (Continued...)

Lecture 25 - Compactness (Continued...)

Lecture 26 - Compactness (Continued...)

Lecture 27 - SO(n) is connected

Lecture 28 - Compact metric spaces

Lecture 29 - Lebesgue Number Lemma

Lecture 30 - Locally compact spaces

Lecture 31 - One point compactification

Lecture 32 - One point compactification (Continued...)

Lecture 33 - Uniqueness of one point compatification

Lecture 34 - Part 1 : Quotient topology

Lecture 35 - Part 2 : Quotient topology on G/H

Lecture 36 - Part 3 : Grassmannian

Lecture 37 - Normal topological spaces

Lecture 38 - Urysohn's Lemma

Lecture 39 - Tietze Extension Theorem

Lecture 40 - Regular and Second Countable spaces

Lecture 41 - Product Topology on mathbb{R}^{mathbb{N}}

Lecture 42 - Urysohn's Metrization Theorem

NPTEL : Stochastic Processes (Mathematics)

Co-ordinators : Dr. S. Dharmaraja

Lecture 1 - Introduction to Stochastic Processes

Lecture 2 - Introduction to Stochastic Processes (Continued.)

Lecture 3 - Problems in Random Variables and Distributions

Lecture 4 - Problems in Sequences of Random Variables

Lecture 5 - Definition, Classification and Examples

Lecture 6 - Simple Stochastic Processes

Lecture 7 - Stationary Processes

Lecture 8 - Autoregressive Processes

Lecture 9 - Introduction, Definition and Transition Probability Matrix

Lecture 10 - Chapman-Kolmogrov Equations

Lecture 11 - Classification of States and Limiting Distributions

Lecture 12 - Limiting and Stationary Distributions

Lecture 13 - Limiting Distributions, Ergodicity and Stationary Distributions

Lecture 14 - Time Reversible Markov Chain, Application of Irreducible Markov Chain in Queueing Models

Lecture 15 - Reducible Markov Chains

Lecture 16 - Definition, Kolmogrov Differential Equations and Infinitesimal Generator Matrix

Lecture 17 - Limiting and Stationary Distributions, Birth Death Processes

Lecture 18 - Poisson Processes

Lecture 19 - M/M/1 Queueing Model

Lecture 20 - Simple Markovian Queueing Models

Lecture 21 - Queueing Networks

Lecture 22 - Communication Systems

Lecture 23 - Stochastic Petri Nets

Lecture 24 - Conditional Expectation and Filtration

Lecture 25 - Definition and Simple Examples

Lecture 26 - Definition and Properties

Lecture 27 - Processes Derived from Brownian Motion

Lecture 28 - Stochastic Differential Equations

Lecture 29 - Ito Integrals

Lecture 30 - Ito Formula and its Variants

Lecture 31 - Some Important SDE`s and Their Solutions

Lecture 32 - Renewal Function and Renewal Equation

Lecture 33 - Generalized Renewal Processes and Renewal Limit Theorems

Lecture 34 - Markov Renewal and Markov Regenerative Processes

Lecture 35 - Non Markovian Queues

Lecture 36 - Non Markovian Queues Cont,,

Lecture 37 - Application of Markov Regenerative Processes

Lecture 38 - Galton-Watson Process

Lecture 39 - Markovian Branching Process

NPTEL : NOC:Stochastic Processes - 1 (Mathematics)

Co-ordinators : Dr. S. Dharmaraja

Lecture 1 - Introduction and motivation for studying stochastic processes

Lecture 2 - Probability space and conditional probability

Lecture 3 - Random variable and cumulative distributive function

Lecture 4 - Discrete Uniform Distribution, Binomial Distribution, Geometric Distribution, Continuous Uniform Distribution, Exponential Distribution, Normal Distribution and Poisson Distribution

Lecture 5 - Joint Distribution of Random Variables

Lecture 6 - Independent Random Variables, Covariance and Correlation Coefficient and Conditional Distribution

Lecture 7 - Conditional Expectation and Covariance Matrix

Lecture 8 - Generating Functions, Law of Large Numbers and Central Limit Theorem

Lecture 9 - Problems in Random variables and Distributions

Lecture 10 - Problems in Random variables and Distributions (Continued...)

Lecture 11 - Problems in Random variables and Distributions (Continued...)

Lecture 12 - Problems in Random variables and Distributions (Continued...)

Lecture 13 - Problems in Sequences of Random Variables

Lecture 14 - Problems in Sequences of Random Variables (Continued...)

Lecture 15 - Problems in Sequences of Random Variables (Continued...)

Lecture 16 - Problems in Sequences of Random Variables (Continued...)

Lecture 17 - Definition of Stochastic Processes, Parameter and State Spaces

Lecture 18 - Classification of Stochastic Processes

Lecture 19 - Examples of Classification of Stochastic Processes

Lecture 20 - Examples of Classification of Stochastic Processes (Continued...)

Lecture 21 - Bernoulli Process

Lecture 22 - Poisson Process

Lecture 23 - Poisson Process (Continued...)

Lecture 24 - Simple Random Walk and Population Processes

Lecture 25 - Introduction to Discrete time Markov Chain

Lecture 26 - Introduction to Discrete time Markov Chain (Continued...)

Lecture 27 - Examples of Discrete time Markov Chain

Lecture 28 - Examples of Discrete time Markov Chain (Continued...)

Lecture 29 - Introduction to Chapman-Kolmogorov equations

Lecture 30 - State Transition Diagram and Examples

Lecture 31 - Examples

Lecture 32 - Introduction to Classification of States and Periodicity

Lecture 33 - Closed set of States and Irreducible Markov Chain

Lecture 34 - First Passage time and Mean Recurrence Time

Lecture 35 - Recurrent State and Transient State

Lecture 36 - Introduction and example of Classification of states

Lecture 37 - Example of Classification of states (Continued...)

Lecture 38 - Example of Classification of states (Continued...)

Lecture 39 - Example of Classification of states (Continued...)

Lecture 40 - Introduction and Limiting Distribution

Lecture 41 - Example of Limiting Distribution and Ergodicity

Lecture 42 - Stationary Distribution and Examples

Lecture 43 - Examples of Stationary Distributions

Lecture 44 - Time Reversible Markov Chain and Examples

Lecture 45 - Definition of Reducible Markov Chains and Types of Reducible Markov Chains

Lecture 46 - Stationary Distributions and Types of Reducible Markov chains

Lecture 47 - Type of Reducible Markov Chains (Continued...)

Lecture 48 - Gambler's Ruin Problem

Lecture 49 - Introduction to Continuous time Markov Chain

Lecture 50 - Waiting time Distribution

Lecture 51 - Chapman-Kolmogorov Equation

Lecture 52 - Infinitesimal Generator Matrix

Lecture 53 - Introduction and Example Of Continuous time Markov Chain

Lecture 54 - Limiting and Stationary Distributions

Lecture 55 - Time reversible CTMC and Birth Death Process

Lecture 56 - Steady State Distributions, Pure Birth Process and Pure Death Process

Lecture 57 - Introduction to Poisson Process

Lecture 58 - Definition of Poisson Process

Lecture 59 - Superposition and Deposition of Poisson Process

Lecture 60 - Compound Poisson Process and Examples

Lecture 61 - Introduction to Queueing Systems and Kendall Notations

Lecture 62 - M/M/1 Queueing Model

Lecture 63 - Little's Law, Distribution of Waiting Time and Response Time

Lecture 64 - Burke's Theorem and Simulation of M/M/1 queueing Model

Lecture 65 - M/M/c Queueing Model

Lecture 66 - M/M/1/N Queueing Model

Lecture 67 - M/M/c/K Model, M/M/c/c Loss System, M/M/? Self Service System

Lecture 68 - Transient Solution of Finite Birth Death Process and Finite Source Markovian Queueing Model

Lecture 69 - Queueing Networks Characteristics and Types of Queueing Networks

Lecture 70 - Tandem Queueing Networks

Lecture 71 - Stationary Distribution and Open Queueing Network

Lecture 72 - Jackson's Theorem, Closed Queueing Networks, Gordon and Newell Results

Lecture 73 - Wireless Handoff Performance Model and System Description

Lecture 74 - Description of 3G Cellular Networks and Queueing Model

Lecture 75 - Simulation of Queueing Systems

Lecture 76 - Definition and Basic Components of Petri Net and Reachability Analysis

Lecture 77 - Arc Extensions in Petri Net, Stochastic Petri Nets and examples

NPTEL : NOC:Stochastic Processes (Mathematics)

Co-ordinators : Dr. S. Dharmaraja

Lecture 1 - Introduction and motivation for studying stochastic processes

Lecture 2 - Probability space and conditional probability

Lecture 3 - Random variable and cumulative distributive function

Lecture 4 - Discrete Uniform Distribution, Binomial Distribution, Geometric Distribution, Continuous Uniform Distribution, Exponential Distribution, Normal Distribution and Poisson Distribution

Lecture 5 - Joint Distribution of Random Variables

Lecture 6 - Independent Random Variables, Covariance and Correlation Coefficient and Conditional Distribution

Lecture 7 - Conditional Expectation and Covariance Matrix

Lecture 8 - Generating Functions, Law of Large Numbers and Central Limit Theorem

Lecture 9 - Problems in Random variables and Distributions

Lecture 10 - Problems in Random variables and Distributions (Continued...)

Lecture 11 - Problems in Random variables and Distributions (Continued...)

Lecture 12 - Problems in Random variables and Distributions (Continued...)

Lecture 13 - Problems in Sequences of Random Variables

Lecture 14 - Problems in Sequences of Random Variables (Continued...)

Lecture 15 - Problems in Sequences of Random Variables (Continued...)

Lecture 16 - Problems in Sequences of Random Variables (Continued...)

Lecture 17 - Definition of Stochastic Processes, Parameter and State Spaces

Lecture 18 - Classification of Stochastic Processes

Lecture 19 - Examples of Discrete Time Markov Chain

Lecture 20 - Examples of Discrete Time Markov Chain (Continued...)

Lecture 21 - Bernoulli Process

Lecture 22 - Poisson Process

Lecture 23 - Poisson Process (Continued...)

Lecture 24 - Simple Random Walk and Population Processes

Lecture 25 - Introduction to Discrete time Markov Chain

Lecture 26 - Introduction to Discrete time Markov Chain (Continued...)

Lecture 27 - Examples of Discrete time Markov Chain

Lecture 28 - Examples of Discrete time Markov Chain (Continued...)

Lecture 29 - Introduction to Chapman-Kolmogorov equations

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Lecture 31 - Examples

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Lecture 33 - Closed set of States and Irreducible Markov Chain

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Lecture 35 - Recurrent State and Transient State

Lecture 36 - Introduction and example of Classification of states

Lecture 37 - Example of Classification of states (Continued...)

Lecture 38 - Example of Classification of states (Continued...)

Lecture 39 - Example of Classification of states (Continued...)

Lecture 40 - Introduction and Limiting Distribution

Lecture 41 - Example of Limiting Distribution and Ergodicity

Lecture 42 - Stationary Distribution and Examples

Lecture 43 - Examples of Stationary Distributions

Lecture 44 - Time Reversible Markov Chain and Examples

Lecture 45 - Definition of Reducible Markov Chains and Types of Reducible Markov Chains

Lecture 46 - Stationary Distributions and Types of Reducible Markov chains

Lecture 47 - Type of Reducible Markov Chains (Continued...)

Lecture 48 - Gambler's Ruin Problem

Lecture 49 - Introduction to Continuous time Markov Chain

Lecture 50 - Waiting time Distribution

Lecture 51 - Chapman-Kolmogorov Equation

Lecture 52 - Infinitesimal Generator Matrix

Lecture 53 - Introduction and Example Of Continuous time Markov Chain

Lecture 54 - Limiting and Stationary Distributions

Lecture 55 - Time reversible CTMC and Birth Death Process

Lecture 56 - Steady State Distributions, Pure Birth Process and Pure Death Process

Lecture 57 - Introduction to Poisson Process

Lecture 58 - Definition of Poisson Process

Lecture 59 - Superposition and Deposition of Poisson Process

Lecture 60 - Compound Poisson Process and Examples

Lecture 61 - Introduction to Queueing Systems and Kendall Notations

Lecture 62 - M/M/1 Queueing Model

Lecture 63 - Little's Law, Distribution of Waiting Time and Response Time

Lecture 64 - Burke's Theorem and Simulation of M/M/1 queueing Model

Lecture 65 - M/M/c Queueing Model

Lecture 66 - M/M/1/N Queueing Model

Lecture 67 - M/M/c/K Model, M/M/c/c Loss System, M/M/? Self Service System

Lecture 68 - Transient Solution of Finite Birth Death Process and Finite Source Markovian Queueing Model

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Lecture 75 - Simulation of Queueing Systems

Lecture 76 - Definition and Basic Components of Petri Net and Reachability Analysis

Lecture 77 - Arc Extensions in Petri Net, Stochastic Petri Nets and examples

Lecture 78 - Generalized Stochastic Petri Net

Lecture 79 - Generalized Stochastic Petri Net (Continued...)

Lecture 80 - Conditional Expectation and Examples

Lecture 81 - Filtration in Discrete time

Lecture 82 - Remarks of Conditional Expectation and Adaptabilty

Lecture 83 - Definition and Examples of Martingale

Lecture 84 - Examples of Martingale (Continued...)

Lecture 85 - Examples of Martingale (Continued...)

Lecture 86 - Doob's Martingale Process, Sub martingale and Super Martingale

Lecture 87 - Definition of Brownian Motion

Lecture 88 - Definition of Brownian Motion (Continued...)

Lecture 89 - Properties of Brownian Motion

Lecture 90 - Processes Derived from Brownian Motion

Lecture 91 - Processes Derived from Brownian Motion (Continued...)

Lecture 92 - Processes Derived from Brownian Motion (Continued...)

Lecture 93 - Stochastic Differential Equations

Lecture 94 - Stochastic Differential Equations (Continued...)

Lecture 95 - Stochastic Differential Equations (Continued...)

Lecture 96 - Ito Integrals

Lecture 97 - Ito Integrals (Continued...)

Lecture 98 - Ito Integrals (Continued...)

Lecture 99 - Renewal Function and Renewal Equation

Lecture 100 - Renewal Function and Renewal Equation (Continued...)

Lecture 101 - Renewal Function and Renewal Equation (Continued...)

Lecture 102 - Generalized Renewal Processes and Renewal Limit Theorems

Lecture 103 - Generalized Renewal Processes and Renewal Limit Theorems (Continued...)

Lecture 104 - Generalized Renewal Processes and Renewal Limit Theorems (Continued...)

Lecture 105 - Markov Renewal and Markov Regenerative Processes

Lecture 106 - Markov Renewal and Markov Regenerative Processes (Continued...)

Lecture 107 - Markov Renewal and Markov Regenerative Processes (Continued...)

Lecture 108 - Markov Renewal and Markov Regenerative Processes (Continued...)

Lecture 109 - Non Markovian Queues

Lecture 110 - Non Markovian Queues (Continued...)

Lecture 111 - Non Markovian Queues (Continued...)

Lecture 112 - Stationary Processes

Lecture 113 - Stationary Processes (Continued...)

Lecture 114 - Stationary Processes (Continued...)

Lecture 115 - Stationary Processes (Continued...) and Ergodicity

Lecture 116 - G1/M/1 queue

Lecture 117 - G1/M/1 queue (Continued...)

Lecture 118 - G1/M/1/N queue and examples

Lecture 119 - Galton-Watson Process

Lecture 120 - Examples and Theorems

Lecture 121 - Theorems and Examples (Continued...)

Lecture 122 - Markov Branching Process

Lecture 123 - Markov Branching Process Theorems and Properties

Lecture 124 - Markov Branching Process Theorems and Properties (Continued...)

NPTEL : NOC:Chaotic Dynamical Systems (Mathematics)

Co-ordinators : Dr. Anima Nagar

Lecture 1 - The beginning

Lecture 2 - Elementary Concepts

Lecture 3 - Elementary Concepts (Continued...)

Lecture 4 - More on orbits

Lecture 5 - Peiods of Periodic Points

Lecture 6 - Scrambled Sets

Lecture 7 - Sensitive Dependence on Initial Conditions

Lecture 8 - A Population Dynamics Model

Lecture 9 - Bifurcations

Lecture 10 - Nonlinear Systems

Lecture 11 - Horseshoe Attractor

Lecture 12 - Dynamics of the Horseshoe Attractor

Lecture 13 - Recurrence

Lecture 14 - Recurrence (Continued...)

Lecture 15 - Transitivity

Lecture 16 - Devaneyâ€™s Chaos

Lecture 17 - Transitivity = Chaos on Intervals

Lecture 18 - Stronger forms of Transitivity

Lecture 19 - Chaotic Properties of Mixing Systems

Lecture 20 - Weakly Mixing and Chaos

Lecture 21 - Strongly Transitive Systems

Lecture 22 - Strongly Transitive Systems (Continued...)

Lecture 23 - Introduction to Symbolic Dynamics

Lecture 24 - Shift Spaces

Lecture 25 - Subshifts of Finite Type

Lecture 26 - Subshifts of Finite Type (Continued...), Chatoic Dynamical Systems

Lecture 27 - Measuring Chaos - Topological Entropy

Lecture 28 - Topological Entropy - Adlerâ€™s Version

Lecture 29 - Bowenâ€™s Definition of Topological Entropy

Lecture 30 - Equivalance of the two definitions of Topological Entropy

Lecture 31 - Linear Systems in Two Dimentions

Lecture 32 - Asymptotic Properties of Orbits of Linear Transformation in IR2

Lecture 33 - Hyperbolic Toral Automorphisms

Lecture 34 - Chaos in Toral Automorphisms

Lecture 35 - Chaotic Attractors of Henon Maps

NPTEL : NOC:Introduction to Probability Theory and Stochastic Processes (Mathematics)

Co-ordinators : Dr. S. Dharmaraja

Lecture 1 - Random experiment, sample space, axioms of probability, probability space

Lecture 2 - Random experiment, sample space, axioms of probability, probability space (Continued...)

Lecture 3 - Random experiment, sample space, axioms of probability, probability space (Continued...)

Lecture 4 - Conditional probability, independence of events.

Lecture 5 - Multiplication rule, total probability rule, Bayes's theorem.

Lecture 6 - Definition of Random Variable, Cumulative Distribution Function

Lecture 7 - Definition of Random Variable, Cumulative Distribution Function (Continued...)

Lecture 8 - Definition of Random Variable, Cumulative Distribution Function (Continued...)

Lecture 9 - Type of Random Variables, Probability Mass Function, Probability Density Function

Lecture 10 - Type of Random Variables, Probability Mass Function, Probability Density Function (Continued...)

Lecture 11 - Distribution of Function of Random Variables

Lecture 12 - Mean and Variance

Lecture 13 - Mean and Variance (Continued...)

Lecture 14 - Higher Order Moments and Moments Inequalities

Lecture 15 - Higher Order Moments and Moments Inequalities (Continued...)

Lecture 16 - Generating Functions

Lecture 17 - Generating Functions (Continued...)

Lecture 18 - Common Discrete Distributions

Lecture 19 - Common Discrete Distributions (Continued...)

Lecture 20 - Common Continuous Distributions

Lecture 21 - Common Continuous Distributions (Continued...)

Lecture 22 - Applications of Random Variable

Lecture 23 - Applications of Random Variable (Continued...)

Lecture 24 - Random vector and joint distribution

Lecture 25 - Joint probability mass function

Lecture 26 - Joint probability density function

Lecture 27 - Independent random variables

Lecture 28 - Independent random variables (Continued...)

Lecture 29 - Functions of several random variables

Lecture 30 - Functions of several random variables (Continued...)

Lecture 31 - Some important results

Lecture 32 - Order statistics

Lecture 33 - Conditional distributions

Lecture 34 - Random sum

Lecture 35 - Moments and Covariance

Lecture 36 - Variance Covariance matrix

Lecture 37 - Multivariate Normal distribution

Lecture 38 - Probability generating function and Moment generating function

Lecture 39 - Correlation coefficient

Lecture 40 - Conditional Expectation

Lecture 41 - Conditional Expectation (Continued...)

Lecture 42 - Modes of Convergence

Lecture 43 - Mode of Convergence (Continued...)

Lecture 44 - Law of Large Numbers

Lecture 45 - Central Limit Theorem

Lecture 46 - Central Limit Theorem (Continued...)

Lecture 47 - Motivation for Stochastic Processes

Lecture 48 - Definition of a Stochastic Process

Lecture 49 - Classification of Stochastic Processes

Lecture 50 - Examples of Stochastic Process

Lecture 51 - Examples Of Stochastic Process (Continued...)

Lecture 52 - Bernoulli Process

Lecture 53 - Poisson Process

Lecture 54 - Poisson Process (Continued...)

Lecture 55 - Simple Random Walk

Lecture 56 - Time Series and Related Definitions

Lecture 57 - Strict Sense Stationary Process

Lecture 58 - Wide Sense Stationary Process and Examples

Lecture 59 - Examples of Stationary Processes (Continued...)

Lecture 60 - Discrete Time Markov Chain (DTMC)

Lecture 61 - DTMC (Continued...)

Lecture 62 - Examples of DTMC

Lecture 63 - Examples of DTMC (Continued...)

Lecture 64 - Chapman-Kolmogorov equations and N-step transition matrix

Lecture 65 - Examples based on N-step transition matrix

Lecture 66 - Examples (Continued...)

Lecture 67 - Classification of states

Lecture 68 - Classification of states (Continued...)

Lecture 69 - Calculation of N-Step - 9

Lecture 70 - Calculation of N-Step - 10

Lecture 71 - Limiting and Stationary distributions

Lecture 72 - Limiting and Stationary distributions (Continued...)

Lecture 73 - Continuous time Markov chain (CTMC)

Lecture 74 - CTMC (Continued...)

Lecture 75 - State transition diagram and Chapman-Kolmogorov equation

Lecture 76 - Infinitesimal generator and Kolmogorov differential equations

Lecture 77 - Limiting distribution

Lecture 78 - Limiting and Stationary distributions - 1

Lecture 79 - Birth death process

Lecture 80 - Birth death process (Continued...)

Lecture 81 - Poisson process - 1

Lecture 82 - Poisson process (Continued...)

Lecture 83 - Poisson process (Continued...)

Lecture 84 - Non-homogeneous and compound Poisson process

Lecture 85 - Introduction to Queueing Models and Kendall Notation

Lecture 86 - M/M/1 Queueing Model

Lecture 87 - M/M/1 Queueing Model (Continued...)

Lecture 88 - M/M/1 Queueing Model and Burke's Theorem

Lecture 89 - M/M/c Queueing Model

Lecture 90 - M/M/c (Continued...) and M/M/1/N Model

Lecture 91 - Other Markovian Queueing Models

Lecture 92 - Transient Solution of Finite Capacity Markovian Queues

NPTEL : NOC:Statistical Inference (Mathematics)

Co-ordinators : Prof. Nilladri Chaterjee

Lecture 1 - Statistical Inference - 1

Lecture 2 - Statistical Inference - 2

Lecture 3 - Statistical Inference - 3

Lecture 4 - Statistical Inference - 4

Lecture 5 - Statistical Inference - 5

Lecture 6 - Statistical Inference - 6

Lecture 7 - Statistical Inference - 7

Lecture 8 - Statistical Inference - 8

Lecture 9 - Statistical Inference - 9

Lecture 10 - Statistical Inference - 10

Lecture 11 - Statistical Inference - 11

Lecture 12 - Statistical Inference - 12

Lecture 13 - Statistical Inference - 13

Lecture 14 - Statistical Inference - 14

Lecture 15 - Statistical Inference - 15

Lecture 16 - Stasistical Inference - 16

Lecture 17 - Stasistical Inference - 17

Lecture 18 - Statistical Inference - 18

Lecture 19 - Stasistical Inference - 19

Lecture 20 - Stasistical Inference - 20

Lecture 21 - Stasistical Inference - 21

NPTEL : NOC:Integral Transforms and their Applications (Mathematics)

Co-ordinators : Prof. Sarthok Sircar

Lecture 1 - Introduction to Fourier Transforms - Part 1

Lecture 2 - Introduction to Fourier Transforms - Part 2

Lecture 3 - Introduction to Fourier Transforms - Part 3

Lecture 4 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 1

Lecture 5 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 2

Lecture 6 - Properties of Fourier transforms, Shannon Sampling Theorem, Gibb's Phenomena - Part 3

Lecture 7 - Applications of Fourier Transforms - Part 1

Lecture 8 - Applications of Fourier Transforms - Part 2

Lecture 9 - Applications of Fourier Transforms - Part 3

Lecture 10 - Introduction to Laplace Transforms - Part 1

Lecture 11 - Introduction to Laplace Transforms - Part 2

Lecture 12 - Introduction to Laplace Transforms - Part 3

Lecture 13 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 1

Lecture 14 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 2

Lecture 15 - Inverse Laplace Transform, Initial and Final Value Theorems - Part 3

Lecture 16 - Applications of Laplace Transforms - Part 1

Lecture 17 - Applications of Laplace Transforms - Part 2

Lecture 18 - Applications of Laplace Transforms - Part 3

Lecture 19 - Applications of Laplace Transforms (Continued) - Part 1

Lecture 20 - Applications of Laplace Transforms (Continued) - Part 2

Lecture 21 - Applications of Laplace Transforms (Continued) - Part 3

Lecture 22 - Applications of Fourier-Laplace Transforms - Part 1

Lecture 23 - Applications of Fourier-Laplace Transforms - Part 2

Lecture 24 - Applications of Fourier-Laplace Transforms - Part 3

Lecture 25 - Introduction to Hankel Transforms - Part 1

Lecture 26 - Introduction to Hankel Transforms - Part 2

Lecture 27 - Introduction to Hankel Transforms - Part 3

Lecture 28 - Introduction to Mellin Transforms - Part 1

Lecture 29 - Introduction to Mellin Transforms - Part 2

Lecture 30 - Introduction to Mellin Transforms - Part 3

Lecture 31 - Introduction to Hilbert Transforms - Part 1

Lecture 32 - Introduction to Hilbert Transforms - Part 2

Lecture 33 - Introduction to Hilbert Transforms - Part 3

Lecture 34 - Applications of Hilbert Transfroms, Introduction to Stieltjes Transform - Part 1

Lecture 35 - Applications of Hilbert Transfroms, Introduction to Stieltjes Transform - Part 2

Lecture 36 - Applications of Hilbert Transfroms, Introduction to Stieltjes Transform - Part 3

Lecture 37 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 1

Lecture 38 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 2

Lecture 39 - Applications of Stieltjes Transform, Generalized Stieltjes Transform - Part 3

Lecture 40 - Introduction to Legendre Transform - Part 1

Lecture 41 - Introduction to Legendre Transform - Part 2

Lecture 42 - Introduction to Legendre Transform - Part 3

Lecture 43 - Introduction to Z-transform - Part 1

Lecture 44 - Introduction to Z-transform - Part 2

Lecture 45 - Introduction to Z-transform - Part 3

Lecture 46 - Inverse Z-transfrom, Applciations of Z-Transform - Part 1

Lecture 47 - Inverse Z-transfrom, Applciations of Z-Transform - Part 2

Lecture 48 - Inverse Z-transfrom, Applciations of Z-Transform - Part 3

Lecture 49 - Introduction to Radon Transform - Part 1

Lecture 50 - Introduction to Radon Transform - Part 2

Lecture 51 - Introduction to Radon Transform - Part 3

Lecture 52 - Inverse Radon Transform, Applications to Radon Transform - Part 1

Lecture 53 - Inverse Radon Transform, Applications to Radon Transform - Part 2

Lecture 54 - Inverse Radon Transform, Applications to Radon Transform - Part 3

Lecture 55 - Introduction to Fractional Calculus - Part 1

Lecture 56 - Introduction to Fractional Calculus - Part 2

Lecture 57 - Introduction to Fractional Calculus - Part 3

Lecture 58 - Fractional ODEs, Abel's Integral Equations - Part 1

Lecture 59 - Fractional ODEs, Abel's Integral Equations - Part 2

Lecture 60 - Fractional ODEs, Abel's Integral Equations - Part 3

Lecture 61 - Fractional PDEs - Part 1

Lecture 62 - Fractional PDEs - Part 2

Lecture 63 - Fractional PDEs - Part 3

Lecture 64 - Fractional ODEs and PDEs (Continued) - Part 1

Lecture 65 - Fractional ODEs and PDEs (Continued) - Part 2

Lecture 66 - Fractional ODEs and PDEs (Continued) - Part 3

Lecture 67 - Introduction to Wavelet Transform - Part 1

Lecture 68 - Introduction to Wavelet Transform - Part 2

Lecture 69 - Introduction to Wavelet Transform - Part 3

Lecture 70 - Discrete Haar, Shanon and Debauchies Wavelet - Part 1

Lecture 71 - Discrete Haar, Shanon and Debauchies Wavelet - Part 2

Lecture 72 - Discrete Haar, Shanon and Debauchies Wavelet - Part 3

NPTEL : NOC:Introduction to Fuzzy Set Theory, Arithmetic and Logic (Mathematics)

Co-ordinators : Prof. Nilladri Chaterjee

Lecture 1 - Fuzzy Sets Arithmetic and Logic - 1

Lecture 2 - Fuzzy Sets Arithmetic and Logic - 2

Lecture 3 - Fuzzy Sets Arithmetic and Logic - 3

Lecture 4 - Fuzzy Sets Arithmetic and Logic - 4

Lecture 5 - Fuzzy Sets Arithmetic and Logic - 5

Lecture 6 - Fuzzy Sets Arithmetic and Logic - 6

Lecture 7 - Fuzzy Sets Arithmetic and Logic - 7

Lecture 8 - Fuzzy Sets Arithmetic and Logic - 8

Lecture 9 - Fuzzy Sets Arithmetic and Logic - 9

Lecture 10 - Fuzzy Sets Arithmetic and Logic - 10

Lecture 11 - Fuzzy Sets Arithmetic and Logic - 11

Lecture 12 - Fuzzy Sets Arithmetic and Logic - 12

Lecture 13 - Fuzzy Sets Arithmetic and Logic - 13

Lecture 14 - Fuzzy Sets Arithmetic and Logic - 14

Lecture 15 - Fuzzy Sets Arithmetic and Logic - 15

Lecture 16 - Fuzzy Sets Arithmetic and Logic - 16

Lecture 17 - Fuzzy Sets Arithmetic and Logic - 17

Lecture 18 - Fuzzy Sets Arithmetic and Logic - 18

Lecture 19 - Fuzzy Sets Arithmetic and Logic - 19

Lecture 20 - Fuzzy Sets Arithmetic and Logic - 20

Lecture 21 - Fuzzy Sets Arithmetic and Logic - 21

Lecture 22 - Fuzzy Sets Arithmetic and Logic - 22

Lecture 23 - Fuzzy Sets Arithmetic and Logic - 23

Lecture 24 - Fuzzy Sets Arithmetic and Logic - 24

Lecture 25 - Fuzzy Sets Arithmetic and Logic - 25

Lecture 26 - Fuzzy Sets Arithmetic and Logic - 26

Lecture 27 - Fuzzy Sets Arithmetic and Logic - 27

Lecture 28 - Fuzzy Sets Arithmetic and Logic - 28

Lecture 29 - Fuzzy Sets Arithmetic and Logic - 29

Lecture 30 - Fuzzy Sets Arithmetic and Logic - 30

NPTEL : NOC:Introduction to Methods of Applied Mathematics (Mathematics)

Co-ordinators : Prof. Vivek Kumar Aggarwal

Lecture 1 - Introduction to First Order Differential Equations

Lecture 2 - Introduction to First Order Differential Equations (Continued...)

Lecture 3 - Introduction to Second Order Linear Differential Equations

Lecture 4 - Second Order Linear Differential Equations With Constant Coefficients

Lecture 5 - Second Order Linear Differential Equations With Constant Coefficients (Continued...)

Lecture 6 - Second Order Linear Differential Equations With Variable Coefficients

Lecture 7 - Factorization of Second order Differential Operator and Euler Cauchy Equation

Lecture 8 - Power Series Solution of General Differential Equation

Lecture 9 - Green's function

Lecture 10 - Method of Green's Function for Solving Initial Value and Boundary Value Problems

Lecture 11 - Adjoint Linear Differential Operator

Lecture 12 - Adjoint Linear Differential Operator (Continued...)

Lecture 13 - Sturm-Liouvile Problems

Lecture 14 - Laplace transformation

Lecture 15 - Laplace transformation (Continued...)

Lecture 16 - Laplace Transform Method for Solving Ordinary Differential Equations

Lecture 17 - Laplace Transform Applied to Differential Equations and Convolution

Lecture 18 - Fourier Series

Lecture 19 - Fourier Series (Continued...)

Lecture 20 - Gibbs Phenomenon and Parseval's Identity

Lecture 21 - Fourier Integral and Fourier Transform

Lecture 22 - Fourier Integral and Fourier Transform (Continued...)

Lecture 23 - Fourier Transform Method for Solving Ordinary Differential Equations

Lecture 24 - Frames, Riesz Bases and Orthonormal Bases

Lecture 25 - Frames, Riesz Bases and Orthonormal Bases (Continued...)

Lecture 26 - Fourier Series and Fourier Transform

Lecture 27 - Time-Frequency Analysis and Gabor Transform

Lecture 28 - Window Fourier Transform and Multiresolution Analysis

Lecture 29 - Construction of Scaling Functions and Wavelets Using Multiresolution Analysis

Lecture 30 - Daubechies Wavelet

Lecture 31 - Daubechies Wavelet (Continued...)

Lecture 32 - Wavelet Transform and Shannon Wavelet

NPTEL : NOC:Advanced Probability Theory (Mathematics)

Co-ordinators : Prof. Niladri Chatterjee

Lecture 1 - Advanced Probability Theory

Lecture 2 - Advanced Probability Theory

Lecture 3 - Advanced Probability Theory

Lecture 4 - Advanced Probability Theory

Lecture 5 - Advanced Probability Theory

Lecture 6 - Advanced Probability Theory

Lecture 7 - Advanced Probability Theory

Lecture 8 - Advanced Probability Theory

Lecture 9 - Advanced Probability Theory

Lecture 10 - Advanced Probability Theory

Lecture 11 - Advanced Probability Theory

Lecture 12 - Advanced Probability Theory

Lecture 13 - Advanced Probability Theory

Lecture 14 - Advanced Probability Theory

Lecture 15 - Advanced Probability Theory

Lecture 16 - Advanced Probability Theory

Lecture 17 - Advanced Probability Theory

Lecture 18 - Advanced Probability Theory

Lecture 19 - Advanced Probability Theory

Lecture 20 - Advanced Probability Theory

Lecture 21 - Advanced Probability Theory

Lecture 22 - Advanced Probability Theory

Lecture 23 - Advanced Probability Theory

Lecture 24 - Advanced Probability Theory

Lecture 25 - Advanced Probability Theory

Lecture 26 - Advanced Probability Theory

Lecture 27 - Advanced Probability Theory

Lecture 28 - Advanced Probability Theory

Lecture 29 - Advanced Probability Theory

Lecture 30 - Advanced Probability Theory

NPTEL : NOC:Scientific Computing using Matlab (Mathematics)

Co-ordinators : Prof. Vivek Kumar Aggarwal, Prof. Mani Mehra

Lecture 1 - Introduction to Matlab

Lecture 2 - Plotting of Functions in Matlab

Lecture 3 - Symbolic Computation in Matlab

Lecture 4 - Functions definition in Matlab

Lecture 5 - In continuation of basics of Matlab

Lecture 6 - In continuation of basics of Matlab (Continued...)

Lecture 7 - Floating point representation of a number

Lecture 8 - Errors arithmetic

Lecture 9 - Iterative method for solving nonlinear equations

Lecture 10 - Bisection method for solving nonlinear equations

Lecture 11 - Order of Convergence of an Iterative Method

Lecture 12 - Regula-Falsi and Secant Method for Solving Nonlinear Equations

Lecture 13 - Raphson method for solving nonlinear equations

Lecture 14 - Newton-Raphson Method for Solving Nonlinear System of Equations

Lecture 15 - Matlab Code for Fixed Point Iteration Method

Lecture 16 - Matlab Code for Newton-Raphson and Regula-Falsi Method

Lecture 17 - Matlab Code for Newton Method for Solving System of Equations

Lecture 18 - Linear System of Equations

Lecture 19 - Linear System of Equations (Continued...)

Lecture 20 - Gauss Elimination Method for solving Linear System of Equation

Lecture 21 - Matlab Code for Gauss Elimination Method

Lecture 22 - LU Decomposition Method for Solving Linear System of Equations

Lecture 23 - LU Decomposition Method for Solving Linear System of Equations (Continued...)

Lecture 24 - Iterative Method for Solving Linear System of Equations

Lecture 25 - Iterative Method for Solving Linear System of Equations (Continued...)

Lecture 26 - Matlab Code for Gauss Jacobi Method

Lecture 27 - Matlab Code for Gauss Seidel Method

Lecture 28 - Matlab Code for Gauss Seidel Method

Lecture 29 - Power Method for Solving Eigenvalues of a Matrix

Lecture 30 - Power Method for Solving Eigenvalues of a Matrix (Continued...)

Lecture 31 - Gershgorin Circle Theorem for Estimating Eigenvalues of a Matrix

Lecture 32 - Gershgorin Circle Theorem for Estimating Eigenvalues of a Matrix

Lecture 33 - Matlab Code for Power Method/ Shifted Inverse Power Method

Lecture 34 - Interpolation

Lecture 35 - Interpolation (Continued...)

Lecture 36 - Interpolation (Continued...)

Lecture 37 - Interpolating Polynomial Using Newton's Forward Difference Formula

Lecture 38 - Error Estimates in Polynomial Approximation

Lecture 39 - Interpolating Polynomial Using Newton's Backward Difference Formula

Lecture 40 - Stirling's Formula and Lagrange's Interpolating Polynomial

Lecture 41 - In Continuation of Lagrange's Interpolating Formula

Lecture 42 - Interpolating Polynomial Using Newton's Divided Difference Formula

Lecture 43 - Examples Based on Lagrange's and Newton's Divided Difference Interpolation

Lecture 44 - Spline Interpolation

Lecture 45 - Cubic Spline

Lecture 46 - Cubic Spline (Continued...)

Lecture 47 - Curve Fitting

Lecture 48 - Quadratic Polynomial Fitting and Code for Lagrange's Interpolating Polynomial using Octave

Lecture 49 - Matlab Code for Newton's Divided Difference and Least Square Approximation

Lecture 50 - Matlab Code for Cubic Spline

Lecture 51 - Numerical Differentiation

Lecture 52 - Various Numerical Differentiation Formulas

Lecture 53 - Higher Order Accurate Numerical Differentiation Formula For First Order Derivative

Lecture 54 - Higher Order Accurate Numerical Differentiation Formula For Second Order Derivative

Lecture 55 - Numerical Integration

Lecture 56 - Trapezoidal Rule for Numerical Integration

Lecture 57 - Simpson's 1/3 rule for Numerical Integration

Lecture 58 - Simpson's 3/8 Rule for Numerical Integration

Lecture 59 - Method of Undetermined Coefficients

Lecture 60 - Octave Code for Trapezoidal and Simpson's Rule

Lecture 61 - Taylor Series Method for Ordinary Differential Equations

Lecture 62 - Linear Multistep Method (LMM) for Ordinary Differential Equations

Lecture 63 - Convergence and Zero Stability for LMM

Lecture 64 - Matlab/Octave Code for Initial Value Problems

Lecture 65 - Advantage of Implicit and Explicit Methods Over Each other via Matlab/Octave Codes for Initial value Problem

NPTEL : NOC:Non-parametric Statistical Inference (Mathematics)

Co-ordinators : Prof. Niladri Chatterjee

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

NPTEL : NOC:Matrix Computation and its applications (Mathematics)

Co-ordinators : Prof. Vivek K. Aggarwal

Lecture 1 - Binary Operation and Groups

Lecture 2 - Vector Spaces

Lecture 3 - Some Examples of Vector Spaces

Lecture 4 - Some Examples of Vector Spaces (Continued...)

Lecture 5 - Subspace of a Vector Space

Lecture 6 - Spanning Set

Lecture 7 - Properties of Subspaces

Lecture 8 - Properties of Subspaces (Continued...)

Lecture 9 - Linearly Independent and Dependent Vectors

Lecture 10 - Linearly Independent and Dependent Vectors (Continued...)

Lecture 11 - Properties of Linearly Independent and Dependent Vectors

Lecture 12 - Properties of Linearly Independent and Dependent Vectors (Continued...)

Lecture 13 - Basis and Dimension of a Vector Space

Lecture 14 - Example of Basis and Standard Basis of a Vector Space

Lecture 15 - Linear Functions

Lecture 16 - Range Space of a Matrix and Row Reduced Echelon Form

Lecture 17 - Row Equivalent Matrices

Lecture 18 - Row Equivalent Matrices (Continued...)

Lecture 19 - Null Space of a Matrix

Lecture 20 - Four Subspaces Associated with a Given Matrix

Lecture 21 - Four Subspaces Associated with a Given Matrix (Continued...)

Lecture 22 - Linear Independence of the rows and columns of a Matrix

Lecture 23 - Application of Diagonal Dominant Matrices

Lecture 24 - Application of Zero Null Space: Interpolating Polynomial and Wronskian Matrix

Lecture 25 - Characterization of basic of a Vector Space and its Subspaces

Lecture 26 - Coordinate of a Vector with respect to Ordered Basis

Lecture 27 - Examples of different subspaces of a vector space of polynomials having degree less than or equal to 3

Lecture 28 - Linear Transformation

Lecture 29 - Properties of Linear Transformation

Lecture 30 - Determining Linear Transformation on a Vector Space by its value on the basis element

Lecture 31 - Range space and null space of a Linear Transformation

Lecture 32 - Rank and Nuility of a Linear Transformation

Lecture 33 - Rank Nuility Theorem

Lecture 34 - Application of Rank Nuility Theorem and Inverse of a Linear Transformation

Lecture 35 - Matrix Associated with Linear Transformation

Lecture 36 - Matrix Representation of a Linear Transformation Relative to Ordered Bases

Lecture 37 - Matrix Representation of a Linear Transformation Relative to Ordered Bases (Continued...)

Lecture 38 - Linear Map Associated with a Matrix

Lecture 39 - Similar Matrices and Diagonalisation of Matrix

Lecture 40 - Orthonormal bases of a Vector Space

Lecture 41 - Gram-Schmidt Orthogonalisation Process

Lecture 42 - QR Factorisation

Lecture 43 - Inner Product Spaces

Lecture 44 - Inner Product of different real vector spaces and basics of complex vector space

Lecture 45 - Inner Product on complex vector spaces and Cauchy-Schwarz inequality

Lecture 46 - Norm of a Vector

Lecture 47 - Matrix Norm

Lecture 48 - Sensitivity Analysis of a System of Linear Equations

Lecture 49 - Orthoganality of the four subspaces associated with a matrix

Lecture 50 - Best Approximation: Least Square Method

Lecture 51 - Best Approximation: Least Square Method (Continued...)

Lecture 52 - Jordan-Canonical Form

Lecture 53 - Some examples on the Jordan form of a given matrix and generalised eigon vectors

Lecture 54 - Singular value decomposition (SVD) theorem

Lecture 55 - Matlab/Octave code for Solving SVD

Lecture 56 - Pseudo-Inverse/Moore-Penrose Inverse

Lecture 57 - Householder Transformation

Lecture 58 - Matlab/Octave code for Householder Transformation

NPTEL : NOC:Introduction to Probability Theory and Statistics (Mathematics)

Co-ordinators : Prof. S Dharmaraja

Lecture 1 - Random experiment, sample space, axioms of probability, probability space

Lecture 2 - Random experiment, sample space, axioms of probability, probability space (Continued...)

Lecture 3 - Random experiment, sample space, axioms of probability, probability space (Continued...)

Lecture 4 - Conditional probability, independence of events

Lecture 5 - Multiplication rule, total probability rule, Bayes's theorem

Lecture 6 - Definition of Random Variable, Cumulative Distribution Function

Lecture 7 - Definition of Random Variable, Cumulative Distribution Function (Continued...)

Lecture 8 - Definition of Random Variable, Cumulative Distribution Function (Continued...)

Lecture 9 - Type of Random Variables, Probability Mass Function, Probability Density Function

Lecture 10 - Type of Random Variables, Probability Mass Function, Probability Density Function (Continued...)

Lecture 11 - Distribution of Function of Random Variables

Lecture 12 - Mean and Variance

Lecture 13 - Mean and Variance (Continued...)

Lecture 14 - Higher Order Moments and Moments Inequalities

Lecture 15 - Higher Order Moments and Moments Inequalities (Continued...)

Lecture 16 - Generating Functions

Lecture 17 - Generating Functions (Continued...)

Lecture 18 - Common Discrete Distributions

Lecture 19 - Common Discrete Distributions (Continued...)

Lecture 20 - Common Continuous Distributions

Lecture 21 - Common Continuous Distributions (Continued...)

Lecture 22 - Applications of Random Variable

Lecture 23 - Applications of Random Variable (Continued...)

Lecture 24 - Random vector and joint distribution

Lecture 25 - Joint probability mass function

Lecture 26 - Joint probability density function

Lecture 27 - Independent random variables

Lecture 28 - Independent random variables (Continued...)

Lecture 29 - Functions of several random variables

Lecture 30 - Functions of several random variables (Continued...)

Lecture 31 - Some important results

Lecture 32 - Order statistics

Lecture 33 - Conditional distributions

Lecture 34 - Random sum

Lecture 35 - Moments and Covariance

Lecture 36 - Variance Covariance matrix

Lecture 37 - Multivariate Normal distribution

Lecture 38 - Probability generating function and Moment generating function

Lecture 39 - Correlation coefficient

Lecture 40 - Conditional Expectation

Lecture 41 - Conditional Expectation (Continued...)

Lecture 42 - Mode of Convergence

Lecture 43 - Mode of Convergence (Continued...)

Lecture 44 - Law of Large Numbers

Lecture 45 - Central Limit Theorem

Lecture 46 - Central Limit Theorem (Continued...)

Lecture 47 - Descriptive Statistics and Sampling Distributions

Lecture 48 - Descriptive Statistics and Sampling Distributions (Continued...)

Lecture 49 - Descriptive Statistics and Sampling Distributions (Continued...)

Lecture 50 - Point estimation

Lecture 51 - Methods of Point estimation

Lecture 52 - Interval Estimation

Lecture 53 - Testing of Statistical Hypothesis

Lecture 54 - Nonparametric Statistical Tests

Lecture 55 - Analysis of Variance

Lecture 56 - Correlation

Lecture 57 - Regression

Lecture 58 - Logistic Regression

NPTEL : NOC:Introduction to Probability Theory and Stochastic Processes (Tamil) (Mathematics)

Co-ordinators : Prof. S Dharmaraja

Lecture 1 - Random Experiment, Sample Space and Sigma Field

Lecture 2 - Axiomatic Definition of Probability

Lecture 3 - Properties of Axiomatic Definition of Probability and Classical Definition of Probability

Lecture 4 - Conditional Probability, Independent Events and Baye's Rule

Lecture 5 - Definition of Random Variable

Lecture 6 - Cumulative Distribution Function

Lecture 7 - Discrete and Continuous Type Random Variables

Lecture 8 - Mixed Type Random Variable

Lecture 9 - Function of a Random Variable

Lecture 10 - Mean

Lecture 11 - Variance and Higher Order Moments

Lecture 12 - Inequalities of Markov and Chebyshev

Lecture 13 - Generating Functions

Lecture 14 - Standard Discrete Distributions

Lecture 15 - Standard Discrete Distributions (Continued...)

Lecture 16 - Standard Continuous Distributions

Lecture 17 - Standard Continuous Distributions (Continued...)

Lecture 18 - Definition and Joint Distribution of a Random Vector

Lecture 19 - Joint Probability Mass Function

Lecture 20 - Joint Probability Density Function

Lecture 21 - Independent Random Vector

Lecture 22 - Distribution of Functions of Random Variables (Discrete Type)

Lecture 23 - Distribution of Functions of Random Variables (Continuous Type)

Lecture 24 - Conditional Distribution of Random Variables (Discrete Type)

Lecture 25 - Conditional Distribution of Random Variables (Continuous Type)

Lecture 26 - Expectation for Several Random Variables

Lecture 27 - Covariance and Correlation Coefficient

Lecture 28 - Generating Functions for Several Random Variables

Lecture 29 - Conditional Expectation

Lecture 30 - Modes of Convergence

Lecture 31 - Modes of Convergence (Continued...)

Lecture 32 - Law of Large Numbers

Lecture 33 - Central Limit Theorem

Lecture 34 - Definition and Classification of Stochastic Processes

Lecture 35 - Properties of Stochastic Processes

Lecture 36 - Properties of Stochastic Processes (Continued...)

Lecture 37 - Standard Simple Stochastic Processes

Lecture 38 - Definition of Discrete Time Markov Chain (DTMC)

Lecture 39 - Chapman-Kolmogorov Equation

Lecture 40 - Classification of States

Lecture 41 - Classification of States (Continued...)

Lecture 42 - Limiting Distribution

Lecture 43 - Stationary Distribution

Lecture 44 - Reducible Markov Chains

Lecture 45 - Definition of Continuous Time Markov Chain (CTMC)

Lecture 46 - Infinitesimal Generator Matrix

Lecture 47 - Kolmogorov Differential Equations

Lecture 48 - Limiting Distribution and Steady-State Distribution

Lecture 49 - Birth Death Processes

Lecture 50 - Introduction to Queueing Models and Kendall Notation

Lecture 51 - Single-Server Queueing Models

Lecture 52 - Single-Server Queueing Models (Continued...)

Lecture 53 - Multi-Server Queueing Models

NPTEL : Formal Languages and Automata Theory (Mathematics)

Co-ordinators : Dr. K.V. Krishna, Dr. Diganta Goswami

Lecture 1 - Introduction

Lecture 2 - Alphabet, Strings, Languages

Lecture 3 - Finite Representation

Lecture 4 - Grammars (CFG)

Lecture 5 - Derivation Trees

Lecture 6 - Regular Grammars

Lecture 7 - Finite Automata

Lecture 8 - Nondeterministic Finite Automata

Lecture 9 - NFA <=> DFA

Lecture 10 - Myhill-Nerode Theorem

Lecture 11 - Minimization

Lecture 12 - RE => FA

Lecture 13 - FA => RE

Lecture 14 - FA <=> RG

Lecture 15 - Variants of FA

Lecture 16 - Closure Properties of RL

Lecture 17 - Homomorphism

Lecture 18 - Pumping Lemma

Lecture 19 - Simplification of CFG

Lecture 20 - Normal Forms of CFG

Lecture 21 - Properties of CFLs

Lecture 22 - Pushdown Automata

Lecture 23 - PDA <=> CFG

Lecture 24 - Turing Machines

Lecture 25 - Turing Computable Functions

Lecture 26 - Combining Turing Machines

Lecture 27 - Multi Input

Lecture 28 - Turing Decidable Languages

Lecture 29 - Varients of Turing Machines

Lecture 30 - Structured Grammars

Lecture 31 - Decidability

Lecture 32 - Undecidability 1

Lecture 33 - Undecidability 2

Lecture 34 - Undecidability 3

Lecture 35 - Time Bounded Turing Machines

Lecture 36 - P and NP

Lecture 37 - NP-Completeness

Lecture 38 - NP-Complete Problems 1

Lecture 39 - NP-Complete Problems 2

Lecture 40 - NP-Complete Problems 3

Lecture 41 - Chomsky Hierarchy

NPTEL : Complex Analysis (Mathematics)

Co-ordinators : Prof. P.A.S. Sree Krishna

Lecture 1 - Introduction

Lecture 2 - Introduction to Complex Numbers

Lecture 3 - de Moivreâ€™s Formula and Stereographic Projection

Lecture 4 - Topology of the Complex Plane - Part-I

Lecture 5 - Topology of the Complex Plane - Part-II

Lecture 6 - Topology of the Complex Plane - Part-III

Lecture 7 - Introduction to Complex Functions

Lecture 8 - Limits and Continuity

Lecture 9 - Differentiation

Lecture 10 - Cauchy-Riemann Equations and Differentiability

Lecture 11 - Analytic functions; the exponential function

Lecture 12 - Sine, Cosine and Harmonic functions

Lecture 13 - Branches of Multifunctions; Hyperbolic Functions

Lecture 14 - Problem Solving Session I

Lecture 15 - Integration and Contours

Lecture 16 - Contour Integration

Lecture 17 - Introduction to Cauchyâ€™s Theorem

Lecture 18 - Cauchyâ€™s Theorem for a Rectangle

Lecture 19 - Cauchyâ€™s theorem - Part-II

Lecture 20 - Cauchyâ€™s Theorem - Part-III

Lecture 21 - Cauchyâ€™s Integral Formula and its Consequences

Lecture 22 - The First and Second Derivatives of Analytic Functions

Lecture 23 - Moreraâ€™s Theorem and Higher Order Derivatives of Analytic Functions

Lecture 24 - Problem Solving Session II

Lecture 25 - Introduction to Complex Power Series

Lecture 26 - Analyticity of Power Series

Lecture 27 - Taylorâ€™s Theorem

Lecture 28 - Zeroes of Analytic Functions

Lecture 29 - Counting the Zeroes of Analytic Functions

Lecture 30 - Open mapping theorem - Part-I

Lecture 31 - Open mapping theorem - Part-II

Lecture 32 - Properties of Mobius Transformations - Part-I

Lecture 33 - Properties of Mobius Transformations - Part-II

Lecture 34 - Problem Solving Session III

Lecture 35 - Removable Singularities

Lecture 36 - Poles Classification of Isolated Singularities

Lecture 37 - Essential Singularity & Introduction to Laurent Series

Lecture 38 - Laurentâ€™s Theorem

Lecture 39 - Residue Theorem and Applications

Lecture 40 - Problem Solving Session IV

NPTEL : NOC:Mathematical Finance (Mathematics)

Co-ordinators : Prof. Siddhartha Pratim Chakrabarty

Lecture 1 - Introduction to Financial Markets and Bonds

Lecture 2 - Introduction to Stocks, Futures and Forwards and Swaps

Lecture 3 - Introduction to Options

Lecture 4 - Interest Rates and Present Value

Lecture 5 - Present and Future Values, Annuities, Amortization and Bond Yield

Lecture 6 - Price Yield Curve and Term Structure of Interest Rates

Lecture 7 - Markowitz Theory, Return and Risk and Two Asset Portfolio

Lecture 8 - Minimum Variance Portfolio and Feasible Set

Lecture 9 - Multi Asset Portfolio, Minimum Variance Portfolio, Efficient Frontier and Minimum Variance Line

Lecture 10 - Minimum Variance Line (Continued), Market Portfolio

Lecture 11 - Capital Market Line, Capital Asset Pricing Model

Lecture 12 - Performance Analysis

Lecture 13 - No-Arbitrage Principle and Pricing of Forward Contracts

Lecture 14 - Futures, Options and Put-Call-Parity

Lecture 15 - Bounds on Options

Lecture 16 - Derivative Pricing in a Single Period Binomial Model

Lecture 17 - Derivative Pricing in Multiperiod Binomial Model

Lecture 18 - Derivative Pricing in Binomial Model and Path Dependent Options

Lecture 19 - Discrete Probability Spaces

Lecture 20 - Filtrations and Conditional Expectations

Lecture 21 - Properties of Conditional Expectations

Lecture 22 - Examples of Conditional Expectations, Martingales

Lecture 23 - Risk-Neutral Pricing of European Derivatives in Binomial Model

Lecture 24 - Actual and Risk-Neutral Probabilities, Markov Process, American Options

Lecture 25 - General Probability Spaces, Expectations, Change of Measure

Lecture 26 - Filtrations, Independence, Conditional Expectations

Lecture 27 - Brownian Motion and its Properties

Lecture 28 - ItÃ´ Integral and its Properties

Lecture 29 - ItÃ´ Formula, ItÃ´ Processes

Lecture 30 - Multivariable Stochastic Calculus, Stochastic Differential Equations

Lecture 31 - Black-Scholes-Merton (BSM) Model, BSM Equation, BSM Formula

Lecture 32 - Greeks, Put-Call Parity, Change of Measure

Lecture 33 - Girsanov Theorem, Risk-Neutral Pricing of Derivatives, BSM Formula

Lecture 34 - MRT and Hedging, Multidimensional Girsanov and MRT

Lecture 35 - Multidimensional BSM Model, Fundamental Theorems of Asset Pricing

Lecture 36 - BSM Model with Dividend-Paying Stocks

NPTEL : NOC:Mathematical Portfolio Theory (Mathematics)

Co-ordinators : Prof. Siddhartha Pratim Chakrabarty

Lecture 1 - Probability space and their properties, Random variables

Lecture 2 - Mean, variance, covariance and their properties

Lecture 3 - Linear regression; Binomial and normal distribution; Central Limit Theorem

Lecture 4 - Financial markets

Lecture 5 - Bonds and stocks

Lecture 6 - Binomial and geometric Brownian motion (gBm) asset pricing models

Lecture 7 - Expected return, risk and covariance of returns

Lecture 8 - Expected return and risk of a portfolio; Minimum variance portfolio

Lecture 9 - Multi-asset portfolio and Efficient frontier

Lecture 10 - Capital Market Line and Derivation of efficient frontier

Lecture 11 - Capital Asset Pricing Model and Single index model

Lecture 12 - Portfolio performance analysis

Lecture 13 - Utility functions and expected utility

Lecture 14 - Risk preferences of investors

Lecture 15 - Absolute Risk Aversion and Relative Risk Aversion

Lecture 16 - Portfolio theory with utility functions

Lecture 17 - Geometric Mean Return and Roy's Safety-First Criterion

Lecture 18 - Kataoka's Safety-First Criterion and Telser's Safety-First Criterion

Lecture 19 - Semi-variance framework

Lecture 20 - Stochastic dominance; First order stochastic dominance

Lecture 21 - Second order stochastic dominance and Third order stochastic dominance

Lecture 22 - Discrete time model and utility function

Lecture 23 - Optimal portfolio for single-period discrete time model

Lecture 24 - Optimal portfolio for multi-period discrete time model; Discrete Dynamic Programming

Lecture 25 - Continuous time model; Hamilton-Jacobi-Bellman PDE

Lecture 26 - Hamilton-Jacobi-Bellman PDE; Duality/Martingale Approach

Lecture 27 - Duality/Martingale Approach in Discrete and Continuous Time

Lecture 28 - Interest rates and bonds; Duration

Lecture 29 - Duration; Immunization

Lecture 30 - Convexity; Hedging and Immunization

Lecture 31 - Quantiles and their properties

Lecture 32 - Value-at-Risk and its properties

Lecture 33 - Average Value-at-Risk and its properties

Lecture 34 - Asset allocation

Lecture 35 - Portfolio optimization

Lecture 36 - Portfolio optimization with constraints, Value-at-Risk: Estimation and backtesting

NPTEL : NOC:Discrete-time Markov Chains and Poission Processes (Mathematics)

Co-ordinators : Prof. Ayon Ganguly, Prof. Subhamay Saha

Lecture 1 - Review of Basic Probability - I

Lecture 2 - Review of Basic Probability - II

Lecture 3 - Review of Basic Probability - III

Lecture 4 - Stochastic Processes

Lecture 5 - Definition of Markov Chain and Transition Probabilities

Lecture 6 - Markov Property and Chapman-Kolmogorov Equations

Lecture 7 - Chapman-Kolmogorov Equations: Examples

Lecture 8 - Accessibility and Communication of States

Lecture 9 - Hitting Time - I

Lecture 10 - Hitting Time - II

Lecture 11 - Hitting Time - III

Lecture 12 - Strong Markov Property

Lecture 13 - Passage Time and Excursion

Lecture 14 - Number of Visits

Lecture 15 - Class Property

Lecture 16 - Transience and Recurrence of Random Walks

Lecture 17 - Stationary Distribution - I

Lecture 18 - Stationary Distribution - II

Lecture 19 - Stationary Distribution - III

Lecture 20 - Limit Theorems - I

Lecture 21 - Limit Theorems - II

Lecture 22 - Some Problems - I

Lecture 23 - Some Problems - II

Lecture 24 - Time Reversibility

Lecture 25 - Properties of Exponential Distribution

Lecture 26 - Some Problems

Lecture 27 - Order Statistics

Lecture 28 - Poisson Processes

Lecture 29 - Poisson Thinning - I

Lecture 30 - Poisson Thinning - II

Lecture 31 - Conditional Arrival Times

Lecture 32 - Independent Poisson Processes

Lecture 33 - Some Problems

Lecture 34 - Compound Poisson Processes

NPTEL : NOC:Introduction to Queueing Theory (Mathematics)

Co-ordinators : Prof. N. Selvaraju

Lecture 1 - Queueing Systems, System Performance Measures

Lecture 2 - Characteristics of Queueing Systems, Kendall's Notation

Lecture 3 - Little's Law, General Relationships

Lecture 4 - Laplace and Laplace-Stieltjes Transforms, Probability Generating Functions

Lecture 5 - An Overview of Stochastic Processes

Lecture 6 - Markov Chains: Definition, Transition Probabilities

Lecture 7 - Classification Properties of Markov Chains

Lecture 8 - Long-Term Behaviour of Markov Chains

Lecture 9 - Exponential Distribution and its Properties, Poisson Process

Lecture 10 - Poisson Process and its Properties, Generalizations

Lecture 11 - Continuous-Time Markov Chains, Generator Matrix, Kolmogorov Equations

Lecture 12 - Stationary and Limiting Distributions of CTMC, Balance Equations, Birth-Death Processes

Lecture 13 - Birth-Death Queues: General Theory, M/M/1 Queues and their Steady State Solution

Lecture 14 - M/M/1 Queues: Performance Measures, PASTA Property, Waiting Time Distributions

Lecture 15 - M/M/c Queues, Erlang Delay Formula

Lecture 16 - M/M/c/K Queues

Lecture 17 - Erlang's Loss System, Erlang Loss Formula, Infinite-Server Queues

Lecture 18 - Finite-Source Queues, Engset Loss System, State-Dependent Queues, Queues with Impatience

Lecture 19 - Transient Solutions: M/M/1/1, Infinite-Server and M/M/1 Queues, Busy Period Analysis

Lecture 20 - Queues with Bulk Arrivals

Lecture 21 - Queues with Bulk Service

Lecture 22 - Erlang and Phase-Type Distributions

Lecture 23 - Erlangian Queues: Erlangian Arrivals, Erlangian Service Times

Lecture 24 - Nonpreemptive Priority Queues

Lecture 25 - Nonpreemptive and Preemptive Priority Queues

Lecture 26 - M/M/1 Retrial Queues

Lecture 27 - Discrete-Time Queues: Geo/Geo/1 (EAS), Geo/Geo/1 (LAS)

Lecture 28 - Introduction to Queueing Networks, Two-Node Network

Lecture 29 - Burke's Theorem, General Setup, Tandem Networks

Lecture 30 - Queueing Networks with Blocking, Open Jackson Networks

Lecture 31 - Waiting Times and Multiple Classes in Open Jackson Networks

Lecture 32 - Closed Jackson Networks

Lecture 33 - Closed Jackson Networks, Convolution Algorithm

Lecture 34 - Mean-Value Analysis Algorithm

Lecture 35 - Cyclic Queueing Networks, Extensions of Jackson Networks

Lecture 36 - Renewal Processes

Lecture 37 - Regenerative Processes, Semi-Markov Processes

Lecture 38 - M/G/1 Queues, The Pollaczek-Khinchin Mean Formula

Lecture 39 - M/G/1 Queues, The Pollaczek-Khinchin Transform Formula

Lecture 40 - M/G/1 Queues: Waiting Times and Busy Period

Lecture 41 - M/G/1/K Queues, Additional Insights on M/G/1 Queues

Lecture 42 - M/G/c, M/G/âˆž and M/G/c/c Queues

Lecture 43 - G/M/1 Queues

Lecture 44 - G/G/1 Queues: Lindley's Integral Equation

Lecture 45 - G/G/1 Queues: Bounds

Lecture 46 - Vacation Queues: Introduction, M/M/1 Queues with Vacations

Lecture 47 - M/G/1 Queues with Vacations

NPTEL : Applied Multivariate Analysis (Mathematics)

Co-ordinators : Dr. Sharmishtha Mitra

Lecture 1 - Prologue

Lecture 2 - Basic concepts on multivariate distribution

Lecture 3 - Basic concepts on multivariate distribution

Lecture 4 - Multivariate normal distribution â€“ I

Lecture 5 - Multivariate normal distribution â€“ II

Lecture 6 - Multivariate normal distribution â€“ III

Lecture 7 - Some problems on multivariate distributions â€“ I

Lecture 8 - Some problems on multivariate distributions â€“ II

Lecture 9 - Random sampling from multivariate normal distribution and Wishart distribution - I

Lecture 10 - Random sampling from multivariate normal distribution and Wishart distribution - II

Lecture 11 - Random sampling from multivariate normal distribution and Wishart distribution - III

Lecture 12 - Wishart distribution and itâ€™s properties - I

Lecture 13 - Wishart distribution and itâ€™s properties - II

Lecture 14 - Hotellingâ€™s T2 distribution and itâ€™s applications

Lecture 15 - Hotellingâ€™s T2 distribution and various confidence intervals and regions

Lecture 16 - Hotellingâ€™s T2 distribution and Profile analysis

Lecture 17 - Profile analysis - I

Lecture 18 - Profile analysis - II

Lecture 19 - MANOVA - I

Lecture 20 - MANOVA - II

Lecture 21 - MANOVA - III

Lecture 22 - MANOVA & Multiple Correlation Coefficient

Lecture 23 - Multiple Correlation Coefficient

Lecture 24 - Principal Component Analysis

Lecture 25 - Principal Component Analysis

Lecture 26 - Principal Component Analysis

Lecture 27 - Cluster Analysis

Lecture 28 - Cluster Analysis

Lecture 29 - Cluster Analysis

Lecture 30 - Cluster Analysis

Lecture 31 - Discriminant Analysis and Classification

Lecture 32 - Discriminant Analysis and Classification

Lecture 33 - Discriminant Analysis and Classification

Lecture 34 - Discriminant Analysis and Classification

Lecture 35 - Discriminant Analysis and Classification

Lecture 36 - Discriminant Analysis and Classification

Lecture 37 - Discriminant Analysis and Classification

Lecture 38 - Factor_Analysis

Lecture 39 - Factor_Analysis

Lecture 40 - Factor_Analysis

Lecture 41 - Cannonical Correlation Analysis

Lecture 42 - Cannonical Correlation Analysis

Lecture 43 - Cannonical Correlation Analysis

Lecture 44 - Cannonical Correlation Analysis

NPTEL : Calculus of Variations and Integral Equations (Mathematics)

Co-ordinators : Dr. Malay Banerjee, Prof. D. Bahuguna

Lecture 1 - Calculus of Variations and Integral Equations

Lecture 2 - Calculus of Variations and Integral Equations

Lecture 3 - Calculus of Variations and Integral Equations

Lecture 4 - Calculus of Variations and Integral Equations

Lecture 5 - Calculus of Variations and Integral Equations

Lecture 6 - Calculus of Variations and Integral Equations

Lecture 7 - Calculus of Variations and Integral Equations

Lecture 8 - Calculus of Variations and Integral Equations

Lecture 9 - Calculus of Variations and Integral Equations

Lecture 10 - Calculus of Variations and Integral Equations

Lecture 11 - Calculus of Variations and Integral Equations

Lecture 12 - Calculus of Variations and Integral Equations

Lecture 13 - Calculus of Variations and Integral Equations

Lecture 14 - Calculus of Variations and Integral Equations

Lecture 15 - Calculus of Variations and Integral Equations

Lecture 16 - Calculus of Variations and Integral Equations

Lecture 17 - Calculus of Variations and Integral Equations

Lecture 18 - Calculus of Variations and Integral Equations

Lecture 19 - Calculus of Variations and Integral Equations

Lecture 20 - Calculus of Variations and Integral Equations

Lecture 21 - Calculus of Variations and Integral Equations

Lecture 22 - Calculus of Variations and Integral Equations

Lecture 23 - Calculus of Variations and Integral Equations

Lecture 24 - Calculus of Variations and Integral Equations

Lecture 25 - Calculus of Variations and Integral Equations

Lecture 26 - Calculus of Variations and Integral Equations

Lecture 27 - Calculus of Variations and Integral Equations

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Lecture 32 - Calculus of Variations and Integral Equations

Lecture 33 - Calculus of Variations and Integral Equations

Lecture 34 - Calculus of Variations and Integral Equations

Lecture 35 - Calculus of Variations and Integral Equations

Lecture 36 - Calculus of Variations and Integral Equations

Lecture 37 - Calculus of Variations and Integral Equations

Lecture 38 - Calculus of Variations and Integral Equations

Lecture 39 - Calculus of Variations and Integral Equations

Lecture 40 - Calculus of Variations and Integral Equations

NPTEL : Linear programming and Extensions (Mathematics)

Co-ordinators : Prof. Prabha Sharma

Lecture 1 - Introduction to Linear Programming Problems

Lecture 2 - Vector space, Linear independence and dependence, basis

Lecture 3 - Moving from one basic feasible solution to another, optimality criteria

Lecture 4 - Basic feasible solutions, existence & derivation

Lecture 5 - Convex sets, dimension of a polyhedron, Faces, Example of a polytope

Lecture 6 - Direction of a polyhedron, correspondence between bfs and extreme points

Lecture 7 - Representation theorem, LPP solution is a bfs, Assignment 1

Lecture 8 - Development of the Simplex Algorithm, Unboundedness, Simplex Tableau

Lecture 9 - Simplex Tableau & algorithm ,Cycling, Blandâ€™s anti-cycling rules, Phase I & Phase II

Lecture 10 - Big-M method,Graphical solutions, adjacent extreme pts and adjacent bfs

Lecture 11 - Assignment 2, progress of Simplex algorithm on a polytope, bounded variable LPP

Lecture 12 - LPP Bounded variable, Revised Simplex algorithm, Duality theory, weak duality theorem

Lecture 13 - Weak duality theorem, economic interpretation of dual variables, Fundamental theorem of duality

Lecture 14 - Examples of writing the dual, complementary slackness theorem

Lecture 15 - Complementary slackness conditions, Dual Simplex algorithm, Assignment 3

Lecture 16 - Primal-dual algorithm

Lecture 17 - Problem in lecture 16, starting dual feasible solution, Shortest Path Problem

Lecture 18 - Shortest Path Problem, Primal-dual method, example

Lecture 19 - Shortest Path Problem-complexity, interpretation of dual variables, post-optimality analysis-changes in the cost vector

Lecture 20 - Assignment 4, postoptimality analysis, changes in b, adding a new constraint, changes in {aij} , Parametric analysis

Lecture 21 - Parametric LPP-Right hand side vector

Lecture 22 - Parametric cost vector LPP

Lecture 23 - Parametric cost vector LPP, Introduction to Min-cost flow problem

Lecture 24 - Mini-cost flow problem-Transportation problem

Lecture 25 - Transportation problem degeneracy, cycling

Lecture 26 - Sensitivity analysis

Lecture 27 - Sensitivity analysis

Lecture 28 - Bounded variable transportation problem, min-cost flow problem

Lecture 29 - Min-cost flow problem

Lecture 30 - Starting feasible solution, Lexicographic method for preventing cycling ,strongly feasible solution

Lecture 31 - Assignment 6, Shortest path problem, Shortest Path between any two nodes,Detection of negative cycles

Lecture 32 - Min-cost-flow Sensitivity analysis Shortest path problem sensitivity analysis

Lecture 33 - Min-cost flow changes in arc capacities , Max-flow problem, assignment 7

Lecture 34 - Problem 3 (assignment 7), Min-cut Max-flow theorem, Labelling algorithm

Lecture 35 - Max-flow - Critical capacity of an arc, starting solution for min-cost flow problem

Lecture 36 - Improved Max-flow algorithm

Lecture 37 - Critical Path Method (CPM)

Lecture 38 - Programme Evaluation and Review Technique (PERT)

Lecture 39 - Simplex Algorithm is not polynomial time- An example

Lecture 40 - Interior Point Methods

NPTEL : Convex Optimization (Mathematics)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Convex Optimization

Lecture 2 - Convex Optimization

Lecture 3 - Convex Optimization

Lecture 4 - Convex Optimization

Lecture 5 - Convex Optimization

Lecture 6 - Convex Optimization

Lecture 7 - Convex Optimization

Lecture 8 - Convex Optimization

Lecture 9 - Convex Optimization

Lecture 10 - Convex Optimization

Lecture 11 - Convex Optimization

Lecture 12 - Convex Optimization

Lecture 13 - Convex Optimization

Lecture 14 - Convex Optimization

Lecture 15 - Convex Optimization

Lecture 16 - Convex Optimization

Lecture 17 - Convex Optimization

Lecture 18 - Convex Optimization

Lecture 19 - Convex Optimization

Lecture 20 - Convex Optimization

Lecture 21 - Convex Optimization

Lecture 22 - Convex Optimization

Lecture 23 - Convex Optimization

Lecture 24 - Convex Optimization

Lecture 25 - Convex Optimization

Lecture 26 - Convex Optimization

Lecture 27 - Convex Optimization

Lecture 28 - Convex Optimization

Lecture 29 - Convex Optimization

Lecture 30 - Convex Optimization

Lecture 31 - Convex Optimization

Lecture 32 - Convex Optimization

Lecture 33 - Convex Optimization

Lecture 34 - Convex Optimization

Lecture 35 - Convex Optimization

Lecture 36 - Convex Optimization

Lecture 37 - Convex Optimization

Lecture 38 - Convex Optimization

Lecture 39 - Convex Optimization

Lecture 40 - Convex Optimization

Lecture 41 - Convex Optimization

Lecture 42 - Convex Optimization

NPTEL : Foundations of Optimization (Mathematics)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Optimization

Lecture 2 - Optimization

Lecture 3 - Optimization

Lecture 4 - Optimization

Lecture 5 - Optimization

Lecture 6 - Optimization

Lecture 7 - Optimization

Lecture 8 - Optimization

Lecture 9 - Optimization

Lecture 10 - Optimization

Lecture 11 - Optimization

Lecture 12 - Optimization

Lecture 13 - Optimization

Lecture 14 - Optimization

Lecture 15 - Optimization

Lecture 16 - Optimization

Lecture 17 - Optimization

Lecture 18 - Optimization

Lecture 19 - Optimization

Lecture 20 - Optimization

Lecture 21 - Optimization

Lecture 22 - Optimization

Lecture 23 - Optimization

Lecture 24 - Optimization

Lecture 25 - Optimization

Lecture 26 - Optimization

Lecture 27 - Optimization

Lecture 28 - Optimization

Lecture 29 - Optimization

Lecture 30 - Optimization

Lecture 31 - Optimization

Lecture 32 - Optimization

Lecture 33 - Optimization

Lecture 34 - Optimization

Lecture 35 - Optimization

Lecture 36 - Optimization

Lecture 37 - Optimization

Lecture 38 - Optimization

NPTEL : Probability Theory and Applications (Mathematics)

Co-ordinators : Prof. Prabha Sharma

Lecture 1 - Basic principles of counting

Lecture 2 - Sample space, events, axioms of probability

Lecture 3 - Conditional probability, Independence of events

Lecture 4 - Random variables, cumulative density function, expected value

Lecture 5 - Discrete random variables and their distributions

Lecture 6 - Discrete random variables and their distributions

Lecture 7 - Discrete random variables and their distributions

Lecture 8 - Continuous random variables and their distributions

Lecture 9 - Continuous random variables and their distributions

Lecture 10 - Continuous random variables and their distributions

Lecture 11 - Function of random variables, Momement generating function

Lecture 12 - Jointly distributed random variables, Independent r. v. and their sums

Lecture 13 - Independent r. v. and their sums

Lecture 14 - Chi â€“ square r. v., sums of independent normal r. v., Conditional distr

Lecture 15 - Conditional disti, Joint distr. of functions of r. v., Order statistics

Lecture 16 - Order statistics, Covariance and correlation

Lecture 17 - Covariance, Correlation, Cauchy- Schwarz inequalities, Conditional expectation

Lecture 18 - Conditional expectation, Best linear predictor

Lecture 19 - Inequalities and bounds

Lecture 20 - Convergence and limit theorems

Lecture 21 - Central limit theorem

Lecture 22 - Applications of central limit theorem

Lecture 23 - Strong law of large numbers, Joint mgf

Lecture 24 - Convolutions

Lecture 25 - Stochastic processes: Markov process

Lecture 26 - Transition and state probabilities

Lecture 27 - State prob., First passage and First return prob

Lecture 28 - First passage and First return prob. Classification of states

Lecture 29 - Random walk, periodic and null states

Lecture 30 - Reducible Markov chains

Lecture 31 - Time reversible Markov chains

Lecture 32 - Poisson Processes

Lecture 33 - Inter-arrival times, Properties of Poisson processes

Lecture 34 - Queuing Models: M/M/I, Birth and death process, Littleâ€™s formulae

Lecture 35 - Analysis of L, Lq ,W and Wq , M/M/S model

Lecture 36 - M/M/S , M/M/I/K models

Lecture 37 - M/M/I/K and M/M/S/K models

Lecture 38 - Application to reliability theory failure law

Lecture 39 - Exponential failure law, Weibull law

Lecture 40 - Reliability of systems

NPTEL : NOC:Basic Calculus for Engineers, Scientists and Economists (Mathematics)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Numbers

Lecture 2 - Functions-1

Lecture 3 - Sequence-1

Lecture 4 - Sequence-2

Lecture 5 - Limits and Continuity-1

Lecture 6 - Limits and Continuity-2

Lecture 7 - Limits And Continuity-3

Lecture 8 - Derivative-1

Lecture 9 - Derivative-2

Lecture 10 - Maxima And Minima

Lecture 11 - Mean-Value Theorem And Taylors Expansion-1

Lecture 12 - Mean-Value Theorem And Taylors Expansion-2

Lecture 13 - Integration-1

Lecture 14 - Integration-2

Lecture 15 - Integration By Parts

Lecture 16 - Definite Integral

Lecture 17 - Riemann Integration-1

Lecture 18 - Riemann Integration-2

Lecture 19 - Functions Of Two Or More Variables

Lecture 20 - Limits And Continuity Of Functions Of Two Variable

Lecture 21 - Differentiation Of Functions Of Two Variables-1

Lecture 22 - Differentiation Of Functions Of Two Variables-2

Lecture 23 - Unconstrained Minimization Of Funtions Of Two Variables

Lecture 24 - Constrained Minimization And Lagrange Multiplier Rules

Lecture 25 - Infinite Series-1

Lecture 26 - Infinite Series-2

Lecture 27 - Infinite Series-3

Lecture 28 - Multiple Integrals-1

Lecture 29 - Multiple Integrals-2

Lecture 30 - Multiple Integrals-3

NPTEL : NOC:Probability and Stochastics for finance (Mathematics)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Basic Probability

Lecture 2 - Interesting Problems In Probability

Lecture 3 - Random variables, distribution function and independence

Lecture 4 - Chebyshev inequality, Borel-Cantelli Lemmas and related issues

Lecture 5 - Law of Large Number and Central Limit Theorem

Lecture 6 - Conditional Expectation - I

Lecture 7 - Conditional Expectation - II

Lecture 8 - Martingales

Lecture 9 - Brownian Motion - I

Lecture 10 - Brownian Motion - II

Lecture 11 - Brownian Motion - III

Lecture 12 - Ito Integral - I

Lecture 13 - Ito Integral - II

Lecture 14 - Ito Calculus - I

Lecture 15 - Ito Calculus - II

Lecture 16 - Ito Integral In Higher Dimension

Lecture 17 - Application to Ito Integral - I

Lecture 18 - Application to Ito Integral - II

Lecture 19 - Black Scholes Formula - I

Lecture 20 - Black Scholes Formula - II

NPTEL : NOC:Differential Calculus in Several Variables (Mathematics)

Co-ordinators : Prof. Sudipta Dutta

Lecture 1 - Introduction to Several Variables and Notion Of distance in Rn

Lecture 2 - Countinuity And Compactness

Lecture 3 - Countinuity And Connectdness

Lecture 4 - Derivatives: Possible Definition

Lecture 5 - Matrix Of Linear Transformation

Lecture 6 - Examples for Differentiable function

Lecture 7 - Sufficient condition of differentiability

Lecture 8 - Chain Rule

Lecture 9 - Mean Value Theorem

Lecture 10 - Higher Order Derivatives

Lecture 11 - Taylor's Formula

Lecture 12 - Maximum And Minimum

Lecture 13 - Second derivative test for maximum, minimum and saddle point

Lecture 14 - We formalise the second derivative test discussed in Lecture 2 and do examples

Lecture 15 - Specialisation to functions of two variables

Lecture 16 - Implicit Function Theorem

Lecture 17 - Implicit Function Theorem -a

Lecture 18 - Application of IFT: Lagrange's Multipliers Method

Lecture 19 - Application of IFT: Lagrange's Multipliers Method - b

Lecture 20 - Application of IFT: Lagrange's Multipliers Method - c

Lecture 21 - Application of IFT: Inverse Function Theorem - c

NPTEL : NOC:Curves and Surfaces (Mathematics)

Co-ordinators : Prof. Sudipta Dutta

Lecture 1 - Level curves and locus, definition of parametric curves, tangent, arc length, arc length parametrisation

Lecture 2 - How much a curve is Â‘curvedÂ’, signed unit normal and signed curvature, rigid motions, constant curvature

Lecture 3 - Curves in R^3, principal normal and binormal, torsion

Lecture 4 - Frenet-Serret formula

Lecture 5 - Simple closed curve and isoperimetric inequality

Lecture 6 - Surfaces and parametric surfaces, examples, regular surface and non-example of regular surface, transition maps.

Lecture 7 - Transition maps of smooth surfaces, smooth function between surfaces, diffeomorphism

Lecture 8 - Reparameterization

Lecture 9 - Tangent, Normal

Lecture 10 - Orientable surfaces

Lecture 11 - Examples of Surfaces

Lecture 12 - First Fundamental Form

Lecture 13 - Conformal Mapping

Lecture 14 - Curvature of Surfaces

Lecture 15 - Euler's Theorem

Lecture 16 - Regular Surfaces locally as Quadratic Surfaces

Lecture 17 - Geodesics

Lecture 18 - Existence of Geodesics, Geodesics on Surfaces of revolution

Lecture 19 - Geodesics on surfaces of revolution; Clairaut's Theorem

Lecture 20 - Pseudosphere

Lecture 21 - Classification of Quadratic Surface

Lecture 22 - Surface Area and Equiareal Map

NPTEL : NOC:Linear Regression Analysis and Forecasting (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1 - Basic Fundamental Concepts Of Modelling

Lecture 2 - Regression Model - A Statistical Tool

Lecture 3 - Simple Linear Regression Analysis

Lecture 4 - Estimation Of Parameters In Simple Linear Regression Model

Lecture 5 - Estimation Of Parameters In Simple Linear Regression Model (Continued...) : Some Nice Properties

Lecture 6 - Estimation Of Parameters In Simple Linear Regression Model (Continued...)

Lecture 7 - Maximum Likelihood Estimation of Parameters in Simple Linear Regression Model

Lecture 8 - Testing of Hypotheis and Confidence Interval Estimation in Simple Linear Regression Model

Lecture 9 - Testing of Hypotheis and Confidence Interval Estimation in Simple Linear Regression Model (Continued...)

Lecture 10 - Software Implementation in Simple Linear Regression Model using MINITAB

Lecture 11 - Multiple Linear Regression Model

Lecture 12 - Estimation of Model Parameters in Multiple Linear Regression Model

Lecture 13 - Estimation of Model Parameters in Multiple Linear Regression Model (Continued...)

Lecture 14 - Standardized Regression Coefficients and Testing of Hypothesis

Lecture 15 - Testing of Hypothesis (Continued...) and Goodness of Fit of the Model

Lecture 16 - Diagnostics in Multiple Linear Regression Model

Lecture 17 - Diagnostics in Multiple Linear Regression Model (Continued...)

Lecture 18 - Diagnostics in Multiple Linear Regression Model (Continued...)

Lecture 19 - Software Implementation of Multiple Linear Regression Model using MINITAB

Lecture 20 - Software Implementation of Multiple Linear Regression Model using MINITAB (Continued...)

Lecture 21 - Forecasting in Multiple Linear Regression Model

Lecture 22 - Within Sample Forecasting

Lecture 23 - Outside Sample Forecasting

Lecture 24 - Software Implementation of Forecasting using MINITAB

NPTEL : NOC:Introduction to R Software (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1 - How to Learn and Follow the Course

Lecture 2 - Why R and Installation Procedure

Lecture 3 - Introduction _Help_ Demo examples_ packages_ libraries

Lecture 4 - Introduction _Command line_ Data editor _ Rstudio

Lecture 5 - Basics in Calculations

Lecture 6 - Basics of Calculations _ Calculator _Built in Functions Assignments

Lecture 7 - Basics of Calculations _Functions _Matrices

Lecture 8 - Basics Calculations: Matrix Operations

Lecture 9 - Basics Calculations: Matrix operations

Lecture 10 - Basics Calculations: Missing data and logical operators

Lecture 11 - Basics Calculations: Logical operators

Lecture 12 - Basics Calculations: Truth table and conditional executions

Lecture 13 - Basics Calculations: Conditional executions and loops

Lecture 14 - Basics Calculations: Loops

Lecture 15 - Data management - Sequences

Lecture 16 - Data management - sequences

Lecture 17 - Data management - Repeats

Lecture 18 - Data management - Sorting and Ordering

Lecture 19 - Data management - Lists

Lecture 20 - Data management - Lists (Continued...)

Lecture 21 - Data management - Vector indexing

Lecture 22 - Data management - Vector Indexing (Continued...)

Lecture 23 - Data management - Factors

Lecture 24 - Data management - factors (Continued...)

Lecture 25 - Strings - Display and Formatting, Print and Format Functions

Lecture 26 - Strings - Display and Formatting, Print and Format with Concatenate

Lecture 27 - Strings - Display and Formatting, Paste Function

Lecture 28 - Strings - Display and Formatting, Splitting

Lecture 29 - Strings - Display and Formatting, Replacement_ Manipulations _Alphabets

Lecture 30 - Strings - Display and Formatting, Replacement and Evaluation of Strings

Lecture 31 - Data frames

Lecture 32 - Data frames (Continued...)

Lecture 33 - Data frames (Continued...)

Lecture 34 - Data Handling - Importing CSV and Tabular Data Files

Lecture 35 - Data Handling - Importing Data Files from Other Software

Lecture 36 - Statistical Functions - Frequency and Partition values

Lecture 37 - Statistical Functions - Graphics and Plots

Lecture 38 - Statistical Functions - Central Tendency and Variation

Lecture 39 - Statistical Functions - Boxplots, Skewness and Kurtosis

Lecture 40 - Statistical Functions - Bivariate three dimensional plot

Lecture 41 - Statistical Functions - Correlation and Examples of Programming

Lecture 42 - Examples of Programming

Lecture 43 - Examples of More Programming

NPTEL : NOC:Descriptive Statistics with R Software (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1 - Introduction to R Software

Lecture 2 - Basics and R as a Calculator

Lecture 3 - Calculations with Data Vectors

Lecture 4 - Built-in Commands and Missing Data Handling

Lecture 5 - Operations with Matrices

Lecture 6 - Objectives, Steps and Basic Definitions

Lecture 7 - Variables and Types of Data

Lecture 8 - Absolute Frequency, Relative Frequency and Frequency Distribution

Lecture 9 - Frequency Distribution and Cumulative Distribution Function

Lecture 10 - Bar Diagrams

Lecture 11 - Subdivided Bar Plots and Pie Diagrams

Lecture 12 - 3D Pie Diagram and Histogram

Lecture 13 - Kernel Density and Stem - Leaf Plots

Lecture 14 - Arithmetic Mean

Lecture 15 - Median

Lecture 16 - Quantiles

Lecture 17 - Mode, Geometric Mean and Harmonic Mean

Lecture 18 - Range, Interquartile Range and Quartile Deviation

Lecture 19 - Absolute Deviation and Absolute Mean Deviation

Lecture 20 - Mean Squared Error, Variance and Standard Deviation

Lecture 21 - Coefficient of Variation and Boxplots

Lecture 22 - Raw and Central Moments

Lecture 23 - Sheppard's Correction, Absolute Moments and Computation of Moments

Lecture 24 - Skewness and Kurtosis

Lecture 25 - Univariate and Bivariate Scatter Plots

Lecture 26 - Smooth Scatter Plots

Lecture 27 - Quantile- Quantile and Three Dimensional Plots

Lecture 28 - Correlation Coefficient

Lecture 29 - Correlation Coefficient Using R Software

Lecture 30 - Rank Correlation Coefficient

Lecture 31 - Measures of Association for Discrete and Counting Variables - Part 1

Lecture 32 - Measures of Association for Discrete and Counting Variables - Part 2

Lecture 33 - Least Squares Method - One Variable

Lecture 34 - Least Squares Method - R Commands and More than One Variables

NPTEL : NOC:Calculus of Several Real Variables (Mathematics)

Co-ordinators : Dr. Joydeep Dutta

Lecture 1 - Vectors in plane and space

Lecture 2 - Inner product and distance

Lecture 3 - Application to real world problems

Lecture 4 - Matrices and determinants

Lecture 5 - Cross product of two vectors

Lecture 6 - Higher dimensional Euclidean space

Lecture 7 - Functions of more than one real-variable

Lecture 8 - Partial derivatives and Continuity

Lecture 9 - Vector-valued maps and Jacobian matrix

Lecture 10 - Chain rule for partial derivatives

Lecture 11 - The Gradient Vector and Directional Derivative

Lecture 12 - The Implicit Function Theorem

Lecture 13 - Higher Order Partial Derivatives

Lecture 14 - Taylor's Theorem in Higher Dimension

Lecture 15 - Maxima and Minima for Several Variables

Lecture 16 - Second Derivative Test for Maximum and Minimum

Lecture 17 - Constrained Optimization and The Lagrange Multiplier Rule

Lecture 18 - Vector Valued Function and Classical Mechanics

Lecture 19 - Arc Length

Lecture 20 - Vector Fields

Lecture 21 - Multiple Integral - I

Lecture 22 - Multiple Integral - II

Lecture 23 - Multiple Integral - III

Lecture 24 - Multiple Integral - IV

Lecture 25 - Cylindrical and Spherical Coordinates

Lecture 26 - Multiple Integrals and Mechanics

Lecture 27 - Line Integral - I

Lecture 28 - Line Integral - II

Lecture 29 - Parametrized Surfaces

Lecture 30 - Area of a surface Integral

Lecture 31 - Area of parametrized surface

Lecture 32 - Surface Integrals

Lecture 33 - Green's Theorem

Lecture 34 - Stoke's Theorem

Lecture 35 - Examples of Stoke's Theorem

Lecture 36 - Gauss Divergence Theorem

Lecture 37 - Facts about vector fields

NPTEL : NOC:Linear Algebra (Prof. A.K. Lal) (Mathematics)

Co-ordinators : Prof. A.K. Lal

Lecture 1 - Notations, Motivation and Definition

Lecture 2 - Matrix: Examples, Transpose and Addition

Lecture 3 - Matrix Multiplication

Lecture 4 - Matrix Product Recalled

Lecture 5 - Matrix Product (Continued...)

Lecture 6 - Inverse of a Matrix

Lecture 7 - Introduction to System of Linear Equations

Lecture 8 - Some Initial Results on Linear Systems

Lecture 9 - Row Echelon Form (REF)

Lecture 10 - LU Decomposition - Simplest Form

Lecture 11 - Elementary Matrices

Lecture 12 - Row Reduced Echelon Form (RREF)

Lecture 13 - Row Reduced Echelon Form (RREF) (Continued...)

Lecture 14 - RREF and Inverse

Lecture 15 - Rank of a matrix

Lecture 16 - Solution Set of a System of Linear Equations

Lecture 17 - System of n Linear Equations in n Unknowns

Lecture 18 - Determinant

Lecture 19 - Permutations and the Inverse of a Matrix

Lecture 20 - Inverse and the Cramer's Rule

Lecture 21 - Vector Spaces

Lecture 22 - Vector Subspaces and Linear Span

Lecture 23 - Linear Combination, Linear Independence and Dependence

Lecture 24 - Basic Results on Linear Independence

Lecture 25 - Results on Linear Independence (Continued...)

Lecture 26 - Basis of a Finite Dimensional Vector Space

Lecture 27 - Fundamental Spaces associated with a Matrix

Lecture 28 - Rank - Nullity Theorem

Lecture 29 - Fundamental Theorem of Linear Algebra

Lecture 30 - Definition and Examples of Linear Transformations

Lecture 31 - Results on Linear Transformations

Lecture 32 - Rank-Nullity Theorem and Applications

Lecture 33 - Isomorphism of Vector Spaces

Lecture 34 - Ordered Basis of a Finite Dimensional Vector Space

Lecture 35 - Ordered Basis (Continued...)

Lecture 36 - Matrix of a Linear Transformation

Lecture 37 - Matrix of a Linear Transformation (Continued...)

Lecture 38 - Matrix of a Linear Transformation (Continued...)

Lecture 39 - Similarity of Matrices

Lecture 40 - Inner Product Space

Lecture 41 - Inner Product (Continued...)

Lecture 42 - Cauchy Schwartz Inequality

Lecture 43 - Projection on a Vector

Lecture 44 - Results on Orthogonality

Lecture 45 - Results on Orthogonality (Continued...)

Lecture 46 - Gram-Schmidt Orthonormalization Process

Lecture 47 - Orthogonal Projections

Lecture 48 - Gram-Schmidt Process: Applications

Lecture 49 - Examples and Applications on QR-decomposition

Lecture 50 - Recapitulate ideas on Inner Product Spaces

Lecture 51 - Motivation on Eigenvalues and Eigenvectors

Lecture 52 - Examples and Introduction to Eigenvalues and Eigenvectors

Lecture 53 - Results on Eigenvalues and Eigenvectors

Lecture 54 - Results on Eigenvalues and Eigenvectors (Continued...)

Lecture 55 - Results on Eigenvalues and Eigenvectors (Continued...)

Lecture 56 - Diagonalizability

Lecture 57 - Diagonalizability (Continued...)

Lecture 58 - Schur's Unitary Triangularization (SUT)

Lecture 59 - Applications of Schur's Unitary Triangularization

Lecture 60 - Spectral Theorem for Hermitian Matrices

Lecture 61 - Cayley Hamilton Theorem

Lecture 62 - Quadratic Forms

Lecture 63 - Sylvester's Law of Inertia

Lecture 64 - Applications of Quadratic Forms to Analytic Geometry

Lecture 65 - Examples of Conics and Quartics

Lecture 66 - Singular Value Decomposition (SVD)

NPTEL : NOC:Computational Number Theory and Algebra (Mathematics)

Co-ordinators : Prof. Nitin Saxena

Lecture 1 - Introduction: Computation and Algebra

Lecture 2 - Background

Lecture 3 - GCD algorithm and Chinese Remainder Theorem

Lecture 4 - Fast polynomial multiplication

Lecture 5 - Fast polynomial multiplication (Continued...)

Lecture 6 - Fast integer multiplication and division

Lecture 7 - Fast integer arithmetic and matrix multiplication

Lecture 8 - Matrix Multiplication Tensor

Lecture 9 - Polynomial factoring over finite fields: Irreducibility testing

Lecture 10 - Equi-degree factorization and idea of Berlekamp's algorithm

Lecture 11 - Berlekamp's algorithm as a reduction method

Lecture 12 - Factoring over finite fields: Cantor-Zassenhaus algorithm

Lecture 13 - Reed Solomon Error Correcting Codes

Lecture 14 - List Decoding

Lecture 15 - Bivariate Factorization - Hensel Lifting

Lecture 16 - Bivariate polynomial factoring (Continued...)

Lecture 17 - Multivariate Polynomial Factorization

Lecture 18 - Multivariate Factoring - Hilbert's Irreducibility Theorem

Lecture 19 - Multivariate factoring (Continued...)

Lecture 20 - Analysis of LLL algorithm

Lecture 21 - Analysis of LLL algorithm (Continued...)

Lecture 22 - Analysis of LLL-reduced basis algorithm and Introduction to NTRU cryptosystem

Lecture 23 - NTRU cryptosystem (Continued...) and Introduction to Primality testing

Lecture 24 - Randomized Primality testing: Solovay-Strassen and Miller-Rabin tests

Lecture 25 - Deterministic primality test (AKS) and RSA cryptosystem

Lecture 26 - Integer factoring: Smooth numbers and Pollard's rho method

Lecture 27 - Pollard's p-1, Fermat, Morrison-Brillhart, Quadratic and Number field sieve methods

NPTEL : NOC:Basic Calculus 1 and 2 (Mathematics)

Co-ordinators : Prof. Parasar Mohanty

Lecture 1 - Real numbers and Archimedean property

Lecture 2 - Supremum and Decimal representation of Reals

Lecture 3 - Functions

Lecture 4 - Functions continued and Limits

Lecture 5 - Limits (Continued...)

Lecture 6 - Limits (Continued...) and Continuity

Lecture 7 - Continuity and Intermediate Value Property

Lecture 8 - Differentiation

Lecture 9 - Chain Rule

Lecture 10 - Nth derivative of a function

Lecture 11 - Local extrema and Rolle's theorem

Lecture 12 - Mean value theorem and Monotone functions

Lecture 13 - Local extremum tests

Lecture 14 - Concavity and points of inflection

Lecture 15 - Asymptotes and plotting graph of functions

Lecture 16 - Optimization and L'Hospital Rule

Lecture 17 - L'Hospital Rule continued and Cauchy Mean value theorem

Lecture 18 - Approximation of Roots

Lecture 19 - Antiderivative and Riemann Integration

Lecture 20 - Riemann's criterion for Integrability

Lecture 21 - Integration and its properties

Lecture 22 - Area and Mean value theorem for integrals

Lecture 23 - Fundamental theorem of Calculus

Lecture 24 - Integration by parts and Trapezoidal rule

Lecture 25 - Simpson's rule and Substitution in integrals

Lecture 26 - Area between curves

Lecture 27 - Arc Length and Parametric curves

Lecture 28 - Polar Co-ordinates

Lecture 29 - Area of curves in polar coordinates

Lecture 30 - Volume of solids

Lecture 31 - Improper Integrals

Lecture 32 - Sequences

Lecture 33 - Algebra of sequences and Sandwich theorem

Lecture 34 - Subsequences

Lecture 35 - Series

Lecture 36 - Comparison tests for Series

Lecture 37 - Ratio and Root test for series

Lecture 38 - Integral test and Leibniz test for series

Lecture 39 - Revision - I

Lecture 40 - Revision - II

NPTEL : NOC:Advanced Partial Differential Equations (Mathematics)

Co-ordinators : Prof. Kaushik Bal

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

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Lecture 13

Lecture 14

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Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

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Lecture 31

Lecture 32

Lecture 33

NPTEL : NOC:Essentials of Data Science With R Software 1: Probability and Statistical Inference (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1 - Data Science - Why, What, and How?

Lecture 2 - Installation and Working with R

Lecture 3 - Installation and Working with R Studio

Lecture 4 - Calculations with R as a Calculator

Lecture 5 - Calculations with Data Vectors

Lecture 6 - Built-in Commands and Bivariate Plots

Lecture 7 - Logical Operators and Selection of Sample

Lecture 8 - Introduction to Probability

Lecture 9 - Sample Space and Events

Lecture 10 - Set Theory and Events using Venn Diagrams

Lecture 11 - Relative Frequency and Probability

Lecture 12 - Probability and Relative Frequency - An Example

Lecture 13 - Axiomatic Definition of Probability

Lecture 14 - Some Rules of Probability

Lecture 15 - Basic Principles of Counting - Ordered Set, Unordered Set, and Permutations

Lecture 16 - Basic Principles of Counting - Combination

Lecture 17 - Conditional Probability

Lecture 18 - Multiplication Theorem of Probability

Lecture 19 - Bayes' Theorem

Lecture 20 - Independent Events

Lecture 21 - Computation of Probability using R

Lecture 22 - Random Variables - Discrete and Continuous

Lecture 23 - Cumulative Distribution and Probability Density Function

Lecture 24 - Discrete Random Variables, Probability Mass Function and Cumulative Distribution Function

Lecture 25 - Expectation of Variables

Lecture 26 - Moments and Variance

Lecture 27 - Data Based Moments and Variance in R Software

Lecture 28 - Skewness and Kurtosis

Lecture 29 - Quantiles and Tschebyschevâ€™s Inequality

Lecture 30 - Degenerate and Discrete Uniform Distributions

Lecture 31 - Discrete Uniform Distribution in R

Lecture 32 - Bernoulli and Binomial Distribution

Lecture 33 - Binomial Distribution in R

Lecture 34 - Poisson Distribution

Lecture 35 - Poisson Distribution in R

Lecture 36 - Geometric Distribution

Lecture 37 - Geometric Distribution in R

Lecture 38 - Continuous Random Variables and Uniform Distribution

Lecture 39 - Normal Distribution

Lecture 40 - Normal Distribution in R

Lecture 41 - Normal Distribution - More Results

Lecture 42 - Exponential Distribution

Lecture 43 - Bivariate Probability Distribution for Discrete Random Variables

Lecture 44 - Bivariate Probability Distribution in R Software

Lecture 45 - Bivariate Probability Distribution for Continuous Random Variables

Lecture 46 - Examples in Bivariate Probability Distribution Functions

Lecture 47 - Covariance and Correlation

Lecture 48 - Covariance and Correlation â€ Examples and R Software

Lecture 49 - Bivariate Normal Distribution

Lecture 50 - Chi square Distribution

Lecture 51 - t-Distribution

Lecture 52 - F-Distribution

Lecture 53 - Distribution of Sample Mean, Convergence in Probability and Weak Law of Large Numbers

Lecture 54 - Central Limit Theorem

Lecture 55 - Needs for Drawing Statistical Inferences

Lecture 56 - Unbiased Estimators

Lecture 57 - Efficiency of Estimators

Lecture 58 - CramÃ©râ€“Rao Lower Bound and Efficiency of Estimators

Lecture 59 - Consistency and Sufficiency of Estimators

Lecture 60 - Method of Moments

Lecture 61 - Method of Maximum Likelihood and Rao Blackwell Theorem

Lecture 62 - Basic Concepts of Confidence Interval Estimation

Lecture 63 - Confidence Interval for Mean in One Sample with Known Variance

Lecture 64 - Confidence Interval for Mean and Variance

Lecture 65 - Basics of Tests of Hypothesis and Decision Rules

Lecture 66 - Test Procedures for One Sample Test for Mean with Known Variance

Lecture 67 - One Sample Test for Mean with Unknown Variance

Lecture 68 - Two Sample Test for Mean with Known and Unknown Variances

Lecture 69 - Test of Hypothesis for Variance in One and Two Samples

NPTEL : NOC:Essentials of Data Science With R Software 2: Sampling Theory and Linear Regression Analysis (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1 - What is Data Science ?

Lecture 2 - Installation and Working with R

Lecture 3 - Calculations with R as a Calculator

Lecture 4 - Calculations with Data Vectors

Lecture 5 - Built-in Commands and Missing Data Handling

Lecture 6 - Operations with Matrices

Lecture 7 - Data Handling

Lecture 8 - Graphics and Plots

Lecture 9 - Sampling, Sampling Unit, Population and Sample

Lecture 10 - Terminologies and Concepts

Lecture 11 - Ensuring Representativeness and Type of Surveys

Lecture 12 - Conducting Surveys and Ensuring Representativeness

Lecture 13 - SRSWOR, SRSWR, and Selection of Unit - 1

Lecture 14 - SRSWOR, SRSWR, and Selection of Unit - 2

Lecture 15 - Probabilities of Selection of Samples

Lecture 16 - SRSWOR and SRSWR with R with sample Package

Lecture 17 - Examples of SRS with R using sample Package

Lecture 18 - Simple Random Sampling : SRS with R using sampling and sample Packages

Lecture 19 - Simple Random Sampling : Estimation of Population Mean

Lecture 20 - Simple Random Sampling : Estimation of Population Variance

Lecture 21 - Simple Random Sampling : Estimation of Population Variance

Lecture 22 - SRS: Confidence Interval Estimation of Population Mean

Lecture 23 - SRS: Estimation of Mean, Variance and Confidence Interval in SRSWOR using R

Lecture 24 - SRS: Estimation of Mean, Variance and Confidence Interval in SRSWR using R

Lecture 25 - Sampling for Proportions and Percentages : Basic Concepts

Lecture 26 - Sampling for Proportions and Percentages : Mean and Variance of Sample Proportion

Lecture 27 - Sampling for Proportions and Percentages : Sampling for Proportions with R

Lecture 28 - Stratified Random Sampling : Drawing the Sample and Sampling Procedure

Lecture 29 - Stratified Random Sampling : Estimation of Population Mean, Population Variance and Confidence Interval

Lecture 30 - Stratified Random Sampling : Sample Allocation and Variances Under Allocation

Lecture 31 - Stratified Random Sampling : Drawing of Sample Using sampling and strata Packages in R

Lecture 32 - Stratified Random Sampling : Drawing of Sample Using survey Package in R

Lecture 33 - Bootstrap Methodology : What is Bootstrap and Methodology

Lecture 34 - Bootstrap Methodology : EDF, Bootstrap Bias and Bootstrap Standard Errors

Lecture 35 - Bootstrap Methodology : Bootstrap Analysis Using boot Package in R

Lecture 36 - Bootstrap Methodology : Bootstrap Confidence Interval

Lecture 37 - Bootstrap Methodology : Bootstrap Confidence Interval Using boot and bootstrap Packages in R

Lecture 38 - Bootstrap Methodology : Example of Bootstrap Analysis Using boot Package

Lecture 39 - Introduction to Linear Models and Regression : Introduction and Basic Concepts

Lecture 40 - Simple Linear Regression Analysis : Basic Concepts and Least Squares Estimation

Lecture 41 - Simple Linear Regression Analysis : Fitting Linear Model With R Software

Lecture 42 - Simple Linear Regression Analysis : Properties of Least Squares Estimators

Lecture 43 - Simple Linear Regression Analysis : Maximum Likelihood and Confidence Interval Estimation

Lecture 44 - Simple Linear Regression Analysis : Test of Hypothesis and Confidence Interval Estimation With R

Lecture 45 - Multiple Linear Regression Analysis : Basic Concepts

Lecture 46 - Multiple Linear Regression Analysis : OLSE, Fitted Model and Residuals

Lecture 47 - Multiple Linear Regression Analysis : Model Fitting With R Software

Lecture 48 - Multiple Linear Regression Analysis : Properties of OLSE and Maximum Likelihood Estimation

Lecture 49 - Multiple Linear Regression Analysis : Test of Hypothesis and Confidence Interval Estimation on Individual Regression Coefficients

Lecture 50 - Analysis of Variance and Implementation in R Software

Lecture 51 - Goodness of Fit and Implementation in R Software

Lecture 52 - Variable Selection using LASSO Regression : Introduction and Basic Concepts

Lecture 53 - Variable Selection using LASSO Regression : LASSO with R

NPTEL : NOC:Measure Theoretic Probability 1 (Mathematics)

Co-ordinators : Prof. Suprio Bhar

Lecture 1 - Introduction to the course Measure Theoretic Probability 1

Lecture 2 - Sigma-fields and Measurable spaces

Lecture 3 - Fields and Generating sets for Sigma-fields

Lecture 4 - Borel Sigma-field on R and other sets

Lecture 5 - Limits of sequences of sets and Monotone classes

Lecture 6 - Measures and Measure spaces

Lecture 7 - Probability Measures

Lecture 8 - Properties of Measures - I

Lecture 9 - Properties of Measures - II

Lecture 10 - Properties of Measures - III

Lecture 11 - Measurable functions

Lecture 12 - Borel Measurable functions

Lecture 13 - Algebraic properties of Measurable functions

Lecture 14 - Limiting behaviour of measurable functions

Lecture 15 - Random Variables and Random Vectors

Lecture 16 - Law or Distribution of an RV

Lecture 17 - Distribution Function of an RV

Lecture 18 - Decomposition of Distribution functions

Lecture 19 - Construction of RVs with a specified law

Lecture 20 - Caratheodery Extension Theorem

Lecture 21 - From Distribution Functions to Probability Measures - I

Lecture 22 - From Distribution Functions to Probability Measures - II

Lecture 23 - Lebesgue-Stieltjes Measures

Lecture 24 - Properties of Lebesgue Measure on R

Lecture 25 - Distribution Functions and Probability Measures in higher dimensions

Lecture 26 - Integration of measurable functions

Lecture 27 - Properties of Measure Theoretic Integration - I

Lecture 28 - Properties of Measure Theoretic Integration - II

Lecture 29 - Monotone Convergence Theorem

Lecture 30 - Computation of Expectation for Discrete RVs

Lecture 31 - MCT and the Linearity of Measure Theoretic Integration

Lecture 32 - Sets of measure zero and Measure Theoretic Integration

Lecture 33 - Fatou's Lemma and Dominated Convergence Theorem

Lecture 34 - Riemann and Lebesgue integration

Lecture 35 - Computations involving Lebesgue Integration

Lecture 36 - Decomposition of Measures

Lecture 37 - Absolutely Continuous RVs

Lecture 38 - Expectation of Absolutely Continuous RVs

Lecture 39 - Inequalities involving moments of RVs

Lecture 40 - Conclusion to the course Measure Theoretic Probability 1

NPTEL : NOC:Foundations of R Software (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1

Lecture 2

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Lecture 9

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Lecture 51

Lecture 52

Lecture 53

NPTEL : NOC:Foundations of R Software (In Hindi) (Mathematics)

Co-ordinators : Prof. Shalabh

Lecture 1

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Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

NPTEL : NOC:An Introduction to Hyperbolic Geometry (Mathematics)

Co-ordinators : Prof. Abhijit Pal

Lecture 1

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Lecture 4

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Lecture 6

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Lecture 8

Lecture 9

Lecture 10

Lecture 11

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Lecture 32

Lecture 33

Lecture 34

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Lecture 37

Lecture 38

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Lecture 40

Lecture 41

NPTEL : NOC:A Primer to Mathematical Optimization (Mathematics)

Co-ordinators : Prof. Debdas Ghosh

Lecture 1 - Introduction and History of Optimization

Lecture 2 - Basics of Linear Algebra

Lecture 3 - Definiteness of Matrices

Lecture 4 - Sets in R^n

Lecture 5 - Limit Superior and Limit Inferior

Lecture 6 - Order of Convergence

Lecture 7 - Lipschitz and Uniform Continuity

Lecture 8 - Partial and Directional Derivatives and Differnentiability (8,9)

Lecture 9 - Taylor's Theorem

Lecture 10 - Convex Sets and Convexity Preserving Operations

Lecture 11 - Sepration Results

Lecture 12 - Theorems of Alternatives (13 and 14)

Lecture 13 - Convex Functions

Lecture 14 - Properties and Zeroth Order Characterization of Convex Function

Lecture 15 - First-Order and Second-Order Characterization of Convex Functions

Lecture 16 - Convexity Preserving Operations

Lecture 17 - Optimality and Coerciveness

Lecture 18 - First-Order Optimality Condition (20 Part 1)

Lecture 19 - Second-Order Optimality Condition (20 Part 2)

Lecture 20 - General Structure of Unconstrained Optimization Algorithms

Lecture 21 - Inexact Line Search

Lecture 22 - Globel Convergence of Descent Methods (23,24)

Lecture 23 - Where Do Descent Methods Converge?

Lecture 24 - Scaling of Variables

Lecture 25 - Practical Stoping Criteria

Lecture 26 - Steepest Descent Method (28,29)

Lecture 27 - Newton's Method (30,31,32)

Lecture 28 - Quasi Newton Methods (33,34,35)

Lecture 29 - Conjugate Direction Methods (36,37)

Lecture 30 - Trust Region Methods - Part I

Lecture 31 - Trust Region Methods - Part II

Lecture 32 - A Revisit to Lagrange Multipliears Method

Lecture 33 - Special Cones for Contrained Optimization

Lecture 34 - Tangent Cone

Lecture 35 - First-Order KKT Optimality Conditions (42,43)

Lecture 36 - Second-Order KKT Optimality Conditions

Lecture 37 - Constraint Qualifications

Lecture 38 - Lagrangian Duality Theory (46 to 50)

Lecture 39 - Methods for Linearly Constrained Problems (51,52,53)

Lecture 40 - Interior-Point Method for QPP

Lecture 41 - Penalty Methods

Lecture 42 - Sequential Quadratic Programming Method

NPTEL : NOC:Measure Theoretic Probability 2 (Mathematics)

Co-ordinators : Prof. Suprio Bhar

Lecture 1

Lecture 2

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Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

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Lecture 43

Lecture 44

NPTEL : NOC:Set Theory and Mathematical Logic (Mathematics)

Co-ordinators : Prof. Amit Kuber

Lecture 1 - Introduction to Set Theory

Lecture 2 - Operations on Sets, and Functions

Lecture 3 - Bijective Functions

Lecture 4 - Equivalence Relations and Partitions

Lecture 5 - Cantor-Schroder-Bernstein Theorem

Lecture 6 - Natural Numbers in ZF Set Theory

Lecture 7 - Standard Number Systems in ZF Set Theory

Lecture 8 - (Finitary) Power Sets and Countability

Lecture 9 - Bijections of the set of real numbers: Dedekind cut and Cantor's middle-third set

Lecture 10 - Bijections of the real numbers: Continued Fractions

Lecture 11 - Principles of Mathematical Induction

Lecture 12 - Ordinal Numbers

Lecture 13 - Ordinal Arithmetic

Lecture 14 - Cardinal Numbers and Cardinal Arithmetic

Lecture 15 - Tutorial - Week 4

Lecture 16 - Partial Orders

Lecture 17 - Lattices

Lecture 18 - Equivalents of the Axiom of Choice (AC): Zorn's Lemma (ZL) and Well-ordering theorem (WOT)

Lecture 19 - Tutorial - Week 5

Lecture 20 - Boolean Algebras

Lecture 21 - Stone's Representation Theorems for Boolean Algebras

Lecture 22 - Some Exercises on Boolean Algebras

Lecture 23 - Ultrafilters in Boolean Algebras

Lecture 24 - Introduction to Mathematical Logic

Lecture 25 - Propositional Logic: Language, Formulas and Valuations

Lecture 26 - Propositional Logic: Logical Equivalence and Lindenbaum-Tarski Algebra

Lecture 27 - Tutorial - Week 7

Lecture 28 - Propositional Logic: Normal Forms of Formulas and Adequacy of Connectives

Lecture 29 - Propositional Logic: Semantic Consequence Relation

Lecture 30 - Propositional Logic: Syntactic Consequence Relation

Lecture 31 - Deduction Theorem (Continued...)

Lecture 32 - Tutorial - Week 8

Lecture 33 - Propositional Logic: Consistency and Soundness Theorem

Lecture 34 - Propositional Logic: Completeness Theorem - Part I

Lecture 35 - Propositional Logic: Completeness Theorem - Part II

Lecture 36 - Compactness Theorem and Konig's Lemma

Lecture 37 - Tutorial - Week 9

Lecture 38 - Introduction to First-Order Predicate Logic

Lecture 39 - Predicate Logic: Terms and Formulas

Lecture 40 - Predicate Logic: Validity of Formulas

Lecture 41 - Tutorial - Week 10

Lecture 42 - Predicate Logic Substructures, Semantic Consequence Relation, and Models of Theories

Lecture 43 - Predicate Logic: Standard Logical Equivalences, Normal Forms, and Definable Sets

Lecture 44 - Tutorial - Week 11

Lecture 45 - Hyperreal Numbers

Lecture 46 - Predicate Logic: Ultraproduct of Structures and Los's Theorem

Lecture 47 - Predicate Logic: Compactness Theorem

Lecture 48 - Tutorial - Week 12

Lecture 49 - Predicate Logic: Lowenheim-Skolem Theorems

Lecture 50 - Predicate Logic: Reduced Products, Categoricity

Lecture 51 - Predicate Logic: Categoricity (Continued...) and Quantifier Elimination

Lecture 52 - Godel's Incompleteness Theorems

NPTEL : NOC:Introduction to Fourier Analysis (Mathematics)

Co-ordinators : Prof. Parasar Mohanty

Lecture 1 - Origin of Fourier series

Lecture 2 - Convergence of a series and Riemann integration

Lecture 3 - Riemann integration and periodic functions

Lecture 4 - Fourier coefficients and series

Lecture 5 - Complex Fourier series

Lecture 6 - Riemann Lebesgue lemma and Dirichlet kernel

Lecture 7 - Convolution of two Riemann integrable functions

Lecture 8 - Properties of convolution

Lecture 9 - Cesaro summability and summation by parts

Lecture 10 - Fejer kernel

Lecture 11 - Fejer theorem and applications

Lecture 12 - Good kernels and Poisson kernel

Lecture 13 - Abel summability

Lecture 14 - Dirichlet problem

Lecture 15 - Convergence at jump discontinuity

Lecture 16 - Orthonormal families

Lecture 17 - Pythagoras theorem and Parseval identity

Lecture 18 - Pointwise convergence

Lecture 19 - Parseval identity applications

Lecture 20 - Divergent Fourier series

Lecture 21 - Pointwise convergence of S_N(f)

Lecture 22 - Isoperimetric problem

Lecture 23 - Weyl's equidistribution theorem

Lecture 24 - on Equidistributed sequences

Lecture 25 - Proof of Weyl's criterion

Lecture 26 - Fourier analysis on finite groups

Lecture 27 - Fourier transform on Z(N)

Lecture 28 - Inversion theorem and Parseval identity

Lecture 29 - Results on Fourier coefficients of two functions

Lecture 30 - Fast Fourier transform

Lecture 31 - Fourier analysis on finite abelian group

Lecture 32 - Fourier analysis on finite abelian groups

Lecture 33 - Simultaneously diagonalizable operators and characters

Lecture 34 - Results of Fourier series on finite abelian group

Lecture 35 - Applications in Number theory

Lecture 36 - Fourier transform on R

Lecture 37 - Properties of Fourier transform

Lecture 38 - Inversion formula and convolution

Lecture 39 - Fejer kernel on R

Lecture 40 - Schwartz space

Lecture 41 - Convolution and Good kernel in Schwartz space

Lecture 42 - Multiplication formula and Fourier inversion theorem

Lecture 43 - Plancherel formula and Poisson summation formula

Lecture 44 - Application of Poisson summation formula

Lecture 45 - Weierstrass theorem and Heisenberg uncertainty principle

Lecture 46 - Hermite operator

Lecture 47 - Solution of ODE by using Fourier transform

Lecture 48 - Laplacian equation

Lecture 49 - Poisson kermal and mean value theorem for harmonic functions

Lecture 50 - Wave equation

Lecture 51 - Eigenvalues of Fourier transform

Lecture 52 - Fourier transform on R^n

Lecture 53 - Properties of Fourier transform on R^n

Lecture 54 - Inversion theorem and Plancherel theorem

Lecture 55 - Wave equation, heat equation and Poisson kernel

Lecture 56 - Fourier series in higher dimension

Lecture 57 - Poission summation formula

Lecture 58 - Application of Poission summation formula

Lecture 59 - Radon transform

Lecture 60 - Reconstruction formula

NPTEL : NOC:Ordinary Differential Equations (Mathematics)

Co-ordinators : Prof. Kaushik Bal

Lecture 1 - Vector Spaces

Lecture 2 - Linear Transformation

Lecture 3 - Matrices

Lecture 4 - Calculus in Several Variable

Lecture 5 - Lipchitz Continuity

Lecture 6 - Cauchy-Schwatz and Gronwall Inequality

Lecture 7 - Ordinary Differential Equations: Introduction

Lecture 8 - Differential Inequalities

Lecture 9 - 2nd Order Constant coefficient linear equations

Lecture 10 - Picard Existence and Uniqueness Theorem

Lecture 11 - Linear System

Lecture 12 - Well-Posedness of a ODE

Lecture 13 - Linear System - 1

Lecture 14 - Linear System - 2

Lecture 15 - Fundamental Matrix

Lecture 16 - Exponential of a Linear Operator

Lecture 17 - Fundamental theorem of linear Systems

Lecture 18 - Higher Dimensional Matrix Exponential - 1

Lecture 19 - Higher Dimensional Matrix Exponential - 2

Lecture 20 - Method of Eigenvalue

Lecture 21 - Method of Eigenvalue (Continued...)

Lecture 22 - Maximal Interval of Existence

Lecture 23 - Maximal Interval of Existence: Worked out examples

Lecture 24 - Periodic Linear System

Lecture 25 - Asymptotic behavior of solution to linear system - I

Lecture 26 - Asymptotic behavior of solution to linear system - II

Lecture 27 - Asymptotic Behavior of Linear Systems - III

Lecture 28 - Exact and Adjoint equations

Lecture 29 - Sturm Comparison Theory

Lecture 30 - Oscillation Theory - 2

Lecture 31 - Linear Boundary Value Problem

Lecture 32 - Maximum Principle

Lecture 33 - Sturm Liouville Theory - 1

Lecture 34 - Sturm Liouville Theory - 2

Lecture 35 - Periodic Sturm Liouville Problem

Lecture 36 - Eigenfunction Expansion

Lecture 37 - Stability in the sense of Lyapunov - I

Lecture 38 - Stability in the sense of Lyapunov - II

Lecture 39 - Lyapunov Direct method

Lecture 40 - Linear two-dimensional phase space dynamics (Continued...)

Lecture 41 - Phase Portrait for Planar Systems

NPTEL : NOC:Category Theory (Mathematics)

Co-ordinators : Prof. Amit Kuber

Lecture 1 - Introduction to Category Theory

Lecture 2 - Examples of Categories

Lecture 3 - Functors

Lecture 4 - Natural Transformations and Equivalences of Categories

Lecture 5 - Equivalence of Categories and some properties of morphisms

Lecture 6 - The Yoneda lemma and Representable functors

Lecture 7 - Limits and colimits - Part 1

Lecture 8 - Limits and colimits - Part 2

Lecture 9 - Limits and colimits - Part 3 - Interaction with functors - Adjuctions - I Definitions

Lecture 10 - Adjunctions - II Examples

Lecture 11 - Adjunctions - III Triangular identities

Lecture 12 - Adjunctions - IV General adjoint functor theorem

Lecture 13 - Adjunctions - V Special adjoint functor theorem Filtered colimits-I Basics

Lecture 14 - Filtered colimits - II Locally finitely presentable (LFP) categories

Lecture 15 - Monads - I Eilenberg-Moore and Kleisli categories

Lecture 16 - Monads - II Monadicity theorem

Lecture 17 - Monoidal categories and enriched categories

Lecture 18 - Abelian categories

Lecture 19 - Grothendieck categories and localization

Lecture 20 - Freyd-Mitchell embedding theorem Homological algebra I Diagram chasing

Lecture 21 - Homological algebra II Chain homotopy, projective resolutions and the derived category

Lecture 22 - Model categories

Lecture 23 - Topos Theory - I Elementary toposes

Lecture 24 - Topos Theory - II Grothendieck toposes

NPTEL : Advanced Engineering Mathematics (Mathematics)

Co-ordinators : Dr. P. Panigrahi, Prof. J. Kumar, Prof. P.D. Srivastava, Prof. Somesh Kumar

Lecture 1 - Review Groups, Fields and Matrices

Lecture 2 - Vector Spaces, Subspaces, Linearly Dependent/Independent of Vectors

Lecture 3 - Basis, Dimension, Rank and Matrix Inverse

Lecture 4 - Linear Transformation, Isomorphism and Matrix Representation

Lecture 5 - System of Linear Equations, Eigenvalues and Eigenvectors

Lecture 6 - Method to Find Eigenvalues and Eigenvectors, Diagonalization of Matrices

Lecture 7 - Jordan Canonical Form, Cayley Hamilton Theorem

Lecture 8 - Inner Product Spaces, Cauchy-Schwarz Inequality

Lecture 9 - Orthogonality, Gram-Schmidt Orthogonalization Process

Lecture 10 - Spectrum of special matrices,positive/negative definite matrices

Lecture 11 - Concept of Domain, Limit, Continuity and Differentiability

Lecture 12 - Analytic Functions, C-R Equations

Lecture 13 - Harmonic Functions

Lecture 14 - Line Integral in the Complex

Lecture 15 - Cauchy Integral Theorem

Lecture 16 - Cauchy Integral Theorem (Continued.)

Lecture 17 - Cauchy Integral Formula

Lecture 18 - Power and Taylor's Series of Complex Numbers

Lecture 19 - Power and Taylor's Series of Complex Numbers (Continued.)

Lecture 20 - Taylor's, Laurent Series of f(z) and Singularities

Lecture 21 - Classification of Singularities, Residue and Residue Theorem

Lecture 22 - Laplace Transform and its Existence

Lecture 23 - Properties of Laplace Transform

Lecture 24 - Evaluation of Laplace and Inverse Laplace Transform

Lecture 25 - Applications of Laplace Transform to Integral Equations and ODEs

Lecture 26 - Applications of Laplace Transform to PDEs

Lecture 27 - Fourier Series

Lecture 28 - Fourier Series (Continued.)

Lecture 29 - Fourier Integral Representation of a Function

Lecture 30 - Introduction to Fourier Transform

Lecture 31 - Applications of Fourier Transform to PDEs

Lecture 32 - Laws of Probability - I

Lecture 33 - Laws of Probability - II

Lecture 34 - Problems in Probability

Lecture 35 - Random Variables

Lecture 36 - Special Discrete Distributions

Lecture 37 - Special Continuous Distributions

Lecture 38 - Joint Distributions and Sampling Distributions

Lecture 39 - Point Estimation

Lecture 40 - Interval Estimation

Lecture 41 - Basic Concepts of Testing of Hypothesis

Lecture 42 - Tests for Normal Populations

NPTEL : Functional Analysis (Mathematics)

Co-ordinators : Prof. P.D. Srivastava

Lecture 1 - Metric Spaces with Examples

Lecture 2 - Holder Inequality and Minkowski Inequality

Lecture 3 - Various Concepts in a Metric Space

Lecture 4 - Separable Metrics Spaces with Examples

Lecture 5 - Convergence, Cauchy Sequence, Completeness

Lecture 6 - Examples of Complete and Incomplete Metric Spaces

Lecture 7 - Completion of Metric Spaces + Tutorial

Lecture 8 - Vector Spaces with Examples

Lecture 9 - Normed Spaces with Examples

Lecture 10 - Banach Spaces and Schauder Basic

Lecture 11 - Finite Dimensional Normed Spaces and Subspaces

Lecture 12 - Compactness of Metric/Normed Spaces

Lecture 13 - Linear Operators-definition and Examples

Lecture 14 - Bounded Linear Operators in a Normed Space

Lecture 15 - Bounded Linear Functionals in a Normed Space

Lecture 16 - Concept of Algebraic Dual and Reflexive Space

Lecture 17 - Dual Basis & Algebraic Reflexive Space

Lecture 18 - Dual Spaces with Examples

Lecture 19 - Tutorial - I

Lecture 20 - Tutorial - II

Lecture 21 - Inner Product & Hilbert Space

Lecture 22 - Further Properties of Inner Product Spaces

Lecture 23 - Projection Theorem, Orthonormal Sets and Sequences

Lecture 24 - Representation of Functionals on a Hilbert Spaces

Lecture 25 - Hilbert Adjoint Operator

Lecture 26 - Self Adjoint, Unitary & Normal Operators

Lecture 27 - Tutorial - III

Lecture 28 - Annihilator in an IPS

Lecture 29 - Total Orthonormal Sets And Sequences

Lecture 30 - Partially Ordered Set and Zorns Lemma

Lecture 31 - Hahn Banach Theorem for Real Vector Spaces

Lecture 32 - Hahn Banach Theorem for Complex V.S. & Normed Spaces

Lecture 33 - Baires Category & Uniform Boundedness Theorems

Lecture 34 - Open Mapping Theorem

Lecture 35 - Closed Graph Theorem

Lecture 36 - Adjoint Operator

Lecture 37 - Strong and Weak Convergence

Lecture 38 - Convergence of Sequence of Operators and Functionals

Lecture 39 - LP - Space

Lecture 40 - LP - Space (Continued.)

NPTEL : Numerical methods of Ordinary and Partial Differential Equations (Mathematics)

Co-ordinators : Dr. G.P. Raja Sekhar

Lecture 1 - Motivation with few Examples

Lecture 2 - Single - Step Methods for IVPs

Lecture 3 - Analysis of Single Step Methods

Lecture 4 - Runge - Kutta Methods for IVPs

Lecture 5 - Higher Order Methods/Equations

Lecture 6 - Error - Stability - Convergence of Single Step Methods

Lecture 7 - Tutorial - I

Lecture 8 - Tutorial - II

Lecture 9 - Multi-Step Methods (Explicit)

Lecture 10 - Multi-Step Methods (Implicit)

Lecture 11 - Convergence and Stability of multi step methods

Lecture 12 - General methods for absolute stability

Lecture 13 - Stability Analysis of Multi Step Methods

Lecture 14 - Predictor - Corrector Methods

Lecture 15 - Some Comments on Multi - Step Methods

Lecture 16 - Finite Difference Methods - Linear BVPs

Lecture 17 - Linear/Non - Linear Second Order BVPs

Lecture 18 - BVPS - Derivative Boundary Conditions

Lecture 19 - Higher Order BVPs

Lecture 20 - Shooting Method BVPs

Lecture 21 - Tutorial - III

Lecture 22 - Introduction to First Order PDE

Lecture 23 - Introduction to Second Order PDE

Lecture 24 - Finite Difference Approximations to Parabolic PDEs

Lecture 25 - Implicit Methods for Parabolic PDEs

Lecture 26 - Consistency, Stability and Convergence

Lecture 27 - Other Numerical Methods for Parabolic PDEs

Lecture 28 - Tutorial - IV

Lecture 29 - Matrix Stability Analysis of Finite Difference Scheme

Lecture 30 - Fourier Series Stability Analysis of Finite Difference Scheme

Lecture 31 - Finite Difference Approximations to Elliptic PDEs - I

Lecture 32 - Finite Difference Approximations to Elliptic PDEs - II

Lecture 33 - Finite Difference Approximations to Elliptic PDEs - III

Lecture 34 - Finite Difference Approximations to Elliptic PDEs - IV

Lecture 35 - Finite Difference Approximations to Hyperbolic PDEs - I

Lecture 36 - Finite Difference Approximations to Hyperbolic PDEs - II

Lecture 37 - Method of characteristics for Hyperbolic PDEs - I

Lecture 38 - Method of characterisitcs for Hyperbolic PDEs - II

Lecture 39 - Finite Difference Approximations to 1st order Hyperbolic PDEs

Lecture 40 - Summary, Appendices, Remarks

NPTEL : Optimization (Mathematics)

Co-ordinators : Prof. A. Goswami, Dr. Debjani Chakraborty

Lecture 1 - Optimization - Introduction

Lecture 2 - Formulation of LPP

Lecture 3 - Geometry of LPP and Graphical Solution of LPP

Lecture 4 - Solution of LPP : Simplex Method

Lecture 5 - Big - M Method

Lecture 6 - Two - Phase Method

Lecture 7 - Special Cases in Simple Applications

Lecture 8 - Introduction to Duality Theory

Lecture 9 - Dual Simplex Method

Lecture 10 - Post Optimaility Analysis

Lecture 11 - Integer Programming - I

Lecture 12 - Integer Programming - II

Lecture 13 - Introduction to Transportation Problems

Lecture 14 - Solving Various types of Transportation Problems

Lecture 15 - Assignment Problems

Lecture 16 - Project Management

Lecture 17 - Critical Path Analysis

Lecture 18 - PERT

Lecture 19 - Shortest Path Algorithm

Lecture 20 - Travelling Salesman Problem

Lecture 21 - Classical optimization techniques : Single variable optimization

Lecture 22 - Unconstarined multivariable optimization

Lecture 23 - Nonlinear programming with equality constraint

Lecture 24 - Nonlinear programming KKT conditions

Lecture 25 - Numerical optimization : Region elimination techniques

Lecture 26 - Numerical optimization : Region elimination techniques (Continued.)

Lecture 27 - Fibonacci Method

Lecture 28 - Golden Section Methods

Lecture 29 - Interpolation Methods

Lecture 30 - Unconstarined optimization techniques : Direct search method

Lecture 31 - Unconstarined optimization techniques : Indirect search method

Lecture 32 - Nonlinear programming : constrained optimization techniques

Lecture 33 - Interior and Exterior penulty Function Method

Lecture 34 - Separable Programming Problem

Lecture 35 - Introduction to Geometric Programming

Lecture 36 - Constrained Geometric Programming Problem

Lecture 37 - Dynamic Programming Problem

Lecture 38 - Dynamic Programming Problem (Continued.)

Lecture 39 - Multi Objective Decision Making

Lecture 40 - Multi attribute decision making

NPTEL : Probability and Statistics (Mathematics)

Co-ordinators : Prof. Somesh Kumar

Lecture 1 - Algebra of Sets - I

Lecture 2 - Algebra of Sets - II

Lecture 3 - Introduction to Probability

Lecture 4 - Laws of Probability - I

Lecture 5 - Laws of Probability - II

Lecture 6 - Problems in Probability

Lecture 7 - Random Variables

Lecture 8 - Probability Distributions

Lecture 9 - Characteristics of Distribution

Lecture 10 - Special Distributions - I

Lecture 11 - Special Distributions - II

Lecture 12 - Special Distributions - III

Lecture 13 - Special Distributions - IV

Lecture 14 - Special Distributions - V

Lecture 15 - Special Distributions - VI

Lecture 16 - Special Distributions - VII

Lecture 17 - Functions of a Random Variable

Lecture 18 - Joint Distributions - I

Lecture 19 - Joint Distributions - II

Lecture 20 - Joint Distributions - III

Lecture 21 - Joint Distributions - IV

Lecture 22 - Transformations of Random Vectors

Lecture 23 - Sampling Distributions - I

Lecture 24 - Sampling Distributions - II

Lecture 25 - Descriptive Statistics - I

Lecture 26 - Descriptive Statistics - II

Lecture 27 - Estimation - I

Lecture 28 - Estimation - II

Lecture 29 - Estimation - III

Lecture 30 - Estimation - IV

Lecture 31 - Estimation - V

Lecture 32 - Estimation - VI

Lecture 33 - Testing of Hypothesis - I

Lecture 34 - Testing of Hypothesis - II

Lecture 35 - Testing of Hypothesis - III

Lecture 36 - Testing of Hypothesis - IV

Lecture 37 - Testing of Hypothesis - V

Lecture 38 - Testing of Hypothesis - VI

Lecture 39 - Testing of Hypothesis - VII

Lecture 40 - Testing of Hypothesis - VIII

NPTEL : Regression Analysis (Mathematics)

Co-ordinators : Dr. Soumen Maity

Lecture 1 - Simple Linear Regression

Lecture 2 - Simple Linear Regression (Continued...1)

Lecture 3 - Simple Linear Regression (Continued...2)

Lecture 4 - Simple Linear Regression (Continued...3)

Lecture 5 - Simple Linear Regression (Continued...4)

Lecture 6 - Multiple Linear Regression

Lecture 7 - Multiple Linear Regression (Continued...1)

Lecture 8 - Multiple Linear Regression (Continued...2)

Lecture 9 - Multiple Linear Regression (Continued...3)

Lecture 10 - Selecting the BEST Regression model

Lecture 11 - Selecting the BEST Regression model (Continued...1)

Lecture 12 - Selecting the BEST Regression model (Continued...2)

Lecture 13 - Selecting the BEST Regression model (Continued...3)

Lecture 14 - Multicollinearity

Lecture 15 - Multicollinearity (Continued...1)

Lecture 16 - Multicollinearity (Continued...2)

Lecture 17 - Model Adequacy Checking

Lecture 18 - Model Adequacy Checking (Continued...1)

Lecture 19 - Model Adequacy Checking (Continued...2)

Lecture 20 - Test for Influential Observations

Lecture 21 - Transformations and Weighting to correct model inadequacies

Lecture 22 - Transformations and Weighting to correct model inadequacies (Continued...1)

Lecture 23 - Transformations and Weighting to correct model inadequacies (Continued...2)

Lecture 24 - Dummy Variables

Lecture 25 - Dummy Variables (Continued...1)

Lecture 26 - Dummy Variables (Continued...2)

Lecture 27 - Polynomial Regression Models

Lecture 28 - Polynomial Regression Models (Continued...1)

Lecture 29 - Polynomial Regression Models (Continued...2)

Lecture 30 - Generalized Linear Models

Lecture 31 - Generalized Linear Models (Continued.)

Lecture 32 - Non-Linear Estimation

Lecture 33 - Regression Models with Autocorrelated Errors

Lecture 34 - Regression Models with Autocorrelated Errors (Continued.)

Lecture 35 - Measurement Errors & Calibration Problem

Lecture 36 - Tutorial - I

Lecture 37 - Tutorial - II

Lecture 38 - Tutorial - III

Lecture 39 - Tutorial - IV

Lecture 40 - Tutorial - V

NPTEL : Statistical Inference (Mathematics)

Co-ordinators : Prof. Somesh Kumar

Lecture 1 - Introduction and Motivation

Lecture 2 - Basic Concepts of Point Estimations - I

Lecture 3 - Basic Concepts of Point Estimations - II

Lecture 4 - Finding Estimators - I

Lecture 5 - Finding Estimators - II

Lecture 6 - Finding Estimators - III

Lecture 7 - Properties of MLEs

Lecture 8 - Lower Bounds for Variance - I

Lecture 9 - Lower Bounds for Variance - II

Lecture 10 - Lower Bounds for Variance - III

Lecture 11 - Lower Bounds for Variance - IV

Lecture 12 - Sufficiency

Lecture 13 - Sufficiency and Information

Lecture 14 - Minimal Sufficiency, Completeness

Lecture 15 - UMVU Estimation, Ancillarity

Lecture 16 - Invariance - I

Lecture 17 - Invariance - II

Lecture 18 - Bayes and Minimax Estimation - I

Lecture 19 - Bayes and Minimax Estimation - II

Lecture 20 - Bayes and Minimax Estimation - III

Lecture 21 - Testing of Hypotheses : Basic Concepts

Lecture 22 - Neyman Pearson Fundamental Lemma

Lecture 23 - Applications of NP lemma

Lecture 24 - UMP Tests

Lecture 25 - UMP Tests (Continued.)

Lecture 26 - UMP Unbiased Tests

Lecture 27 - UMP Unbiased Tests (Continued.)

Lecture 28 - UMP Unbiased Tests : Applications

Lecture 29 - Unbiased Tests for Normal Populations

Lecture 30 - Unbiased Tests for Normal Populations (Continued.)

Lecture 31 - Likelihood Ratio Tests - I

Lecture 32 - Likelihood Ratio Tests - II

Lecture 33 - Likelihood Ratio Tests - III

Lecture 34 - Likelihood Ratio Tests - IV

Lecture 35 - Invariant Tests

Lecture 36 - Test for Goodness of Fit

Lecture 37 - Sequential Procedure

Lecture 38 - Sequential Procedure (Continued.)

Lecture 39 - Confidence Intervals

Lecture 40 - Confidence Intervals (Continued.)

NPTEL : A Basic Course in Real Analysis (Mathematics)

Co-ordinators : Prof. P.D. Srivastava

Lecture 1 - Rational Numbers and Rational Cuts

Lecture 2 - Irrational numbers, Dedekind's Theorem

Lecture 3 - Continuum and Exercises

Lecture 4 - Continuum and Exercises (Continued.)

Lecture 5 - Cantor's Theory of Irrational Numbers

Lecture 6 - Cantor's Theory of Irrational Numbers (Continued.)

Lecture 7 - Equivalence of Dedekind and Cantor's Theory

Lecture 8 - Finite, Infinite, Countable and Uncountable Sets of Real Numbers

Lecture 9 - Types of Sets with Examples, Metric Space

Lecture 10 - Various properties of open set, closure of a set

Lecture 11 - Ordered set, Least upper bound, greatest lower bound of a set

Lecture 12 - Compact Sets and its properties

Lecture 13 - Weiersstrass Theorem, Heine Borel Theorem, Connected set

Lecture 14 - Tutorial - II

Lecture 15 - Concept of limit of a sequence

Lecture 16 - Some Important limits, Ratio tests for sequences of Real Numbers

Lecture 17 - Cauchy theorems on limit of sequences with examples

Lecture 18 - Fundamental theorems on limits, Bolzano-Weiersstrass Theorem

Lecture 19 - Theorems on Convergent and divergent sequences

Lecture 20 - Cauchy sequence and its properties

Lecture 21 - Infinite series of real numbers

Lecture 22 - Comparison tests for series, Absolutely convergent and Conditional convergent series

Lecture 23 - Tests for absolutely convergent series

Lecture 24 - Raabe's test, limit of functions, Cluster point

Lecture 25 - Some results on limit of functions

Lecture 26 - Limit Theorems for functions

Lecture 27 - Extension of limit concept (one sided limits)

Lecture 28 - Continuity of Functions

Lecture 29 - Properties of Continuous Functions

Lecture 30 - Boundedness Theorem, Max-Min Theorem and Bolzano's theorem

Lecture 31 - Uniform Continuity and Absolute Continuity

Lecture 32 - Types of Discontinuities, Continuity and Compactness

Lecture 33 - Continuity and Compactness (Continued.), Connectedness

Lecture 34 - Differentiability of real valued function, Mean Value Theorem

Lecture 35 - Mean Value Theorem (Continued.)

Lecture 36 - Application of MVT , Darboux Theorem, L Hospital Rule

Lecture 37 - L'Hospital Rule and Taylor's Theorem

Lecture 38 - Tutorial - III

Lecture 39 - Riemann/Riemann Stieltjes Integral

Lecture 40 - Existence of Reimann Stieltjes Integral

Lecture 41 - Properties of Reimann Stieltjes Integral

Lecture 42 - Properties of Reimann Stieltjes Integral (Continued.)

Lecture 43 - Definite and Indefinite Integral

Lecture 44 - Fundamental Theorems of Integral Calculus

Lecture 45 - Improper Integrals

Lecture 46 - Convergence Test for Improper Integrals

NPTEL : Statistical Methods for Scientists and Engineers (Mathematics)

Co-ordinators : Prof. Somesh Kumar

Lecture 1 - Foundations of Probability

Lecture 2 - Laws of Probability

Lecture 3 - Random Variables

Lecture 4 - Moments and Special Distributions

Lecture 5 - Moments and Special Distributions (Continued...)

Lecture 6 - Special Distributions (Continued...)

Lecture 7 - Special Distributions (Continued...)

Lecture 8 - Sampling Distributions

Lecture 9 - Parametric Methods - I

Lecture 10 - Parametric Methods - II

Lecture 11 - Parametric Methods - III

Lecture 12 - Parametric Methods - IV

Lecture 13 - Parametric Methods - V

Lecture 14 - Parametric Methods - VI

Lecture 15 - Parametric Methods - VII

Lecture 16 - Multivariate Analysis - I

Lecture 17 - Multivariate Analysis - II

Lecture 18 - Multivariate Analysis - III

Lecture 19 - Multivariate Analysis - IV

Lecture 20 - Multivariate Analysis - V

Lecture 21 - Multivariate Analysis - VI

Lecture 22 - Multivariate Analysis - VII

Lecture 23 - Multivariate Analysis - VIII

Lecture 24 - Multivariate Analysis - IX

Lecture 25 - Multivariate Analysis - X

Lecture 26 - Multivariate Analysis - XI

Lecture 27 - Multivariate Analysis - XII

Lecture 28 - Non parametric Methods - I

Lecture 29 - Non parametric Methods - II

Lecture 30 - Non parametric Methods - III

Lecture 31 - Non parametric Methods - IV

Lecture 32 - Nonparametric Methods - V

Lecture 33 - Nonparametric Methods - VI

Lecture 34 - Nonparametric Methods - VII

Lecture 35 - Nonparametric Methods - VIII

Lecture 36 - Nonparametric Methods - IX

Lecture 37 - Nonparametric Methods - X

Lecture 38 - Nonparametric Methods - XI

Lecture 39 - Nonparametric Methods - XII

Lecture 40 - Nonparametric Methods - XIII

NPTEL : NOC:Probability and Statistics (Mathematics)

Co-ordinators : Prof. Somesh Kumar

Lecture 1 - Sets, Classes, Collection

Lecture 2 - Sequence of Sets

Lecture 3 - Ring, Field (Algebra)

Lecture 4 - Sigma-Ring, Sigma-Field, Monotone Class

Lecture 5 - Random Experiment, Events

Lecture 6 - Definitions of Probability

Lecture 7 - Properties of Probability Function - I

Lecture 8 - Properties of Probability Function - II

Lecture 9 - Conditional Probability

Lecture 10 - Independence of Events

Lecture 11 - Problems in Probability - I

Lecture 12 - Problems in Probability - II

Lecture 13 - Random Variables

Lecture 14 - Probability Distribution of a Random Variable - I

Lecture 15 - Probability Distribution of a Random Variable - II

Lecture 16 - Moments

Lecture 17 - Characteristics of Distributions - I

Lecture 18 - Characteristics of Distributions - II

Lecture 19 - Special Discrete Distributions - I

Lecture 20 - Special Discrete Distributions - II

Lecture 21 - Special Discrete Distributions - III

Lecture 22 - Poisson Process - I

Lecture 23 - Poisson Process - II

Lecture 24 - Special Continuous Distributions - I

Lecture 25 - Special Continuous Distributions - II

Lecture 26 - Special Continuous Distributions - III

Lecture 27 - Special Continuous Distributions - IV

Lecture 28 - Special Continuous Distributions - V

Lecture 29 - Normal Distribution

Lecture 30 - Problems on Normal Distribution

Lecture 31 - Problems on Special Distributions - I

Lecture 32 - Problems on Special Distributions - II

Lecture 33 - Function of a random variable - I

Lecture 34 - Function of a random variable - II

Lecture 35 - Joint Distributions - I

Lecture 36 - Joint Distributions - II

Lecture 37 - Independence, Product Moments

Lecture 38 - Linearity Property of Correlation and Examples

Lecture 39 - Bivariate Normal Distribution - I

Lecture 40 - Bivariate Normal Distribution - II

Lecture 41 - Additive Properties of Distributions - I

Lecture 42 - Additive Properties of Distributions - II

Lecture 43 - Transformation of Random Variables

Lecture 44 - Distribution of Order Statistics

Lecture 45 - Basic Concepts

Lecture 46 - Chi-Square Distribution

Lecture 47 - Chi-Square Distribution (Continued...), t-Distribution

Lecture 48 - F-Distribution

Lecture 49 - Descriptive Statistics - I

Lecture 50 - Descriptive Statistics - II

Lecture 51 - Descriptive Statistics - III

Lecture 52 - Descriptive Statistics - IV

Lecture 53 - Introduction to Estimation

Lecture 54 - Unbiased and Consistent Estimators

Lecture 55 - LSE, MME

Lecture 56 - Examples on MME, MLE

Lecture 57 - Examples on MLE - I

Lecture 58 - Examples on MLE - II, MSE

Lecture 59 - UMVUE, Sufficiency, Completeness

Lecture 60 - Rao - Blackwell Theorem and Its Applications

Lecture 61 - Confidence Intervals - I

Lecture 62 - Confidence Intervals - II

Lecture 63 - Confidence Intervals - III

Lecture 64 - Confidence Intervals - IV

Lecture 65 - Basic Definitions

Lecture 66 - Two Types of Errors

Lecture 67 - Neyman-Pearson Fundamental Lemma

Lecture 68 - Applications of N-P Lemma - I

Lecture 69 - Applications of N-P Lemma - II

Lecture 70 - Testing for Normal Mean

Lecture 71 - Testing for Normal Variance

Lecture 72 - Large Sample Test for Variance and Two Sample Problem

Lecture 73 - Paired t-Test

Lecture 74 - Examples

Lecture 75 - Testing Equality of Proportions

Lecture 76 - Chi-Square Test for Goodness Fit - I

Lecture 77 - Chi-Square Test for Goodness Fit - II

Lecture 78 - Testing for Independence in rxc Contingency Table - I

Lecture 79 - Testing for Independence in rxc Contingency Table - II

NPTEL : NOC:Applied Multivariate Statistical Modeling (Mathematics)

Co-ordinators : Dr J Maiti

Lecture 1 - Introduction to Multivariate Statistical Modeling

Lecture 2 - Introduction to Multivariate Statistical Modeling: Data types, models, and modeling

Lecture 3 - Statistical approaches to model building

Lecture 4 - Statistical approaches to model building (Continued...)

Lecture 5 - Univariate Descriptive Statistics

Lecture 6 - Univariate Descriptive Statistics (Continued...)

Lecture 7 - Normal Distribution and Chi-squared Distribution

Lecture 8 - t-distribution, F-distribution, and Central Limit Theorem

Lecture 9 - Univariate Inferential Statistics: Estimation

Lecture 10 - Univariate Inferential Statistics: Estimation (Continued...)

Lecture 11 - Univariate Inferential Statistics: Hypothesis Testing

Lecture 12 - Hypothesis Testing (Continued...): Decision Making Scenarios

Lecture 13 - Multivariate Descriptive Statistics: Mean Vector

Lecture 14 - Multivariate Descriptive Statistics: Covariance Matrix

Lecture 15 - Multivariate Descriptive Statistics: Correlation Matrix

Lecture 16 - Multivariate Descriptive Statistics: Relationship between correlation and covariance matrices

Lecture 17 - Multivariate Normal Distribution

Lecture 18 - Multivariate Normal Distribution (Continued...)

Lecture 19 - Multivariate Normal Distribution (Continued...): Geometrical Interpretation

Lecture 20 - Multivariate Normal Distribution (Continued...): Examining data for multivariate normal distribution

Lecture 21 - Multivariate Inferential Statistics: Basics and Hotelling T-square statistic

Lecture 22 - Multivariate Inferential Statistics: Confidence Region

Lecture 23 - Multivariate Inferential Statistics: Simultaneous confidence interval and Hypothesis testing

Lecture 24 - Multivariate Inferential Statistics: Hypothesis testing for equality of two population mean vectors

Lecture 25 - Analysis of Variance (ANOVA)

Lecture 26 - Analysis of Variance (ANOVA): Decomposition of Total sum of squares

Lecture 27 - Analysis of Variance (ANOVA): Estimation of Parameters and Model Adequacy tests

Lecture 28 - Two-way and Three-way Analysis of Variance (ANOVA)

Lecture 29 - Tutorial ANOVA

Lecture 30 - Tutorial ANOVA (Continued...)

Lecture 31 - Multivariate Analysis of Variance (MANOVA): Conceptual Model

Lecture 32 - Multivariate Analysis of Variance (MANOVA): Assumptions and Decomposition of total sum square and cross products (SSCP)

Lecture 33 - Multivariate Analysis of Variance (MANOVA): Decomposition of total sum square and cross products (SSCP) (Continued...)

Lecture 34 - Multivariate Analysis of Variance (MANOVA): Estimation and Hypothesis testing

Lecture 35 - MANOVA Case Study

Lecture 36 - Multiple Linear Regression: Introduction

Lecture 37 - Multiple Linear Regression: Assumptions and Estimation of model parameters

Lecture 38 - Multiple Linear Regression: Sampling Distribution of parameter estimates

Lecture 39 - Multiple Linear Regression: Sampling Distribution of parameter estimates (Continued...)

Lecture 40 - Multiple Linear Regression: Model Adequacy Tests

Lecture 41 - Multiple Linear Regression: Model Adequacy Tests (Continued...)

Lecture 42 - Multiple Linear Regression: Test of Assumptions

Lecture 43 - MLR-Model diagnostics

Lecture 44 - MLR-case study

Lecture 45 - Multivariate Linear Regression: Conceptual model and assumptions

Lecture 46 - Multivariate Linear Regression: Estimation of parameters

Lecture 47 - Multivariate Linear Regression: Estimation of parameters (Continued...)

Lecture 48 - Multiple Linear Regression: Sampling Distribution of parameter estimates

Lecture 49 - Multivariate Linear Regression: Model Adequacy Tests

Lecture 50 - Multiple Linear Regression: Model Adequacy Tests (Continued...)

Lecture 51 - Regression modeling using SPSS

Lecture 52 - Principal Component Analysis (PCA): Conceptual Model

Lecture 53 - Principal Component Analysis (PCA): Extraction of Principal components (PCs)

Lecture 54 - Principal Component Analysis (PCA): Model Adequacy and Interpretation

Lecture 55 - Principal Component Analysis (PCA): Model Adequacy and Interpretation (Continued...)

Lecture 56 - Factor Analysis: Basics and Orthogonal factor models

Lecture 57 - Factor Analysis: Types of models and key questions

Lecture 58 - Factor Analysis: Parameter Estimation

Lecture 59 - Factor Analysis: Parameter Estimation (Continued...)

Lecture 60 - Factor Analysis: Model Adequacy tests and factor rotation

Lecture 61 - Factor Analysis: Factor scores and case study

NPTEL : NOC:Partial Differential Equations (PDE) for Engineers - Solution by Separation of Variables (Mathematics)

Co-ordinators : Prof. S. De

Lecture 1 - Introduction to PDE

Lecture 2 - Classification of PDE

Lecture 3 - Principle of Linear Superposition

Lecture 4 - Standard Eigen Value Problem and Special ODEs

Lecture 5 - Adjoint Operator

Lecture 6 - Generalized Sturm - Louiville Problem

Lecture 7 - Properties of Adjoint Operator

Lecture 8 - Separation of Variables: Rectangular Coordinate Systems

Lecture 9 - Solution of 3 Dimensional Parabolic Problem

Lecture 10 - Solution of 4 Dimensional Parabolic problem

Lecture 11 - Solution of 4 Dimensional Parabolic Problem (Continued...)

Lecture 12 - Solution of Elliptical PDE

Lecture 13 - Solution of Hyperbolic PDE

Lecture 14 - Orthogonality of Bessel Function and 2 Dimensional Cylindrical Coordinate System

Lecture 15 - Cylindrical Co-ordinate System - 3 Dimensional Problem

Lecture 16 - Spherical Polar Coordinate System

Lecture 17 - Spherical Polar Coordinate System (Continued...)

Lecture 18 - Example of Generalized 3 Dimensional Problem

Lecture 19 - Example of Application Oriented Problems

Lecture 20 - Examples of Application Oriented Problems (Continued...)

NPTEL : NOC:Introductory Course in Real Analysis (Mathematics)

Co-ordinators : Prof. P.D. Srivastava

Lecture 1 - Countable and Uncountable sets

Lecture 2 - Properties of Countable and Uncountable sets

Lecture 3 - Examples of Countable and Uncountable sets

Lecture 4 - Concepts of Metric Space

Lecture 5 - Open ball, Closed ball, Limit point of a set

Lecture 6 - Tutorial-I

Lecture 7 - Some theorems on Open and Closed sets

Lecture 8 - Ordered set, Least upper bound, Greatest lower bound of a set

Lecture 9 - Ordered set, Least upper bound, Greatest lower bound of a set (Continued...)

Lecture 10 - Compact Set

Lecture 11 - Properties of Compact sets

Lecture 12 - Tutorial-II

Lecture 13 - Heine Borel Theorem

Lecture 14 - Weierstrass Theorem

Lecture 15 - Cantor set and its properties

Lecture 16 - Derived set and Dense set

Lecture 17 - Limit of a sequence and monotone sequence

Lecture 18 - Tutorial-III

Lecture 19 - Some Important limits of sequences

Lecture 20 - Ratio Test CauchyÂ's theorems on limits of sequences of real numbers

Lecture 21 - Fundamental theorems on limits

Lecture 22 - Some results on limits and Bolzano-Weierstrass Theorem

Lecture 23 - Criteria for convergent sequence

Lecture 24 - Tutorial-IV

Lecture 25 - Criteria for Divergent Sequence

Lecture 26 - Cauchy Sequence

Lecture 27 - Cauchy Convergence Criteria for Sequences

Lecture 28 - Infinite Series of Real Numbers

Lecture 29 - Convergence Criteria for Series of Positive Real Numbers

Lecture 30 - Tutorial-V

Lecture 31 - Comparison Test for Series

Lecture 32 - Absolutely and Conditionally Convergent Series

Lecture 33 - Rearrangement Theorem and Test for Convergence of Series

Lecture 34 - Ratio and Integral Test for Convergence of Series

Lecture 35 - Raabe's Test for Convergence of Series

Lecture 36 - Tutorial-VI

Lecture 37 - Limit of Functions and Cluster Point

Lecture 38 - Limit of Functions (Continued...)

Lecture 39 - Divergence Criteria for Limit

Lecture 40 - Various Properties of Limit of Functions

Lecture 41 - Left and Right Hand Limits for Functions

Lecture 42 - Tutorial-VII

Lecture 43 - Limit of Functions at Infinity

Lecture 44 - Continuous Functions (Cauchy's Definition)

Lecture 45 - Continuous Functions (Heine's Definition)

Lecture 46 - Properties of Continuous Functions

Lecture 47 - Properties of Continuous Functions (Continued...)

Lecture 48 - Tutorial-VIII

Lecture 49 - Boundness Theorem and Max-Min Theorem

Lecture 50 - Location of Root and Bolzano's Theorem

Lecture 51 - Uniform Continuity and Related Theorems

Lecture 52 - Absolute Continuity and Related Theorems

Lecture 53 - Types of Discontinuities

Lecture 54 - Tutorial-IX

Lecture 55 - Types of Discontinuities (Continued...)

Lecture 56 - Relation between Continuity and Compact Sets

Lecture 57 - Differentiability of Real Valued Functions

Lecture 58 - Local Max. - Min. Cauchy's and Lagrange's Mean Value Theorem

Lecture 59 - Rolle's Mean Value Theorems and Its Applications

Lecture 60 - Tutorial-X

Lecture 61

Lecture 62

Lecture 63

Lecture 64

Lecture 65

Lecture 66

Lecture 67

Lecture 68

Lecture 69

Lecture 70

Lecture 71

Lecture 72

Lecture 73

NPTEL : NOC:Modeling Transport Phenomena of Microparticles (Mathematics)

Co-ordinators : Dr. G.P. Raja Sekhar, Prof. Somnath Bhattacharyya

Lecture 1 - Preliminary concepts: Fluid kinematics, stress, strain

Lecture 2 - CauchyÂ's equation of motion and Navier-Stokes equations

Lecture 3 - Reduced forms of Navier-Stokes equations and Boundary conditions

Lecture 4 - Exact solutions of Navier-Stokes equations in particular cases

Lecture 5 - Dimensional Analysis Â– Non-dimensionalization of Navier-StokesÂ's equations

Lecture 6 - Stream function formulation of Navier-Stokes equations

Lecture 7 - Stokes flow past a cylinder

Lecture 8 - Stokes flow past a sphere

Lecture 9 - Elementary Lubrication Theory

Lecture 10 - Hydrodynamics of Squeeze flow

Lecture 11 - Solution of arbitrary Stokes flows

Lecture 12 - Mechanics of Swimming Microorganisms

Lecture 13 - Viscous flow past a spherical drop

Lecture 14 - Migration of a viscous drop under Marangoni effects

Lecture 15 - Singularities of Stokes flows

Lecture 16 - Introduction to porous media

Lecture 17 - Flow through porous media Â– elementary geometries

Lecture 18 - Flow through composite porous channels

Lecture 19 - Modeling transport of particles inside capillaries

Lecture 20 - Modeling transport of microparticles Â– some applications

Lecture 21 - Introduction to Elctrokietics

Lecture 22 - Basics on Electrostatics

Lecture 23 - Transport Equations for Electrokinetics, Part-I

Lecture 24 - Transport Equations for Electrokinetics, Part-II

Lecture 25 - Electric Double Layer

Lecture 26 - Electroosmotic flow (EOF) of ionized fluid

Lecture 27 - EOF in micro-channel

Lecture 28 - Non-linear EOF, Overlapping Debye Layer

Lecture 29 - Two-dimensional EOF

Lecture 30 - EOF near heterogeneous surface potential

Lecture 31 - Electroosmosis in hydrophobic surface

Lecture 32 - Numerical Methods for Boundary Value Problems (BVP)

Lecture 33 - Numerical Methods for nonlinear BVP

Lecture 34 - Numerical Methods for coupled set of BVP

Lecture 35 - Numerical Methods for PDEs

Lecture 36 - Numerical Methods for transport equations, Part-I

Lecture 37 - Numerical Methods for transport equations, Part-II

Lecture 38 - Electrophoresis of charged colloids, Part-I

Lecture 39 - Electrophoresis of charged colloids, Part-II

Lecture 40 - Gel Electrophoresis

NPTEL : NOC:Constrained and Unconstrained Optimization (Mathematics)

Co-ordinators : Dr. Debjani Chakraborty, Prof. A. Goswami

Lecture 1 - Introduction to Optimization

Lecture 2 - Assumptions and Mathematical Modeling of LPP

Lecture 3 - Geometrey of LPP

Lecture 4 - Graphical Solution of LPP - I

Lecture 5 - Graphical Solution of LPP - II

Lecture 6 - Solution of LPP: Simplex Method

Lecture 7 - Simplex Method

Lecture 8 - Introduction to BIG-M Method

Lecture 9 - Algorithm of BIG-M Method

Lecture 10 - Problems on BIG-M Method

Lecture 11 - Two Phase Method: Introduction

Lecture 12 - Two Phase Method: Problem Solution

Lecture 13 - Special Cases of LPP

Lecture 14 - Degeneracy in LPP

Lecture 15 - Sensitivity Analysis - I

Lecture 16 - Sensitivity Analysis - II

Lecture 17 - Problems on Sensitivity Analysis

Lecture 18 - Introduction to Duality Theory - I

Lecture 19 - Introduction to Duality Theory - II

Lecture 20 - Dual Simplex Method

Lecture 21 - Examples on Dual Simplex Method

Lecture 22 - Interger Linear Programming

Lecture 23 - Interger Linear Programming

Lecture 24 - IPP: Branch and BBound Method

Lecture 25 - Mixed Integer Programming Problem

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31 - Introduction to Nonlinear programming

Lecture 32 - Graphical Solution of NLP

Lecture 33 - Types of NLP

Lecture 34 - One dimentional unconstrained optimization

Lecture 35 - Unconstrained Optimization

Lecture 36 - Region Elimination Technique - 1

Lecture 37 - Region Elimination Technique - 2

Lecture 38 - Region Elimination Technique - 3

Lecture 39 - Unconstrained Optimization

Lecture 40 - Unconstrained Optimization

Lecture 41 - Multivariate Unconstrained Optimization - 1

Lecture 42 - Multivariate Unconstrained Optimization - 2

Lecture 43 - Unconstrained Optimization

Lecture 44 - NLP with Equality Constrained - 1

Lecture 45 - NLP with Equality Constrained - 2

Lecture 46 - Constrained NLP - 1

Lecture 47 - Constrained NLP - 2

Lecture 48 - Constrained Optimization

Lecture 49 - Constrained Optimization

Lecture 50 - KKT

Lecture 51 - Constrained Optimization

Lecture 52 - Constrained Optimization

Lecture 53 - Feasible Direction

Lecture 54 - Penalty and barrier method

Lecture 55 - Penalty method

Lecture 56 - Penalty and barrier method

Lecture 57 - Penalty and barrier method

Lecture 58 - Dynamic programming

Lecture 59 - Multi-Objective decision making

Lecture 60 - Multi-Attribute decision making

NPTEL : NOC:Matrix Solver (Mathematics)

Co-ordinators : Prof. Somnath Roy

Lecture 1 - Introduction to Matrix Algebra - I

Lecture 2 - Introduction to Matrix Algebra - II

Lecture 3 - System of Linear Equations

Lecture 4 - Determinant of a Matrix

Lecture 5 - Determinant of a Matrix (Continued...)

Lecture 6 - Gauss Elimination

Lecture 7 - Gauss Elimination (Continued...)

Lecture 8 - LU Decomposition

Lecture 9 - Gauss-Jordon Method

Lecture 10 - Representation of Physical Systems as Matrix Equations

Lecture 11 - Tridiagonal Matrix Algorithm

Lecture 12 - Equations with Singular Matrices

Lecture 13 - Introduction to Vector Space

Lecture 14 - Vector Subspace

Lecture 15 - Column Space and Nullspace of a Matrix

Lecture 16 - Finding Null Space of a Matrix

Lecture 17 - Solving Ax=b when A is Singular

Lecture 18 - Linear Independence and Spanning of a Subspace

Lecture 19 - Basis and Dimension of a Vector Space

Lecture 20 - Four Fundamental Subspaces of a Matrix

Lecture 21 - Left and right inverse of a matrix

Lecture 22 - Orthogonality between the subspaces

Lecture 23 - Best estimate

Lecture 24 - Projection operation and linear transformation

Lecture 25 - Creating orthogonal basis vectors

Lecture 26 - Gram-Schmidt and modified Gram-Schmidt algorithms

Lecture 27 - Comparing GS and modified GS

Lecture 28 - Introduction to eigenvalues and eigenvectors

Lecture 29 - Eigenvlues and eigenvectors for real symmetric matrix

Lecture 30 - Positive definiteness of a matrix

Lecture 31 - Positive definiteness of a matrix (Continued...)

Lecture 32 - Basic Iterative Methods: Jacobi and Gauss-Siedel

Lecture 33 - Basic Iterative Methods: Matrix Representation

Lecture 34 - Convergence Rate and Convergence Factor for Iterative Methods

Lecture 35 - Numerical Experiments on Convergence

Lecture 36 - Steepest Descent Method: Finding Minima of a Functional

Lecture 37 - Steepest Descent Method: Gradient Search

Lecture 38 - Steepest Descent Method: Algorithm and Convergence

Lecture 39 - Introduction to General Projection Methods

Lecture 40 - Residue Norm and Minimum Residual Algorithm

Lecture 41 - Developing computer programs for basic iterative methods

Lecture 42 - Developing computer programs for projection based methods

Lecture 43 - Introduction to Krylov subspace methods

Lecture 44 - Krylov subspace methods for linear systems

Lecture 45 - Iterative methods for solving linear systems using Krylov subspace methods

Lecture 46 - Conjugate gradient methods

Lecture 47 - Conjugate gradient methods (Continued...)

Lecture 48 - Conjugate gradient methods (Continued...) and Introduction to GMRES

Lecture 49 - GMRES (Continued...)

Lecture 50 - Lanczos Biorthogonalization and BCG Algorithm

Lecture 51 - Numerical issues in BICG and polynomial based formulation

Lecture 52 - Conjugate gradient squared and Biconjugate gradient stabilized

Lecture 53 - Line relaxation method

Lecture 54 - Block relaxation method

Lecture 55 - Domain Decomposition and Parallel Computing

Lecture 56 - Preconditioners

Lecture 57 - Preconditioned conjugate gradient

Lecture 58 - Preconditioned GMRES

Lecture 59 - Multigrid methods - I

Lecture 60 - Multigrid methods - II

NPTEL : NOC:Introduction to Abstract and Linear Algebra (Mathematics)

Co-ordinators : Prof.Sourav Mukhopadhyay

Lecture 1 - Set Theory

Lecture 2 - Set Operations

Lecture 3 - Set Operations (Continued...)

Lecture 4 - Set of sets

Lecture 5 - Binary relation

Lecture 6 - Equivalence relation

Lecture 7 - Mapping

Lecture 8 - Permutation

Lecture 9 - Binary Composition

Lecture 10 - Groupoid

Lecture 11 - Group

Lecture 12 - Order of an element

Lecture 13 - Subgroup

Lecture 14 - Cyclic Group

Lecture 15 - Subgroup Operations

Lecture 16 - Left Cosets

Lecture 17 - Right Cosets

Lecture 18 - Normal Subgroup

Lecture 19 - Rings

Lecture 20 - Field

Lecture 21 - Vector Spaces

Lecture 22 - Sub-Spaces

Lecture 23 - Linear Span

Lecture 24 - Basis of a Vector Space

Lecture 25 - Dimension of a Vector space

Lecture 26 - Complement of subspace

Lecture 27 - Linear Transformation

Lecture 28 - Linear Transformation (Continued...)

Lecture 29 - More on linear mapping

Lecture 30 - Linear Space

Lecture 31 - Rank of a matrix

Lecture 32 - Rank of a matrix (Continued...)

Lecture 33 - System of linear equations

Lecture 34 - Row rank and Column rank

Lecture 35 - Eigen value of a matrix

Lecture 36 - Eigen Vector

Lecture 37 - Geometric multiplicity

Lecture 38 - More on eigen value

Lecture 39 - Similar matrices

Lecture 40 - Diagonalisable

NPTEL : NOC:Engineering Mathematics-I (Mathematics)

Co-ordinators : Prof. Jitendra Kumar

Lecture 1 - RolleÃ¢â‚¬â„¢s Theorem

Lecture 2 - Mean Value Theorems

Lecture 3 - Indeterminate Forms - Part 1

Lecture 4 - Indeterminate Forms - Part 2

Lecture 5 - Taylor Polynomial and Taylor Series

Lecture 6 - Limit of Functions of Two Variables

Lecture 7 - Evaluation of Limit of Functions of Two Variables

Lecture 8 - Continuity of Functions of Two Variables

Lecture 9 - Partial Derivatives of Functions of Two Variables

Lecture 10 - Partial Derivatives of Higher Order

Lecture 11 - Derivative and Differentiability

Lecture 12 - Differentiability of Functions of Two Variables

Lecture 13 - Differentiability of Functions of Two Variables (Continued...)

Lecture 14 - Differentiability of Functions of Two Variables (Continued...)

Lecture 15 - Composite and Homogeneous Functions

Lecture 16 - TaylorÃ¢â‚¬â„¢s Theorem for Functions of Two Variables

Lecture 17 - Maxima and Minima of Functions of Two Variables

Lecture 18 - Maxima and Minima of Functions of Two Variables (Continued...)

Lecture 19 - Maxima and Minima of Functions of Two Variables (Continued...)

Lecture 20 - Constrained Maxima and Minima

Lecture 21 - Improper Integrals

Lecture 22 - Improper Integrals (Continued...)

Lecture 23 - Improper Integrals (Continued...)

Lecture 24 - Improper Integrals (Continued...)

Lecture 25 - Beta and Gamma Function

Lecture 26 - Beta and Gamma Function (Continued...)

Lecture 27 - Differentiation Under Integral Sign

Lecture 28 - Double Integrals

Lecture 29 - Double Integrals (Continued...)

Lecture 30 - Double Integrals (Continued...)

Lecture 31 - Integral Calculus Double Integrals in Polar Form

Lecture 32 - Integral Calculus Double Integrals: Change of Variables

Lecture 33 - Integral Calculus Double Integrals: Surface Area

Lecture 34 - Integral Calculus Triple Integrals

Lecture 35 - Integral Calculus Triple Integrals (Continued...)

Lecture 36 - System of Linear Equations

Lecture 37 - System of Linear Equations Gauss Elimination

Lecture 38 - System of Linear Equations Gauss Elimination (Continued...)

Lecture 39 - Linear Algebra - Vector Spaces

Lecture 40 - Linear Independence of Vectors

Lecture 41 - Vector Spaces Spanning Set

Lecture 42 - Vector Spaces Basis and Dimension

Lecture 43 - Rank of a Matrix

Lecture 44 - Linear Transformations

Lecture 45 - Linear Transformations (Continued....)

Lecture 46 - Eigenvalues and Eigenvectors

Lecture 47 - Eigenvalues and Eigenvectors (Continued...)

Lecture 48 - Eigenvalues and Eigenvectors (Continued...)

Lecture 49 - Eigenvalues and Eigenvectors (Continued...)

Lecture 50 - Eigenvalues and Eigenvectors: Diagonalization

Lecture 51 - Differential Equations - Introduction

Lecture 52 - First Order Differential Equations

Lecture 53 - Exact Differential Equations

Lecture 54 - Exact Differential Equations (Continued...)

Lecture 55 - First Order Linear Differential Equations

Lecture 56 - Higher Order Linear Differential Equations

Lecture 57 - Solution of Higher Order Homogeneous Linear Equations

Lecture 58 - Solution of Higher Order Non-Homogeneous Linear Equations

Lecture 59 - Solution of Higher Order Non-Homogeneous Linear Equations (Continued...)

Lecture 60 - Cauchy-Euler Equations

NPTEL : NOC:Integral and Vector Calculus (Mathematics)

Co-ordinators : Prof. Hari Shankar Mahato

Lecture 1 - Partition, Riemann intergrability and One example

Lecture 2 - Partition, Riemann intergrability and One example (Continued...)

Lecture 3 - Condition of integrability

Lecture 4 - Theorems on Riemann integrations

Lecture 5 - Examples

Lecture 6 - Examples (Continued...)

Lecture 7 - Reduction formula

Lecture 8 - Reduction formula (Continued...)

Lecture 9 - Improper Integral

Lecture 10 - Improper Integral (Continued...)

Lecture 11 - Improper Integral (Continued...)

Lecture 12 - Improper Integral (Continued...)

Lecture 13 - Introduction to Beta and Gamma Function

Lecture 14 - Beta and Gamma Function

Lecture 15 - Differentiation under Integral Sign

Lecture 16 - Differentiation under Integral Sign (Continued...)

Lecture 17 - Double Integral

Lecture 18 - Double Integral over a Region E

Lecture 19 - Examples of Integral over a Region E

Lecture 20 - Change of variables in a Double Integral

Lecture 21 - Change of order of Integration

Lecture 22 - Triple Integral

Lecture 23 - Triple Integral (Continued...)

Lecture 24 - Area of Plane Region

Lecture 25 - Area of Plane Region (Continued...)

Lecture 26 - Rectification

Lecture 27 - Rectification (Continued...)

Lecture 28 - Surface Integral

Lecture 29 - Surface Integral (Continued...)

Lecture 30 - Surface Integral (Continued...)

Lecture 31 - Volume Integral, Gauss Divergence Theorem

Lecture 32 - Vector Calculus

Lecture 33 - Limit, Continuity, Differentiability

Lecture 34 - Successive Differentiation

Lecture 35 - Integration of Vector Function

Lecture 36 - Gradient of a Function

Lecture 37 - Divergence and Curl

Lecture 38 - Divergence and Curl Examples

Lecture 39 - Divergence and Curl important Identities

Lecture 40 - Level Surface Relevant Theorems

Lecture 41 - Directional Derivative (Concept and Few Results)

Lecture 42 - Directional Derivative (Concept and Few Results) (Continued...)

Lecture 43 - Directional Derivatives, Level Surfaces

Lecture 44 - Application to Mechanics

Lecture 45 - Equation of Tangent, Unit Tangent Vector

Lecture 46 - Unit Normal, Unit binormal, Equation of Normal Plane

Lecture 47 - Introduction and Derivation of Serret-Frenet Formula, few results

Lecture 48 - Example on binormal, normal tangent, Serret-Frenet Formula

Lecture 49 - Osculating Plane, Rectifying plane, Normal plane

Lecture 50 - Application to Mechanics, Velocity, speed, acceleration

Lecture 51 - Angular Momentum, Newton's Law

Lecture 52 - Example on derivation of equation of motion of particle

Lecture 53 - Line Integral

Lecture 54 - Surface integral

Lecture 55 - Surface integral (Continued...)

Lecture 56 - Green's Theorem and Example

Lecture 57 - Volume integral, Gauss theorem

Lecture 58 - Gauss divergence theorem

Lecture 59 - Stoke's Theorem

Lecture 60 - Overview of Course

NPTEL : NOC:Transform Calculus and its applications in Differential Equations (Mathematics)

Co-ordinators : Prof. A. Goswami

Lecture 1 - Introduction to Integral Transform and Laplace Transform

Lecture 2 - Existence of Laplace Transform

Lecture 3 - Shifting Properties of Laplace Transform

Lecture 4 - Laplace Transform of Derivatives and Integration of a Function - I

Lecture 5 - Laplace Transform of Derivatives and Integration of a Function - II

Lecture 6 - Explanation of properties of Laplace Transform using Examples

Lecture 7 - Laplace Transform of Periodic Function

Lecture 8 - Laplace Transform of some special Functions

Lecture 9 - Error Function, Dirac Delta Function and their Laplace Transform

Lecture 10 - Bessel Function and its Laplace Transform

Lecture 11 - Introduction to Inverse Laplace Transform

Lecture 12 - Properties of Inverse Laplace Transform

Lecture 13 - Convolution and its Applications

Lecture 14 - Evaluation of Integrals using Laplace Transform

Lecture 15 - Solution of Ordinary Differential Equations with constant coefficients using Laplace Transform

Lecture 16 - Solution of Ordinary Differential Equations with variable coefficients using Laplace Transform

Lecture 17 - Solution of Simultaneous Ordinary Differential Equations using Laplace Transform

Lecture 18 - Introduction to Integral Equation and its Solution Process

Lecture 19 - Introduction to Fourier Series

Lecture 20 - Fourier Series for Even and Odd Functions

Lecture 21 - Fourier Series of Functions having arbitrary period - I

Lecture 22 - Fourier Series of Functions having arbitrary period - II

Lecture 23 - Half Range Fourier Series

Lecture 24 - Parseval's Theorem and its Applications

Lecture 25 - Complex form of Fourier Series

Lecture 26 - Fourier Integral Representation

Lecture 27 - Introduction to Fourier Transform

Lecture 28 - Derivation of Fourier Cosine Transform and Fourier Sine Transform of Functions

Lecture 29 - Evaluation of Fourier Transform of various functions

Lecture 30 - Linearity Property and Shifting Properties of Fourier Transform

Lecture 31 - Change of Scale and Modulation Properties of Fourier Transform

Lecture 32 - Fourier Transform of Derivative and Integral of a Function

Lecture 33 - Applications of Properties of Fourier Transform - I

Lecture 34 - Applications of Properties of Fourier Transform - II

Lecture 35 - Fourier Transform of Convolution of two functions

Lecture 36 - Parseval's Identity and its Application

Lecture 37 - Evaluation of Definite Integrals using Properties of Fourier Transform

Lecture 38 - Fourier Transform of Dirac Delta Function

Lecture 39 - Representation of a function as Fourier Integral

Lecture 40 - Applications of Fourier Transform to Ordinary Differential Equations - I

Lecture 41 - Applications of Fourier Transform to Ordinary Differential Equations - II

Lecture 42 - Solution of Integral Equations using Fourier Transform

Lecture 43 - Introduction to Partial Differential Equations

Lecture 44 - Solution of Partial Differential Equations using Laplace Transform

Lecture 45 - Solution of Heat Equation and Wave Equation using Laplace Transform

Lecture 46 - Criteria for choosing Fourier Transform, Fourier Sine Transform, Fourier Cosine Transform in solving Partial Differential Equations

Lecture 47 - Solution of Partial Differential Equations using Fourier Cosine Transform and Fourier Sine Transform

Lecture 48 - Solution of Partial Differential Equations using Fourier Transform - I

Lecture 49 - Solution of Partial Differential Equations using Fourier Transform - II

Lecture 50 - Solving problems on Partial Differential Equations using Transform Techniques

Lecture 51 - Introduction to Finite Fourier Transform

Lecture 52 - Solution of Boundary Value Problems using Finite Fourier Transform - I

Lecture 53 - Solution of Boundary Value Problems using Finite Fourier Transform - II

Lecture 54 - Introduction to Mellin Transform

Lecture 55 - Properties of Mellin Transform

Lecture 56 - Examples of Mellin Transform - I

Lecture 57 - Examples of Mellin Transform - II

Lecture 58 - Introduction to Z-Transform

Lecture 59 - Properties of Z-Transform

Lecture 60 - Evaluation of Z-Transform of some functions

NPTEL : NOC:Statistical Inference (2019) (Mathematics)

Co-ordinators : Prof. Somesh Kumar

Lecture 1 - Introduction and Motivation - I

Lecture 2 - Introduction and Motivation - II

Lecture 3 - Basic Concepts of Point Estimations - I

Lecture 4 - Basic Concepts of Point Estimations - II

Lecture 5 - Basic Concepts of Point Estimations - III

Lecture 6 - Basic Concepts of Point Estimations - IV

Lecture 7 - Finding Estimators - I

Lecture 8 - Finding Estimators - II

Lecture 9 - Finding Estimators - III

Lecture 10 - Finding Estimators - IV

Lecture 11 - Finding Estimators - V

Lecture 12 - Finding Estimators - VI

Lecture 13 - Properties of MLEs - I

Lecture 14 - Properties of MLEs - II

Lecture 15 - Lower Bounds for Variance - I

Lecture 16 - Lower Bounds for Variance - II

Lecture 17 - Lower Bounds for Variance - III

Lecture 18 - Lower Bounds for Variance - IV

Lecture 19 - Lower Bounds for Variance - V

Lecture 20 - Lower Bounds for Variance - VI

Lecture 21 - Lower Bounds for Variance - VII

Lecture 22 - Lower Bounds for Variance - VIII

Lecture 23 - Sufficiency - I

Lecture 24 - Sufficiency - II

Lecture 25 - Sufficiency and Information - I

Lecture 26 - Sufficiency and Information - II

Lecture 27 - Minimal Sufficiency, Completeness - I

Lecture 28 - Minimal Sufficiency, Completeness - II

Lecture 29 - UMVU Estimation, Ancillarity - I

Lecture 30 - UMVU Estimation, Ancillarity - II

Lecture 31 - Testing of Hypotheses : Basic Concepts - I

Lecture 32 - Testing of Hypotheses : Basic Concepts - II

Lecture 33 - Neyman Pearson Fundamental Lemma - I

Lecture 34 - Neyman Pearson Fundamental Lemma - II

Lecture 35 - Application of NP-Lemma - I

Lecture 36 - Application of NP-Lemma - II

Lecture 37 - UMP Tests - I

Lecture 38 - UMP Tests - II

Lecture 39 - UMP Tests - III

Lecture 40 - UMP Tests - IV

Lecture 41 - UMP Unbiased Tests - I

Lecture 42 - UMP Unbiased Tests - II

Lecture 43 - UMP Unbiased Tests - III

Lecture 44 - UMP Unbiased Tests - IV

Lecture 45 - Applications of UMP Unbiased Tests - I

Lecture 46 - Applications of UMP Unbiased Tests - II

Lecture 47 - Unbiased Test for Normal Populations - I

Lecture 48 - Unbiased Test for Normal Populations - II

Lecture 49 - Unbiased Test for Normal Populations - III

Lecture 50 - Unbiased Test for Normal Populations - IV

Lecture 51 - Likelihood Ratio Tests - I

Lecture 52 - Likelihood Ratio Tests - II

Lecture 53 - Likelihood Ratio Tests - III

Lecture 54 - Likelihood Ratio Tests - IV

Lecture 55 - Likelihood Ratio Tests - V

Lecture 56 - Likelihood Ratio Tests - VI

Lecture 57 - Likelihood Ratio Tests - VII

Lecture 58 - Likelihood Ratio Tests - VIII

Lecture 59 - Test for Goodness of Fit - I

Lecture 60 - Test for Goodness of Fit - II

Lecture 61 - Interval Estimation - I

Lecture 62 - Interval Estimation - II

Lecture 63 - Interval Estimation - III

Lecture 64 - Interval Estimation - IV

NPTEL : NOC:Mathematical Methods for Boundary Value Problems (Mathematics)

Co-ordinators : Prof. Somnath Bhattacharyya

Lecture 1 - Strum-Liouville Problems, Linear BVP

Lecture 2 - Strum-Liouville Problems, Linear BVP (Continued...)

Lecture 3 - Solution of BVPs by Eigen function expansion

Lecture 4 - Solution of BVPs by Eigen function expansion (Continued...)

Lecture 5 - Solutions of linear parabolic, hyperbolic and elliptic PDEs with finite domain by Eigen function expansions

Lecture 6 - Solutions of linear parabolic, hyperbolic and elliptic PDEs with finite domain by Eigen function expansions (Continued...)

Lecture 7 - Green's Function for BVP and Dirichlet Problem

Lecture 8 - Green's Function for BVP and Dirichlet Problem (Continued...)

Lecture 9 - Numerical Techniques for IVP; Shooting Method for BVP

Lecture 10 - Numerical Techniques for IVP; Shooting Method for BVP (Continued...)

Lecture 11 - Finite difference methods for linear BVP; Thomas Algorithm

Lecture 12 - Finite difference methods for linear BVP; Thomas Algorithm (Continued...)

Lecture 13 - Finite difference method for Higher-order BVP; Block tri-diagonal System

Lecture 14 - Finite difference method for Higher-order BVP; Block tri-diagonal System (Continued...)

Lecture 15 - Iterative methods for nonlinear BVP; Control volume formulation

Lecture 16 - Iterative methods for nonlinear BVP; Control volume formulation (Continued...)

Lecture 17 - Implicit scheme; Truncation error; Crank-Nicolson scheme

Lecture 18 - Implicit scheme; Truncation error; Crank-Nicolson scheme (Continued...)

Lecture 19 - Stability analysis of numerical schemes

Lecture 20 - Alternating-Direction-Implicit Scheme; Successive-Over-Relaxation technique for Poisson equations

NPTEL : NOC:Engineering Mathematics-II (Mathematics)

Co-ordinators : Prof. Jitendra Kumar

Lecture 1 - Vector Functions

Lecture 2 - Vector and Scalar Fields

Lecture 3 - Divergence and Curl of a Vector Field

Lecture 4 - Line Integrals

Lecture 5 - Conservative Vector Field

Lecture 6 - Greenâ€™s Theorem

Lecture 7 - Surface Integral - I

Lecture 8 - Surface Integral - II

Lecture 9 - Stokesâ€™ Theorem

Lecture 10 - Divergence Theorem

Lecture 11 - Complex Numbers and Functions

Lecture 12 - Differentiability of Complex Functions

Lecture 13 - Analytic Functions

Lecture 14 - Line Integral

Lecture 15 - Cauchy Integral Theorem

Lecture 16 - Cauchy Integral Formula

Lecture 17 - Taylorâ€™s Series

Lecture 18 - Laurentâ€™s Series

Lecture 19 - Singularities

Lecture 20 - Residue

Lecture 21 - Iterative Methods for Solving System of Linear Equations

Lecture 22 - Iterative Methods for Solving System of Linear Equations (Continued...)

Lecture 23 - Iterative Methods for Solving System of Linear Equations (Continued...)

Lecture 24 - Roots of Algebraic and Transcendental Equations

Lecture 25 - Roots of Algebraic and Transcendental Equations (Continued...)

Lecture 26 - Polynomial Interpolation

Lecture 27 - Polynomial Interpolation (Continued...)

Lecture 28 - Polynomial Interpolation (Continued...)

Lecture 29 - Polynomial Interpolation (Continued...)

Lecture 30 - Numerical Integration

Lecture 31 - Trigonometric Polynomials and Series

Lecture 32 - Derivation of Fourier Series

Lecture 33 - Fourier Series -Evaluation

Lecture 34 - Convergence of Fourier Series - I

Lecture 35 - Convergence of Fourier Series - II

Lecture 36 - Fourier Series for Even and Odd Functions

Lecture 37 - Half Range Fourier Expansions

Lecture 38 - Differentiation and Integration of Fourier Series

Lecture 39 - Besselâ€™s Inequality and Parsevalâ€™s Identity

Lecture 40 - Complex Form of Fourier Series

Lecture 41 - Fourier Integral Representation of a Function

Lecture 42 - Fourier Sine and Cosine Integrals

Lecture 43 - Fourier Cosine and Sine Transform

Lecture 44 - Fourier Transform

Lecture 45 - Properties of Fourier Transform

Lecture 46 - Evaluation of Fourier Transform - Part 1

Lecture 47 - Evaluation of Fourier Transform - Part 2

Lecture 48 - Introduction to Partial Differential Equations

Lecture 49 - Applications of Fourier Transform to PDEs - Part 1

Lecture 50 - Applications of Fourier Transform to PDEs - Part 2

Lecture 51 - Laplace Transform of Some Elementary Functions

Lecture 52 - Existence of Laplace Transform

Lecture 53 - Inverse Laplace Transform

Lecture 54 - Properties of Laplace Transform

Lecture 55 - Properties of Laplace Transform (Continued...)

Lecture 56 - Properties of Laplace Transform (Continued...)

Lecture 57 - Laplace Transform of Special Functions

Lecture 58 - Laplace Transform of Special Functions (Continued...)

Lecture 59 - Applications of Laplace Transform

Lecture 60 - Applications of Laplace Transform (Continued...)

NPTEL : NOC:Advanced Calculus For Engineers (Mathematics)

Co-ordinators : Prof. Somesh Kumar, Prof. Jitendra Kumar

Lecture 1 - Rolle's Theorem

Lecture 2 - Mean Value Theorem

Lecture 3 - Taylor's Formula (Single Variable)

Lecture 4 - Indeterminate Forms - Part 1

Lecture 5 - Indeterminate Forms - Part 2

Lecture 6 - Introduction to Limit

Lecture 7 - Evaluation of Limit

Lecture 8 - Continuity

Lecture 9 - First Order Partial Derivatives

Lecture 10 - Higher Order Partial Derivatives

Lecture 11 - Differentiability - Part 1

Lecture 12 - Differentiability - Part 2

Lecture 13 - Differentiability - Part 3

Lecture 14 - Differentiability - Part 4

Lecture 15 - Composite and Homogeneous Functions

Lecture 16 - Taylor's Theorem (Multivariable)

Lecture 17 - Maxima and Minima - Part 1

Lecture 18 - Maxima and Minima - Part 2

Lecture 19 - Maxima and Minima - Part 3

Lecture 20 - Maxima and Minima - Part 4

Lecture 21 - Formation of Differential Equations

Lecture 22 - First Order and First Degree DE

Lecture 23 - Exact Differential Equations

Lecture 24 - Integrating Factor

Lecture 25 - Linear Differential Equations

Lecture 26 - Introduction to Higher Order DEs

Lecture 27 - Complementary Function

Lecture 28 - Particular Integral

Lecture 29 - Cauchy-Euler Equations

Lecture 30 - Method of Variation of Parameters

Lecture 31 - Improper Integral - Part 1

Lecture 32 - Improper Integral - Part 2

Lecture 33 - Improper Integral - Part 3

Lecture 34 - Improper Integral - Part 4

Lecture 35 - Beta and Gamma Function - Part 1

Lecture 36 - Beta and Gamma Function - Part 2

Lecture 37 - Differentiation under the Integral Sign

Lecture 38 - Double Integrals - Part 1

Lecture 39 - Double Integrals - Part 2

Lecture 40 - Double Integrals - Part 3

Lecture 41 - Double Integrals - Part 4

Lecture 42 - Double Integrals - Part 5

Lecture 43 - Double Integrals - Part 6

Lecture 44 - Triple Integrals - Part 1

Lecture 45 - Triple Integrals - Part 2

Lecture 46 - Vector Functions

Lecture 47 - Vector and Scalar Fields

Lecture 48 - Divergence and Curl of a Vector Field

Lecture 49 - Line Integrals

Lecture 50 - Conservative Vector Fields

Lecture 51 - Green's Theorem

Lecture 52 - Surface Integrals - Part 1

Lecture 53 - Surface Integrals - Part 2

Lecture 54 - Stokes' Theorem

Lecture 55 - Divergence Theorem

Lecture 56 - Application of Derivatives

Lecture 57 - Application of Derivatives (Continued...)

Lecture 58 - Properties of Gradient, Divergence and Curl

Lecture 59 - Properties of Gradient, Divergence and Curl (Continued...)

Lecture 60 - Curl and Integrals

NPTEL : NOC:Rings and Modules (Mathematics)

Co-ordinators : Prof. Ramakrishna Nanduri, Prof. Mousumi Mandal

Lecture 1 - Introduction to Rings

Lecture 2 - Rings, Subrings

Lecture 3 - Ring Homomorphism, Ideals

Lecture 4 - Properties of Ideals

Lecture 5 - Properties of Ideals (Continued...)

Lecture 6 - Quotient Ring, Isomorphism Theorem

Lecture 7 - Isomorphism Theorem, Homomorphism Theorem

Lecture 8 - Homomorphism Theorem

Lecture 9 - Integral Domain, Quotient Ring

Lecture 10 - Quotient Ring

Lecture 11 - Prime ideals, Maximal ideals

Lecture 12 - Maximal ideals

Lecture 13 - Hillbertâ€™s Nullstellensatz

Lecture 14 - Hillbertâ€™s Nullstellensatz (Continued...)

Lecture 15 - Application of Hillbertâ€™s Nullstellensatz

Lecture 16 - Unique Factorization domian

Lecture 17 - Properties of Unique Factorization domain

Lecture 18 - Principal ideal domain

Lecture 19 - Properties of PID and ED

Lecture 20 - Properties of PID and ED (Continued...)

Lecture 21 - Prime elements of Z[i]

Lecture 22 - Prime elements of Z[i] (Continued...)

Lecture 23 - Application in Z[i]

Lecture 24 - Polynomial Rings over UFD

Lecture 25 - Gauss's Lemma

Lecture 26 - Polynomial Ring over UFD and Irreducibility Criterion

Lecture 27 - Irreducibility Criterion

Lecture 28 - Chinese Remainder Theorem

Lecture 29 - Nilradical and Jacobson radical

Lecture 30 - Examples and Problems

Lecture 31 - Definition of Modules and Examples

Lecture 32 - Definition of Modules and Examples (Continued...)

Lecture 33 - Submodules,direct sum and direct product of modules

Lecture 34 - Direct sum and direct product of modules, free modules

Lecture 35 - Finitely generated modules, free modules vs Vector spaces

Lecture 36 - Free modules vs Vector spaces

Lecture 37 - Vector spaces vs free modules and Examples

Lecture 38 - Quotient modules and module homomorphisms

Lecture 39 - Module homomorphism, Epimorphism theorem

Lecture 40 - Epimorphism theorem

Lecture 41 - Maximal submodules, minimal submodules

Lecture 42 - Freeness of submodules of a free module over a PID

Lecture 43 - Torsion modules, freeness of torsion-free modules over a PID

Lecture 44 - Rank of a module, p-submodules over a PID

Lecture 45 - Structure of a torsion module over a PID

Lecture 46 - Structure theorem, chain conditions

Lecture 47 - Artinian modules, Artinian rings

Lecture 48 - Noetherian modules, Noetherian rings

Lecture 49 - Ascending chain condition, Noetherian modules

Lecture 50 - Examples of Noetherian and Artinian modules and rings

Lecture 51 - Composition series, Modules of finite length

Lecture 52 - Jordan-HolderÃ¢'s theorem

Lecture 53 - Artinian rings

Lecture 54 - Noetherian rings

Lecture 55 - Hilbert basis theorem

Lecture 56 - CohenÃ¢'s theorem on Noetherianness

Lecture 57 - Nakayama lemma

Lecture 58 - Nil and Jacobson radicals in Artinian rings

Lecture 59 - Structure theorem

Lecture 60 - Comparison between Artinian and Noetherian rings

NPTEL : NOC:Advanced Computational Techniques (Mathematics)

Co-ordinators : Prof. Somnath Bhattacharyya

Lecture 1 - Polynomial Interpolation

Lecture 2 - Polynomial Interpolation

Lecture 3 - Polynomial Interpolation

Lecture 4 - Spline Interpolation

Lecture 5 - Spline Interpolation

Lecture 6 - Numerical Quadrature

Lecture 7 - Numerical Quadrature (Continued...)

Lecture 8 - Least Squares Approximation

Lecture 9 - Linear System of Equations

Lecture 10 - Linear System of Equations (Continued...)

Lecture 11 - Initial Value Problems (IVP)

Lecture 12 - Initial Value Problems (Continued...)

Lecture 13 - Initial Value Problems (Continued...)

Lecture 14 - Initial Value Problems (Continued...)

Lecture 15 - Linear Boundary Value Problem (BVP)

Lecture 16 - Linear Boundary Value Problem (BVP) (Continued...)

Lecture 17 - Non-linear BVP, Iterative Method

Lecture 18 - Linear Parabolic PDE

Lecture 19 - Hyperbolic PDE

Lecture 20 - Non-linear advection-diffusion equation

NPTEL : NOC:Applied Linear Algebra in AI and ML (Mathematics)

Co-ordinators : Prof. Swanand Khare

Lecture 1 - Vector Spaces

Lecture 2 - Vector Subspaces

Lecture 3 - Linear Span and Linear Dependence

Lecture 4 - Linear Independence

Lecture 5 - Basis and Dimension

Lecture 6 - Linear Functionals

Lecture 7 - Norm of Vector - Part I

Lecture 8 - Norm of Vector - Part II

Lecture 9 - Linear Functions

Lecture 10 - Affine Functions and Examples

Lecture 11 - Examples of Linear and Affine Functions

Lecture 12 - Function Composition

Lecture 13 - System of Linear Equations

Lecture 14 - Left Invertibility

Lecture 15 - Invertibility of Matrices

Lecture 16 - Triangular Systems

Lecture 17 - LU Decomposition - Part I

Lecture 18 - LU Decomposition - Part II

Lecture 19 - QR Decomposition (Rotators) - Part I

Lecture 20 - QR Decomposition (Rotators) - Part II

Lecture 21 - QR Decomposition (Reflectors) - Part I

Lecture 22 - QR Decomposition (Reflectors) - Part II

Lecture 23 - Matrix Norms

Lecture 24 - Sensitivity Analysis

Lecture 25 - Condition Number of a Matrix

Lecture 26 - Sensitivity Analysis - II

Lecture 27 - Sensitivity Analysis - III

Lecture 28 - Least Squares - Part I

Lecture 29 - Least Squares - Part II

Lecture 30 - Least Squares - Part III

Lecture 31 - Least Squares Data Fitting

Lecture 32 - Examples of LS data fitting

Lecture 33 - Classification using Least Squares

Lecture 34 - Examples of LS classification

Lecture 35 - Constrained Least Squares

Lecture 36 - Multiobjective Least Squares

Lecture 37 - Eigenvalues and Eigenvectors - Part I

Lecture 38 - Eigenvalues and Eigenvectors - Part II

Lecture 39 - Spectral Decomposition Theorem

Lecture 40 - Positive Definite Matrices

Lecture 41 - Singular Value Decomposition (SVD)

Lecture 42 - Proof of SVD

Lecture 43 - Properties of SVD

Lecture 44 - Another Proof of SVD

Lecture 45 - Low Rank Approximations

Lecture 46 - Principal Component Analysis

Lecture 47 - SVD and Pseudo - Inverse

Lecture 48 - SVD and the Least Squares Problem

Lecture 49 - Sensitivity Analysis of the Least Squares Problem

Lecture 50 - Power Method

Lecture 51 - Directed Graphs and Properties

Lecture 52 - Page Ranking Algorithm

Lecture 53 - Inverse Eigen Value Problem

Lecture 54 - Fastest Mixing Markov Chains on Graphs - Part I

Lecture 55 - Fastest Mixing Markov Chains on Graphs - Part II

Lecture 56 - Sparse Solution and Underdetermined Systems

Lecture 57 - Structured Low Rank Approximations - Part I

Lecture 58 - Structured Low Rank Approximations - Part II

Lecture 59 - Structured Low Rank Approximations - Part III

Lecture 60 - Recap

NPTEL : NOC:Advanced Engineering Mathematics (2023) (Mathematics)

Co-ordinators : Prof. H S Mahato

Lecture 1 - Introduction on functions of a single variable

Lecture 2 - Basic definitions

Lecture 3 - Mean value Theorems

Lecture 4 - Extremum of function of single variable

Lecture 5 - Examples

Lecture 6 - Introduction on functions of two variable

Lecture 7 - Basic definitions

Lecture 8 - Partial differentiation

Lecture 9 - Extremum of function of two variable

Lecture 10 - Examples

Lecture 11 - Convergence and divergence test

Lecture 12 - Beta function, Gamma function

Lecture 13 - Differentiation under integral sign

Lecture 14 - Line integral, integration in R^2 (Double integral)

Lecture 15 - Examples

Lecture 16 - Double integral

Lecture 17 - Integration in R3

Lecture 18 - Triple integral

Lecture 19 - Examples

Lecture 20 - Introduction to Differential equation

Lecture 21 - Exact form

Lecture 22 - Second order differential equation

Lecture 23 - Iterative method (bisection and fixed point)

Lecture 24 - Newton-Raphson, Jacobi and Gauss-Seidel method

Lecture 25 - Finite difference method

Lecture 26 - Newton's forward and backward interpolation

Lecture 27 - Numerical integration

Lecture 28 - Vector space and Subspace

Lecture 29 - Basis and dimension

Lecture 30 - Rank of a matrix

Lecture 31 - Gauss-Elimination Method

Lecture 32 - Linear Transformation

Lecture 33 - Examples

Lecture 34 - Matrix Representation

Lecture 35 - Eigenvalues and Eigenvectors

Lecture 36 - Cayley-Hamilton Theorem

Lecture 37 - Diagonalisation of a Matrix

Lecture 38 - Examples and applications

Lecture 39 - Types of matrices

Lecture 40 - Equivalent Matrices and Elementary Matrices

Lecture 41 - Introduction to the vector function

Lecture 42 - Differentiation and integration of the vector function

Lecture 43 - Partial differentiation of vector function

Lecture 44 - Directional derivative of a vector function

Lecture 45 - Examples on directional derivative, tangent plane and normal

Lecture 46 - Divergence and curl of a vector function

Lecture 47 - Application to mechanics of vector calculus

Lecture 48 - Serret-Frenet formula and more applications to mechanics

Lecture 49 - Examples on finding unit vectors, curvature and torsion

Lecture 50 - Application of vector calculus to the particle dynamics

Lecture 51 - Line integral of vector function

Lecture 52 - Surface integral of vector function

Lecture 53 - Volume integral of vector function and Gauss Divergence Theorem

Lecture 54 - Green's theorem and Stoke's theorem

Lecture 55 - Verification and application of Divergencen theorem, Green's theorem and Stoke's theorem

Lecture 56 - Basic properties of a complex valued function

Lecture 57 - Analytic Complex valued function

Lecture 58 - Complex Integration and theorems

Lecture 59 - Application of Cauchy's integral formula

Lecture 60 - Regular and Singular point of a complex valued function

NPTEL : NOC:Essentials of Topology (Mathematics)

Co-ordinators : Prof. S. P. Tiwari

Lecture 1 - Introduction

Lecture 2 - Sets and Functions - I

Lecture 3 - Sets and Functions - II

Lecture 4 - Sets and Functions - III

Lecture 5 - Sets and Functions - IV

Lecture 6 - Metric Spaces

Lecture 7 - Topological Spaces

Lecture 8 - Topological Spaces (Examples)

Lecture 9 - Typologies on R - I

Lecture 10 - Typologies on R - II

Lecture 11 - Comparison of topologies

Lecture 12 - Closed sets

Lecture 13 - Basis for a topology - I

Lecture 14 - Basis for a topology - II

Lecture 15 - A topology on R^2

Lecture 16 - Subbasis and Neighborhood

Lecture 17 - Limit points of sets

Lecture 18 - Closure of sets

Lecture 19 - Interior and boundary of sets

Lecture 20 - Subspaces

Lecture 21 - Product topology

Lecture 22 - Product and Box topologies

Lecture 23 - The Quotient topology

Lecture 24 - Krakowski closure/interior operator

Lecture 25 - Countability axioms - I

Lecture 26 - Countability axioms - II

Lecture 27 - Countability axioms - III

Lecture 28 - Continuous functions - I

Lecture 29 - Continuous functions - II

Lecture 30 - Continuous functions - III

Lecture 31 - Continuous functions - IV

Lecture 32 - Homeomorphisms - I

Lecture 33 - Homeomorphisms - II

Lecture 34 - Homeomorphisms - III

Lecture 35 - Connectedness - I

Lecture 36 - Connectedness - II

Lecture 37 - Connectedness - III

Lecture 38 - Connectedness - IV

Lecture 39 - Connectedness - V

Lecture 40 - Connectedness - VI

Lecture 41 - Connectedness - VII

Lecture 42 - Connectedness - VIII

Lecture 43 - Path connectedness - I

Lecture 44 - Path connectedness - II

Lecture 45 - Path connectedness - III

Lecture 46 - Path components and Local connectedness

Lecture 47 - Local connectedness

Lecture 48 - Local path connectedness

Lecture 49 - Compactness - I

Lecture 50 - Compactness - II

Lecture 51 - Compactness - III

Lecture 52 - Compactness - IV

Lecture 53 - Compactness - V

Lecture 54 - Compactness - VI

Lecture 55 - Compactness - VII

Lecture 56 - Compactness - VIII

Lecture 57 - Compactness - IX

Lecture 58 - Compactness - X

Lecture 59 - One-point compactifications - I

Lecture 60 - One-point compactifications - II

Lecture 61 - Separation axioms - I

Lecture 62 - Separation axioms - II

Lecture 63 - Separation axioms - III

Lecture 64 - Separation axioms - IV

Lecture 65 - Separation axioms - V

Lecture 66 - Separation axioms - VI

Lecture 67 - Separation axioms - VII

Lecture 68 - Separation axioms - VIII

Lecture 69 - Tychonoff theorem - I

Lecture 70 - Tychonoff theorem - II

Lecture 71 - Stone-Cech compactification - I

Lecture 72 - Stone-Cech compactification - II

NPTEL : NOC:Numerical Linear Algebra and Application (Mathematics)

Co-ordinators : Prof. Srinivasa Rao Pentyala

Lecture 1 - Linear Algebra and Introduction

Lecture 2 - Computational Difficulties

Lecture 3 - Computational Error

Lecture 4 - Stability

Lecture 5 - Gaussian Elimination

Lecture 6 - LU Factorization

Lecture 7 - Iterative refinement

Lecture 8 - QR Factorization

Lecture 9 - Gram-Schmidt Orthogonalization

Lecture 10 - Cholesky Decomposition

Lecture 11 - Projections

Lecture 12 - House-Holder Reflectors

Lecture 13 - Image Compression

Lecture 14 - Singular Value Decomposition

Lecture 15 - Least Square Solutions

Lecture 16 - Pseudo-Inverse

Lecture 17 - Normal Equations

Lecture 18 - Eigenvalue problems

Lecture 19 - Gershgorin Theorem

Lecture 20 - Similarity Transforms

Lecture 21 - Eigenvalues

Lecture 22 - Sensitivity Vectors

Lecture 23 - Power method

Lecture 24 - Schur Decomposition

Lecture 25 - Jordan Canonical form

Lecture 26 - QR Iteration

Lecture 27 - Heisenberg transformation

Lecture 28 - Rayleigh Quotient

Lecture 29 - Symmetric eigenvalue problem

Lecture 30 - Jacobi Method

Lecture 31 - Divide and Conquer

Lecture 32 - Computing the Singular Value Decomposition

Lecture 33 - Golub-Kahan-Reinsch Algorithm

Lecture 34 - Chan SVD Algorithm

Lecture 35 - Generalized SVD

Lecture 36 - Generalized and Quadratic Eigenvalue Problems

Lecture 37 - Generalized Schur Decomposition (QZ Decomposition)

Lecture 38 - Iterative Methods for Large Linear Systems: Jacobi

Lecture 39 - Iterative methods for large linear systems: Gauss-Seidel Method

Lecture 40 - Iterative methods for large linear systems: SOR method

Lecture 41 - Convergence of iterative algorithms

Lecture 42 - Krylov subspace methods

Lecture 43 - Lanczos

Lecture 44 - Arnoldi

Lecture 45 - Stability of the Cholesky QR Algorithm

Lecture 46 - Conditioning of the eigenvalues

Lecture 47 - Symmetric definite pencil

Lecture 48 - AI applications

Lecture 49 - Sensitive systems

Lecture 50 - Real Life Systems

Lecture 51 - Transient thermal systems

Lecture 52 - Left Inverse

Lecture 53 - Right Inverse

Lecture 54 - Generalized Inverse

Lecture 55 - Applications

Lecture 56 - Applications (Continued...)

Lecture 57 - Applications (Continued...)

Lecture 58 - Applications (Continued...)

Lecture 59 - Applications (Continued...)

Lecture 60 - Applications of the Matrices in Real Life Systems

Lecture 61 - Matrices and Its Fundamentals: Recalling Examples

Lecture 62 - Properties of Matrices: Recalling and Revision, Examples

Lecture 63 - Matrices: Finite Digit Arithmetic: recalling and Examples

NPTEL : NOC:Mathematics for Machine Learning (Mathematics)

Co-ordinators : Prof. Debjani Chakraborty, Prof. Debashree Guha Adhya

Lecture 1 - Introduction to Machine Learning

Lecture 2 - Few Instances of Learning

Lecture 3 - Loss Function Optimization

Lecture 4 - Phases of Machine Learning Systems

Lecture 5 - Single-layer and multi-layer neurons

Lecture 6 - Introduction to Convexity

Lecture 7 - Study on Convex Function

Lecture 8 - Formation of Convex Hull

Lecture 9 - Optimization of Functions

Lecture 10 - Convex Optimization Problem

Lecture 11 - Directional derivative, Gradient, Jacobian, Firest Order Taylor Formula

Lecture 12 - Gradient, Jacobian, First order Taylor formula

Lecture 13 - Gradient Descent Optimization Technique

Lecture 14 - Gradient Descent, Interpretation from Taylor approximation

Lecture 15 - Sub-Gradient Descent Optimization Technique

Lecture 16 - Introduction to Underfitting and Overfitting

Lecture 17 - Relation of Bias and Variance to Underfitting and Overfitting

Lecture 18 - Bias-Variance Trade-off

Lecture 19 - Ridge Regression

Lecture 20 - LASSO Regression

Lecture 21 - Stochastic Gradient descent

Lecture 22 - Stochastic Gradient descent (Continued...)

Lecture 23 - Variants of Gradient descent

Lecture 24 - Momentum based Gradient descent

Lecture 25 - Accelerated Gradient descent

Lecture 26 - Linear Predictors (Logistic Regression)

Lecture 27 - Linear Predictors (Logistic Regression) (Continued....)

Lecture 28 - Linear Predictors (Logistic Regression) (Continued....)

Lecture 29 - Linear Predictors (Logistic Regression) (Continued....)

Lecture 30 - Linear Predictors (Support Vector Machines)

Lecture 31 - Introduction to Theory of Estimation

Lecture 32 - Probability Theory

Lecture 33 - Discrete Probability Distribution

Lecture 34 - Continuous Probability Distribution

Lecture 35 - Maximum likelihood Estimation

Lecture 36 - MLE for Discrete Probability Distribution

Lecture 37 - MLE for Continuous Probability Distribution

Lecture 38 - Properties of Estimators

Lecture 39 - MLE for Linear and Logistic Regression

Lecture 40 - MLE for NaÃ¯ve Bayes Model

Lecture 41 - Eigen value and eigen vector, Linearly independent vectors

Lecture 42 - Orthogonal Basis, Eigen value decomposition

Lecture 43 - Orthogonal Basis, Eigen value decomposition (Continued...)

Lecture 44 - Principal Component Analysis

Lecture 45 - Principal Component Analysis (Continued...)

Lecture 46 - Introduction to Dynamical System

Lecture 47 - Dynamical System and Control

Lecture 48 - Discrete Fourier Transform

Lecture 49 - Inverse Fourier Transform

Lecture 50 - Applications: Discrete Fourier Transform

Lecture 51 - Introduction to Mixture models

Lecture 52 - Introduction to Gaussian Mixture Models

Lecture 53 - EM Algorithm

Lecture 54 - EM Algorithm (Continued...)

Lecture 55 - A brief application to predict HMM parameters

Lecture 56 - Conditional probability, Bayes theorem

Lecture 57 - Bayes Decision Rule

Lecture 58 - Bayes Decision Rule (Continued...)

Lecture 59 - Bayes Decision Rule (Bayesian minimum risk classifier)

Lecture 60 - Bayes Decision Rule (Linear Discriminant Analysis)

NPTEL : NOC:Advanced Theory of Ordinary Differential Equations (Mathematics)

Co-ordinators : Prof. Hari Sankar Mahato

Lecture 1 - Introduction to ODEs

Lecture 2 - Introduction to ODEs (Continued...)

Lecture 3 - Existence of local solution. Theorems and Examples

Lecture 4 - Continuation of solutions upto the boundary. Global existence of Solution

Lecture 5 - Continuation of solution and dependence on initital data

Lecture 6 - Dependence on Initial data : Examples

Lecture 7 - Regular Perturbations and linearisation

Lecture 8 - Linear System of equations and their stability

Lecture 9 - Linear System of equations and their stability (Continued...)

Lecture 10 - Stability Analysis

Lecture 11 - Stability Analysis (Continued...)

Lecture 12 - Stability of linear systems with constant and periodic co-efficient Matrix

Lecture 13 - Stability of linear systems with constant and periodic co-efficient Matrix (Continued...)

Lecture 14 - Stability of nonlinear system, linearization and Lyapunov functions

Lecture 15 - Stability and Lyapunov functions

Lecture 16 - Stability and Lyapunov functions (Continued...)

Lecture 17 - Chaotic Theory - Introduction

Lecture 18 - Chaotic Theory - Introduction (Continued...)

Lecture 19 - Lorenz equation, attractor, Lyapunov exponent

Lecture 20 - Lorenz equation, attractor, Lyapunov exponent (Continued...)

Lecture 21 - Local divergence, Lyapunov exponents and related topics

Lecture 22 - Local divergence, Lyapunov exponents and related topics (Continued...)

Lecture 23 - Strange and Chaotic attractors

Lecture 24 - Strange and Chaotic attractors

Lecture 25 - Fractal Dimension and Reconstruction

Lecture 26 - Fractal Dimension and Reconstruction (Continued...)

Lecture 27 - Stiff Differential Equations: Introduction

Lecture 28 - Stiff Differential Equations: Slow and fast time scales

Lecture 29 - Stiff differential equations: Introduction

Lecture 30 - Increment function, A-stable

Lecture 31 - BDF methods and their implementation, Bifurcation Theory: Introduction

Lecture 32 - Bifurcation Theory

Lecture 33 - One dimensional bifurcation for scalar equations

Lecture 34 - One dimensional bifurcations for planar systems

Lecture 35 - Few definitions related to Hopf bifurcation

Lecture 36 - Few definitions related to Hopf bifurcation (Continued...)

Lecture 37 - Mathematical models with second order equations - Undamped free oscillations

Lecture 38 - Damped free oscillations

Lecture 39 - Undamped and Damped Forced Oscillations

Lecture 40 - Undamped and Damped Forced Oscillations (Continued...)

Lecture 41 - Higher order linear ODEs

Lecture 42 - Higher order linear ODEs (Continued...)

Lecture 43 - Linear Differential Equations of Higher Order with Constant Coefficients

Lecture 44 - Linear Differential Equations of Higher Order with Constant Coefficients (Continued...)

Lecture 45 - Higher order linear ODEs - Particular Integrals

Lecture 46 - Higher order linear ODEs - Particular Integrals (Continued...)

Lecture 47 - Higher order linear ODEs - Variable Coefficients

Lecture 48 - Higher order linear ODEs - Variation of Parameters

Lecture 49 - Series Solution

Lecture 50 - Series Solution (Continued...)

Lecture 51 - Series Solution - Frobenius Method

Lecture 52 - Series Solution - Frobenius method (Continued...)

Lecture 53 - Special functions

Lecture 54 - Special functions (Continued...)

Lecture 55 - Sturm-Liouville Problem - Eigenvalues and Eigenfunctions

Lecture 56 - Sturm-Liouville Problem - Eigenvalues and Eigenfunctions (Continued...)

Lecture 57 - Laplace Transform and Its Applications (Continued...)

Lecture 58 - Laplace Transform

Lecture 59 - Laplace Transform and Its Applications

Lecture 60 - Laplace Transform and Its Applications (Continued...)

NPTEL : An Introduction to Riemann Surfaces and Algebraic Curves: Complex 1-Tori and Elliptic Curves (Mathematics)

Co-ordinators : Dr. T.E. Venkata Balaji

Lecture 1 - The Idea of a Riemann Surface

Lecture 2 - Simple Examples of Riemann Surfaces

Lecture 3 - Maximal Atlases and Holomorphic Maps of Riemann Surfaces

Lecture 4 - A Riemann Surface Structure on a Cylinder

Lecture 5 - A Riemann Surface Structure on a Torus

Lecture 6 - Riemann Surface Structures on Cylinders and Tori via Covering Spaces

Lecture 7 - Moebius Transformations Make up Fundamental Groups of Riemann Surfaces

Lecture 8 - Homotopy and the First Fundamental Group

Lecture 9 - A First Classification of Riemann Surfaces

Lecture 10 - The Importance of the Path-lifting Property

Lecture 11 - Fundamental groups as Fibres of the Universal covering Space

Lecture 12 - The Monodromy Action

Lecture 13 - The Universal covering as a Hausdorff Topological Space

Lecture 14 - The Construction of the Universal Covering Map

Lecture 15 - Completion of the Construction of the Universal Covering: Universality of the Universal Covering

Lecture 16 - Completion of the Construction of the Universal Covering: The Fundamental Group of the base as the Deck Transformation Group

Lecture 17 - The Riemann Surface Structure on the Topological Covering of a Riemann Surface

Lecture 18 - Riemann Surfaces with Universal Covering the Plane or the Sphere

Lecture 19 - Classifying Complex Cylinders: Riemann Surfaces with Universal Covering the Complex Plane

Lecture 20 - Characterizing Moebius Transformations with a Single Fixed Point

Lecture 21 - Characterizing Moebius Transformations with Two Fixed Points

Lecture 22 - Torsion-freeness of the Fundamental Group of a Riemann Surface

Lecture 23 - Characterizing Riemann Surface Structures on Quotients of the Upper Half-Plane with Abelian Fundamental Groups

Lecture 24 - Classifying Annuli up to Holomorphic Isomorphism

Lecture 25 - Orbits of the Integral Unimodular Group in the Upper Half-Plane

Lecture 26 - Galois Coverings are precisely Quotients by Properly Discontinuous Free Actions

Lecture 27 - Local Actions at the Region of Discontinuity of a Kleinian Subgroup of Moebius Transformations

Lecture 28 - Quotients by Kleinian Subgroups give rise to Riemann Surfaces

Lecture 29 - The Unimodular Group is Kleinian

Lecture 30 - The Necessity of Elliptic Functions for the Classification of Complex Tori

Lecture 31 - The Uniqueness Property of the Weierstrass Phe-function associated to a Lattice in the Plane

Lecture 32 - The First Order Degree Two Cubic Ordinary Differential Equation satisfied by the Weierstrass Phe-function

Lecture 33 - The Values of the Weierstrass Phe-function at the Zeros of its Derivative are nonvanishing Analytic Functions on the Upper Half-Plane

Lecture 34 - The Construction of a Modular Form of Weight Two on the Upper Half-Plane

Lecture 35 - The Fundamental Functional Equations satisfied by the Modular Form of Weight Two on the Upper Half-Plane

Lecture 36 - The Weight Two Modular Form assumes Real Values on the Imaginary Axis in the Upper Half-plane

Lecture 37 - The Weight Two Modular Form Vanishes at Infinity

Lecture 38 - The Weight Two Modular Form Decays Exponentially in a Neighbourhood of Infinity

Lecture 39 - A Suitable Restriction of the Weight Two Modular Form is a Holomorphic Conformal Isomorphism onto the Upper Half-Plane

Lecture 40 - The J-Invariant of a Complex Torus (or) of an Algebraic Elliptic Curve

Lecture 41 - A Fundamental Region in the Upper Half-Plane for the Elliptic Modular J-Invariant

Lecture 42 - The Fundamental Region in the Upper Half-Plane for the Unimodular Group

Lecture 43 - A Region in the Upper Half-Plane Meeting Each Unimodular Orbit Exactly Once

Lecture 44 - Moduli of Elliptic Curves

Lecture 45 - Punctured Complex Tori are Elliptic Algebraic Affine Plane Cubic Curves in Complex 2-Space

Lecture 46 - The Natural Riemann Surface Structure on an Algebraic Affine Nonsingular Plane Curve

Lecture 47 - Complex Projective 2-Space as a Compact Complex Manifold of Dimension Two

Lecture 48 - Complex Tori are the same as Elliptic Algebraic Projective Curves

NPTEL : Linear Algebra (Mathematics)

Co-ordinators : Dr. K.C. Sivakumar

Lecture 1 - Introduction to the Course Contents

Lecture 2 - Linear Equations

Lecture 3a - Equivalent Systems of Linear Equations I : Inverses of Elementary Row-operations, Row-equivalent matrices

Lecture 3b - Equivalent Systems of Linear Equations II : Homogeneous Equations, Examples

Lecture 4 - Row-reduced Echelon Matrices

Lecture 5 - Row-reduced Echelon Matrices and Non-homogeneous Equations

Lecture 6 - Elementary Matrices, Homogeneous Equations and Non-homogeneous Equations

Lecture 7 - Invertible matrices, Homogeneous Equations Non-homogeneous Equations

Lecture 8 - Vector spaces

Lecture 9 - Elementary Properties in Vector Spaces. Subspaces

Lecture 10 - Subspaces (Continued...), Spanning Sets, Linear Independence, Dependence

Lecture 11 - Basis for a vector space

Lecture 12 - Dimension of a vector space

Lecture 13 - Dimensions of Sums of Subspaces

Lecture 14 - Linear Transformations

Lecture 15 - The Null Space and the Range Space of a Linear Transformation

Lecture 16 - The Rank-Nullity-Dimension Theorem. Isomorphisms Between Vector Spaces

Lecture 17 - Isomorphic Vector Spaces, Equality of the Row-rank and the Column-rank - I

Lecture 18 - Equality of the Row-rank and the Column-rank - II

Lecture 19 - The Matrix of a Linear Transformation

Lecture 20 - Matrix for the Composition and the Inverse. Similarity Transformation

Lecture 21 - Linear Functionals. The Dual Space. Dual Basis - I

Lecture 22 - Dual Basis II. Subspace Annihilators - I

Lecture 23 - Subspace Annihilators - II

Lecture 24 - The Double Dual. The Double Annihilator

Lecture 25 - The Transpose of a Linear Transformation. Matrices of a Linear Transformation and its Transpose

Lecture 26 - Eigenvalues and Eigenvectors of Linear Operators

Lecture 27 - Diagonalization of Linear Operators. A Characterization

Lecture 28 - The Minimal Polynomial

Lecture 29 - The Cayley-Hamilton Theorem

Lecture 30 - Invariant Subspaces

Lecture 31 - Triangulability, Diagonalization in Terms of the Minimal Polynomial

Lecture 32 - Independent Subspaces and Projection Operators

Lecture 33 - Direct Sum Decompositions and Projection Operators - I

Lecture 34 - Direct Sum Decompositions and Projection Operators - II

Lecture 35 - The Primary Decomposition Theorem and Jordan Decomposition

Lecture 36 - Cyclic Subspaces and Annihilators

Lecture 37 - The Cyclic Decomposition Theorem - I

Lecture 38 - The Cyclic Decomposition Theorem - II. The Rational Form

Lecture 39 - Inner Product Spaces

Lecture 40 - Norms on Vector spaces. The Gram-Schmidt Procedure I

Lecture 41 - The Gram-Schmidt Procedure II. The QR Decomposition

Lecture 42 - Bessel's Inequality, Parseval's Indentity, Best Approximation

Lecture 43 - Best Approximation: Least Squares Solutions

Lecture 44 - Orthogonal Complementary Subspaces, Orthogonal Projections

Lecture 45 - Projection Theorem. Linear Functionals

Lecture 46 - The Adjoint Operator

Lecture 47 - Properties of the Adjoint Operation. Inner Product Space Isomorphism

Lecture 48 - Unitary Operators

Lecture 49 - Unitary operators - II. Self-Adjoint Operators - I.

Lecture 50 - Self-Adjoint Operators - II - Spectral Theorem

Lecture 51 - Normal Operators - Spectral Theorem

NPTEL : Mathematical Logic (Mathematics)

Co-ordinators : Prof. Arindama Singh

Lecture 1 - Sets and Strings

Lecture 2 - Syntax of Propositional Logic

Lecture 3 - Unique Parsing

Lecture 4 - Semantics of PL

Lecture 5 - Consequences and Equivalences

Lecture 6 - Five results about PL

Lecture 7 - Calculations and Informal Proofs

Lecture 8 - More Informal Proofs

Lecture 9 - Normal forms

Lecture 10 - SAT and 3SAT

Lecture 11 - Horn-SAT and Resolution

Lecture 12 - Resolution

Lecture 13 - Adequacy of Resolution

Lecture 14 - Adequacy and Resolution Strategies

Lecture 15 - Propositional Calculus (PC)

Lecture 16 - Some Results about PC

Lecture 17 - Arguing with Proofs

Lecture 18 - Adequacy of PC

Lecture 19 - Compactness & Analytic Tableau

Lecture 20 - Examples of Tableau Proofs

Lecture 21 - Adequacy of Tableaux

Lecture 22 - Syntax of First order Logic (FL)

Lecture 23 - Symbolization & Scope of Quantifiers

Lecture 24 - Hurdles in giving Meaning

Lecture 25 - Semantics of FL

Lecture 26 - Relevance Lemma

Lecture 27 - Validity, Satisfiability & Equivalence

Lecture 28 - Six Results about FL

Lecture 29 - Laws, Calculation & Informal Proof

Lecture 30 - Quantifier Laws and Consequences

Lecture 31 - More Proofs and Prenex Form

Lecture 32 - Prenex Form Conversion

Lecture 33 - Skolem Form

Lecture 34 - Syntatic Interpretation

Lecture 35 - Herbrand's Theorem

Lecture 36 - Most General Unifiers

Lecture 37 - Resolution Rules

Lecture 38 - Resolution Examples

Lecture 39 - Ariomatic System FC

Lecture 40 - FC and Semidecidability of FL

Lecture 41 - Analytic Tableau for FL

Lecture 42 - Godels Incompleteness Theorems

NPTEL : Real Analysis (Mathematics)

Co-ordinators : Prof. S.H. Kulkarni

Lecture 1 - Introduction

Lecture 2 - Functions and Relations

Lecture 3 - Finite and Infinite Sets

Lecture 4 - Countable Sets

Lecture 5 - Uncountable Sets, Cardinal Number

Lecture 6 - Real Number System

Lecture 7 - LUB Axiom

Lecture 8 - Sequences of Real Numbers

Lecture 9 - Sequences of Real Numbers - (Continued.)

Lecture 10 - Sequences of Real Numbers - (Continued.)

Lecture 11 - Infinite Series of Real Numbers

Lecture 12 - Series of nonnegative Real Numbers

Lecture 13 - Conditional Convergence

Lecture 14 - Metric Spaces: Definition and Examples

Lecture 15 - Metric Spaces: Examples and Elementary Concepts

Lecture 16 - Balls and Spheres

Lecture 17 - Open Sets

Lecture 18 - Closure Points, Limit Points and isolated Points

Lecture 19 - Closed sets

Lecture 20 - Sequences in Metric Spaces

Lecture 21 - Completeness

Lecture 22 - Baire Category Theorem

Lecture 23 - Limit and Continuity of a Function defined on a Metric space

Lecture 24 - Continuous Functions on a Metric Space

Lecture 25 - Uniform Continuity

Lecture 26 - Connectedness

Lecture 27 - Connected Sets

Lecture 28 - Compactness

Lecture 29 - Compactness (Continued.)

Lecture 30 - Characterizations of Compact Sets

Lecture 31 - Continuous Functions on Compact Sets

Lecture 32 - Types of Discontinuity

Lecture 33 - Differentiation

Lecture 34 - Mean Value Theorems

Lecture 35 - Mean Value Theorems (Continued.)

Lecture 36 - Taylor's Theorem

Lecture 37 - Differentiation of Vector Valued Functions

Lecture 38 - Integration

Lecture 39 - Integrability

Lecture 40 - Integrable Functions

Lecture 41 - Integrable Functions (Continued.)

Lecture 42 - Integration as a Limit of Sum

Lecture 43 - Integration and Differentiation

Lecture 44 - Integration of Vector Valued Functions

Lecture 45 - More Theorems on Integrals

Lecture 46 - Sequences and Series of Functions

Lecture 47 - Uniform Convergence

Lecture 48 - Uniform Convergence and Integration

Lecture 49 - Uniform Convergence and Differentiation

Lecture 50 - Construction of Everywhere Continuous Nowhere Differentiable Function

Lecture 51 - Approximation of a Continuous Function by Polynomials: Weierstrass Theorem

Lecture 52 - Equicontinuous family of Functions: Arzela - Ascoli Theorem

NPTEL : Dynamic Data Assimilation: An Introduction (Mathematics)

Co-ordinators : Prof. S. Lakshmivarahan

Lecture 1 - An Overview

Lecture 2 - Data Mining, Data assimilation and prediction

Lecture 3 - A classification of forecast errors

Lecture 4 - Finite Dimensional Vector Space

Lecture 5 - Matrices

Lecture 6 - Matrices (Continued...)

Lecture 7 - Multi-variate Calculus

Lecture 8 - Optimization in Finite Dimensional Vector spaces

Lecture 9 - Deterministic, Static, linear Inverse (well-posed) Problems

Lecture 10 - Deterministic, Static, Linear Inverse (Ill-posed) Problems

Lecture 11 - A Geometric View Â– Projections

Lecture 12 - Deterministic, Static, nonlinear Inverse Problems

Lecture 13 - On-line Least Squares

Lecture 14 - Examples of static inverse problems

Lecture 15 - Interlude and a Way Forward

Lecture 16 - Matrix Decomposition Algorithms

Lecture 17 - Matrix Decomposition Algorithms (Continued...)

Lecture 18 - Minimization algorithms

Lecture 19 - Minimization algorithms (Continued...)

Lecture 20 - Inverse problems in deterministic

Lecture 21 - Inverse problems in deterministic (Continued...)

Lecture 22 - Forward sensitivity method

Lecture 23 - Relation between FSM and 4DVAR

Lecture 24 - Statistical Estimation

Lecture 25 - Statistical Least Squares

Lecture 26 - Maximum Likelihood Method

Lecture 27 - Bayesian Estimation

Lecture 28 - From Gauss to Kalman-Linear Minimum Variance Estimation

Lecture 29 - Initialization Classical Method

Lecture 30 - Optimal interpolations

Lecture 31 - A Bayesian Formation-3D-VAR methods

Lecture 32 - Linear Stochastic Dynamics - Kalman Filter

Lecture 33 - Linear Stochastic Dynamics - Kalman Filter (Continued...)

Lecture 34 - Linear Stochastic Dynamics - Kalman Filter (Continued...)

Lecture 35 - Covariance Square Root Filter

Lecture 36 - Nonlinear Filtering

Lecture 37 - Ensemble Reduced Rank Filter

Lecture 38 - Basic nudging methods

Lecture 39 - Deterministic predictability

Lecture 40 - Predictability A stochastic view and Summary

NPTEL : NOC:An Invitation to Mathematics (Mathematics)

Co-ordinators : Prof. Sankaran Vishwanath

Lecture 1 - Introduction

Lecture 2 - Long division

Lecture 3 - Applications of Long division

Lecture 4 - Lagrange interpolation

Lecture 5 - The 0-1 idea in other contexts - dot and cross product

Lecture 6 - Taylors formula

Lecture 7 - The Chebyshev polynomials

Lecture 8 - Counting number of monomials - several variables

Lecture 9 - Permutations, combinations and the binomial theorem

Lecture 10 - Combinations with repetition, and counting monomials

Lecture 11 - Combinations with restrictions, recurrence relations

Lecture 12 - Fibonacci numbers; an identity and a bijective proof

Lecture 13 - Permutations and cycle type

Lecture 14 - The sign of a permutation, composition of permutations

Lecture 15 - Rules for drawing tangle diagrams

Lecture 16 - Signs and cycle decompositions

Lecture 17 - Sorting lists of numbers, and crossings in tangle diagrams

Lecture 18 - Real and integer valued polynomials

Lecture 19 - Integer valued polynomials revisited

Lecture 20 - Functions on the real line, continuity

Lecture 21 - The intermediate value property

Lecture 22 - Visualizing functions

Lecture 23 - Functions on the plane, Rigid motions

Lecture 24 - More examples of functions on the plane, dilations

Lecture 25 - Composition of functions

Lecture 26 - Affine and Linear transformations

Lecture 27 - Length and Area dilation, the derivative

Lecture 28 - Examples-I

Lecture 29 - Examples-II

Lecture 30 - Linear equations, Lagrange interpolation revisited

Lecture 31 - Completed Matrices in combinatorics

Lecture 32 - Polynomials acting on matrices

Lecture 33 - Divisibility, prime numbers

Lecture 34 - Congruences, Modular arithmetic

Lecture 35 - The Chinese remainder theorem

Lecture 36 - The Euclidean algorithm, the 0-1 idea and the Chinese remainder theorem

NPTEL : Advanced Complex Analysis (Mathematics)

Co-ordinators : Dr. T.E. Venkata Balaji

Lecture 1 - Fundamental Theorems Connected with Zeros of Analytic Functions

Lecture 2 - The Argument (Counting) Principle, Rouche's Theorem and The Fundamental Theorem of Algebra

Lecture 3 - Morera's Theorem and Normal Limits of Analytic Functions

Lecture 4 - Hurwitz's Theorem and Normal Limits of Univalent Functions

Lecture 5 - Local Constancy of Multiplicities of Assumed Values

Lecture 6 - The Open Mapping Theorem

Lecture 7 - Introduction to the Inverse Function Theorem

Lecture 8 - Completion of the Proof of the Inverse Function Theorem: The Integral Inversion Formula for the Inverse Function

Lecture 9 - Univalent Analytic Functions have never-zero Derivatives and are Analytic Isomorphisms

Lecture 10 - Introduction to the Implicit Function Theorem

Lecture 11 - Proof of the Implicit Function Theorem: Topological Preliminaries

Lecture 12 - Proof of the Implicit Function Theorem: The Integral Formula for & Analyticity of the Explicit Function

Lecture 13 - Doing Complex Analysis on a Real Surface: The Idea of a Riemann Surface

Lecture 14 - F(z,w)=0 is naturally a Riemann Surface

Lecture 15 - Constructing the Riemann Surface for the Complex Logarithm

Lecture 16 - Constructing the Riemann Surface for the m-th root function

Lecture 17 - The Riemann Surface for the functional inverse of an analytic mapping at a critical point

Lecture 18 - The Algebraic nature of the functional inverses of an analytic mapping at a critical point

Lecture 19 - The Idea of a Direct Analytic Continuation or an Analytic Extension

Lecture 20 - General or Indirect Analytic Continuation and the Lipschitz Nature of the Radius of Convergence

Lecture 21 - Analytic Continuation Along Paths via Power Series Part A

Lecture 22 - Analytic Continuation Along Paths via Power Series Part B

Lecture 23 - Continuity of Coefficients occurring in Families of Power Series defining Analytic Continuations along Paths

Lecture 24 - Analytic Continuability along Paths: Dependence on the Initial Function and on the Path - First Version of the Monodromy Theorem

Lecture 25 - Maximal Domains of Direct and Indirect Analytic Continuation: Second Version of the Monodromy Theorem

Lecture 26 - Deducing the Second (Simply Connected) Version of the Monodromy Theorem from the First (Homotopy) Version

Lecture 27 - Existence and Uniqueness of Analytic Continuations on Nearby Paths

Lecture 28 - Proof of the First (Homotopy) Version of the Monodromy Theorem

Lecture 29 - Proof of the Algebraic Nature of Analytic Branches of the Functional Inverse of an Analytic Function at a Critical Point

Lecture 30 - The Mean-Value Property, Harmonic Functions and the Maximum Principle

Lecture 31 - Proofs of Maximum Principles and Introduction to Schwarz Lemma

Lecture 32 - Proof of Schwarz Lemma and Uniqueness of Riemann Mappings

Lecture 33 - Reducing Existence of Riemann Mappings to Hyperbolic Geometry of Sub-domains of the Unit Disc

Lecture 34 - Differential or Infinitesimal Schwarzs Lemma, Picks Lemma, Hyperbolic Arclengths, Metric and Geodesics on the Unit Disc

Lecture 35 - Differential or Infinitesimal Schwarzs Lemma, Picks Lemma, Hyperbolic Arclengths, Metric and Geodesics on the Unit Disc

Lecture 36 - Hyperbolic Geodesics for the Hyperbolic Metric on the Unit Disc

Lecture 37 - Schwarz-Pick Lemma for the Hyperbolic Metric on the Unit Disc

Lecture 38 - Arzela-Ascoli Theorem: Under Uniform Boundedness, Equicontinuity and Uniform Sequential Compactness are Equivalent

Lecture 39 - Completion of the Proof of the Arzela-Ascoli Theorem and Introduction to Montels Theorem

Lecture 40 - The Proof of Montels Theorem

Lecture 41 - The Candidate for a Riemann Mapping

Lecture 42 - Completion of Proof of The Riemann Mapping Theorem

Lecture 43 - Completion of Proof of The Riemann Mapping Theorem

NPTEL : NOC:Discrete Mathematics (Mathematics)

Co-ordinators : Prof. Sourav Chakraborty

Lecture 1 - Course Introduction

Lecture 2 - Sets, Relations and Functions

Lecture 3 - Propositional Logic and Predicate Logic

Lecture 4 - Propositional Logic and Predicate Logic (Part 2)

Lecture 5 - Elementary Number Theory

Lecture 6 - Formal Proofs

Lecture 7 - Direct Proofs

Lecture 8 - Case Study

Lecture 9 - Case Study (Part 2)

Lecture 10 - Sets, Relations, Function and Logic

Lecture 11 - Proof by Contradiction (Part 1)

Lecture 12 - Proof by Contradiction (Part 2)

Lecture 13 - Proof by Contraposition

Lecture 14 - Proof by Counter Example

Lecture 15 - Mathematical Induction (Part 1)

Lecture 16 - Mathematical Induction (Part 2)

Lecture 17 - Mathematical Induction (Part 3)

Lecture 18 - Mathematical Induction (Part 4)

Lecture 19 - Mathematical Induction (Part 5)

Lecture 20 - Mathematical Induction (Part 6)

Lecture 21 - Mathematical Induction (Part 7)

Lecture 22 - Mathematical Induction (Part 8)

Lecture 23 - Introduction to Graph Theory

Lecture 24 - Handshake Problem

Lecture 25 - Tournament Problem

Lecture 26 - Tournament Problem (Part 2)

Lecture 27 - Ramsey Problem

Lecture 28 - Ramsey Problem (Part 2)

Lecture 29 - Properties of Graphs

Lecture 30 - Problem 1

Lecture 31 - Problem 2

Lecture 32 - Problem 3 & 4

Lecture 33 - Counting for Selection

Lecture 34 - Counting for Distribution

Lecture 35 - Counting for Distribution (Part 2)

Lecture 36 - Some Counting Problems

Lecture 37 - Counting using Recurrence Relations

Lecture 38 - Counting using Recurrence Relations (Part 2)

Lecture 39 - Solving Recurrence Relations (Part 1)

Lecture 40 - Solving Recurrence Relations (Part 2)

Lecture 41 - Asymptotic Relations (Part 1)

Lecture 42 - Asymptotic Relations (Part 2)

Lecture 43 - Asymptotic Relations (Part 3)

Lecture 44 - Asymptotic Relations (Part 4)

Lecture 45 - Generating Functions (Part 1)

Lecture 46 - Generating Functions (Part 2)

Lecture 47 - Generating Functions (Part 3)

Lecture 48 - Generating Functions (Part 4)

Lecture 49 - Proof Techniques

Lecture 50 - Modeling: Graph Theory and Linear Programming

Lecture 51 - Combinatorics

NPTEL : Advanced Complex Analysis - Part 2 (Mathematics)

Co-ordinators : Dr. T.E. Venkata Balaji

Lecture 1 - Properties of the Image of an Analytic Function - Introduction to the Picard Theorems

Lecture 2 - Recalling Singularities of Analytic Functions - Non-isolated and Isolated Removable, Pole and Essential Singularities

Lecture 3 - Recalling Riemann's Theorem on Removable Singularities

Lecture 4 - Casorati-Weierstrass Theorem; Dealing with the Point at Infinity -- Riemann Sphere and Riemann Stereographic Projection

Lecture 5 - Neighborhood of Infinity, Limit at Infinity and Infinity as an Isolated Singularity

Lecture 6 - Studying Infinity - Formulating Epsilon-Delta Definitions for Infinite Limits and Limits at Infinity

Lecture 7 - When is a function analytic at infinity ?

Lecture 8 - Laurent Expansion at Infinity and Riemann\'s Removable Singularities Theorem for the Point at Infinity

Lecture 9 - The Generalized Liouville Theorem - Little Brother of Little Picard and Analogue of Casorati-Weierstrass; Failure of Cauchy\'s Theorem at Infinity

Lecture 10 - Morera\'s Theorem at Infinity, Infinity as a Pole and Behaviour at Infinity of Rational and Meromorphic Functions

Lecture 11 - Residue at Infinity and Introduction to the Residue Theorem for the Extended Complex Plane - Residue Theorem for the Point at Infinity

Lecture 12 - Proofs of Two Avatars of the Residue Theorem for the Extended Complex Plane and Applications of the Residue at Infinity

Lecture 13 - Infinity as an Essential Singularity and Transcendental Entire Functions

Lecture 14 - Meromorphic Functions on the Extended Complex Plane are Precisely Quotients of Polynomials

Lecture 15 - The Ubiquity of Meromorphic Functions - The Nerves of the Geometric Network Bridging Algebra, Analysis and Topology

Lecture 16 - Continuity of Meromorphic Functions at Poles and Topologies of Spaces of Functions

Lecture 17 - Why Normal Convergence, but Not Globally Uniform Convergence, is the Inevitable in Complex Analysis

Lecture 18 - Measuring Distances to Infinity, the Function Infinity and Normal Convergence of Holomorphic Functions in the Spherical Metric

Lecture 19 - The Invariance Under Inversion of the Spherical Metric on the Extended Complex Plane

Lecture 20 - Introduction to Hurwitz\'s Theorem for Normal Convergence of Holomorphic Functions in the Spherical Metric

Lecture 21 - Completion of Proof of Hurwitz\'s Theorem for Normal Limits of Analytic Functions in the Spherical Metric

Lecture 22 - Hurwitz\'s Theorem for Normal Limits of Meromorphic Functions in the Spherical Metric

Lecture 23 - What could the Derivative of a Meromorphic Function Relative to the Spherical Metric Possibly Be ?

Lecture 24 - Defining the Spherical Derivative of a Meromorphic Function

Lecture 25 - Well-definedness of the Spherical Derivative of a Meromorphic Function at a Pole and Inversion-invariance of the Spherical Derivative

Lecture 26 - Topological Preliminaries - Translating Compactness into Boundedness

Lecture 27 - Introduction to the Arzela-Ascoli Theorem - Passing from abstract Compactness to verifiable Equicontinuity

Lecture 28 - Proof of the Arzela-Ascoli Theorem for Functions - Abstract Compactness Implies Equicontinuity

Lecture 29 - Proof of the Arzela-Ascoli Theorem for Functions - Equicontinuity Implies Compactness

Lecture 30 - Introduction to the Montel Theorem - the Holomorphic Avatar of the Arzela-Ascoli Theorem & Why you get Equicontinuity for Free

Lecture 31 - Completion of Proof of the Montel Theorem - the Holomorphic Avatar of the Arzela-Ascoli Theorem

Lecture 32 - Introduction to Marty\'s Theorem - the Meromorphic Avatar of the Montel & Arzela-Ascoli Theorems

Lecture 33 - Proof of one direction of Marty\'s Theorem - the Meromorphic Avatar of the Montel & Arzela-Ascoli Theorems - Normal Uniform Boundedness of Spherical Derivatives Implies Normal Sequential Compactness

Lecture 34 - Proof of the other direction of Marty\'s Theorem - the Meromorphic Avatar of the Montel & Arzela-Ascoli Theorems - Normal Sequential Compactness Implies Normal Uniform Boundedness of Spherical Derivatives

Lecture 35 - Normal Convergence at Infinity and Hurwitz\'s Theorems for Normal Limits of Analytic and Meromorphic Functions at Infinity

Lecture 36 - Normal Sequential Compactness, Normal Uniform Boundedness and Montel\'s & Marty\'s Theorems at Infinity

Lecture 37 - Local Analysis of Normality and the Zooming Process - Motivation for Zalcman\'s Lemma

Lecture 38 - Characterizing Normality at a Point by the Zooming Process and the Motivation for Zalcman\'s Lemma

Lecture 39 - Local Analysis of Normality and the Zooming Process - Motivation for Zalcman\'s Lemma

Lecture 40 - Montel\'s Deep Theorem - The Fundamental Criterion for Normality or Fundamental Normality Test based on Omission of Values

Lecture 41 - Proofs of the Great and Little Picard Theorems

Lecture 42 - Royden\'s Theorem on Normality Based On Growth Of Derivatives

Lecture 43 - Schottky\'s Theorem - Uniform Boundedness from a Point to a Neighbourhood & Problem Solving Session

NPTEL : Basic Algebraic Geometry : Varieties, Morphisms, Local Rings, Function Fields and Nonsingularity (Mathematics)

Co-ordinators : Dr. T.E. Venkata Balaji

Lecture 1 - What is Algebraic Geometry?

Lecture 2 - The Zariski Topology and Affine Space

Lecture 3 - Going back and forth between subsets and ideals

Lecture 4 - Irreducibility in the Zariski Topology

Lecture 5 - Irreducible Closed Subsets Correspond to Ideals Whose Radicals are Prime

Lecture 6 - Understanding the Zariski Topology on the Affine Line; The Noetherian property in Topology and in Algebra

Lecture 7 - Basic Algebraic Geometry : Varieties, Morphisms, Local Rings, Function Fields and Nonsingularity

Lecture 8 - Topological Dimension, Krull Dimension and Heights of Prime Ideals

Lecture 9 - The Ring of Polynomial Functions on an Affine Variety

Lecture 10 - Geometric Hypersurfaces are Precisely Algebraic Hypersurfaces

Lecture 11 - Why Should We Study Affine Coordinate Rings of Functions on Affine Varieties ?

Lecture 12 - Capturing an Affine Variety Topologically From the Maximal Spectrum of its Ring of Functions

Lecture 13 - Analyzing Open Sets and Basic Open Sets for the Zariski Topology

Lecture 14 - The Ring of Functions on a Basic Open Set in the Zariski Topology

Lecture 15 - Quasi-Compactness in the Zariski Topology; Regularity of a Function at a point of an Affine Variety

Lecture 16 - What is a Global Regular Function on a Quasi-Affine Variety?

Lecture 17 - Characterizing Affine Varieties; Defining Morphisms between Affine or Quasi-Affine Varieties

Lecture 18 - Translating Morphisms into Affines as k-Algebra maps and the Grand Hilbert Nullstellensatz

Lecture 19 - Morphisms into an Affine Correspond to k-Algebra Homomorphisms from its Coordinate Ring of Functions

Lecture 20 - The Coordinate Ring of an Affine Variety Determines the Affine Variety and is Intrinsic to it

Lecture 21 - Automorphisms of Affine Spaces and of Polynomial Rings - The Jacobian Conjecture; The Punctured Plane is Not Affine

Lecture 22 - The Various Avatars of Projective n-space

Lecture 23 - Gluing (n+1) copies of Affine n-Space to Produce Projective n-space in Topology, Manifold Theory and Algebraic Geometry; The Key to the Definition of a Homogeneous Ideal

Lecture 24 - Translating Projective Geometry into Graded Rings and Homogeneous Ideals

Lecture 25 - Expanding the Category of Varieties to Include Projective and Quasi-Projective Varieties

Lecture 26 - Translating Homogeneous Localisation into Geometry and Back

Lecture 27 - Adding a Variable is Undone by Homogenous Localization - What is the Geometric Significance of this Algebraic Fact ?

Lecture 28 - Doing Calculus Without Limits in Geometry ?

Lecture 29 - The Birth of Local Rings in Geometry and in Algebra

Lecture 30 - The Formula for the Local Ring at a Point of a Projective Variety Or Playing with Localisations, Quotients, Homogenisation and Dehomogenisation !

Lecture 31 - The Field of Rational Functions or Function Field of a Variety - The Local Ring at the Generic Point

Lecture 32 - Fields of Rational Functions or Function Fields of Affine and Projective Varieties and their Relationships with Dimensions

Lecture 33 - Global Regular Functions on Projective Varieties are Simply the Constants

Lecture 34 - The d-Uple Embedding and the Non-Intrinsic Nature of the Homogeneous Coordinate Ring of a Projective Variety

Lecture 35 - The Importance of Local Rings - A Morphism is an Isomorphism if it is a Homeomorphism and Induces Isomorphisms at the Level of Local Rings

Lecture 36 - The Importance of Local Rings - A Rational Function in Every Local Ring is Globally Regular

Lecture 37 - Geometric Meaning of Isomorphism of Local Rings - Local Rings are Almost Global

Lecture 38 - Local Ring Isomorphism,Equals Function Field Isomorphism, Equals Birationality

Lecture 39 - Why Local Rings Provide Calculus Without Limits for Algebraic Geometry Pun Intended!

Lecture 40 - How Local Rings Detect Smoothness or Nonsingularity in Algebraic Geometry

Lecture 41 - Any Variety is a Smooth Manifold with or without Non-Smooth Boundary

Lecture 42 - Any Variety is a Smooth Hypersurface On an Open Dense Subset

NPTEL : NOC:Introduction to Commutative Algebra (Mathematics)

Co-ordinators : Prof. A.V.Jayanthan

Lecture 1 - Review of Ring Theory

Lecture 2 - Review of Ring Theory (Continued...)

Lecture 3 - Ideals in commutative rings

Lecture 4 - Operations on ideals

Lecture 5 - Properties of prime ideals

Lecture 6 - Colon and Radical of ideals

Lecture 7 - Radicals, extension and contraction of ideals

Lecture 8 - Modules and homomorphisms

Lecture 9 - Isomorphism theorems and Operations on modules

Lecture 10 - Operations on modules (Continued...)

Lecture 11 - Module homomorphism and determinant trick

Lecture 12 - NakayamaÂ's lemma and exact sequences

Lecture 13 - Exact sequences (Continued...)

Lecture 14 - Homomorphisms and Tensor products

Lecture 15 - Properties of tensor products

Lecture 16 - Properties of tensor products (Continued...)

Lecture 17 - Tensor product of Algebras

Lecture 18 - Localization

Lecture 19 - Localization (Continued...)

Lecture 20 - Local properties

Lecture 21 - Further properties of localization

Lecture 22 - Intergral dependence

Lecture 23 - Integral extensions

Lecture 24 - Lying over and Going-up theorems

Lecture 25 - Going-down theorem

Lecture 26 - Going-down theorem (Continued...)

Lecture 27 - Chain conditions

Lecture 28 - Noetherian and Artinian modules

Lecture 29 - Properties of Noetherian and Artinian modules, Composition Series

Lecture 30 - Further properties of Noetherian and Artinian modules and rings

Lecture 31 - Hilbert basis theorem and Primary decomposition

Lecture 32 - Primary decomposition (Continued...)

Lecture 33 - Uniqueness of primary decomposition

Lecture 34 - 2nd Uniqueness theorem, Artinian rings

Lecture 35 - Properties of Artinian rings

Lecture 36 - Structure Theorem of Artinian rings

Lecture 37 - Noether Normalization

Lecture 38 - Hilberts Nullstellensatz

NPTEL : NOC:Differential Equations (Mathematics)

Co-ordinators : Prof. Srinivasa Manam

Lecture 1 - Introduction to Ordinary Differential Equations (ODE)

Lecture 2 - Methods for First Order ODE's - Homogeneous Equations

Lecture 3 - Methods for First order ODE's - Exact Equations

Lecture 4 - Methods for First Order ODE's - Exact Equations (Continued...)

Lecture 5 - Methods for First order ODE's - Reducible to Exact Equations

Lecture 6 - Methods for First order ODE's - Reducible to Exact Equations (Continued...)

Lecture 7 - Non-Exact Equations - Finding Integrating Factors

Lecture 8 - Linear First Order ODE and Bernoulli's Equation

Lecture 9 - Introduction to Second order ODE's

Lecture 10 - Properties of solutions of second order homogeneous ODE's

Lecture 11 - Abel's formula to find the other solution

Lecture 12 - Abel's formula - Demonstration

Lecture 13 - Second Order ODE's with constant coefficients

Lecture 14 - Euler - Cauchy equation

Lecture 15 - Non homogeneous ODEs Variation of Parameters

Lecture 16 - Method of undetermined coefficients

Lecture 17 - Demonstration of Method of undetermined coefficients

Lecture 18 - Power Series and its properties

Lecture 19 - Power Series Solutions to Second Order ODE's

Lecture 20 - Power Series Solutions (Continued...)

Lecture 21 - Legendre Differential Equation

Lecture 22 - Legendre Polynomials

Lecture 23 - Properties of Legendre Polynomials

Lecture 24 - Power series solutions around a regular singular point

Lecture 25 - Frobenius method of solutions

Lecture 26 - Frobenius method of solutions (Continued...)

Lecture 27 - Examples on Frobenius method

Lecture 28 - Bessel differential equation

Lecture 29 - Frobenius solutions for Bessel Equation

Lecture 30 - Properties of Bessel functions

Lecture 31 - Properties of Bessel functions (Continued...)

Lecture 32 - Introduction to Sturm-Liouville theory

Lecture 33 - Sturm-Liouville Problems

Lecture 34 - Regular Sturm-Liouville problem

Lecture 35 - Periodic and singular Sturm-Liouville Problems

Lecture 36 - Generalized Fourier series

Lecture 37 - Examples of Sturm-Liouville systems

Lecture 38 - Examples of Sturm-Liouville systems (Continued...)

Lecture 39 - Examples of regular Sturm-Liouville systems

Lecture 40 - Second order linear PDEs

Lecture 41 - Classification of second order linear PDEs

Lecture 42 - Reduction to canonical form for equations with constant coefficients

Lecture 43 - Reduction to canonical form for equations with variable coefficients

Lecture 44 - Reduction to Normal form-More examples

Lecture 45 - D'Alembert solution for wave equation

Lecture 46 - Uniqueness of solutions for wave equation

Lecture 47 - Vibration of a semi-infinite string

Lecture 48 - Vibration of a finite string

Lecture 49 - Finite length string vibrations

Lecture 50 - Finite length string vibrations (Continued...)

Lecture 51 - Non-homogeneous wave equation

Lecture 52 - Vibration of a circular drum

Lecture 53 - Solutions of heat equation-Properties

Lecture 54 - Temperature in an infinite rod

Lecture 55 - Temperature in a semi-infinite rod

Lecture 56 - Non-homogeneous heat equation

Lecture 57 - Temperature in a finite rod

Lecture 58 - Temperature in a finite rod with insulated ends

Lecture 59 - Laplace equation over a rectangle

Lecture 60 - Laplace equation over a rectangle with flux boundary conditions

Lecture 61 - Laplace equation over circular domains

Lecture 62 - Laplace equation over circular Sectors

Lecture 63 - Uniqueness of the boundary value problems for Laplace equation

Lecture 64 - Conclusions

NPTEL : NOC:Numerical Analysis (Mathematics)

Co-ordinators : Prof. R. Usha

Lecture 1 - Lesson 1 - Introduction, Motivation

Lecture 2 - Lesson 2 - Part 1 - Mathematical Preliminaries, Polynomial Interpolation - 1

Lecture 3 - Lesson 2 - Part 2 - Mathematical Preliminaries, Polynomial Interpolation - 1

Lecture 4 - Lesson 3 - Part 1 - Polynomial Interpolation - 2

Lecture 5 - Lesson 3 - Part 2 - Polynomial Interpolation - 2

Lecture 6 - Lesson 4 - Polynomial Interpolation - 3

Lecture 7 - Lagrange Interpolation Polynomial, Error In Interpolation - 1

Lecture 8 - Lagrange Interpolation Polynomial, Error In Interpolation - 1

Lecture 9 - Error In Interpolation - 2

Lecture 10 - Error In Interpolation - 2

Lecture 11 - Divide Difference Interpolation Polynomial

Lecture 12 - Properties Of Divided Difference, Introduction To Inverse Interpolation

Lecture 13 - Properties Of Divided Difference, Introduction To Inverse Interpolation

Lecture 14 - Inverse Interpolation, Remarks on Polynomial Interpolation

Lecture 15 - Numerical Differentiation - 1 Taylor Series Method

Lecture 16 - Numerical Differentiation - 2 Method Of Undetermined Coefficients

Lecture 17 - Numerical Differentiation - 2 Polynomial Interpolation Method

Lecture 18 - Numerical Differentiation - 3 Operator Method Numerical Integration - 1

Lecture 19 - Numerical Integration - 2 Error in Trapezoidal Rule Simpson's Rule

Lecture 20 - Numerical Integration - 3 Error in Simpson's Rule Composite in Trapezoidal Rule, Error

Lecture 21 - Numerical Integration - 4 Composite Simpsons Rule , Error Method of Undetermined Coefficients

Lecture 22 - Numerical Integration - 5 Gaussian Quadrature (Two-Point Method)

Lecture 23 - Numerical Integrature - 5 Gaussian Quadrature (Three-Point Method) Adaptive Quadrature

Lecture 24 - Numerical Solution of Ordinary Differential Equation (ODE) - 1

Lecture 25 - Numerical Solution Of ODE-2 Stability , Single-Step Methods - 1 Taylor Series Method

Lecture 26 - Numerical Solution Of ODE-3 Examples of Taylor Series Method Euler's Method

Lecture 27 - Numerical Solution Of ODE-4 Runge-Kutta Methods

Lecture 28 - Numerical Solution Of ODE-5 Example For RK-Method Of Order 2 Modified Euler's Method

Lecture 29 - Numerical Solution Of Ordinary Differential Equations - 6 Predictor-Corrector Methods (Adam-Moulton)

Lecture 30 - Numerical Solution Of Ordinary Differential Equations - 7

Lecture 31 - Numerical Solution Of Ordinary Differential Equations - 8

Lecture 32 - Numerical Solution of Ordinary Differential Equations - 9

Lecture 33 - Numerical Solution of Ordinary Differential Equations - 10

Lecture 34 - Numerical Solution of Ordinary Differential Equations - 11

Lecture 35 - Root Finding Methods - 1 The Bisection Method - 1

Lecture 36 - Root Finding Methods - 2 The Bisection Method - 2

Lecture 37 - Root Finding Methods - 3 Newton-Raphson Method - 1

Lecture 38 - Root Finding Methods - 4 Newton-Raphson Method - 2

Lecture 39 - Root Finding Methods - 5 Secant Method, Method Of false Position

Lecture 40 - Root Finding Methods - 6 Fixed Point Methods - 1

Lecture 41 - Root Finding Methods - 7 Fixed Point Methods - 2

Lecture 42 - Root Finding Methods - 8 Fixed Point Iteration Methods - 3

Lecture 43 - Root Finding Methods - 9 Practice Problems

Lecture 44 - Solution Of Linear Systems Of Equations - 1

Lecture 45 - Solution Of Linear Systems Of Equations - 2

Lecture 46 - Solution Of Linear Systems Of Equations - 3

Lecture 47 - Solution Of Linear Systems Of Equations - 4

Lecture 48 - Solution Of Linear Systems Of Equations - 5

Lecture 49 - Solution Of Linear Systems Of Equations - 6

Lecture 50 - Solution Of Linear Systems Of Equations - 7

Lecture 51 - Solution Of Linear Systems Of Equations - 8 Iterative Method - 1

Lecture 52 - Solution Of Linear Systems Of Equations - 8 Iterative Method - 2

Lecture 53 - Matrix Eigenvalue Problems - 2 Power Method - 2

Lecture 54 - Practice Problems

NPTEL : NOC:Graph Theory (Mathematics)

Co-ordinators : Dr. Soumen Maity

Lecture 1 - Basic Concepts

Lecture 2 - Basic Concepts - 1

Lecture 3 - Eulerian and Hamiltonian Graph

Lecture 4 - Eulerian and Hamiltonian Graph - 1

Lecture 5 - Bipartite Graph

Lecture 6 - Bipartite Graph

Lecture 7 - Diameter of a graph; Isomorphic graphs

Lecture 8 - Diameter of a graph; Isomorphic graphs

Lecture 9 - Minimum Spanning Tree

Lecture 10 - Minimum Spanning Trees (Continued...)

Lecture 11 - Minimum Spanning Trees (Continued...)

Lecture 12 - Minimum Spanning Trees (Continued...)

Lecture 13 - Maximum Matching in Bipartite Graph

Lecture 14 - Maximum Matching in Bipartite Graph - 1

Lecture 15 - Hall's Theorem and Konig's Theorem

Lecture 16 - Hall's Theorem and Konig's Theorem - 1

Lecture 17 - Independent Set and Edge Cover

Lecture 18 - Independent Set and Edge Cover - 1

Lecture 19 - Matching in General Graphs

Lecture 20 - Proof of Halls Theorem

Lecture 21 - Stable Matching

Lecture 22 - Gale-Shapley Algorithm

Lecture 23 - Graph Connectivity

Lecture 24 - Graph Connectivity - 1

Lecture 25 - 2-Connected Graphs

Lecture 26 - 2-Connected Graphs - 1

Lecture 27 - Subdivision of an edge; 2-edge-connected graphs

Lecture 28 - Problems Related to Graphs Connectivity

Lecture 29 - Flow Network

Lecture 30 - Residual Network and Augmenting Path

Lecture 31 - Augmenting Path Algorithm

Lecture 32 - Max-Flow and Min-Cut

Lecture 33 - Max-Flow and Min-Cut Theorem

Lecture 34 - Vertex Colouring

Lecture 35 - Chromatic Number and Max. Degree

Lecture 36 - Edge Colouring

Lecture 37 - Planar Graphs and Euler's Formula

Lecture 38 - Characterization Of Planar Graphs

Lecture 39 - Colouring of Planar Graphs

NPTEL : NOC:Transform Techniques for Engineers (Mathematics)

Co-ordinators : Prof. Srinivasa Manam

Lecture 1 - Introduction to Fourier series

Lecture 2 - Fourier seriesÂ - ExamplesÂ

Lecture 3 - Complex Fourier seriesÂ

Lecture 4 - Conditions for the Convergence of Fourier SeriesÂ

Lecture 5 - Conditions for the Convergence of Fourier Series (Continued...)

Lecture 6 - Use of Delta function in the Fourier series convergence

Lecture 7 - More Examples on Fourier Series of a Periodic Signal

Lecture 8 - Gibb's Phenomenon in the Computation of Fourier Series

Lecture 9 - Properties of Fourier Transform of a Periodic Signal

Lecture 10 - Properties of Fourier transform (Continued...)

Lecture 11 - Parseval's Identity and Recap of Fourier series

Lecture 12 - Fourier integral theorem-an informal proof

Lecture 13 - Definition of Fourier transforms

Lecture 14 - Fourier transform of a Heavyside function

Lecture 15 - Use of Fourier transforms to evaluate some integrals

Lecture 16 - Evaluation of an integral- Recall of complex function theory

Lecture 17 - Properties of Fourier transforms of non-periodic signals

Lecture 18 - More properties of Fourier transforms

Lecture 19 - Fourier integral theorem - proof

Lecture 20 - Application of Fourier transform to ODE's

Lecture 21 - Application of Fourier transforms to differential and integral equations

Lecture 22 - Evaluation of integrals by Fourier transforms

Lecture 23 - D'Alembert's solution by Fourier transform

Lecture 24 - Solution of Heat equation by Fourier transform

Lecture 25 - Solution of Heat and Laplace equations by Fourier transform

Lecture 26 - Introduction to Laplace transform

Lecture 27 - Laplace transform of elementary functions

Lecture 28 - Properties of Laplace transforms

Lecture 29 - Properties of Laplace transforms (Continued...)

Lecture 30 - Methods of finding inverse Laplace transform

Lecture 31 - Heavyside expansion theorem

Lecture 32 - Review of complex function theory

Lecture 33 - Inverse Laplace transform by contour integration

Lecture 34 - Application of Laplace transforms - ODEs'

Lecture 35 - Solutions of initial or boundary value problems for ODEs'

Lecture 36 - Solving first order PDE's by Laplace transform

Lecture 37 - Solution of wave equation by Laplace transform

Lecture 38 - Solving hyperbolic equations by Laplace transform

Lecture 39 - Solving heat equation by Laplace transform

Lecture 40 - Initial boundary value problems for heat equations

Lecture 41 - Solution of Integral Equations by Laplace Transform

Lecture 42 - Evaluation of Integrals by Laplace Transform

Lecture 43 - Introduction to Z-Transforms

Lecture 44 - Properties of Z-Transforms

Lecture 45 - Inverse Z-transforms

Lecture 46 - Solution of difference equations by Z-transforms

Lecture 47 - Evaluation of infinite sums by Z-transforms

Lecture 48 - conclusions

NPTEL : NOC:Introduction to Probability and Statistics (Mathematics)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Introduction to probability and Statistics

Lecture 2 - Types of data

Lecture 3 - Categorical data

Lecture 4 - Describing Categorical data

Lecture 5 - Describing Categorical data (Continued...)

Lecture 6 - Describing numerical data

Lecture 7 - Describing numerical data (Continued...)

Lecture 8 - Exercises, Association between categorical variables

Lecture 9 - Association between categorical variables (Continued...)

Lecture 10 - Association between numerical variables

Lecture 11 - Association between numerical variables (Continued...)

Lecture 12 - Probability

Lecture 13 - Rules of Probability

Lecture 14 - Rules of Probability (Continued...)

Lecture 15 - Conditional Probability

Lecture 16 - Random variables

Lecture 17 - Random variables - concepts and exercises

Lecture 18 - Association between Random variables

Lecture 19 - Binomial Distribution

Lecture 20 - Normal distribution

Lecture 21 - Additional Examples

NPTEL : NOC:Introduction to Abstract Group Theory (Mathematics)

Co-ordinators : Prof. Krishna Hanumanthu

Lecture 1 - Motivational examples of groups

Lecture 2 - Definition of a group and examples

Lecture 3 - More examples of groups

Lecture 4 - Basic properties of groups and multiplication tables

Lecture 5 - Problems - 1

Lecture 6 - Problems - 2

Lecture 7 - Problems - 3

Lecture 8 - Subgroups

Lecture 9 - Types of groups

Lecture 10 - Group homomorphisms and examples

Lecture 11 - Properties of homomorphisms

Lecture 12 - Group isomorphisms

Lecture 13 - Normal subgroups

Lecture 14 - Equivalence relations

Lecture 15 - Problems - 4

Lecture 16 - Cosets and Lagrange's theorem

Lecture 17 - S_3 revisited

Lecture 18 - Problems - 5

Lecture 19 - Quotient groups

Lecture 20 - Examples of quotient groups

Lecture 21 - First isomorphism theorem

Lecture 22 - Examples and Second isomorphism theorem

Lecture 23 - Third isomorphism theorem

Lecture 24 - Cauchy's theorem

Lecture 25 - Problems - 6

Lecture 26 - Symmetric groups - I

Lecture 27 - Symmetric Groups - II

Lecture 28 - Symmetric groups - III

Lecture 29 - Symmetric groups - IV

Lecture 30 - Odd and even permutations - I

Lecture 31 - Odd and even permutations - II

Lecture 32 - Alternating groups

Lecture 33 - Group actions

Lecture 34 - Examples of group actions

Lecture 35 - Orbits and stabilizers

Lecture 36 - Counting formula

Lecture 37 - Cayley's theorem

Lecture 38 - Problems - 7

Lecture 39 - Problems - 8 and Class equation

Lecture 40 - Group actions on subsets

Lecture 41 - Sylow Theorem - I

Lecture 42 - Sylow Theorem - II

Lecture 43 - Sylow Theorem - III

Lecture 44 - Problems - 9

Lecture 45 - Problems - 10

NPTEL : NOC:Groups: Motion, Symmetry and Puzzles (Mathematics)

Co-ordinators : Prof. Amit Kulshrestha

Lecture 1 - Permutation, symmetry and groups

Lecture 2 - Groups acting on a set/an object

Lecture 3 - More on group actions

Lecture 4 - Groups and parity

Lecture 5 - Parity and puzzles

Lecture 6 - Generators and relations

Lecture 7 - Cosets, quotients and homomorphisms

Lecture 8 - Cayley graphs of groups

Lecture 9 - Platonic solids

Lecture 10 - Symmetries of plane and wallpapers

Lecture 11 - Introduction to GAP

Lecture 12 - GAP through Rubik's cube

Lecture 13 - Representing abstract groups

Lecture 14 - A quick introduction to group representations

Lecture 15 - Rotations and quaternions

Lecture 16 - Rotational symmetries of platonic solids

Lecture 17 - Finite subgroups of SO(3)

NPTEL : NOC:Introduction to Rings and Fields (Mathematics)

Co-ordinators : Prof. Krishna Hanumanthu

Lecture 1 - Introduction, main definitions

Lecture 2 - Examples of rings

Lecture 3 - More examples

Lecture 4 - Polynomial Rings - 1

Lecture 5 - Polynomial Rings - 2

Lecture 6 - Homomorphisms

Lecture 7 - Kernels, ideals

Lecture 8 - Problems - 1

Lecture 9 - Problems - 2

Lecture 10 - Problems - 3

Lecture 11 - Quotient Rings

Lecture 12 - First isomorphism and correspondence theorems

Lecture 13 - Examples of correspondence theorem

Lecture 14 - Prime ideals

Lecture 15 - Maximal ideals, integral domains

Lecture 16 - Existence of maximal ideals

Lecture 17 - Problems - 4

Lecture 18 - Problems - 5

Lecture 19 - Problems - 6

Lecture 20 - Field of fractions, Noetherian rings - 1

Lecture 21 - Noetherian rings - 2

Lecture 22 - Hilbert Basis Theorem

Lecture 23 - Irreducible, prime elements

Lecture 24 - Irreducible, prime elements, GCD

Lecture 25 - Principal Ideal Domains

Lecture 26 - Unique Factorization Domains - 1

Lecture 27 - Unique Factorization Domains - 2

Lecture 28 - Gauss Lemma

Lecture 29 - Z[X] is a UFD

Lecture 30 - Eisenstein criterion and Problems - 7

Lecture 31 - Problems - 8

Lecture 32 - Problems - 9

Lecture 33 - Field extensions - 1

Lecture 34 - Field extensions - 2

Lecture 35 - Degree of a field extension - 1

Lecture 36 - Degree of a field extension - 2

Lecture 37 - Algebraic elements form a field

Lecture 38 - Field homomorphisms

Lecture 39 - Splitting fields

Lecture 40 - Finite fields - 1

Lecture 41 - Finite fields - 2

Lecture 42 - Finite fields - 3

Lecture 43 - Problems - 10

Lecture 44 - Problems - 11

NPTEL : NOC:Probabilistic Methods in PDE (Mathematics)

Co-ordinators : Prof. Anindya Goswami

Lecture 1 - Prerequisite Measure Theory - Part 1

Lecture 2 - Prerequisite Measure Theory - Part 2

Lecture 3 - Prerequisite Measure Theory - Part 3

Lecture 4 - Random variable

Lecture 5 - Stochastic Process

Lecture 6 - Conditional Expectation

Lecture 7 - Preliminary for Stochastic Integration - Part 1

Lecture 8 - Preliminary for Stochastic Integration - Part 2

Lecture 9 - Definition and properties of Stochastic Integration - Part 1

Lecture 10 - Definition and properties of Stochastic Integration - Part 2

Lecture 11 - Further properties of Stochastic Integration

Lecture 12 - Extension of stochastic integral

Lecture 13 - change of variable formula and proof - Part 1

Lecture 14 - change of variable formula and proof - Part 2

Lecture 15 - Brownian motion as the building block

Lecture 16 - Brownian motion and its martingale property - Part 1

Lecture 17 - Brownian motion and its martingale property - Part 2

Lecture 18 - Application of Itoâ€™s rule on Ito process

Lecture 19 - Harmonic function and its properties

Lecture 20 - Maximum principle of harmonic function

Lecture 21 - Dirichlet Problem and bounded solution

Lecture 22 - Example of a Dirichlet problem

Lecture 23 - Regular points at the boundary

Lecture 24 - Zarembas cone condition for regularity

Lecture 25 - Summary of the Zaremba's cone condition

Lecture 26 - Continuity of candidate solution at regular points - Part 1

Lecture 27 - Continuity of candidate solution at regular points - Part 2

Lecture 28 - Summary of bounded solution to the Dirichlet Problem

Lecture 29 - Stochastic representation of bounded solution to a heat equation - Part 1

Lecture 30 - Stochastic representation of bounded solution to a heat equation - Part 2

Lecture 31 - Uniqueness of solution to the heat equationÂ

Lecture 32 - Remark on Tychonoff's Theorem

Lecture 33 - Widderâ€™s result and its extension on heat equation

Lecture 34 - Solution to the mixed initial boundary value problemÂ

Lecture 35 - The Feynman-Kac formulaÂ

Lecture 36 - Kacâ€™s theorem on the stochastic representation of solution to a second-order linear ODE - Part 1

Lecture 37 - Kacâ€™s theorem on the stochastic representation of solution to a second-order linear ODE - Part 2

Lecture 38 - Geometric Brownian motion

Lecture 39 - A system of stochastic differential equations in application

Lecture 40 - Brownian bridge

Lecture 41 - Simulation of stochastic differential equations

Lecture 42 - Stochastic differential equations: Uniqueness

Lecture 43 - Stochastic differential equations: Existence - Part 1

Lecture 44 - Stochastic differential equations: Existence - Part 2

Lecture 45 - Stochastic differential equations: Existence - Part 3

Lecture 46 - Stochastic differential equations: Weak solution

Lecture 47 - Functional Stochastic Differential Equations

Lecture 48 - Statement of Dirichlet and Cauchy problems with variable coefficients elliptic operators

Lecture 49 - Cauchy Problem with variable coefficients: Feynman-Kac formula - Part 1

Lecture 50 - Cauchy Problem with variable coefficients: Feynman-Kac formula - Part 2

Lecture 51 - Semigroup of bounded linear operators on Banach space - Part 1

Lecture 52 - Semigroup of bounded linear operators on Banach space - Part 2

Lecture 53 - Growth property of C0 semigroup

Lecture 54 - Unique semigroup generated by a bounded linear operator

Lecture 55 - Homogeneous initial value problem

Lecture 56 - Mild solution to homogeneous initial value problem

Lecture 57 - Mild solution to inhomogeneous initial value problem

Lecture 58 - Sufficient condition for existence of classical solution of IVP

Lecture 59 - Tutorial on Resolvant operator

Lecture 60 - Feynman-Kac formula and the formula of variations of constants

Lecture 61 - Non-autonomous evolution problem and mild/generalized solution

Lecture 62 - Sufficient condition for existence of an evolution system

Lecture 63 - Y-valued solution

Lecture 64 - mild/generalized solution to Semi-linear Evolution Problem

Lecture 65 - Existence of classical solution - Part 1

Lecture 66 - Existence of classical solution - Part 2

Lecture 67 - Conclusion video

NPTEL : NOC:Linear Algebra (Prof. Pranav Haridas) (Mathematics)

Co-ordinators : Prof. Pranav Haridas

Lecture 1 - Vector Spaces

Lecture 2 - Examples of Vector Spaces

Lecture 3 - Vector Subspaces

Lecture 4 - Linear Combinations and Span

Lecture 5 - Linear Independence

Lecture 6 - Basis

Lecture 7 - Dimension

Lecture 8 - Replacement theorem consequences

Lecture 9 - Linear Transformations

Lecture 10 - Rank Nullity

Lecture 11 - Linear Transformation Basis

Lecture 12 - Linear Transformation and Matrices

Lecture 13 - Problem session

Lecture 14 - Linear Transformation and Matrices (Continued...)

Lecture 15 - Invertible Linear Transformations

Lecture 16 - Invertible Linear Transformations and Matrices

Lecture 17 - Change of Basis

Lecture 18 - Product of Vector Spaces

Lecture 19 - Dual Spaces

Lecture 20 - Quotient Spaces

Lecture 21 - Row operations

Lecture 22 - Rank of a Matrix

Lecture 23 - Inverting matrices

Lecture 24 - Determinants

Lecture 25 - Problem Session

Lecture 26 - Diagonal Matrices

Lecture 27 - Eigenvectors and eigenvalues

Lecture 28 - Computing eigenvalues

Lecture 29 - Characteristic ploynomia

Lecture 30 - Diagonalizibility

Lecture 31 - Multiplicity of eigenvalues

Lecture 32 - Invariant subspaces

Lecture 33 - Complex Vector Spaces

Lecture 34 - Inner Product Spaces

Lecture 35 - Inner Product and Length

Lecture 36 - Orthogonality

Lecture 37 - Problem Session

Lecture 38 - Problem Session

Lecture 39 - Orthonormal Basis

Lecture 40 - Gram Schmidt Orthogonalization

Lecture 41 - Orthogonal Complements

Lecture 42 - Problem Session

Lecture 43 - Riesz Representation Theorem

Lecture 44 - Adjoint of a linear transformation

Lecture 45 - Problem Session

Lecture 46 - Normal Operators

Lecture 47 - Self Adjoint Operators

Lecture 48 - Spectral Theorem

NPTEL : NOC:Algebra - I (Mathematics)

Co-ordinators : Prof. Amritanshu Prasad, Prof. S. Viswanath

Lecture 1 - Permutations

Lecture 2 - Group Axioms

Lecture 3 - Order and Conjugacy

Lecture 4 - Subgroups

Lecture 5 - Problem solving

Lecture 6 - Group Actions

Lecture 7 - Cosets

Lecture 8 - Group Homomorphisms

Lecture 9 - Normal subgroups

Lecture 10 - Qutient Groups

Lecture 11 - Product and Chinese Remainder Theorem

Lecture 12 - Dihedral Groups

Lecture 13 - Semidirect products

Lecture 14 - Problem solving

Lecture 15 - The Orbit Counting Theorem

Lecture 16 - Fixed points of group actions

Lecture 17 - Second application: Fixed points of group actions

Lecture 18 - Sylow Theorem - a preliminary proposition

Lecture 19 - Sylow Theorem - I

Lecture 20 - Problem solving - I

Lecture 21 - Problem solving - II

Lecture 22 - Sylow Theorem - II

Lecture 23 - Sylow Theorem - III

Lecture 24 - Problem solving - I

Lecture 25 - Problem solving - II

Lecture 26 - Free Groups - I

Lecture 27 - Free Groups - IIa

Lecture 28 - Free Groups - IIb

Lecture 29 - Free Groups - III

Lecture 30 - Free Groups - IV

Lecture 31 - Problem Solving/Examples

Lecture 32 - Generators and relations for symmetric groups â€“ I

Lecture 33 - Generators and relations for symmetric groups â€“ II

Lecture 34 - Definition of a Ring

Lecture 35 - Euclidean Domains

Lecture 36 - Gaussian Integers

Lecture 37 - The Fundamental Theorem of Arithmetic

Lecture 38 - Divisibility and Ideals

Lecture 39 - Factorization and the Noetherian Condition

Lecture 40 - Examples of Ideals in Commutative Rings

Lecture 41 - Problem Solving/Examples

Lecture 42 - The Ring of Formal Power Series

Lecture 43 - Fraction Fields

Lecture 44 - Path Algebra of a Quiver

Lecture 45 - Ideals In Non-Commutative Rings

Lecture 46 - Product of Rings

Lecture 47 - Ring Homomorphisms

Lecture 48 - Quotient Rings

Lecture 49 - Problem solving

Lecture 50 - Tensor and Exterior Algebras

Lecture 51 - Modules: definition

Lecture 52 - Modules over polynomial rings $K[x]$

Lecture 53 - Modules: alternative definition

Lecture 54 - Modules: more examples

Lecture 55 - Submodules

Lecture 56 - General constructions of submodules

Lecture 57 - Problem Solving

Lecture 58 - Quotient modules

Lecture 59 - Homomorphisms

Lecture 60 - More examples of homomorphisms

Lecture 61 - First isomorphism theorem

Lecture 62 - Direct sums of modules

Lecture 63 - Complementary submodules

Lecture 64 - Change of ring

Lecture 65 - Problem solving

Lecture 66 - Free Modules (finitely generated)

Lecture 67 - Determinants

Lecture 68 - Primary Decomposition

Lecture 69 - Problem solving

Lecture 70 - Finitely generated modules and the Noetherian condition

Lecture 71 - Counterexamples to the Noetherian condition

Lecture 72 - Generators and relations for Finitely Generated Modules

Lecture 73 - General Linear Group over a Commutative Ring

Lecture 74 - Equivalence of Matrices

Lecture 75 - Smith Canonical Form for a Euclidean domain

Lecture 76 - solved_problems1

Lecture 77 - Smith Canonical Form for PID

Lecture 78 - Structure of finitely generated modules over a PID

Lecture 79 - Structure of a finitely generated abelian group

Lecture 80 - Similarity of Matrices

Lecture 81 - Deciding Similarity

Lecture 82 - Rational Canonical Form

Lecture 83 - Jordan Canonical Form

NPTEL : NOC:Computational Commutative Algebra (Mathematics)

Co-ordinators : Prof. Manoj Kummini

Lecture 1 - Definitions

Lecture 2 - Homomorphisms

Lecture 3 - Quotient rings

Lecture 4 - Noetherian rings

Lecture 5 - Monomials

Lecture 6 - Initial ideals

Lecture 7 - Division algorithm

Lecture 8 - Grobner basis

Lecture 9 - Solving Polynomial Equations

Lecture 10 - Nullstellensatz - Part 1

Lecture 11 - Nullstellensatz - Part 2

Lecture 12 - Buchberger criterion

Lecture 13 - Monomial basis

Lecture 14 - Elimination

Lecture 15 - Modules - Part 1

Lecture 16 - Modules - Part 2

Lecture 17 - Localisation

Lecture 18 - Nakayama Lemma

Lecture 19 - Spectrum - Part 1

Lecture 20 - Spectrum - Part 2

Lecture 21 - Associated primes

Lecture 22 - Primary Decomposition

Lecture 23 - Support of a module

Lecture 24 - Associated primes

Lecture 25 - Prime avoidance

Lecture 26 - Saturation - Part 1

Lecture 27 - Saturation - Part 2

Lecture 28 - Saturation - Part 3

Lecture 29 - Morphisms - Part 1

Lecture 30 - Morphisms - Part 2

Lecture 31 - Integral extensions

Lecture 32 - Noether normalisation lemma

Lecture 33 - Noether normalisation lemma

Lecture 34 - Polynomial rings

Lecture 35 - Going up theorem

Lecture 36 - Artinian rings

Lecture 37 - Graded modules

Lecture 38 - Hilbert polynomial

Lecture 39 - Hilbert-Samuel polynomial

Lecture 40 - Artin Rees Lemma

Lecture 41 - Degree of Hilbert-Samuel polynomial

Lecture 42 - Dimension of noetherian local rings - Part 1

Lecture 43 - Dimension of noetherian local rings - Part 2

Lecture 44 - Dimension of polynomial rings

Lecture 45 - Algebras over a field

Lecture 46 - Graded rings - Part 1

Lecture 47 - Graded rings - Part 2

Lecture 48 - Polynomial rings over fields

Lecture 49 - Hilbert series - Part 1

Lecture 50 - Hilbert series - Part 2

Lecture 51 - Proj of a graded ring

Lecture 52 - Homogenization - Part 1

Lecture 53 - Homogenization - Part 2

Lecture 54 - More on graded rings

Lecture 55 - Free resolutions

Lecture 56 - Computing syzygies

Lecture 57 - Koszul complex

Lecture 58 - More on Koszul complexes

Lecture 59 - Castelnuovo Mumford regularity

Lecture 60 - Castelnuovo Mumford regularity

NPTEL : NOC:Laplace Transform (Mathematics)

Co-ordinators : Prof. Indrava Roy

Lecture 1 - Introduction and Motivation for Laplace transforms - Part 1

Lecture 2 - Introduction and Motivation for Laplace transforms - Part 2

Lecture 3 - Improper Riemann integrals: Definition and Existence - Part 1

Lecture 4 - Improper Riemann integrals: Definition and Existence - Part 2

Lecture 5 - Existence of Laplace transforms and Examples

Lecture 6 - Properties of Laplace transforms-I - Part 1

Lecture 7 - Properties of Laplace transforms-I - Part 2

Lecture 8 - Existence of Laplace transforms for functions with vertical asymptote at the Y-axis - Part 1

Lecture 9 - Existence of Laplace transforms for functions with vertical asymptote at the Y-axis - Part 2

Lecture 10 - Properties of Laplace transforms-II - Part 1

Lecture 11 - Properties of Laplace transforms-II - Part 2

Lecture 12 - Laplace transform of Derivatives - Part 1

Lecture 13 - Laplace transform of Derivatives - Part 2

Lecture 14 - Laplace transform of Periodic functions and Integrals - I

Lecture 15 - Laplace transform of Integrals-II - Part 1

Lecture 16 - Laplace transform of Integrals-II - Part 2

Lecture 17 - Inverse Laplace transform and asymptotic behaviour - Part 1

Lecture 18 - Inverse Laplace transform and asymptotic behaviour - Part 2

Lecture 19 - Methods of finding Inverse Laplace transform-I- Partial Fractions

Lecture 20 - Methods of finding Inverse Laplace transform-II- Convolution theorem

Lecture 21 - Convolution theorem for Laplace transforms

Lecture 22 - Applications of Laplace transforms

Lecture 23 - Applications of Laplace Transform to physical systems

Lecture 24 - Solving Linear ODE's with polynomial coefficients

Lecture 25 - Integral and Integro-differential equation

Lecture 26 - Further application of Laplace transforms - Part 1

Lecture 27 - Further application of Laplace transforms - Part 2

NPTEL : NOC:Measure Theory (Prof. Indrava Roy) (Mathematics)

Co-ordinators : Prof. Indrava Roy

Lecture 1 - Finite Sets and Cardinality

Lecture 2 - Infinite Sets and the Banach-Tarski Paradox - Part 1

Lecture 3 - Infinite Sets and the Banach-Tarski Paradox - Part 2

Lecture 4 - Elementary Sets and Elementary measure - Part 1

Lecture 5 - Elementary Sets and Elementary measure - Part 2

Lecture 6 - Properties of elementary measure - Part 1

Lecture 7 - Properties of elementary measure - Part 2

Lecture 8 - Uniqueness of elementary measure and Jordan measurability - Part 1

Lecture 9 - Uniqueness of elementary measure and Jordan measurability - Part 2

Lecture 10 - Characterization of Jordan measurable sets and basic properties of Jordan measure - Part 1

Lecture 11 - Characterization of Jordan measurable sets and basic properties of Jordan measure - Part 2

Lecture 12 - Examples of Jordan measurable sets-I

Lecture 13 - Examples of Jordan measurable sets-II - Part 1

Lecture 14 - Examples of Jordan measurable sets-II - Part 2

Lecture 15 - Jordan measure under Linear transformations - Part 1

Lecture 16 - Jordan measure under Linear transformations - Part 2

Lecture 17 - Connecting the Jordan measure with the Riemann integral - Part 1

Lecture 18 - Connecting the Jordan measure with the Riemann integral - Part 2

Lecture 19 - Outer measure - Motivation and Axioms of outer measure

Lecture 20 - Comparing Inner Jordan measure, Lebesgue outer measure and Jordan Outer measure

Lecture 21 - Finite additivity of outer measure on Separated sets, Outer regularity - Part 1

Lecture 22 - Finite additivity of outer measure on Separated sets, Outer regularity - Part 2

Lecture 23 - Lebesgue measurable class of sets and their Properties - Part 1

Lecture 24 - Lebesgue measurable class of sets and their Properties - Part 2

Lecture 25 - Equivalent criteria for lebesgue measurability of a subset - Part 1

Lecture 26 - Equivalent criteria for lebesgue measurability of a subset - Part 2

Lecture 27 - The measure axioms and the Borel-Cantelli Lemma

Lecture 28 - Properties of the Lebesgue measure: Inner regularity,Upward and Downwar Monotone convergence theorem, and Dominated convergence theorem for sets - Part 1

Lecture 29 - Properties of the Lebesgue measure: Inner regularity,Upward and Downwar Monotone convergence theorem, and Dominated convergence theorem for sets - Part 2

Lecture 30 - Lebesgue measurability under Linear transformation, Construction of Vitali Set - Part 1

Lecture 31 - Lebesgue measurability under Linear transformation, Construction of Vitali Set - Part 2

Lecture 32 - Abstract measure spaces: Boolean and Sigma-algebras

Lecture 33 - Abstract measure and Caratheodory Measurability - Part 1

Lecture 34 - Abstract measure and Caratheodory Measurability - Part 2

Lecture 35 - Abstrsct measure and Hahn-Kolmogorov Extension

Lecture 36 - Lebesgue measurable class vs Caratheodory extension of usual outer measure on R^d

Lecture 37 - Examples of Measures defined on R^d via Hahn Kolmogorov extension - Part 1

Lecture 38 - Examples of Measures defined on R^d via Hahn Kolmogorov extension - Part 2

Lecture 39 - Measurable functions: definition and basic properties - Part 1

Lecture 40 - Measurable functions: definition and basic properties - Part 2

Lecture 41 - Egorov's theorem: abstract version

Lecture 42 - Lebesgue integral of unsigned simple measurable functions: definition and properties

Lecture 43 - Lebesgue integral of unsigned measurable functions: motivation, definition and basic properties

Lecture 44 - Fundamental convergence theorems in Lebesgue integration: Monotone convergence theorem, Tonelli's theorem and Fatou's lemma

Lecture 45 - Lebesgue integral for complex and real measurable functions: the space of L^1 functions

Lecture 46 - Basic properties of L^1-functions and Lebesgue's Dominated convergence theorem

Lecture 47 - L^1 functions on R^d: Egorov's theorem revisited (Littlewood's third principle)

Lecture 48 - L^1 functions on R^d: Statement of Lusin's theorem (Littlewood's second principle), Density of simple functions, step functions, and continuous compactly supported functions in L^1

Lecture 49 - L^1 functions on R^d: Proof of Lusin's theorem, space of L^1 functions as a metric space

Lecture 50 - L^1 functions on R^d: the Riesz-Fischer theorem

Lecture 51 - Various modes of convergence of measurable functions

Lecture 52 - Easy implications from one mode of convergence to another

Lecture 53 - Implication map for modes of convergence with various examples

Lecture 54 - Uniqueness of limits across various modes of convergence

Lecture 55 - Some criteria for reverse implications for modes of convergence

Lecture 56 - Riesz Representation theorem- Motivation

Lecture 57 - Basics on Locally compact Hausdorff spaces

Lecture 58 - Borel and Radon measures on LCH spaces

Lecture 59 - Properties of Radon measures and Lusin's theorem on LCH spaces

Lecture 60 - Riesz Representation theorem - Complete statement and proof - Part 1

Lecture 61 - Riesz Representation theorem - Complete statement and proof - Part 2

Lecture 62 - Examples of measures constructed using RRT

Lecture 63 - Theorems of Tonelli and Fubini- interchanging the order of integration for repeated integrals: motivation and discussion of product measure spaces

Lecture 64 - Product measures

Lecture 65 - Tonelli's theorem for sets - Part 1

Lecture 66 - Tonelli's theorem for sets - Part 2

Lecture 67 - Fubini-Tonelli theorem: interchanging order of integration for measurable and L^1 functions on sigma-finite measure spaces

Lecture 68 - Lebesgue's differentiation theorem: introduction and motivation

Lecture 69 - Lebesgue's differentiation theorem: statement and proof - Part 1

Lecture 70 - Lebesgue's differentiation theorem: statement and proof - Part 2

Lecture 71 - DIfferentiation theorems: Almost everywhere differentiability for Monotone and Bounded Variation functions - Part 1

Lecture 72 - DIfferentiation theorems: Almost everywhere differentiability for Monotone and Bounded Variation functions - Part 2

Lecture 73 - Riesz's Rising Sun Lemma

Lecture 74 - Differentiation theorem for monone continuous functions

Lecture 75 - Differentation theorem for general monotone functions and Second fundamental theorem of calculus for absolutely continuous functions

NPTEL : NOC:Complex Analysis (Mathematics)

Co-ordinators : Prof. Pranav Haridas

Lecture 1 - Field of Complex Numbers

Lecture 2 - Conjugation and Absolute value

Lecture 3 - Topology on Complex plane

Lecture 4 - Topology on Complex Plane (Continued...)

Lecture 5 - Problem Session

Lecture 6 - Isometries on the Complex Plane

Lecture 7 - Functions on the Complex Plane

Lecture 8 - Complex differentiability

Lecture 9 - Power Series

Lecture 10 - Differentiation of power series

Lecture 11 - Problem Session

Lecture 12 - Cauchy-Riemann equations

Lecture 13 - Harmonic functions

Lecture 14 - MÃ¶bius transformations

Lecture 15 - Problem session

Lecture 16 - Curves in the complex plane

Lecture 17 - Complex Integration over curves

Lecture 18 - First Fundamental theorem of Calculus

Lecture 19 - Second Fundamental theorem of Calculus

Lecture 20 - Problem session

Lecture 21 - Homotopy of curves

Lecture 22 - Cauchy-Goursat theorem

Lecture 23 - Cauchy's theorem

Lecture 24 - Problem Session

Lecture 25 - Cauchy Integral Formula

Lecture 26 - Principle of analytic continuation and Cauchy estimates

Lecture 27 - Further consequences of Cauchy Integral Formula

Lecture 28 - Problem session

Lecture 29 - Winding number

Lecture 30 - Open mapping theorem

Lecture 31 - Schwarz reflection principle

Lecture 32 - Problem session

Lecture 33 - Singularities of a holomorphic function

Lecture 34 - Pole of a function

Lecture 35 - Laurent Series

Lecture 36 - Casorati Weierstrass theorem

Lecture 37 - Problem Session

Lecture 38 - Residue theorem

Lecture 39 - Argument principle

Lecture 40 - Problem Session

Lecture 41 - Branch of the Complex logarithm

Lecture 42 - Automorphisms of the Unit disk

Lecture 43 - Phragmen Lindelof method

Lecture 44 - Problem Session

Lecture 45 - Lifting of maps

Lecture 46 - Covering spaces

Lecture 47 - Bloch's theorem

Lecture 48 - Little Picard's theorem

NPTEL : NOC:Real Analysis - I (Mathematics)

Co-ordinators : Prof. Jaikrishnan J

Lecture 1 - WEEK 1 - INTRODUCTION

Lecture 2 - Why study Real Analysis

Lecture 3 - Square root of 2

Lecture 4 - Wason's selection task

Lecture 5 - Zeno's Paradox

Lecture 6 - Basic set theory

Lecture 7 - Basic logic

Lecture 8 - Quantifiers

Lecture 9 - Proofs

Lecture 10 - Functions and relations

Lecture 11 - Axioms of Set Theory

Lecture 12 - Equivalence relations

Lecture 13 - What are the rationals

Lecture 14 - Cardinality

Lecture 15 - WEEK 2 - INTRODUCTION

Lecture 16 - Field axioms

Lecture 17 - Order axioms

Lecture 18 - Absolute value

Lecture 19 - The completeness axiom

Lecture 20 - Nested intervals property

Lecture 21 - NIP+APâ‡’ Completeness

Lecture 22 - Existence of square roots

Lecture 23 - Uncountability of the real numbers

Lecture 24 - Density of rationals and irrationals

Lecture 25 - WEEK 3 - INTRODUCTION

Lecture 26 - Motivation for infinite sums

Lecture 27 - Definition of sequence and examples

Lecture 28 - Definition of convergence

Lecture 29 - Uniqueness of limits

Lecture 30 - Achilles and the tortoise

Lecture 31 - Deep dive into the definition of convergence

Lecture 32 - A descriptive language for convergence

Lecture 33 - Limit laws

Lecture 34 - Subsequences

Lecture 35 - Examples of convergent and divergent sequences

Lecture 36 - Some special sequences-CORRECT

Lecture 37 - Monotone sequences

Lecture 38 - Bolzano-Weierstrass theorem

Lecture 39 - The Cauchy Criterion

Lecture 40 - MCT implies completeness

Lecture 41 - Definition and examples of infinite series

Lecture 42 - Cauchy tests-Corrected

Lecture 43 - Tests for convergence

Lecture 44 - Erdos_s proof on divergence of reciprocals of primes

Lecture 45 - Resolving Zeno_s paradox

Lecture 46 - Absolute and conditional convergence

Lecture 47 - Absolute convergence continued

Lecture 48 - The number e

Lecture 49 - Grouping terms of an infinite series

Lecture 50 - The Cauchy product

Lecture 51 - WEEK 5 - INTRODUCTION

Lecture 52 - The role of topology in real analysis

Lecture 53 - Open and closed sets

Lecture 54 - Basic properties of adherent and limit points

Lecture 55 - Basic properties of open and closed sets

Lecture 56 - Definition of continuity

Lecture 57 - Deep dive into epsilon-delta

Lecture 58 - Negating continuity

Lecture 59 - The functions x and x2

Lecture 60 - Limit laws

Lecture 61 - Limit of sin x_x

Lecture 62 - Relationship between limits and continuity

Lecture 63 - Global continuity and open sets

Lecture 64 - Continuity of square root

Lecture 65 - Operations on continuous functions

Lecture 66 - Language for limits

Lecture 67 - Infinite limits

Lecture 68 - One sided limits

Lecture 69 - Limits of polynomials

Lecture 70 - Compactness

Lecture 71 - The Heine-Borel theorem

Lecture 72 - Open covers and compactness

Lecture 73 - Equivalent notions of compactness

Lecture 74 - The extreme value theorem

Lecture 75 - Uniform continuity

Lecture 76 - Connectedness

Lecture 77 - Intermediate Value Theorem

Lecture 78 - Darboux continuity and monotone functions

Lecture 79 - Perfect sets and the Cantor set

Lecture 80 - The structure of open sets

Lecture 81 - The Baire Category theorem

Lecture 82 - Discontinuities

Lecture 83 - Classification of discontinuities and monotone functions

Lecture 84 - Structure of set of discontinuities

Lecture 85 - WEEK 8 and 9 - INTRODUCTION

Lecture 86 - Definition and interpretation of the derivative

Lecture 87 - Basic properties of the derivative

Lecture 88 - Examples of differentiation

Lecture 89 - Darboux_s theorem

Lecture 90 - The mean value theorem

Lecture 91 - Applications of the mean value theorem

Lecture 92 - Taylor's theorem NEW

Lecture 93 - The ratio mean value theorem and L_Hospital_s rule

Lecture 94 - Axiomatic characterisation of area and the Riemann integral

Lecture 95 - Proof of axiomatic characterization

Lecture 96 - The definition of the Riemann integral

Lecture 97 - Criteria for Riemann integrability

Lecture 98 - Linearity of integral

Lecture 99 - Sets of measure zero

Lecture 100 - The Riemann-Lebesgue theorem

Lecture 101 - Consequences of the Riemann-Lebesgue theorem

Lecture 102 - WEEK 10 and 11 - INTRODUCTION

Lecture 103 - The fundamental theorem of calculus

Lecture 104 - Taylor's theorem-Integral form of remainder

Lecture 105 - Notation for Taylor polynomials

Lecture 106 - Smooth functions and Taylor series

Lecture 107 - Power series

Lecture 108 - Definition of uniform convergence

Lecture 109 - The exponential function

Lecture 110 - The inverse function theorem

Lecture 111 - The Logarithm

Lecture 112 - Trigonometric functions

Lecture 113 - The number Pi

Lecture 114 - The graphs of sin and cos

Lecture 115 - The Basel problem

Lecture 116 - Improper integrals

Lecture 117 - The Integral test

Lecture 118 - Weierstrass approximation theorem

Lecture 119 - Bernstein Polynomials

Lecture 120 - Properties of Bernstein polynomials

Lecture 121 - Proof of Weierstrass approximation theorem

NPTEL : NOC:Variational Calculus and its applications in Control Theory and Nanomechanics (Mathematics)

Co-ordinators : Prof. Sarthok Sircar

Lecture 1 - Introduction / Euler Lagrange Equations - Part 1

Lecture 2 - Introduction / Euler Lagrange Equations - Part 2

Lecture 3 - Introduction / Euler Lagrange Equations - Part 3

Lecture 4 - Introduction / Euler Lagrange Equations - Part 4

Lecture 5 - Introduction / Euler Lagrange Equations - Part 5

Lecture 6 - Introduction / Euler Lagrange Equations - Part 6

Lecture 7 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 1

Lecture 8 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 2

Lecture 9 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 3

Lecture 10 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 4

Lecture 11 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 5

Lecture 12 - Special cases / Invariance, Existence and Uniqueness of solutions - Part 6

Lecture 13 - Generalization / Numerical solution of Euler Lagrange Equations - Part 1

Lecture 14 - Generalization / Numerical solution of Euler Lagrange Equations - Part 2

Lecture 15 - Generalization / Numerical solution of Euler Lagrange Equations - Part 3

Lecture 16 - Generalization / Numerical solution of Euler Lagrange Equations - Part 4

Lecture 17 - Generalization / Numerical solution of Euler Lagrange Equations - Part 5

Lecture 18 - Generalization / Numerical solution of Euler Lagrange Equations - Part 6

Lecture 19 - Isoperimetric Problems - Part 1

Lecture 20 - Isoperimetric Problems - Part 2

Lecture 21 - Isoperimetric Problems - Part 3

Lecture 22 - Isoperimetric Problems - Part 4

Lecture 23 - Isoperimetric Problems - Part 5

Lecture 24 - Isoperimetric Problems - Part 6

Lecture 25 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 1

Lecture 26 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 2

Lecture 27 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 3

Lecture 28 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 4

Lecture 29 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 5

Lecture 30 - Problems with Holononomic and non- Holononomic Constraints, Variable Endpts - Part 6

Lecture 31 - Broken extremals / Hamiltonian Formulation - Part 1

Lecture 32 - Broken extremals / Hamiltonian Formulation - Part 2

Lecture 33 - Broken extremals / Hamiltonian Formulation - Part 3

Lecture 34 - Broken extremals / Hamiltonian Formulation - Part 4

Lecture 35 - Broken extremals / Hamiltonian Formulation - Part 5

Lecture 36 - Broken extremals / Hamiltonian Formulation - Part 6

Lecture 37 - Hamilton-Jacobi Equations - Part 1

Lecture 38 - Hamilton-Jacobi Equations - Part 2

Lecture 39 - Hamilton-Jacobi Equations - Part 3

Lecture 40 - Hamilton-Jacobi Equations - Part 4

Lecture 41 - Hamilton-Jacobi Equations - Part 5

Lecture 42 - Hamilton-Jacobi Equations - Part 6

Lecture 43 - Noether's Theorem / Introduction to Second Variation - Part 1

Lecture 44 - Noether's Theorem / Introduction to Second Variation - Part 2

Lecture 45 - Noether's Theorem / Introduction to Second Variation - Part 3

Lecture 46 - Noether's Theorem / Introduction to Second Variation - Part 4

Lecture 47 - Noether's Theorem / Introduction to Second Variation - Part 5

Lecture 48 - Noether's Theorem / Introduction to Second Variation - Part 6

Lecture 49 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 1

Lecture 50 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 2

Lecture 51 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 3

Lecture 52 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 4

Lecture 53 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 5

Lecture 54 - Conjugate points / Jacobi Accessory Equations / Introduction to Optimal Control Theory - Part 6

Lecture 55 - Constrained Optimization in Optimal Control Theory - Part 1

Lecture 56 - Constrained Optimization in Optimal Control Theory - Part 2

Lecture 57 - Constrained Optimization in Optimal Control Theory - Part 3

Lecture 58 - Constrained Optimization in Optimal Control Theory - Part 4

Lecture 59 - Constrained Optimization in Optimal Control Theory - Part 5

Lecture 60 - Constrained Optimization in Optimal Control Theory - Part 6

Lecture 61 - Introduction to Nanomechanics - Part 1

Lecture 62 - Introduction to Nanomechanics - Part 2

Lecture 63 - Introduction to Nanomechanics - Part 3

Lecture 64 - Introduction to Nanomechanics - Part 4

Lecture 65 - Introduction to Nanomechanics - Part 5

Lecture 66 - Introduction to Nanomechanics - Part 6

NPTEL : NOC:Introduction to Galois Theory (Mathematics)

Co-ordinators : Prof. Krishna Hanumanthu

Lecture 1 - Motivation and overview of the course

Lecture 2 - Review of group theory

Lecture 3 - Review of ring theory - I

Lecture 4 - Review of ring theory - II

Lecture 5 - Review of field theory - I

Lecture 6 - Review of field theory - II

Lecture 7 - Review of field theory - III

Lecture 8 - Problem Session - Part 1

Lecture 9 - Problem Session - Part 2

Lecture 10 - Beginning of Galois theory

Lecture 11 - Fixed fields

Lecture 12 - Theorem I on fixed fields

Lecture 13 - Theorem II on fixed fields

Lecture 14 - Galois extensions, Galois groups

Lecture 15 - Normal extensions

Lecture 16 - Problem Session - Part 3

Lecture 17 - Problem Session - Part 4

Lecture 18 - Separable extension - Part 1

Lecture 19 - Separable extension - Part 2

Lecture 20 - Characterization of Galois extensions - Part 1

Lecture 21 - Characterization of Galois extensions - Part 2

Lecture 22 - Examples of Galois extensions

Lecture 23 - Motivating the main theorem of Galois theory

Lecture 24 - Main theorem of Galois theory - Part 1

Lecture 25 - Main theorem of Galois theory - Part 2

Lecture 26 - Fundamental theorem of algebra

Lecture 27 - Problem Session - Part 5

Lecture 28 - Problem Session - Part 6

Lecture 29 - Problem Session - Part 7

Lecture 30 - Problem Session - Part 8

Lecture 31 - Problem Session - Part 9

Lecture 32 - Kummer extensions - Part 1

Lecture 33 - Kummer extensions - Part 2

Lecture 34 - Kummer extensions - Part 3

Lecture 35 - Cyclotomic extensions - Part 1

Lecture 36 - Cyclotomic extensions - Part 2

Lecture 37 - Solvability by radicals

Lecture 38 - Characterizations of solvability - Part 1

Lecture 39 - Characterizations of solvability - Part 2

Lecture 40 - Discriminants, Galois groups of polynomials

Lecture 41 - Quartics are solvable

Lecture 42 - Solvable groups - Part 1

Lecture 43 - Solvable groups - Part 2

Lecture 44 - Solvable groups - Part 3

Lecture 45 - Insolvability of quintics

Lecture 46 - Problem Session - Part 10

Lecture 47 - Problem Session - Part 11

Lecture 48 - Problem Session - Part 12

Lecture 49 - Problem Session - Part 13

NPTEL : NOC:Basic Calculus 1 (Mathematics)

Co-ordinators : Prof. Arindama Singh

Lecture 1 - The Real line - Part 1

Lecture 2 - The Real line - Part 2

Lecture 3 - Absolute value - Part 1

Lecture 4 - Absolute value - Part 2

Lecture 5 - Functions - Part 1

Lecture 6 - Functions - Part 2

Lecture 7 - Transcendental and trigonometric Functions - Part 1

Lecture 8 - Transcendental and trigonometric Functions - Part 2

Lecture 9 - Limits of functions - Part 1

Lecture 10 - Limits of functions - Part 2

Lecture 11 - Algebra of limits - Part 1

Lecture 12 - Algebra of limits - Part 2

Lecture 13 - One-sided limits - Part 1

Lecture 14 - One-sided limits - Part 2

Lecture 15 - Limits at infinity - Part 1

Lecture 16 - Limits at infinity - Part 2

Lecture 17 - Infinite limits - Part 1

Lecture 18 - Infinite limits - Part 2

Lecture 19 - Continuity - Part 1

Lecture 20 - Continuity - Part 2

Lecture 21 - Algebra of continuous functions - Part 1

Lecture 22 - Algebra of continuous functions - Part 2

Lecture 23 - Results on continuity - Part 1

Lecture 24 - Results on continuity - Part 2

Lecture 25 - Differentiability - Part 1

Lecture 26 - Differentiability - Part 2

Lecture 27 - Derivative and tangent - Part 1

Lecture 28 - Derivative and tangent - Part 2

Lecture 29 - Rules of differentiation - Part 1

Lecture 30 - Rules of differentiation - Part 2

Lecture 31 - Differentiation exercises - Part 1

Lecture 32 - Differentiation exercises - Part 2

Lecture 33 - Maxima and minima - Part 1

Lecture 34 - Maxima and minima - Part 2

Lecture 35 - Rolleâ€™s theorem and mean value theorem - Part 1

Lecture 36 - Rolleâ€™s theorem and mean value theorem - Part 2

Lecture 37 - Using Rolleâ€™s theorem and Mean value theorem - Part 1

Lecture 38 - Using Rolleâ€™s theorem and Mean value theorem - Part 2

Lecture 39 - First derivative test - Part 1

Lecture 40 - First derivative test - Part 2

Lecture 41 - Second derivative test - Part 1

Lecture 42 - Second derivative test - Part 2

Lecture 43 - Concavity - Part 1

Lecture 44 - Concavity - Part 2

Lecture 45 - Linearization and differential - Part 1

Lecture 46 - Linearization and differential - Part 2

Lecture 47 - Lâ€™Hospitalâ€™s rules - Part 1

Lecture 48 - Lâ€™Hospitalâ€™s rules - Part 2

Lecture 49 - Definite integral - Part 1

Lecture 50 - Definite integral - Part 2

Lecture 51 - Properties of integral - Part 1

Lecture 52 - Properties of integral - Part 2

Lecture 53 - Fundamental theorem of calculus - Part 1

Lecture 54 - Fundamental theorem of calculus - Part 2

Lecture 55 - Applications of Funda - mental theorem of calculus - Part 1

Lecture 56 - Applications of Funda - mental theorem of calculus - Part 2

Lecture 57 - Rule of substitution - Part 1

Lecture 58 - Rule of substitution - Part 2

Lecture 59 - Area between curves - Part 1

Lecture 60 - Area between curves - Part 2

Lecture 61 - Volumes by slicing - Part 1

Lecture 62 - Volumes by slicing - Part 2

Lecture 63 - The disk method - Part 1

Lecture 64 - The disk method - Part 2

Lecture 65 - The washer method - Part 1

Lecture 66 - The washer method - Part 2

Lecture 67 - Volumes by cylindrical shells - Part 1

Lecture 68 - Volumes by cylindrical shells - Part 2

Lecture 69 - Lengths oc curves - Part 1

Lecture 70 - Lengths oc curves - Part 2

Lecture 71 - Areas of surface of revolution - Part 1

Lecture 72 - Areas of surface of revolution - Part 2

NPTEL : NOC:Functional Analysis (Mathematics)

Co-ordinators : Prof. Kesavan

Lecture 1 - Normed Linear Spaces

Lecture 2 - Examples of Normed Linear Spaces

Lecture 3 - Examples (Continued...)

Lecture 4 - Continuous linear maps - Part 1

Lecture 5 - Continuous linear maps - Part 2

Lecture 6 - Isomorphisms

Lecture 7 - Exercises

Lecture 8 - Exercises (Continued...)

Lecture 9 - Hahn-Banach Theorems

Lecture 10 - Reflexivity

Lecture 11 - Geometric version

Lecture 12 - Geometric version (Continued...)

Lecture 13 - Vector valued integration

Lecture 14 - Exercises - Part 1

Lecture 15 - Exercises - Part 2

Lecture 16 - Baire's Theorem and Applications

Lecture 17 - Application to Fourier series

Lecture 18 - Open mapping and closed graph theorems

Lecture 19 - Annihilators

Lecture 20 - Complemented subspaces

Lecture 21 - Unbounded Operators, Adjoints - Part 1

Lecture 22 - Unbounded Operators, Adjoints - Part 2

Lecture 23 - Orthogonality relations

Lecture 24 - Exercises

Lecture 25 - Exercises (Continued...)

Lecture 26 - Weak topology - Part 1

Lecture 27 - Weak topology - Part 2

Lecture 28 - Weak topology - Part 3

Lecture 29 - Weak* topology - Part 1

Lecture 30 - Weak* topology - Part 2

Lecture 31 - Reflexive Spaces

Lecture 32 - Separable Spaces - Part 1

Lecture 33 - Separable Spaces - Part 2

Lecture 34 - Uniformly Convex Spaces

Lecture 35 - Applications

Lecture 36 - Exercises

Lecture 37 - L-p Spaces - Part 1

Lecture 38 - L-p Spaces - Part 2

Lecture 39 - Completeness

Lecture 40 - Duality

Lecture 41 - L-p Spaces in Euclidean spaces - Part 1

Lecture 42 - L-p Spaces in Euclidean spaces - Part 2

Lecture 43 - Dual of L-1

Lecture 44 - The space L-1 (Continued...)

Lecture 45 - Exercises - Part 1

Lecture 46 - Exercises - Part 2

Lecture 47 - Exercises - Part 3

Lecture 48 - Exercises - Part 4

Lecture 49 - Hilbert spaces - Part 1

Lecture 50 - Hilbert spaces - Part 2

Lecture 51 - Duality

Lecture 52 - Adjoints

Lecture 53 - Applications

Lecture 54 - Orthonormal sets

Lecture 55 - Orthonormal bases - Part 1

Lecture 56 - Orthonormal bases - Part 2

Lecture 57 - Fourier series

Lecture 58 - Spectrum of an operator - Part 1

Lecture 59 - Spectrum of an operator - Part 2

Lecture 60 - Exercises - Part 1

Lecture 61 - Exercises - Part 2

Lecture 62 - Exercises - Part 3

Lecture 63 - Compact operators - Part 1

Lecture 64 - Compact operators - Part 2

Lecture 65 - Riesz-Fredholm theory - Part 1

Lecture 66 - Riesz-Fredholm theory - Part 2

Lecture 67 - Riesz-Fredholm theory

Lecture 68 - Spectrum of a compact operator

Lecture 69 - Spectrum of a compact self-adjoint operator

Lecture 70 - Eigenvalues of a compact self-adjoint operator

Lecture 71 - Exercises - Part 1

Lecture 72 - Exercises - Part 2

Lecture 73 - Exercises - Part 3

Lecture 74 - Exercises - Part 4

NPTEL : NOC:Mathematical Methods in Physics 1 (Mathematics)

Co-ordinators : Prof. Auditya Sharma

Lecture 1 - Vectors

Lecture 2 - Linear vector spaces

Lecture 3 - Linear vector spaces: immediate consequences

Lecture 4 - Dot product of Euclidean vectors

Lecture 5 - Inner product on a Linear vector space

Lecture 6 - Cauchy-Schwartz inequality for Euclidean vectors

Lecture 7 - Cauchy-Schwartz inequality for vectors from LVS

Lecture 8 - Applications of the Cauchy-Schwartz inequality

Lecture 9 - Triangle inequality

Lecture 10 - Linear dependence and independence of vectors

Lecture 11 - Row reduction of matrices

Lecture 12 - Rank of a matrix

Lecture 13 - Rank of a matrix: consequences

Lecture 14 - Determinants and their properties

Lecture 15 - The rank of a matrix using determinants

Lecture 16 - Cramer's rule

Lecture 17 - Square system of equations

Lecture 18 - Homogeneous equations

Lecture 19 - The rank of a matrix and linear dependence

Lecture 20 - Span, basis, and dimension of a LVS

Lecture 21 - Gram-Schmidt orthogonalization

Lecture 22 - Vector subspaces

Lecture 23 - Linear operators

Lecture 24 - Inverse of an operator

Lecture 25 - Adjoint of an operator

Lecture 26 - Projection operators

Lecture 27 - Eigenvalues and Eigenvectors

Lecture 28 - Hermitian operators

Lecture 29 - Unitary operators

Lecture 30 - Normal operators

Lecture 31 - Similarity and Unitary transformations

Lecture 32 - Matrix representations

Lecture 33 - Eigenvalues and Eigenvectors of matrices

Lecture 34 - Defective matrices

Lecture 35 - Eigenvalues and eigenvectors: useful results

Lecture 36 - Transformation of Basis

Lecture 37 - A class of invertible matrices

Lecture 38 - Diagonalization of matrices

Lecture 39 - Diagonalizability of matrices

Lecture 40 - Functions of matrices

Lecture 41 - SHM and waves

Lecture 42 - Periodic functions

Lecture 43 - Average value of a function

Lecture 44 - Piecewise continuous functions

Lecture 45 - Orthogonal basis: Fourier series

Lecture 46 - Fourier coefficients

Lecture 47 - Dirichlet Conditions

Lecture 48 - Complex Form of Fourier Series

Lecture 49 - Other intervals: arbitrary period

Lecture 50 - Even and Odd Functions

Lecture 51 - Differentiating Fourier series

Lecture 52 - Parseval's theorem

Lecture 53 - Fourier series to Fourier transforms

Lecture 54 - Fourier Sine and Cosine transforms

Lecture 55 - Parseval's theorem for Fourier series

Lecture 56 - Ordinary Differential equations

Lecture 57 - First order ODEs

Lecture 58 - Linear first order ODEs

Lecture 59 - Orthogonal Trajectories

Lecture 60 - Exact differential equations

Lecture 61 - Special first order ODEs

Lecture 62 - Solutions of linear first-order ODEs

Lecture 63 - Revisit linear first-order ODEs

Lecture 64 - ODEs in disguise

Lecture 65 - 2nd order Homogeneous linear equations with constant coefficients

Lecture 66 - The use of a known solution to find another

Lecture 67 - An alternate approach to auxiliary equation

Lecture 68 - Inhomogeneous second order equations

Lecture 69 - Methods to find a Particular solution

Lecture 70 - Successive Integration of two first order equations

Lecture 71 - Illustrative examples

Lecture 72 - Variation of Parameters

Lecture 73 - Vibrations in mechanical systems

Lecture 74 - Forced Vibrations

Lecture 75 - Resonance

Lecture 76 - Linear Superposition

Lecture 77 - Laplace Transform (LT)

Lecture 78 - Basic Properties of Laplace Transforms

Lecture 79 - Step functions, Translations, and Periodic functions

Lecture 80 - The Inverse Laplace Transform

Lecture 81 - Convolution of functions

Lecture 82 - Solving ODEs using Laplace transforms

Lecture 83 - The Dirac Delta function

Lecture 84 - Properties of the Dirac Delta function

Lecture 85 - Green's function method

Lecture 86 - Green's function method: Boundary value problem

Lecture 87 - Power series method

Lecture 88 - Power series solutions about an ordinary point

Lecture 89 - Initial value problem: power series solution

Lecture 90 - Frobenius method for regular singular points

NPTEL : NOC:Computational Mathematics with SageMath (Mathematics)

Co-ordinators : Prof. Ajit Kumar

Lecture 1 - Installation of Python

Lecture 2 - Getting Started with Python

Lecture 3 - Python as an advanced calculator

Lecture 4 - Lists in Python

Lecture 5 - Tuple, Sets and Dictionaries in Python

Lecture 6 - Functions and Branching

Lecture 7 - For loop in Python

Lecture 8 - While loop in Python

Lecture 9 - Creating Modules and Introduction to NumPy

Lecture 10 - Use of NumPy module

Lecture 11 - Python Graphics using MatplotLib

Lecture 12 - Use of SciPy and SymPy in Python

Lecture 13 - Classes in Python - Part 1

Lecture 14 - Classes in Python - Part 2

Lecture 15 - Introduction and Installation of SageMath

Lecture 16 - Exploring integers in SageMath

Lecture 17 - Solving Equations in SageMath

Lecture 18 - 2d Plotting with SageMath

Lecture 19 - 3d Plotting with SageMath

Lecture 20 - Calculus of one variable with SageMath - Part 1

Lecture 21 - Calculus of one variable with SageMath - Part 2

Lecture 22 - Applications of derivatives

Lecture 23 - Integration with SageMath

Lecture 24 - Improper Integral using SageMath

Lecture 25 - Application of integration using SageMath

Lecture 26 - Limit and Continuity of real valued functions

Lecture 27 - Partial Derivative with SageMath

Lecture 28 - Local Maximum and Minimum

Lecture 29 - Application of local maximum and local minimum

Lecture 30 - Constrained optimization using Lagrange multipliers

Lecture 31 - Working with vectors in SageMath

Lecture 32 - Solving system of linear Equations in SageMath

Lecture 33 - Vector Spaces in SageMath

Lecture 34 - Basis and dimensions of vector spaces in SageMath

Lecture 35 - Matrix Spaces with SageMath

Lecture 36 - Linear Transformations - Part 1 with SageMath

Lecture 37 - Linear Transformations - Part 2 with SageMath

Lecture 38 - Eigenvalues and Eigenvectors - Part 1 with SageMath

Lecture 39 - Eigenvalues and Eigenvectors - Part 2 with SageMath

Lecture 40 - Inner Product - Part 1 with SageMath

Lecture 41 - Inner Product - Part 2 with SageMath

Lecture 42 - Orthogonal Decomposition with SageMath

Lecture 43 - Least Square Solution with SageMath

Lecture 44 - Singular Value Decomposition (SVD) with SageMath

Lecture 45 - Application of SVD to image processing

Lecture 46 - Solving System of linear ODE using Eigenvalues and Eigenvectors

Lecture 47 - Google Page Rank Algorithm using SageMath

Lecture 48 - Finding Roots of algebraic and transcendental equations in SageMath

Lecture 49 - Numerical Solutions of System of linear equations in SageMath

Lecture 50 - Interpolations in SageMath

Lecture 51 - Numerical Integration in SageMath

Lecture 52 - Numerical Eigenvalues

Lecture 53 - Solving 1st and 2nd order ODE with SageMath

Lecture 54 - Euler's Method to solve 1st order ODE with SageMath

Lecture 55 - Fourth Order Runge-Kutta Method

Lecture 56 - RK4 method for System of ODE and Applications

Lecture 57 - Solving ODE using Laplace Transforms in SageMath

Lecture 58 - Introduction to Linear Programming Problems (LPP)

Lecture 59 - Solving Linear Programming Problmes using Graphical Methods

Lecture 60 - Basics Definitions and Results in LPP

Lecture 61 - Theory of Simplex Method

Lecture 62 - Simplex Methods in SageMath - Part 1

Lecture 63 - Simplex Methods in SageMath - Part 2

Lecture 64 - Simplex Methods in Matrix Form

Lecture 65 - Revised Simplex Method in SageMath

Lecture 66 - Two Phase Simplex Method in SageMath

Lecture 67 - Big-M Method in SageMath

Lecture 68 - Duality of Linear Program

Lecture 69 - Dual Simplex Method in SageMath

Lecture 70 - Review and What next in SageMath?

NPTEL : NOC:Introduction to Probability (with examples using R) (Mathematics)

Co-ordinators : Prof. Siva Athreya

Lecture 1 - Sample Space, Events and Probability

Lecture 2 - Properties of Probability

Lecture 3 - Equally likely Outcomes

Lecture 4 - Conditional Probability

Lecture 5 - Bayes Theorem

Lecture 6 - Independence - Part 1

Lecture 7 - Independence - Part 2

Lecture 8 - Sampling and Repeated Trials

Lecture 9 - Sampling and Repeated Trials - Part 1

Lecture 10 - Sampling and Repeated Trials - Part 2

Lecture 11 - Sampling with and Without Replacement

Lecture 12 - Sampling without Replacement

Lecture 13 - Hypergeometric Distribution and Discrete Random Variables

Lecture 14 - Discrete Random Variables - Part 1

Lecture 15 - Discrete Random Variables - Part 2

Lecture 16 - Conditional, Joint and Marginal Distributions

Lecture 17 - Memoryless property of Geometric Distribution

Lecture 18 - Functions of Random Variables

Lecture 19 - Sums of Independent Random Variables

Lecture 20 - Functions and Independence

Lecture 21 - Expectation of Random Variables

Lecture 22 - Properties of Expectation

Lecture 23 - Expectation: Independence and Functions

Lecture 24 - Variance of Discrete Random Variables

Lecture 25 - Markov and Chebyshev Inequalities

Lecture 26 - Conditional Expectation and Covariance

Lecture 27 - Continuous Random Variables - Part 1

Lecture 28 - Continuous Random Variables - Part 2

Lecture 29 - Distribution Function

Lecture 30 - Exponential and Normal Random Variable

Lecture 31 - Normal Random Variable

Lecture 32 - Change of Variable

Lecture 33 - Joint Distribution of Continuous Random Variables

Lecture 34 - Marginal Density and Independence

Lecture 35 - Conditional Density

Lecture 36 - Sums of Independent Random Variables

Lecture 37 - Quotient of Independent Random Variables

Lecture 38 - Expectation and Variance of Continuous Random Variables

Lecture 39 - Sampling Distribution and Sample Mean

Lecture 40 - Weak Law of Large Numbers

Lecture 41 - Revisit of Variance and Expectation

Lecture 42 - Revisit of Properties of Variance

Lecture 43 - Revisit Weak Law of Large Numbers

Lecture 44 - Demoivre-Laplace Central Limit Theorem and Normal Random Variables

Lecture 45 - Revisit Normal Random Variables

Lecture 46 - Normal Tables, Mean and Variance

NPTEL : NOC:Algebra-II (Mathematics)

Co-ordinators : Prof. Amritanshu Prasad, Prof. S. Viswanath

Lecture 1 - Algebraic and Transcendental Numbers

Lecture 2 - Extensions Generated by Elements

Lecture 3 - Isomorphic Extensions

Lecture 4 - Degree of an Extension

Lecture 5 - Constructible Numbers

Lecture 6 - The Field of Constructible Numbers

Lecture 7 - Characterization of Constructible Numbers

Lecture 8 - Solved Problems (Week 1)

Lecture 9 - Some Things can't be Constructed

Lecture 10 - Symbolic Adjunction

Lecture 11 - Repeated Roots

Lecture 12 - Gauss Lemma

Lecture 13 - Eisensteinâ€™s criterion

Lecture 14 - Existence Theorem for Finite Fields

Lecture 15 - Subfields of a Finite Field

Lecture 16 - Multiplicative Group of a Finite Field

Lecture 17 - Uniqueness Theorem for Finite Fields

Lecture 18 - Solved Problems (Week 2)

Lecture 19 - Algebraic Extensions and Algebraic Closures

Lecture 20 - Existence of Algebraic Closures

Lecture 21 - Uniqueness of Algebraic Closure

Lecture 22 - Solved Problems - Part 1 (Week 3)

Lecture 23 - Existence of splitting fields, bound on degree

Lecture 24 - Uniqueness of splitting fields

Lecture 25 - Solved problems - Part 2 (Week 3)

Lecture 26 - Normal Extensions

Lecture 27 - Separable polynomials

Lecture 28 - Perfect fields, separable extensions

Lecture 29 - Definition and examples, fixed fields

Lecture 30 - Characterization of Galois extensions

Lecture 31 - Linear Independence of Characters

Lecture 32 - Solved problems (Week 4)

Lecture 33 - Artinâ€™s Theorem - Part 1

Lecture 34 - Artinâ€™s Theorem - Part 2

Lecture 35 - Finite Galois Extensions

Lecture 36 - The fundamental theorem of Galois Theory - 1

Lecture 37 - The fundamental theorem of Galois Theory - 2

Lecture 38 - Solved problems (Week 5)

Lecture 39 - Cyclotomic extensions

Lecture 40 - Irreducibility of the cyclotomic polynomial

Lecture 41 - Application: Constructibility of regular n-gons.

Lecture 42 - Insolvability of the general quintic - Part 1

Lecture 43 - Insolvability of the general quintic - Part 2

Lecture 44 - Insolvability of the general quintic - Part 3

Lecture 45 - What is category theory (and why is it important)?

Lecture 46 - Definition of a category

Lecture 47 - Monomorphisms, epimorphisms, and isomorphisms

Lecture 48 - Categories: First Problem Session

Lecture 49 - Initial and Terminal Objects

Lecture 50 - Products and Coproducts

Lecture 51 - Categories: Second Problem Session

Lecture 52 - Functors

Lecture 53 - The Category of Categories

Lecture 54 - Natural Transformations

Lecture 55 - Functor Categories

Lecture 56 - Categories: Third Problem Session

Lecture 57 - Adjunction

Lecture 58 - Categories: Fourth Problem Session

Lecture 59 - Tensor products of Z-modules

Lecture 60 - Free abelian groups and quotient groups

Lecture 61 - Construction of the tensor product

Lecture 62 - Problem session

Lecture 63 - Tensor product of R-modules

Lecture 64 - Functoriality of the tensor product

Lecture 65 - Bimodules

Lecture 66 - Tensor products of bimodules

Lecture 67 - Tensor products of modules over commutative rings

Lecture 68 - Extension of scalars

Lecture 69 - Problem session - tensor products of vector spaces

Lecture 70 - Some Properties of the tensor product

Lecture 71 - F-algebras

Lecture 72 - Composition Series

Lecture 73 - Schreierâ€™s Theorem

Lecture 74 - Ascending and Descending Chain Conditions

Lecture 75 - Existence of Jordan-Holder Series

Lecture 76 - The Jordan-Holder Theorem

Lecture 77 - Examples related to the Jordan-Holder Theorem

Lecture 78 - The Jordan-Holder Theorem for Groups

Lecture 79 - Indecomposable Modules

Lecture 80 - Direct Sum Decompositions

Lecture 81 - Decomposition as a sum of Indecomposables

Lecture 82 - The Endomorphism Ring of an Indecomposable Module

Lecture 83 - Krull-Schmidt Theorem

Lecture 84 - Krull-Schmidt Examples

NPTEL : NOC:Mathematical Methods in Physics 2 (Mathematics)

Co-ordinators : Prof. Auditya Sharma

Lecture 1 - Introduction to complex numbers

Lecture 2 - The triangle inequality

Lecture 3 - The de Moivre formula

Lecture 4 - Roots of unity

Lecture 5 - Functions of a complex variable and the notion of continuity

Lecture 6 - Derivative of a complex function

Lecture 7 - Differentiation rules for a complex function

Lecture 8 - Cauchy-Riemann Equations

Lecture 9 - Sufficient conditions for differentiability

Lecture 10 - Cauchy-Riemann conditions in polar coordinates

Lecture 11 - More persepective on differentiability

Lecture 12 - The value of the derivative

Lecture 13 - Analytic functions

Lecture 14 - Harmonic functions

Lecture 15 - The exponential function

Lecture 16 - Complex logarithm

Lecture 17 - Complex exponents

Lecture 18 - Trigonometric functions of complex variables

Lecture 19 - Hyperbolic functions of complex variables

Lecture 20 - Inverse Trigonometric and Hyperbolic functions

Lecture 21 - Branch of a multivalued function

Lecture 22 - Contour Integrals

Lecture 23 - Green's Theorem

Lecture 24 - Path dependence of the contour intergal

Lecture 25 - Antiderivatives

Lecture 26 - The Cauchy theorem

Lecture 27 - Crossing contours and multiply connected domains

Lecture 28 - Cauchy Integral formula

Lecture 29 - Derivatives of an analytic function

Lecture 30 - Liouville's theorem and the Fundamental theorem of algebra

Lecture 31 - Taylor Series

Lecture 32 - Laurent Series

Lecture 33 - Convergence

Lecture 34 - Differentiation and integration of power series

Lecture 35 - Isolated Singularities

Lecture 36 - Residues

Lecture 37 - Residue Theorem

Lecture 38 - Evaluation of integrals - I

Lecture 39 - Evaluation of integrals - II

Lecture 40 - Analytic Continuation

Lecture 41 - Introduction of orthogonal polynomials

Lecture 42 - How to construct orthogonal polynomials

Lecture 43 - The weight function

Lecture 44 - Recursion relations

Lecture 45 - Differential equation satisfied by the orthogonal polynomials

Lecture 46 - Hermite polynomials

Lecture 47 - Properties of Hemite polynomials

Lecture 48 - Legendre polynomials

Lecture 49 - Legendre polynomials: recurrence relation

Lecture 50 - Differential equation corresponding to Legendre polynomials

Lecture 51 - The generating function corresponding to Legendre polynomials

Lecture 52 - Laguerre Polynomials

Lecture 53 - Laguerre Polynomials: recurrence relation

Lecture 54 - Laguerre polynomials: differential equation

Lecture 55 - Laguerre polynomials: generating function

Lecture 56 - Bessel functions: series defination

Lecture 57 - Bessel functions: recurrence relations

Lecture 58 - Bessel functions: differential equation

Lecture 59 - Bessel functions of integral order: generating function

Lecture 60 - Bessel functions: orthogonality

Lecture 61 - Classification of Second Order PDEs

Lecture 62 - Canonical Forms for Hyperbolic PDEs

Lecture 63 - Canonical Forms for Parabolic PDEs

Lecture 64 - Canonical Forms for Elliptic PDEs

Lecture 65 - Tha Laplace Equation

Lecture 66 - The Laplace Equation: Separation of Variables

Lecture 67 - The Laplace Equation: Dirichlet and Neumann boundary conditions

Lecture 68 - The Laplace Equation in Cartesian coordinates

Lecture 69 - The Laplace Equation for a 3-D rectangular box

Lecture 70 - The Laplace Equation in spherical coordinates

Lecture 71 - The Laplace Equation in Spherical Coordinates: Solution

Lecture 72 - The Laplace Equation in Spherical Coordinates: illustrative examples

Lecture 73 - The Poisson's Equation: Green's function solution

Lecture 74 - The heat equation: a heuristic discussion

Lecture 75 - From the random walk to the diffusion equation

Lecture 76 - Solution of the Diffusion equation

Lecture 77 - The Diffusion equation with Dirichlet and Neumann boundary conditions

Lecture 78 - The Heat equation: illustrative examples

Lecture 79 - The Wave equation: Method of characteristics

Lecture 80 - The Wave equation: Separation of variables

NPTEL : NOC:Real Analysis - II (Mathematics)

Co-ordinators : Prof. Jaikrishnan J

Lecture 1 - Metric Spaces

Lecture 2 - Examples of metric spaces

Lecture 3 - Loads of definitions

Lecture 4 - Normed vector spaces

Lecture 5 - Examples of normed vector spaces

Lecture 6 - Basic properties open closed sets metric

Lecture 7 - Continuity in metric spaces

Lecture 8 - Equivalent metrics and product spaces

Lecture 9 - Completeness

Lecture 10 - Completeness (Continued...)

Lecture 11 - Completeness of B(x,y)

Lecture 12 - Completion

Lecture 13 - Compactness

Lecture 14 - The Bolzano-Weierstrass Property

Lecture 15 - Open covers and Compactness

Lecture 16 - The Heine-Borel Theorem for Metric Spaces

Lecture 17 - Connectedness

Lecture 18 - Path-Connectedness

Lecture 19 - Connected Components

Lecture 20 - The Arzela-Ascolli theorem

Lecture 21 - Upper and lower limits

Lecture 22 - The Stone-Weierstrass theorem

Lecture 23 - All norms are equivalent

Lecture 24 - Vector-valued functions

Lecture 25 - Scalar-valued functions of a vector variable

Lecture 26 - Directional derivatives and the gradient

Lecture 27 - Interpretation and properties of the gradient

Lecture 28 - Higher-order partial derivatives

Lecture 29 - The derivative as a linear map

Lecture 30 - Examples of differentiation

Lecture 31 - Properties of the derivative map

Lecture 32 - The mean-value theorem

Lecture 33 - Differentiating under the integral sign

Lecture 34 - Higher-order derivatives

Lecture 35 - Symmetry of the second derivative

Lecture 36 - Taylor's theorem

Lecture 37 - Taylor's theorem with remainder

Lecture 38 - The Banach fixed point theorem

Lecture 39 - Newton's method

Lecture 40 - The inverse function theorem

Lecture 41 - Diffeomorphismsm and local diffeomorphisms

Lecture 42 - The implicit function theorem

Lecture 43 - Tangent space to a hypersurface

Lecture 44 - The definition of a manifold

Lecture 45 - Examples and non examples of manifolds

Lecture 46 - The tangent space to a manifold

Lecture 47 - Maxima and minima in several variables

Lecture 48 - The Hessian and extrema

Lecture 49 - Completing the squares

Lecture 50 - Constrained extrema and lagrange multipliers

Lecture 51 - Curves

Lecture 52 - Rectifiability and arc-length

Lecture 53 - The Riemann integral revisited

Lecture 54 - Monotone sequences of functions

Lecture 55 - Upper functions and their integrals

Lecture 56 - Riemann integrable functions as upper functions

Lecture 57 - Lebesgue integrable functions

Lecture 58 - Approximation of Lebesgure integrable functions

Lecture 59 - Levi monotone convergence theorem for step functions

Lecture 60 - Monotone convergence theorem for upper functions

Lecture 61 - Monotone convergence theorem for Lebesgue integrable functions

Lecture 62 - The Lebesgue dominated convergence theorem

Lecture 63 - Applications of the convergence theorems

Lecture 64 - The problem of measure

Lecture 65 - The Lebesgue integral on unbounded intervals

Lecture 66 - Measurable functions

Lecture 67 - Solution to the problem of measure

Lecture 68 - The Lebesgue integral on arbitrary subsets

Lecture 69 - Square integrable functions

Lecture 70 - Norms and inner-products on complex vector spaces

Lecture 71 - Convergence in L2

Lecture 72 - The Riesz-Fischer theorem

Lecture 73 - Multiple Riemann integration

Lecture 74 - Multiple Lebesgue integration

NPTEL : NOC:Sobolev Spaces and Partial Differential Equations (Mathematics)

Co-ordinators : Prof. Kesavan

Lecture 1 - Test Functions - Part 1

Lecture 2 - Test Functions - Part 2

Lecture 3 - Distributions

Lecture 4 - Examples - Part 1

Lecture 5 - Distribution Derivatives

Lecture 6 - More operations on distributions

Lecture 7 - Support of a distribution

Lecture 8 - Distributions with compact support; singular support - Part 1

Lecture 9 - Distributions with compact support; singular support - Part 2

Lecture 10 - Exercises - Part 1

Lecture 11 - Convolution of functions - Part 1

Lecture 12 - Convolution of functions - Part 2

Lecture 13 - Convolution of functions - Part 3

Lecture 14 - Convolution of distributions - Part 1

Lecture 15 - Convolution of distributions - Part 2

Lecture 16 - Convolution of distributions - Part 3

Lecture 17 - Exercises - Part 2

Lecture 18 - Fundamental solutions

Lecture 19 - The Fourier transform

Lecture 20 - The Schwarz space - Part 1

Lecture 21 - The Schwarz space - Part 2

Lecture 22 - Examples - Part 1

Lecture 23 - Fourier inversion formula

Lecture 24 - Tempered distributions

Lecture 25 - Exercises - Part 3

Lecture 26 - Sobolev spaces - Part 1

Lecture 27 - Sobolev spaces - Part 2

Lecture 28 - Sobolev spaces - Part 3

Lecture 29 - Approximation by smooth functions

Lecture 30 - Chain rule and applications - Part 1

Lecture 31 - Chain rule and applications - Part 2

Lecture 32 - Extension theorems - Part 1

Lecture 33 - Extension theorems - Part 2

Lecture 34 - Poincare's inequlity

Lecture 35 - Exercises - Part 4

Lecture 36 - Exercises - Part 5

Lecture 37 - Imbedding theorems

Lecture 38 - Imbedding theorems: Case p less than N - Part 1

Lecture 39 - Imbedding theorems: Case p = N - Part 2

Lecture 40 - Imbedding theorems: Case p greater than N - Part 3

Lecture 41 - Compactness theorems - Part 1

Lecture 42 - Compactness theorems - Part 2

Lecture 43 - Compactness theorems - Part 3

Lecture 44 - The spaces W^{s,p}

Lecture 45 - spaces W^{s,p} and Trace spaces

Lecture 46 - Trace theory - Part 1

Lecture 47 - Trace theory - Part 2

Lecture 48 - Trace theory - Part 3

Lecture 49 - Trace theory - Part 4

Lecture 50 - Exercises - Part 6

Lecture 51 - Exercises - Part 7

Lecture 52 - Abstract variational problems - Part 1

Lecture 53 - Abstract variational problems - Part 2

Lecture 54 - Weak solutions of elliptic boundary value problems - Part 1

Lecture 55 - Weak solutions of elliptic boundary value problems - Part 2

Lecture 56 - Neumann problems

Lecture 57 - The Biharmonic operator

Lecture 58 - The elasticity system

Lecture 59 - Exercises - Part 8

Lecture 60 - Exercises - Part 9

Lecture 61 - Exercises - Part 9

Lecture 62 - Maximum Principles - Part 1

Lecture 63 - Maximum Principles - Part 2

Lecture 64 - Exercises - Part 10

Lecture 65 - Exercises - Part 11

Lecture 66 - Eigenvalue problems - Part 1

Lecture 67 - Eigenvalue problems - Part 2

Lecture 68 - Eigenvalue problems - Part 3

Lecture 69 - Exercises - Part 12

Lecture 70 - Exercises - Part 13

Lecture 71 - Unbounded operators - Part 1

Lecture 72 - Unbounded operators - Part 2

Lecture 73 - The exponential map

Lecture 74 - C_0 Semigroups - Part 1

Lecture 75 - C_0 Semigroups - Part 2

Lecture 76 - Infinitesimal generators of contraction semigroups

Lecture 77 - Hille-Yosida theorem

Lecture 78 - Regularity

Lecture 79 - Contraction semigroups on Hilbert spaces

Lecture 80 - Self-adjoint case and the case of isometries

Lecture 81 - The heat equation

Lecture 82 - The wave equation

Lecture 83 - The Schrodinger equation

Lecture 84 - The inhomogeneous equation

Lecture 85 - Exercises - 14

NPTEL : NOC:Combinatorics (Mathematics)

Co-ordinators : Prof. Narayanan N

Lecture 1 - Pigeonhole Principle

Lecture 2 - Dirichlet theorem and Erdos-Szekeres Theorem

Lecture 3 - Ramey theorem as generalisation of PHP

Lecture 4 - An infinite flock of Pigeons

Lecture 5 - Basic Counting - the sum and product rules

Lecture 6 - Examples of basic counting

Lecture 7 - Examples: Product and Division rules

Lecture 8 - Binomial theorem and bijective counting

Lecture 9 - Counting lattice paths

Lecture 10 - Multinomial theorem

Lecture 11 - Applying Multinomial theorem

Lecture 12 - Integer compositions

Lecture 13 - Set partitions and Stirling numbers

Lecture 14 - Stirling and Hemachandra recursions

Lecture 15 - Integer partitions

Lecture 16 - Young's diagram and Integer partitions

Lecture 17 - Principle of Inclusion and Exclusion

Lecture 18 - Applications of PIE

Lecture 19 - The twelvefold way

Lecture 20 - Inclusion exclusion: Linear algebra view

Lecture 21 - Partial Orders

Lecture 22 - Mobius Inversion Formula

Lecture 23 - Product theorem and applications of Mobius Inversion

Lecture 24 - Formal power series, ordinary generating functions

Lecture 25 - Application of Ordinary generating functions

Lecture 26 - Product of Generating functions

Lecture 27 - Composition of generating functions

Lecture 28 - Exponential Generating Function

Lecture 29 - Composition of EGF

Lecture 30 - Euler pentagonal number theorem

Lecture 31 - Graphs - introduction

Lecture 32 - Paths Walks, Cycles

Lecture 33 - Digraphs and functional digraphs

Lecture 34 - Componenets, Connectivity, Bipartite graphs

Lecture 35 - Acyclic graphs

Lecture 36 - Graph colouring

Lecture 37 - Mycielski graphs

Lecture 38 - Product of graphs

Lecture 39 - Menger's theorem

Lecture 40 - System of Distinct representatives

Lecture 41 - Planar graphs

Lecture 42 - Euler identity

Lecture 43 - Map colouring problem - History

Lecture 44 - The Discharging Method - Part 1

Lecture 45 - The Discharging Method - Part 2

Lecture 46 - Introduction to Group actions

Lecture 47 - Colouring and symmetries - examples

Lecture 48 - Bursides lemma

Lecture 49 - Proof of Bursides lemma

Lecture 50 - Polya's theorem

Lecture 51 - Species of structures- definitions and examples

Lecture 52 - Associated seris and Product of species

Lecture 53 - Species: Substitution and Derivative

Lecture 54 - Species: Pointing and countilg labelled trees

Lecture 55 - Review and Further directions

Lecture 56 - More on further topics

Lecture 57 - Linear Algebra method: Ultra short introduction

Lecture 58 - Probabiistic Method: Ultra short introduction

NPTEL : NOC:Our Mathematical Senses (Mathematics)

Co-ordinators : Prof. Vijay Ravikumar

Lecture 1 - Why do the images of parallel lines converge?

Lecture 2 - The power of vanishing points

Lecture 3 - Bonus material: Perspective in visual art

Lecture 4 - Understanding Points at Infinity

Lecture 5 - The Extended Euclidean Plane

Lecture 6 - Harmonic tetrads

Lecture 7 - Perspective Drawing as a Perspectivity

Lecture 8 - Perspectivities of the Extended Euclidean Plane

Lecture 9 - Projectivities

Lecture 10 - Projectivities as Functions on the Real Numbers

Lecture 11 - Proving Pappus's Theorem

Lecture 12 - The Fundamental Theorem of Projective Geometry

Lecture 13 - The Cross Ratio

Lecture 14 - Applications of the Cross Ratio

Lecture 15 - The Real Projective Plane

Lecture 16 - Transformations of the Real Projective Plane

NPTEL : NOC:Algebraic Combinatorics (Mathematics)

Co-ordinators : Prof. Amritanshu Prasad, Prof. Sankaran Viswanath

Lecture 1 - Examples of Mobius Inversion

Lecture 2 - Partially Ordered Sets

Lecture 3 - Hasse Diagrams

Lecture 4 - Isomorphsms of Posets

Lecture 5 - Maximal, Minimal, Greatest, Least

Lecture 6 - Induced Subposets

Lecture 7 - Incidence Algebras

Lecture 8 - Inversion in Incidence Algebras

Lecture 9 - Mobius Inversion

Lecture 10 - Examples of Mobius Functions

Lecture 11 - Product Posets and their Mobius Functions

Lecture 12 - Opposite of a Poset

Lecture 13 - The Poset of Set Partitions

Lecture 14 - Connected Structures

Lecture 15 - Lattices

Lecture 16 - Weisner's Theorem

Lecture 17 - The Lattice of Non-Crossing Partitions

Lecture 18 - The Canonical Product Decoposition for Intervals of Non-Crossing Partitions

Lecture 19 - The Mobius Function for Non-Crossing Partitions

Lecture 20 - Ideals in a Poset

Lecture 21 - Mobius Function of J(P)

Lecture 22 - Young's Lattice

Lecture 23 - Distributive Lattices

Lecture 24 - Formal Power Series

Lecture 25 - The Necklace Problem

Lecture 26 - Combinatorial Classes

Lecture 27 - Sums, Products, and Sequences of Combinatorial Classes

Lecture 28 - Power Set, Multisets, and Sequences

Lecture 29 - A Little Dendrology

Lecture 30 - Super Catalan/Little Schroeder numbers

Lecture 31 - Regular Languages

Lecture 32 - Finite Automata

Lecture 33 - The Pumping Lemma

Lecture 34 - The Dyck Language

Lecture 35 - Permutations and their cycles

Lecture 36 - Permutation Groups

Lecture 37 - Orbits, fixed points, stabilizers

Lecture 38 - The orbit counting theorem

Lecture 39 - The Polya Enumeration Theorem

Lecture 40 - The Cycle Index Polynomials

Lecture 41 - Cycle Index of the Octahedral Group

Lecture 42 - Cycle Index of the Full Permutation Group

Lecture 43 - Combinatorial Species

Lecture 44 - Generating Series of a Species

Lecture 45 - Cycle Index Series of a Species

Lecture 46 - Isomorphism of Species

Lecture 47 - Visualization of Species

Lecture 48 - Sum of Species

Lecture 49 - Product of Species

Lecture 50 - Sums and Products: More Examples

Lecture 51 - Substitution of Species

Lecture 52 - Derivative of a Species

Lecture 53 - Powers and Seqeunces of Binomial Type

Lecture 54 - Pointing and Cayley's Theorem

Lecture 55 - R-enriched Trees

Lecture 56 - R-enriched Endofunctions

Lecture 57 - Lagrange Inversion Forumla

Lecture 58 - Motivation for the LGV Lemma

Lecture 59 - Statement of the LGV Lemma

Lecture 60 - Nice Applications of the LGV Lemma

Lecture 61 - Sign-Reversing Involutions

Lecture 62 - Proof of the LGV Lemma

Lecture 63 - The Cauchy-Binet Formula

Lecture 64 - Symmetric polynomials: definition and examples

Lecture 65 - Monomial symmetric polynomials

Lecture 66 - Elementary and Complete symmetric polynomials - Part 1

Lecture 67 - Elementary and Complete symmetric polynomials - Part 2

Lecture 68 - Alternating polynomials

Lecture 69 - Labelled abaci and alternants

Lecture 70 - Schur polynomials

Lecture 71 - Pieri Rule - Statement and Examples

Lecture 72 - Pieri Rule - Proof

Lecture 73 - The second Pieri rule

Lecture 74 - Semi-standard tableaux

Lecture 75 - Triangularity of Kostka matrix

Lecture 76 - Monomial expansion of Schur

Lecture 77 - The RSK correspondence

Lecture 78 - Jacobi Trudi identities via LGV lemma

Lecture 79 - Formal ring of symmetric functions in infinitely many variables

Lecture 80 - Monomial expansions and RSK

Lecture 81 - Generating functions for e, h

Lecture 82 - The power sum symmetric functions

Lecture 83 - The inner product and Cauchy identity

Lecture 84 - Skew Schur functions and the LR rule

NPTEL : NOC:An Invitation to Topology (Mathematics)

Co-ordinators : Prof. Indrava Roy

Lecture 1 - Introduction to Topology

Lecture 2 - Basic Set theory

Lecture 3 - Mathematical Logic - Part 1

Lecture 4 - Mathematical Logic - Part 2

Lecture 5 - Functions

Lecture 6 - Finite Sets - Part 1

Lecture 7 - Finite Sets - Part 2

Lecture 8 - Infinite Sets

Lecture 9 - Infinite Sets and Axiom of Choice

Lecture 10 - Definition of aTopology

Lecture 11 - Examples of different topologies

Lecture 12 - Basis for a topology

Lecture 13 - Various topologies on the real line

Lecture 14 - Comparison of topologies - Part 1: Finer and coarser topologies

Lecture 15 - Comparison of topologies - Part 2: Comparing the various topologies on R

Lecture 16 - Basis and Sub-basis for a topology

Lecture 17 - Various topologies: the subspace topology

Lecture 18 - The Product topology

Lecture 19 - Topologies on arbitrary Cartesian products

Lecture 20 - Metric topology - Part 1

Lecture 21 - Metric topology - Part 2

Lecture 22 - Metric topology - Part 3

Lecture 23 - Closed Sets

Lecture 24 - Closure and Limit points

Lecture 25 - Continuous functions

Lecture 26 - Construction of continuous functions

Lecture 27 - Continuous functions on metric spaces - Part 1

Lecture 28 - Continuous functions on metric spaces - Part 2

Lecture 29 - Connectedness

Lecture 30 - Some conditions for Connectedness

Lecture 31 - Connectedness of the Real Line

Lecture 32 - Connectedness of a Linear Continuum

Lecture 33 - The Intermediate Value Theorem

Lecture 34 - Path-connectedness

Lecture 35 - Connectedness does not imply Path-connectedness - Part 1

Lecture 36 - Connectedness does not imply Path-connectedness - Part 2

Lecture 37 - Connected and Path-connected Components

Lecture 38 - Local connectedness and Local Path-connectedness

Lecture 39 - Compactness

Lecture 40 - Properties of compact spaces

Lecture 41 - The Heine-Borel Theorem

Lecture 42 - Tychonoff't theorem

Lecture 43 - Proof of Tychonoff's theorem - Part 1

Lecture 44 - Proof of Tychonoff's theorem - Part 2

Lecture 45 - Compactness in metric spaces

Lecture 46 - Lebesgue Number Lemma and the Uniform Continuity theorem

Lecture 47 - Different Kinds of Compactness

Lecture 48 - Equivalence of various compactness properties for Metric Spaces

Lecture 49 - Compactness and Sequential Compactness in arbitrary topological spaces

Lecture 50 - Baire Spaces

Lecture 51 - Properties and Examples of Baire Spaces

Lecture 52 - The Baire Category Theorem

Lecture 53 - Complete Metric Spaces and the Baire Category theorem - Part 1

Lecture 54 - Complete Metric Spaces and the Baire Category theorem - Part 2

Lecture 55 - Application of the Baire Category theorem

Lecture 56 - Regular and Normal spaces

Lecture 57 - Properties and examples of regular and normal spaces

Lecture 58 - Urysohn's Lemma

Lecture 59 - Proof of Urysohn's Lemma

Lecture 60 - Tietze Extension theorem - Part 1

Lecture 61 - Tietze Extension theorem - Part 2

Lecture 62 - Compactness and Completeness in Metric spaces

Lecture 63 - The space of continuous functions - Part 1

Lecture 64 - The space of continuous functions - Part 2

Lecture 65 - Equicontinuity

Lecture 66 - Total boundedness and Equicontinuity - Part 1

Lecture 67 - Total boundedness and Equicontinuity - Part 2

Lecture 68 - Topology of compact convergence - Part 1

Lecture 69 - Topology of compact convergence - Part 2

Lecture 70 - Equicontinuity revisited - Part 1

Lecture 71 - Equicontinuity revisited - Part 2

Lecture 72 - Locally compact Hausdorff spaces

Lecture 73 - The ArzelÃƒ - Ascoli theorem

NPTEL : NOC:Operator Theory (Mathematics)

Co-ordinators : Prof. G. Ramesh

Lecture 1 - Semi Inner product spaces

Lecture 2 - Inner Product Spaces

Lecture 3 - Parallelogram law

Lecture 4 - Hilbert Spaces

Lecture 5 - Orthogonality

Lecture 6 - Projection Theorem

Lecture 7 - Linear Operator

Lecture 8 - Bounded Operators

Lecture 9 - Norm of a linear operator

Lecture 10 - Examples of bounded operators

Lecture 11 - The Adjoint Operator

Lecture 12 - The Adjoint: Properties

Lecture 13 - Closed range operators - 1

Lecture 14 - Closed range operators - 2

Lecture 15 - Self-adjoint Operators

Lecture 16 - Normal operators

Lecture 17 - Isometris and Unitaries

Lecture 18 - Isometris and Unitaries

Lecture 19 - Mutually Orthogonal Projections

Lecture 20 - Invariant Subspaces

Lecture 21 - Monotone Convergence Theorem

Lecture 22 - Square root

Lecture 23 - Polar decomposition

Lecture 24 - Invertibility

Lecture 25 - Spectrum

Lecture 26 - Spectral Mapping Theorem

Lecture 27 - The spectral radius formula

Lecture 28 - multiplicative linear functionals

Lecture 29 - The GKZ-theorem

Lecture 30 - Maximal Ideal Space

Lecture 31 - Commutative C*-algebras

Lecture 32 - Decomposition of spectrum

Lecture 33 - Computing spectrum: Examples

Lecture 34 - Approximate spectrum

Lecture 35 - Approximate spectrum: Properties

Lecture 36 - Numerical bounds

Lecture 37 - Compact Operators

Lecture 38 - Compact Operators; Properties

Lecture 39 - Spectral Theorem: Compact Self-Adjoint Operators

Lecture 40 - Spectral Theorem: Consequences

Lecture 41 - Compact Normal Operators

Lecture 42 - Compact Operators Singular value Decomposition

Lecture 43 - Fredholm Alternative Theorem

Lecture 44 - Orthogonal decomposition of self-adjoint operators

Lecture 45 - Spectral family; Properties - I

Lecture 46 - Spectral family; Properties - II

Lecture 47 - Spectral theorem Self adjoint Operators

Lecture 48 - Spectral theorem Examples

Lecture 49 - Spectral theorem: Consequences

Lecture 50 - Continuous functional Calculus

Lecture 51 - Spectral mapping theorem

NPTEL : NOC:Measure and Integration (Mathematics)

Co-ordinators : Prof. S. Kesavan

Lecture 1 - Preamble

Lecture 2 - Algebras of sets

Lecture 3 - Measures on rings

Lecture 4 - Outer-measure

Lecture 5 - Measurable sets

Lecture 6 - Caratheodory's method

Lecture 7 - Exercises

Lecture 8 - Exercises

Lecture 9 - Lebesgue measure: the ring

Lecture 10 - Construction of the Lebesgue measure

Lecture 11 - Errata

Lecture 12 - The Cantor set

Lecture 13 - Approximation

Lecture 14 - Approximation

Lecture 15 - Approximation

Lecture 16 - Translation Invariance

Lecture 17 - Non-measurable sets

Lecture 18 - Exercises

Lecture 19 - Measurable functions

Lecture 20 - Measurable functions

Lecture 21 - The Cantor function

Lecture 22 - Exercises

Lecture 23 - Egorov's theorem

Lecture 24 - Convergence in measure

Lecture 25 - Convergence in measure

Lecture 26 - Convergence in measure

Lecture 27 - Exercises

Lecture 28 - Integration: Simple functions

Lecture 29 - Non-negative functions

Lecture 30 - Monotone convergence theorem

Lecture 31 - Examples

Lecture 32 - Fatou's lemma

Lecture 33 - Integrable functions

Lecture 34 - Dominated convergence theorem

Lecture 35 - Dominated convergence theorem: Applications

Lecture 36 - Absolute continuity

Lecture 37 - Integration on the real line

Lecture 38 - Examples

Lecture 39 - Weierstrass' theorem

Lecture 40 - Exercises

Lecture 41 - Exercises

Lecture 42 - Vitali covering lemma

Lecture 43 - Monotonic functions

Lecture 44 - Functions of bounded variation

Lecture 45 - Functions of bounded variation

Lecture 46 - Functions of bounded variation

Lecture 47 - Differentiation of an indefinite integral

Lecture 48 - Absolute continuity

Lecture 49 - Exercises

Lecture 50 - Product spaces

Lecture 51 - Product spaces: measurable functions

Lecture 52 - Product measure

Lecture 53 - Fubini's theorem

Lecture 54 - Examples

Lecture 55 - Examples

Lecture 56 - Integration of radial functions

Lecture 57 - Measure of the unit ball in N dimensions

Lecture 58 - Exercises

Lecture 59 - Signed measures

Lecture 60 - Hahn and Jordan decompositions

Lecture 61 - Upper,lower and totaal variations of a signed measure; Absolute continuity

Lecture 62 - Absolute continuity

Lecture 63 - Radon-Nikodym theorem

Lecture 64 - Radon-Nikodym theorem

Lecture 65 - Exercises

Lecture 66 - Lebesgue spaces

Lecture 67 - Examples. Inclusion questions

Lecture 68 - Convergence in L^p

Lecture 69 - Approximation

Lecture 70 - Applications

Lecture 71 - Duality

Lecture 72 - Duality

Lecture 73 - Convolutions

Lecture 74 - Convolutions

Lecture 75 - Convolutions

Lecture 76 - Exercises

Lecture 77 - Exercises

Lecture 78 - Change of variable

Lecture 79 - Change of variable

NPTEL : NOC:Approximate Reasoning using Fuzzy Set Theory (Mathematics)

Co-ordinators : Prof. Balasubramaniam Jayaram

Lecture 1 - Flow of the Course: A not-so-sneak peek

Lecture 2 - Fuzzy Sets - The Necessity

Lecture 3 - Fuzzy Sets - Representations

Lecture 4 - Fuzziness vs Probability

Lecture 5 - Fuzzy Sets - Some Important Notions

Lecture 6 - Operations on Fuzzy Sets

Lecture 7 - Posets on Fuzzy Sets

Lecture 8 - Lattice of Fuzzy Sets

Lecture 9 - Boolean Algebra of Sets

Lecture 10 - Algebras on Fuzzy Sets

Lecture 11 - Triangular Norms

Lecture 12 - Triangular Norms: Analytical Aspects

Lecture 13 - Triangular Norms: Algebraic Aspects

Lecture 14 - T-Norms: Construction and Representations

Lecture 15 - T-Norms:Complementation and Duality

Lecture 16 - Fuzzy Implications

Lecture 17 - Fuzzy Implications - Desirable Properties

Lecture 18 - Construction of Fuzzy Implication - I

Lecture 19 - Construction of Fuzzy Implication - II

Lecture 20 - Construction of Fuzzy Implication - II

Lecture 21 - Construction of Fuzzy Implication - III

Lecture 22 - Construction of Fuzzy Implication - IV

Lecture 23 - (N, T, I)- An Organic Relationship

Lecture 24 - Fuzzy Relations

Lecture 25 - Composition of Fuzzy Relations

Lecture 26 - Similarity and Compatibility Classes

Lecture 27 - On the Transitivity of Fuzzy Relations - I

Lecture 28 - On the Transitivity of Fuzzy Relations - II

Lecture 29 - Fuzzy Propositions: Some Interpretations

Lecture 30 - Fuzzy If-Then Rules

Lecture 31 - Fuzzy Relational Inference

Lecture 32 - Fuzzy Relational Inference - MISO Case

Lecture 33 - Fuzzy Relational Inference - Multiple Rules

Lecture 34 - Fuzzy Inferencing Schemes - A Visual Illustration

Lecture 35 - Similarity Based Reasoning

Lecture 36 - SBR : Mamdani Fuzzy Systems

Lecture 37 - Introduction to Building a Mamdani FIS

Lecture 38 - Contrast Enhancement in Images: An FIS Approach

Lecture 39 - Takagi-Sugeno-Kang Fuzzy Systems

Lecture 40 - Fuzzy Inference Systems - Interpolativity

Lecture 41 - Interpolativity of FRI - Single SISO Rule

Lecture 42 - Fuzzy Relational Equations

Lecture 43 - Interpolativity of FRI - Multiple SISO Rules

Lecture 44 - Similarity Based Reasoning- Interpolativity

Lecture 45 - FRI~SBR : FITA~FATI : Some Connections

Lecture 46 - Continuous Models of FRI

Lecture 47 - Continuous Models of CRI and BKS

Lecture 48 - Continuous Models of SBR

Lecture 49 - Extensionality of a Fuzzy Set

Lecture 50 - Robustness of CRI

Lecture 51 - Robustness of BKS

Lecture 52 - Robustness of SBR

Lecture 53 - Monotonicity of an FIS

Lecture 54 - Monotonicity of an FRI

Lecture 55 - Monotonicity of an SBR

Lecture 56 - Functional (In)Equalities involving FLCs

Lecture 57 - Suitability of BKS with Yager's Implications

Lecture 58 - Law of Importation and Hierarchical CRI

NPTEL : NOC:Probability-II with Examples Using R (Mathematics)

Co-ordinators : Prof. Siva Athreya

Lecture 1 - Continuous Random Variables - Part 1

Lecture 2 - Continuous Random Variables - Part 2

Lecture 3 - R Set Up

Lecture 4 - Exponential and Normal Random Variable

Lecture 5 - Normal Random Variable

Lecture 6 - Distribution Function

Lecture 7 - Normal Distribution

Lecture 8 - Problem Solving for Week 12 - Part 2

Lecture 9 - Joint Distribution of Continuous Random Variables

Lecture 10 - Marginal Density and Independence

Lecture 11 - Uniform Distribution in R2

Lecture 12 - Problem Solving

Lecture 13 - Bivariate Normal - Part 1

Lecture 14 - Problem Solving 1 - Calculating Probabilities

Lecture 15 - Problem Solving 2 - Quadratic Equation, Random Coefficients

Lecture 16 - Conditional Density

Lecture 17 - Sums of Independent Random Variables

Lecture 18 - Quotient of Independent Random Variables

Lecture 19 - Simulating Bivariate Normal Random Variables

Lecture 20 - Problem Solving Conditional Density

Lecture 21 - Expectation and Variance of Continuous Random Variables

Lecture 22 - Revisit of Variance and Expectation

Lecture 23 - Revisit of Properties of Variance

Lecture 24 - Covariance and Correlation

Lecture 25 - Conditional Expectation and Conditional Variance

Lecture 26 - Analysis of Variance Formula

Lecture 27 - Problem Solving Expectations

Lecture 28 - Moment Generating Function

Lecture 29 - Moments and Moment Generating Function

Lecture 30 - Bivariate Normal - Part 2

Lecture 31 - Problem Solving Conditional Expectation and Conditional Variance

Lecture 32 - Sampling Distribution and Sample Mean

Lecture 33 - Weak Law of Large Numbers

Lecture 34 - Revisit Weak Law of Large Numbers

Lecture 35 - Problem Solving

Lecture 36 - Demoivre-Laplace Central Limit Theorem and Normal Random Variables

Lecture 37 - Revisit Normal Random Variables

Lecture 38 - Normal Tables, Mean and Variance

Lecture 39 - Problem Solving

Lecture 40 - Bivariate Normal Random Variables_Characterisation

Lecture 41 - Bivariate Normal Random Variables_Independence

Lecture 42 - Problem Solving

Lecture 43 - Bivariate Normal Random Variables Joint Density Calculation - Part 1

Lecture 44 - Bivariate Normal Random Variables Joint Density Calculation - Part 2

Lecture 45 - Problem Solving - Review of Transformation of Random Variables

NPTEL : NOC:Predictive Analytics - Regression and Classification (Mathematics)

Co-ordinators : Prof. Sourish Das

Lecture 1 - Introduction

Lecture 2 - Least Squares method

Lecture 3 - Hands-on with Python - Part 1

Lecture 4 - Hands-on with R - Part 1

Lecture 5 - Categorical Variable as Predictor - Part 1

Lecture 6 - Categorical Variable as Predictor - Part 2

Lecture 7 - Hands-on with R - Part 2

Lecture 8 - Understanding the joint probability from data perspective

Lecture 9 - Hands-on with R - Part 3

Lecture 10 - Regression Line as Conditional Expectation

Lecture 11 - Normal Equations

Lecture 12 - Gauss Markov Theorem

Lecture 13 - Hands-on with Python - Part 2

Lecture 14 - Geometry of Regression Model and Feature Engineering

Lecture 15 - Sampling Distribution and Statistical Inference of Regression Coefficient

Lecture 16 - Hands-on with R - Part 4

Lecture 17 - Checking Model Assumptions

Lecture 18 - Comparing Models with Predictive Accuracy

Lecture 19 - Hands-on with Julia

Lecture 20 - Model Complexity, Bias and Variance Tradeoff

Lecture 21 - Feature Selection, Variable Selection

Lecture 22 - Hands on with R - Part 5

Lecture 23 - Understanding Multicollinearity

Lecture 24 - Ill-Posed Problem and Regularisation, LASSO and Risdge

Lecture 25 - Hands-on with Python - Part 3

Lecture 26 - Time Series Forecasting with Regression Model

Lecture 27 - Hands on with R - Part 6

Lecture 28 - Granger Causal model

Lecture 29 - Hands on with R - Part 7

Lecture 30 - Capital Asset Pricing Model

Lecture 31 - Hands on with R for CAPM

Lecture 32 - Bootstrap Regression

Lecture 33 - Hands on with R for Bootstrap Regression

Lecture 34 - Hands on with Python: Handle multicollinearity with Ridge correction

Lecture 35 - Hands on with Julia: Implemente Chennai Temperature Analysis with Julia and CRRao

Lecture 36 - Introduction to logistic Regression

Lecture 37 - Maximum Likelihood Estimate for Logistic Regression

Lecture 38 - Hands on with R for Logistic Regression

Lecture 39 - Hands on with R: Measure Time performance of R code

Lecture 40 - Statistical Inference of Logistic Regression

Lecture 41 - Hands on with R with Iris Dataset

Lecture 42 - Multi-Class Classification with Discriminant Analysis

Lecture 43 - Hands on with R: Implement LDA

Lecture 44 - Effect of Feature Engineer in Logistic Regression

Lecture 45 - Logistic Regression to Deep Learning Neural Network

Lecture 46 - Hands on with R: Feature Engineer in Logistic Regression

Lecture 47 - Generalised Linear Model

Lecture 48 - Hands on with R: Poisson Regression with Football Data

Lecture 49 - Gaussian Process Regression

Lecture 50 - Hands on with R: Implement GP Regression from scratch

Lecture 51 - Tree Structured Regression

Lecture 52 - Hands on with R: Implement Tree Regression and Random Forest with Simulated Data

Lecture 53 - Hands on with R: Implement Tree Regression and Random Forest with EPL football Data

Lecture 54 - Hands on with Python : Analysis of Bangalore House Price Data

Lecture 55 - Hands on with R: Prediction of Bangalore House Price

Lecture 56 - Hands on with R: More Prediction of Bangalore House Price

Lecture 57 - Hands on with R: Some Correction with Bangalore House Price Data Prediction

Lecture 58 - Hands on with R: Classify fake bank note with GLM

Lecture 59 - Hands on with R: Dynamic Pricing with Cheese Data

Lecture 60 - Hands on with Julia - Bayesian Logistic Regression with Horse Shoe Prior - Genetic Data Analysis

Lecture 61 - Hands on with Julia - Bayesian Poisson Regression with Horse Shoe Prior English Premier League Data

Lecture 62 - Why Julia is Future for Data Science Projects ?

Lecture 63 - Concluding Remarks

Lecture 64 - Course Review

NPTEL : NOC:Introduction to Algebraic Geometry (Mathematics)

Co-ordinators : Prof. Arijit Dey

Lecture 1 - Commutative Algebra - Part 1

Lecture 2 - Commutative Algebra - Part 2

Lecture 3 - Commutative Algebra - Part 3

Lecture 4 - Commutative Algebra - Part 4

Lecture 5 - Commutative Algebra - Part 5

Lecture 6 - Tutorial 1 : Cayley-Hamilton Theorem, Nakayama's Lemma

Lecture 7 - Commutative Algebra - Part 6

Lecture 8 - Commutative Algebra - Part 7

Lecture 9 - Commutative Algebra - Part 8

Lecture 10 - Affine Algebraic Sets - Part 1

Lecture 11 - Affine Algebraic Sets - Part 2

Lecture 12 - Tutorial 2 : Noether Normalization Lemma,Some Important Results in Dimension Theory

Lecture 13 - Regular Morphisms

Lecture 14 - Abstract Algebraic Sets

Lecture 15 - Zariski Topology on Affine Space

Lecture 16 - Irreducible Affine Algebraic Sets

Lecture 17 - Ring of Regular Functions

Lecture 18 - Projective Space

Lecture 19 - Tutorial 3 : Some Applications of Dimension Theory

Lecture 20 - Zariski Topology on Projective Space

Lecture 21 - Affine Open Cover of Projective Space

Lecture 22 - Projective and Quasi-Projective Varieties

Lecture 23 - Regular Functions on Quasi-Projective Varieties

Lecture 24 - Presheaves and Sheaves

Lecture 25 - Morphism of Presheaves/Sheaves

Lecture 26 - Tutorial 4 : More Applications of Dimension Theory

Lecture 27 - A Brief Overview of Sheaf Theory - Part 1

Lecture 28 - A Brief Overview of Sheaf Theory - Part 2

Lecture 29 - A Brief Overview of Sheaf Theory - Part 3

Lecture 30 - Prevarieties

Lecture 31 - Sheaf of Regular Functions

Lecture 32 - Ring of Germs of Regular Functions at a point, Field of Rational Functions

Lecture 33 - Tutorial 5 : Sheafification

Lecture 34 - Ring of Regular Functions, Local Ring at a Point,and Field of Rational Functions of an AffineVariety

Lecture 35 - Equivalence of Categories of the Category of Affine Varieties over a Field k and the Category

Lecture 36 - Equivalence of Categories of the Category of Affine Varieties over a Field k (Continued...)

Lecture 37 - Some Examples, Open Immersions and Closed Immersions

Lecture 38 - Product of Quasi-affine Varieties

Lecture 39 - Diagonal Morphisms, Abstract Varieties

Lecture 40 - Tutorial 6 : Normal Varieties and Normalization of a Variety

Lecture 41 - Projective Varieties Revisited - Part 1

Lecture 42 - Projective Varieties Revisited - Part 2

Lecture 43 - Global Regular Functions on ProjectiveVarieties are Constants - Part 1

Lecture 44 - Global Regular Functions on ProjectiveVarieties are Constants - Part 2

Lecture 45 - Product of Prevarieties - Part 1

Lecture 46 - Product of Prevarieties - Part 2

Lecture 47 - Tutorial 7 : A Result on Tensor Products of k-algebras

Lecture 48 - Morphisms of Prevarieties - Part 1

Lecture 49 - Morphisms of Prevarieties - Part 2

Lecture 50 - Finite Morphisms - Part 1

Lecture 51 - Finite Morphisms - Part 2

Lecture 52 - Fiber Products

Lecture 53 - Tutorial 8 : Finite Morphisms

Lecture 54 - Immersions

Lecture 55 - Fiber Products, Separatedness

Lecture 56 - Criterion of Separatedness

Lecture 57 - Proper Morphisms and Complete Varieties

Lecture 58 - Tutorial 9 : Closed Immersions and Graph of a Morphism

Lecture 59 - Projective Varieties are Complete

Lecture 60 - Zariski Tangent Space, Singular and Nonsingular Points

Lecture 61 - Smooth Points Form a Non-empty Open Subset

Lecture 62 - Blow-Ups, Rational Maps and Birational Maps

Lecture 63 - Tutorial 10 : Zariski Tangent Space at a Point of an Affine Variety

Lecture 64 - Blow-Ups (Continued...)

Lecture 65 - Smooth Morphisms

Lecture 66 - Bertini's Theorem

Lecture 67 - Sard's Theorem

Lecture 68 - Tutorial 11 : Dimension of fiber of a morphism

Lecture 69 - Introduction to Affine Schemes - Spectrum of a Ring

Lecture 70 - Introduction to Affine Schemes - Topology on Spec A

Lecture 71 - Introduction to Affine Schemes - Topology on Spec A (Continued...)

Lecture 72 - Introduction to Affine Schemes - Sheaf Structure on Spec A

Lecture 73 - Abstract Non-singular Curves - Part 1

Lecture 74 - Abstract Non-singular Curves - Part 2

Lecture 75 - Tutorial 12 : Extension of Regular Functions

NPTEL : NOC:Introduction to Statistics (Mathematics)

Co-ordinators : Prof. Sameen Naqvi

Lecture 1 - Types of variables

Lecture 2 - Types of studies

Lecture 3 - Types of sampling strategies

Lecture 4 - Python - Session 1

Lecture 5 - Python - Session 2

Lecture 6 - Summary measures of categorical and numerical variables

Lecture 7 - Measures of Dispersion

Lecture 8 - Measures of Skewness

Lecture 9 - Python - Session 3

Lecture 10 - Python - Session 4

Lecture 11 - Visualizing categorical and numerical data

Lecture 12 - Visualizing numerical data

Lecture 13 - Python - Session 5

Lecture 14 - Python - Session 6

Lecture 15 - Python - Session 7

Lecture 16 - Sampling distribution of sample mean

Lecture 17 - Central Limit Theorem

Lecture 18 - Sampling distribution of sample variance and proportion

Lecture 19 - Python - Session 8

Lecture 20 - Python - Session 9

Lecture 21 - Sampling distribution of difference of sample means - Part 1

Lecture 22 - Sampling distribution of difference of sample means - Part 2

Lecture 23 - Sampling distribution of ratio of sample variances and difference of sample proportions

Lecture 24 - Python - Session 10

Lecture 25 - Python - Session 11

Lecture 26 - Point estimation - Part 1

Lecture 27 - Point estimation - Part 2

Lecture 28 - Point estimation - Part 3

Lecture 29 - Python - Session 12

Lecture 30 - Python - Session 13

Lecture 31 - Unbiased estimation

Lecture 32 - EM algorithm - Part 1

Lecture 33 - EM algorithm - Part 2

Lecture 34 - Python - Session 14

Lecture 35 - Python - Session 15

Lecture 36 - Hypothesis Testing - Part 1

Lecture 37 - Hypothesis Testing - Part 2

Lecture 38 - Hypothesis Testing - Part 3

Lecture 39 - Python - Session 16

Lecture 40 - Python - Session 17

Lecture 41 - Hypothesis Testing for two sample problem - Part 1

Lecture 42 - Hypothesis Testing for two sample problem - Part 2

Lecture 43 - Hypothesis Testing for two sample problem - Part 3

Lecture 44 - Python - Session 18

Lecture 45 - Python - Session 19

Lecture 46 - Bootstrap Hypothesis Testing - Part 1

Lecture 47 - Python - Session 20

Lecture 48 - Python - Session 21

Lecture 49 - Bootstrap Hypothesis Testing - Part 2

Lecture 50 - Python - Session 22

Lecture 51 - Confidence Interval Estimation - Part 1

Lecture 52 - Confidence Interval Estimation - Part 2

Lecture 53 - Confidence Interval Estimation - Part 3

Lecture 54 - Python - Session 23

Lecture 55 - Python - Session 24

Lecture 56 - Confidence interval for two sample problem

Lecture 57 - Python - Session 25

Lecture 58 - Bootstrap Confidence Interval

Lecture 59 - Python - Session 26

Lecture 60 - Python - Session 27

NPTEL : NOC:Probability Theory for Data Science (Mathematics)

Co-ordinators : Prof. Ishapathik Das

Lecture 1 - Introduction

Lecture 2 - Sample Space and Events

Lecture 3 - Special Events and Various Approaches to Defining Probability

Lecture 4 - Important Theorems

Lecture 5 - Numerical Examples and Introduction to Conditional Probability

Lecture 6 - Definition of Conditional Probability and Independence

Lecture 7 - Bayes' Theorem

Lecture 8 - Random Variable

Lecture 9 - Events Defined by a Random Variable

Lecture 10 - Cumulative Distribution Function

Lecture 11 - Properties of the Cumulative Distribution Function and Discrete Random Variable

Lecture 12 - Probability Mass Function

Lecture 13 - Continuous Random Variable and Probability Density Function

Lecture 14 - Numerical Examples

Lecture 15 - Moments

Lecture 16 - Higher Order Moments and Variance of a Random Variable

Lecture 17 - Numerical Examples of Moments and Bernoulli Distribution

Lecture 18 - Binomial Distribution

Lecture 19 - Applications of Binomial Distribution

Lecture 20 - Poisson Distribution

Lecture 21 - Applications of Poisson Distribution

Lecture 22 - Numerical Examples of Poisson Distribution and Uniform Distribution

Lecture 23 - Application of Uniform Distribution and Exponential Distribution

Lecture 24 - Applications of Exponential Distribution

Lecture 25 - Memoryless Property and Gamma Distribution

Lecture 26 - Example of Gamma Distribution and Normal Distribution

Lecture 27 - Properties of Normal Distributions

Lecture 28 - Numerical Examples of Normal Distributions

Lecture 29 - Applications of Normal Distributions and Conditional Distribution Function

Lecture 30 - Examples of Conditional Distribution Function and Bivariate Random Variable

Lecture 31 - Example of Bivariate Random Variable

Lecture 32 - Properties of the Joint Cumulative Distribution Function of a Bivariate Random Variable

Lecture 33 - Independence Between Two Random Variables

Lecture 34 - Examples of Joint Cumulative Distribution Functions, Marginals, and Independence

Lecture 35 - Joint Probability Mass Function, Marginal Probability Mass Function, Examples

Lecture 36 - Numerical Examples on Bivariate Discrete Random Variables and the Concept of Joint Probability

Lecture 37 - Marginal Probability Density Function, Independence, and Examples

Lecture 38 - Numerical Examples on Probability Density Function

Lecture 39 - Conditional Probability Mass Function

Lecture 40 - Conditional Probability Density Function

Lecture 41 - Moments for Bivariate Random Variables

Lecture 42 - Association Between Two Random Variables

Lecture 43 - Numerical Examples on Moments for Bivariate Random Variables

Lecture 44 - Conditional Mean and Variance for Discrete Random Variables

Lecture 45 - Conditional Mean and Variance for Continuous Random Variables

Lecture 46 - Numerical Examples on Conditional Mean and Variance

Lecture 47 - Multivariate Random Variables

Lecture 48 - Multivariate Probability Density Function and Independence

Lecture 49 - Moments of a Multivariate Random Variable

Lecture 50 - Numerical Examples on Joint Probability Mass Functions

Lecture 51 - Numerical Examples on Joint Probability Density Functions

Lecture 52 - Multinomial Distribution and Multivariate Normal Distribution

Lecture 53 - Transformation of Random Variables

Lecture 54 - Theorem on Transformation of Random Variables

Lecture 55 - Transformation of Multivariate Random Variables

Lecture 56 - Examples of Transformation of Bivariate Random Variables

Lecture 57 - Convolution and Example on Transformation of n-variate Random Variables

Lecture 58 - Transformation of Discrete Random Variables

Lecture 59 - Moment Generating Functions

Lecture 60 - Example of Moment Generating Functions

Lecture 61 - Moment Generating Functions for the Transformation of Random Variables

Lecture 62 - Chebyshev's Inequality

Lecture 63 - Notions of Convergence, Law of Large Numbers, and the Central Limit Theorem

NPTEL : Discrete Mathematics (Mathematics)

Co-ordinators : Dr. Aditi Gangopadhyay, Dr. Sugata Gangopadhyay, Dr. Tanuja Srivastava

Lecture 1 - Introduction to the theory of sets

Lecture 2 - Set operation and laws of set operation

Lecture 3 - The principle of inclusion and exclusion

Lecture 4 - Application of the principle of inclusion and exclusion

Lecture 5 - Fundamentals of logic

Lecture 6 - Logical Inferences

Lecture 7 - Methods of proof of an implication

Lecture 8 - First order logic (1)

Lecture 9 - First order logic (2)

Lecture 10 - Rules of influence for quantified propositions

Lecture 11 - Mathematical Induction (1)

Lecture 12 - Mathematical Induction (2)

Lecture 13 - Sample space, events

Lecture 14 - Probability, conditional probability

Lecture 15 - Independent events, Bayes theorem

Lecture 16 - Information and mutual information

Lecture 17 - Basic definition

Lecture 18 - Isomorphism and sub graphs

Lecture 19 - Walks, paths and circuits operations on graphs

Lecture 20 - Euler graphs, Hamiltonian circuits

Lecture 21 - Shortest path problem

Lecture 22 - Planar graphs

Lecture 23 - Basic definition

Lecture 24 - Properties of relations

Lecture 25 - Graph of relations

Lecture 26 - Matrix of relation

Lecture 27 - Closure of relaton (1)

Lecture 28 - Closure of relaton (2)

Lecture 29 - Warshall's algorithm

Lecture 30 - Partially ordered relation

Lecture 31 - Partially ordered sets

Lecture 32 - Lattices

Lecture 33 - Boolean algebra

Lecture 34 - Boolean function (1)

Lecture 35 - Boolean function (2)

Lecture 36 - Discrete numeric function

Lecture 37 - Generating function

Lecture 38 - Introduction to recurrence relations

Lecture 39 - Second order recurrence relation with constant coefficients (1)

Lecture 40 - Second order recurrence relation with constant coefficients (2)

Lecture 41 - Application of recurrence relation

NPTEL : NOC:Mathematical Methods and its Applications (Mathematics)

Co-ordinators : Prof. P.N. Agarwal, S. K. Gupta

Lecture 1 - Introduction to linear differential equations

Lecture 2 - Linear dependence, independence and Wronskian of functions

Lecture 3 - Solution of second-order homogenous linear differential equations with constant coefficients - I

Lecture 4 - Solution of second-order homogenous linear differential equations with constant coefficients - II

Lecture 5 - Method of undetermined coefficients

Lecture 6 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients - I

Lecture 7 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients - II

Lecture 8 - Methods for finding Particular Integral for second-order linear differential equations with constant coefficients - III

Lecture 9 - Euler-Cauchy equations

Lecture 10 - Method of reduction for second-order linear differential equations

Lecture 11 - Method of variation of parameters

Lecture 12 - Solution of second order differential equations by changing dependent variable

Lecture 13 - Solution of second order differential equations by changing independent variable

Lecture 14 - Solution of higher-order homogenous linear differential equations with constant coefficients

Lecture 15 - Methods for finding Particular Integral for higher-order linear differential equations

Lecture 16 - Formulation of Partial differential equations

Lecture 17 - Solution of LagrangeÂ’s equation - I

Lecture 18 - Solution of LagrangeÂ’s equation - II

Lecture 19 - Solution of first order nonlinear equations - I

Lecture 20 - Solution of first order nonlinear equations - II

Lecture 21 - Solution of first order nonlinear equations - III

Lecture 22 - Solution of first order nonlinear equations - IV

Lecture 23 - Introduction to Laplace transforms

Lecture 24 - Laplace transforms of some standard functions

Lecture 25 - Existence theorem for Laplace transforms

Lecture 26 - Properties of Laplace transforms - I

Lecture 27 - Properties of Laplace transforms - II

Lecture 28 - Properties of Laplace transforms - III

Lecture 29 - Properties of Laplace transforms - IV

Lecture 30 - Convolution theorem for Laplace transforms - I

Lecture 31 - Convolution theorem for Laplace transforms - II

Lecture 32 - Initial and final value theorems for Laplace transforms

Lecture 33 - Laplace transforms of periodic functions

Lecture 34 - Laplace transforms of Heaviside unit step function

Lecture 35 - Laplace transforms of Dirac delta function

Lecture 36 - Applications of Laplace transforms - I

Lecture 37 - Applications of Laplace transforms - II

Lecture 38 - Applications of Laplace transforms - III

Lecture 39 - ZÂ–transform and inverse Z-transform of elementary functions

Lecture 40 - Properties of Z-transforms - I

Lecture 41 - Properties of Z-transforms - II

Lecture 42 - Initial and final value theorem for Z-transforms

Lecture 43 - Convolution theorem for Z-transforms

Lecture 44 - Applications of Z-transforms - I

Lecture 45 - Applications of Z-transforms - II

Lecture 46 - Applications of Z-transforms - III

Lecture 47 - Fourier series and its convergence - I

Lecture 48 - Fourier series and its convergence - II

Lecture 49 - Fourier series of even and odd functions

Lecture 50 - Fourier half-range series

Lecture 51 - ParsevelÂ's Identity

Lecture 52 - Complex form of Fourier series

Lecture 53 - Fourier integrals

Lecture 54 - Fourier sine and cosine integrals

Lecture 55 - Fourier transforms

Lecture 56 - Fourier sine and cosine transforms

Lecture 57 - Convolution theorem for Fourier transforms

Lecture 58 - Applications of Fourier transforms to BVP - I

Lecture 59 - Applications of Fourier transforms to BVP - II

Lecture 60 - Applications of Fourier transforms to BVP - III

NPTEL : NOC:Integral Equations, Calculus of Variations and its Applications (Mathematics)

Co-ordinators : Prof.D. N Pandey, Prof. P.N. Agarwal

Lecture 1 - Definition and classification of linear integral equations

Lecture 2 - Conversion of IVP into integral equations

Lecture 3 - Conversion of BVP into an integral equations

Lecture 4 - Conversion of integral equations into differential equations

Lecture 5 - Integro-differential equations

Lecture 6 - Fredholm integral equation with separable kernel: Theory

Lecture 7 - Fredholm integral equation with separable kernel: Examples

Lecture 8 - Solution of integral equations by successive substitutions

Lecture 9 - Solution of integral equations by successive approximations

Lecture 10 - Solution of integral equations by successive approximations: Resolvent kernel

Lecture 11 - Fredholm integral equations with symmetric kernels: Properties of eigenvalues and eigenfunctions

Lecture 12 - Fredholm integral equations with symmetric kernels: Hilbert Schmidt theory

Lecture 13 - Fredholm integral equations with symmetric kernels: Examples

Lecture 14 - Construction of Green function - I

Lecture 15 - Construction of Green function - II

Lecture 16 - Green function for self adjoint linear differential equations

Lecture 17 - Green function for non-homogeneous boundary value problem

Lecture 18 - Fredholm alternative theorem - I

Lecture 19 - Fredholm alternative theorem - II

Lecture 20 - Fredholm method of solutions

Lecture 21 - Classical Fredholm theory: Fredholm first theorem - I

Lecture 22 - Classical Fredholm theory: Fredholm first theorem - II

Lecture 23 - Classical Fredholm theory: Fredholm second theorem and third theorem

Lecture 24 - Method of successive approximations

Lecture 25 - Neumann series and resolvent kernels - I

Lecture 26 - Neumann series and resolvent kernels - II

Lecture 27 - Equations with convolution type kernels - I

Lecture 28 - Equations with convolution type kernels - II

Lecture 29 - Singular integral equations - I

Lecture 30 - Singular integral equations - II

Lecture 31 - Cauchy type integral equations - I

Lecture 32 - Cauchy type integral equations - II

Lecture 33 - Cauchy type integral equations - III

Lecture 34 - Cauchy type integral equations - IV

Lecture 35 - Cauchy type integral equations - V

Lecture 36 - Solution of integral equations using Fourier transform

Lecture 37 - Solution of integral equations using Hilbert transform - I

Lecture 38 - Solution of integral equations using Hilbert transform - II

Lecture 39 - Calculus of variations: Introduction

Lecture 40 - Calculus of variations: Basic concepts - I

Lecture 41 - Calculus of variations: Basic concepts - II

Lecture 42 - Calculus of variations: Basic concepts and Euler equation

Lecture 43 - Euler equation: Some particular cases

Lecture 44 - Euler equation : A particular case and Geodesics

Lecture 45 - Brachistochrone problem and Euler equation - I

Lecture 46 - Euler's equation - II

Lecture 47 - Functions of several independent variables

Lecture 48 - Variational problems in parametric form

Lecture 49 - Variational problems of general type

Lecture 50 - Variational derivative and invariance of Euler's equation

Lecture 51 - Invariance of Euler's equation and isoperimetric problem - I

Lecture 52 - Isoperimetric problem - II

Lecture 53 - Variational problem involving a conditional extremum - I

Lecture 54 - Variational problem involving a conditional extremum - II

Lecture 55 - Variational problems with moving boundaries - I

Lecture 56 - Variational problems with moving boundaries - II

Lecture 57 - Variational problems with moving boundaries - III

Lecture 58 - Variational problems with moving boundaries; One sided variation

Lecture 59 - Variational problem with a movable boundary for a functional dependent on two functions

Lecture 60 - Hamilton's principle: Variational principle of least action

NPTEL : NOC:Nonlinear Programming (Mathematics)

Co-ordinators : S. K. Gupta

Lecture 1 - Convex Sets and Functions

Lecture 2 - Properties of Convex Functions - I

Lecture 3 - Properties of Convex Functions - II

Lecture 4 - Properties of Convex Functions- III

Lecture 5 - Convex Programming Problems

Lecture 6 - KKT optimality conditions

Lecture 7 - Quadratic Programming Problems - I

Lecture 8 - Quadratic Programming Problems - II

Lecture 9 - Separable Programming - I

Lecture 10 - Separable Programming - II

Lecture 11 - Geometric Programming - I

Lecture 12 - Geometric Programming - II

Lecture 13 - Geometric Programming - III

Lecture 14 - Dynamic Programming - I

Lecture 15 - Dynamic Programming - II

Lecture 16 - Dynamic programming approach to find shortest path in any network

Lecture 17 - Dynamic Programming - IV

Lecture 18 - Search Techniques - I

Lecture 19 - Search Techniques - II

Lecture 20 - Search Techniques - III

NPTEL : NOC:Numerical Methods (Mathematics)

Co-ordinators : Prof. Sanjeev Kumar, Prof. Ameeya Kumar Nayak

Lecture 1 - Introduction to error analysis and linear systems

Lecture 2 - Gaussian elimination with Partial pivoting

Lecture 3 - LU decomposition

Lecture 4 - Jacobi and Gauss Seidel methods

Lecture 5 - Iterative methods-II

Lecture 6 - Introduction to Non-linear equations and Bisection method

Lecture 7 - Regula Falsi and Secant methods

Lecture 8 - Newton-Raphson method

Lecture 9 - Fixed point iteration method

Lecture 10 - System of Nonlinear equations

Lecture 11 - Introduction to Eigenvalues and Eigenvectors

Lecture 12 - Similarity Transformations and Gershgorin Theorem

Lecture 13 - Jacobi's Method for Computing Eigenvalues

Lecture 14 - Power Method

Lecture 15 - Inverse Power Method

Lecture 16 - Interpolation - Part I (Introduction to Interpolation)

Lecture 17 - Interpolation - Part II (Some basic operators and their properties)

Lecture 18 - Interpolation - Part III (Newtonâ€™s Forward/ Backward difference and derivation of general error)

Lecture 19 - Interpolation - Part IV (Error in approximating a function by a polynomial using Newtonâ€™s Forward and Backward difference formula)

Lecture 20 - Interpolation - Part V (Solving problems using Newton's Forward and Backward difference formula)

Lecture 21 - Interpolation - Part VI (Central difference formula)

Lecture 22 - Interpolation - Part VII (Lagrange interpolation formula with examples)

Lecture 23 - Interpolation - Part VIII (Divided difference interpolation with examples)

Lecture 24 - Interpolation - Part IX (Hermite's interpolation with examples)

Lecture 25 - Numerical differentiation - Part I (Introduction to numerical differentiation by interpolation formula)

Lecture 26 - Numerical differentiation - Part II (Numerical differentiation based on Lagrangeâ€™s interpolation with examples)

Lecture 27 - Numerical differentiation - Part III (Numerical differentiation based on Divided difference formula with examples)

Lecture 28 - Numerical differentiation - Part IV (Maxima and minima of a tabulated function and differentiation errors)

Lecture 29 - Numerical differentiation - Part V (Differentiation based on finite difference operators)

Lecture 30 - Numerical differentiation - Part VI (Method of undetermined coefficients and Derivatives with unequal intervals)

Lecture 31 - Numerical Integration - Part I (Methodology of Numerical Integration and Rectangular rule)

Lecture 32 - Numerical Integration - Part II (Quadrature formula and Trapezoidal rule with associated errors)merical Integration Part-I (Methodology of Numerical Integration and Rectangular rule)

Lecture 33 - Numerical Integration - Part III (Simpsons 1/3rd rule with associated errors)

Lecture 34 - Numerical Integration - Part IV (Composite Simpsons 1/3rd rule and Simpsons 3/8th rule with examples)

Lecture 35 - Numerical Integration - Part V (Gauss Legendre 2-point and 3-point formula with examples)

Lecture 36 - Introduction to Ordinary Differential equations

Lecture 37 - Numerical methods for ODE-1

Lecture 38 - Numerical Methods - II

Lecture 39 - R-K Methods for solving ODEs

Lecture 40 - Multi-step Method for solving ODEs

NPTEL : NOC:Numerical Linear Algebra (Mathematics)

Co-ordinators : Prof.D. N Pandey, Prof. P.N. Agrawal

Lecture 1 - Matrix Operations and Types of Matrices

Lecture 2 - Determinant of a Matrix

Lecture 3 - Rank of a Matrix

Lecture 4 - Vector Space - I

Lecture 5 - Vector Space - II

Lecture 6 - Linear dependence and independence

Lecture 7 - Bases and Dimension - I

Lecture 8 - Bases and Dimension - II

Lecture 9 - Linear Transformation - I

Lecture 10 - Linear Transformation - II

Lecture 11 - Orthogonal Subspaces

Lecture 12 - Row Space, Column Space and Null Space

Lecture 13 - Eigen Values and Eigen Vectors - I

Lecture 14 - Eigen Values and Eigen Vectors - II

Lecture 15 - Diagonalizable Matrices

Lecture 16 - Orthogonal Sets

Lecture 17 - Gram Schmidt ortthogonalization and orthogonal bases

Lecture 18 - Introduction to Matlab

Lecture 19 - Sign Integer Representation

Lecture 20 - Computer Representation of Numbers

Lecture 21 - Floating Point Representation

Lecture 22 - Round-off Error

Lecture 23 - Error Propagation in Computer Arithmetic

Lecture 24 - Addition and Multiplication of Floating Point Numbers

Lecture 25 - Conditioning and Condition Numbers - I

Lecture 26 - Conditioning and Condition Numbers - II

Lecture 27 - Stability of Numerical Algorithms - I

Lecture 28 - Stability of Numerical Algorithms - II

Lecture 29 - Vector Norms - I

Lecture 30 - Vector Norms - II

Lecture 31 - Matrix Norms - I

Lecture 32 - Matrix Norms - II

Lecture 33 - Convergent Matrices - I

Lecture 34 - Convergent Matrices - II

Lecture 35 - Stability of non linear system

Lecture 36 - Condition number of a matrix: Elementary Properties

Lecture 37 - Sensitivity Analysis - I

Lecture 38 - Sensitivity Analysis - II

Lecture 39 - Residual Theorem

Lecture 40 - Nearness to Singularity

Lecture 41 - Estimation of the Condition Number

Lecture 42 - Singular value decomposition of a matrix - I

Lecture 43 - Singular value decomposition of a matrix - II

Lecture 44 - Orthonormal Projections

Lecture 45 - Algebraic and geometric properties of SVD

Lecture 46 - SVD and their applications

Lecture 47 - Perturbation theorem for singular values

Lecture 48 - Outer product expansion of a matrix

Lecture 49 - Least square solutions - I

Lecture 50 - Least square solutions - II

Lecture 51 - Householder matrices

Lecture 52 - Householder matrices and their applications

Lecture 53 - Householder QR factorization - I

Lecture 54 - Householder QR factorization - II

Lecture 55 - Basic theorems on eigenvalues and QR method

Lecture 56 - Power Method

Lecture 57 - Rate of Convergence of Power Method

Lecture 58 - Applications of Power Method with Shift

Lecture 59 - Jacobi Method - I

Lecture 60 - Jacobi Method - II

NPTEL : NOC:Numerical Methods - Finite Difference Approach (Mathematics)

Co-ordinators : Prof. Ameeya Kumar Nayak

Lecture 1 - Introduction to Numerical solutions

Lecture 2 - Numerical Solution of ODE

Lecture 3 - Numerical solution of PDE

Lecture 4 - Finite difference approximation

Lecture 5 - Polynomial fitting and one-sided approximation

Lecture 6 - Solution of parabolic equation

Lecture 7 - Implicit and C-N scheme for solving 1D parabolic equation

Lecture 8 - Stability analysis of Explicit scheme for solving parabolic equation

Lecture 9 - Stability of Crank-Nicoloson's scheme

Lecture 10 - Approximation of derivative boundary conditions

Lecture 11 - Solution of two-dimensional parabolic equation

Lecture 12 - Solution of 2D parabolic equation using ADI scheme

Lecture 13 - Solution of Elliptic Equation

Lecture 14 - Solution of Elliptic equation using SOR method

Lecture 15 - Solution of Elliptic equation using ADI scheme

Lecture 16 - Solution of Hyperbolic equation

Lecture 17 - Stability analysis for Hyperbolic equations

Lecture 18 - Characteristics of PDE

Lecture 19 - Lax-Wendroff's method

Lecture 20 - Wendroff's method

NPTEL : NOC:Multivariable Calculus (Mathematics)

Co-ordinators : Dr. Sanjeev Kumar, S. K. Gupta

Lecture 1 - Functions of several variables

Lecture 2 - Limits for multivariable functions - I

Lecture 3 - Limits for multivariable functions - II

Lecture 4 - Continuity of multivariable functions

Lecture 5 - Partial Derivatives - I

Lecture 6 - Partial Derivatives - II

Lecture 7 - Differentiability - I

Lecture 8 - Differentiability - II

Lecture 9 - Chain rule - I

Lecture 10 - Chain rule - II

Lecture 11 - Change of variables

Lecture 12 - Eulerâ€™s theorem for homogeneous functions

Lecture 13 - Tangent planes and Normal lines

Lecture 14 - Extreme values - I

Lecture 15 - Extreme values - II

Lecture 16 - Lagrange multipliers

Lecture 17 - Taylorâ€™s theorem

Lecture 18 - Error approximation

Lecture 19 - Polar-curves

Lecture 20 - Multiple Integrals

Lecture 21 - Change Of Order Of Integration

Lecture 22 - Change of Variables in Multiple Integral

Lecture 23 - Introduction to Gamma Function

Lecture 24 - Introduction to Beta Function

Lecture 25 - Properties of Beta and Gamma Functions - I

Lecture 26 - Properties of Beta and Gamma Functions - II

Lecture 27 - Dirichlet's Integral

Lecture 28 - Applications of Multiple Integrals

Lecture 29 - Vector Differentiation

Lecture 30 - Gradient of a Scalar Field and Directional Derivative

Lecture 31 - Normal Vector and Potential field

Lecture 32 - Gradient (Identities), Divergence and Curl (Identities)

Lecture 33 - Some Identities on Divergence and Curl

Lecture 34 - Line Integral (I)

Lecture 35 - Applications of Line Integrals

Lecture 36 - Green's Theorem

Lecture 37 - Surface Area

Lecture 38 - Surface Integral

Lecture 39 - Divergence Theorem of Gauss

Lecture 40 - Stoke's Theorem

NPTEL : NOC:Ordinary and Partial Differential Equations and Applications (Mathematics)

Co-ordinators : Prof.D. N Pandey, Prof. P.N. Agrawal

Lecture 1 - Introduction to differential equations - I

Lecture 2 - Introduction to differential equations - II

Lecture 3 - Existence and uniqueness of solutions of differential equations - I

Lecture 4 - Existence and uniqueness of solutions of differential equations - II

Lecture 5 - Existence and uniqueness of solutions of differential equations - III

Lecture 6 - Existence and uniqueness of solutions of a system of differential equations

Lecture 7 - Linear System

Lecture 8 - Properties of Homogeneous Systems

Lecture 9 - Solution of Homogeneous Linear System with Constant Coefficients - I

Lecture 10 - Solution of Homogeneous Linear System with Constant Coefficients - II

Lecture 11 - Solution of Homogeneous Linear System with Constant Coefficients - III

Lecture 12 - Solution of Non-Homogeneous Linear System with Constant Coefficients

Lecture 13 - Power Series

Lecture 14 - Uniform Convergence of Power Series

Lecture 15 - Power Series Solution of Second Order Homogeneous Equations

Lecture 16 - Regular singular points - I

Lecture 17 - Regular singular points - II

Lecture 18 - Regular singular points - III

Lecture 19 - Regular singular points - IV

Lecture 20 - Regular singular points - V

Lecture 21 - Critical points

Lecture 22 - Stability of Linear Systems - I

Lecture 23 - Stability of Linear Systems - II

Lecture 24 - Stability of Linear Systems - III

Lecture 25 - Critical Points and Paths of Non-linear Systems

Lecture 26 - Boundary value problems for second order differential equations

Lecture 27 - Self - adjoint Forms

Lecture 28 - Sturm - Liouville problem and its properties

Lecture 29 - Sturm - Liouville problem and its applications

Lecture 30 - Greenâ€™s function and its applications - I

Lecture 31 - Greenâ€™s function and its applications - II

Lecture 32 - Origins and Classification of First Order PDE

Lecture 33 - Initial Value Problem for Quasi-linear First Order Equations

Lecture 34 - Existence and Uniqueness of Solutions

Lecture 35 - Surfaces orthogonal to a given system of surfaces

Lecture 36 - Nonlinear PDE of first order

Lecture 37 - Cauchy method of characteristics - I

Lecture 38 - Cauchy method of characteristics - II

Lecture 39 - Compatible systems of first order equations

Lecture 40 - Charpitâ€™s method - I

Lecture 41 - Charpitâ€™s method - II

Lecture 42 - Second Order PDE with Variable Coefficients

Lecture 43 - Classification and Canonical Form of Second Order PDE - I

Lecture 44 - Classification and Canonical Form of Second Order PDE - II

Lecture 45 - Classification and Characteristic Curves of Second Order PDEs

Lecture 46 - Review of Integral Transforms - I

Lecture 47 - Review of Integral Transforms - II

Lecture 48 - Review of Integral Transforms - II

Lecture 49 - Review of Integral Transforms - III

Lecture 50 - Laplace Equation - I

Lecture 51 - Laplace Equation - II

Lecture 52 - Laplace and Poisson Equations

Lecture 53 - One dimensional wave equation and its solution - I

Lecture 54 - One dimensional wave equation and its solution - II

Lecture 55 - One dimensional wave equation and its solution - III

Lecture 56 - Two dimensional wave equation and its solution - I

Lecture 57 - Solution of non-homogeneous wave equation

Lecture 58 - Solution of homogeneous diffusion equation - I

Lecture 59 - Solution of homogeneous diffusion equation - II

Lecture 60 - Duhamelâ€™s principle

NPTEL : NOC:Matrix Analysis with Applications (Mathematics)

Co-ordinators : Dr. Sanjeev Kumar, S. K. Gupta

Lecture 1 - Elementary row operations

Lecture 2 - Echelon form of a matrix

Lecture 3 - Rank of a matrix

Lecture 4 - System of Linear Equations - I

Lecture 5 - System of Linear Equations - II

Lecture 6 - Introduction to Vector Spaces

Lecture 7 - Subspaces

Lecture 8 - Basis and Dimension

Lecture 9 - Linear Transformations

Lecture 10 - Rank and Nullity

Lecture 11 - Inverse of a Linear Transformation

Lecture 12 - Matrix Associated with a LT

Lecture 13 - Eigenvalues and Eigenvectors

Lecture 14 - Cayley-Hamilton Theorem and Minimal Polynomial

Lecture 15 - Diagonalization

Lecture 16 - Special Matrices

Lecture 17 - More on Special Matrices and Gerschgorin Theorem

Lecture 18 - Inner Product Spaces

Lecture 19 - Vector and Matrix Norms

Lecture 20 - Gram Schmidt Process

Lecture 21 - Normal Matrices

Lecture 22 - Positive Definite Matrices

Lecture 23 - Positive Definite and Quadratic Forms

Lecture 24 - Gram Matrix and Minimization of Quadratic Forms

Lecture 25 - Generalized Eigenvectors and Jordan Canonical Form

Lecture 26 - Evaluation of Matrix Functions

Lecture 27 - Least Square Approximation

Lecture 28 - Singular Value Decomposition

Lecture 29 - Pseudo-Inverse and SVD

Lecture 30 - Introduction to Ill-Conditioned Systems

Lecture 31 - Regularization of Ill-Conditioned Systems

Lecture 32 - Linear Systems: Iterative Methods - I

Lecture 33 - Linear Systems: Iterative Methods - II

Lecture 34 - Non-Stationary Iterative Methods: Steepest Descent - I

Lecture 35 - Non-Stationary Iterative Methods: Steepest Descent - II

Lecture 36 - Krylov Subspace Iterative Methods (Conjugate Gradient Method)

Lecture 37 - Krylov Subspace Iterative Methods (CG and Pre-Conditioning)

Lecture 38 - Introduction to Positive Matrices

Lecture 39 - Positive Matrices, Positive Eigenpair, Perron Root and vector, Example

Lecture 40 - Polar Decomposition

NPTEL : NOC:Mathematical Modelling: Analysis and Applications (Mathematics)

Co-ordinators : Prof. Ameeya Kumar Nayak

Lecture 1 - Introduction to Mathematical Modeling

Lecture 2 - Discrete Time Linear Models in Population Dynamics - I

Lecture 3 - Discrete Time Linear Models in Population Dynamics - II

Lecture 4 - Discrete Time Linear Age Structured Models

Lecture 5 - Numerical Methods to Compute Eigen Values

Lecture 6 - Discrete Time Non-Linear Models in Population Dynamics - II

Lecture 7 - Analysis on Logistic Difference Equation

Lecture 8 - Classifications of Bifurcation

Lecture 9 - Discrete Time Non - Linear Models in Population Dynamics - II

Lecture 10 - Discrete Time Prey - Predator Model

Lecture 11 - Introduction to Continuous Time Models

Lecture 12 - Solution of First Order First Degree Differential Equations

Lecture 13 - Continuous Time Models in Population Dynamics - I

Lecture 14 - Continuous Time Models in Population Dynamics - II

Lecture 15 - Stability and Linearization of System of Ordinary Differential Equations

Lecture 16 - Continuous Time Single Species Models

Lecture 17 - Qualitative Solution of Differential Equations - Phase Diagrams - I

Lecture 18 - Qualitative Solution of Differential Equations - Phase Diagrams - II

Lecture 19 - Continuous Time Lotka - Volterra Competition Model

Lecture 20 - Continuous Time Prey - Predator Model

NPTEL : NOC:Dynamical System and Control (Mathematics)

Co-ordinators : Prof.D. N Pandey, Dr. N. Sukavanam

Lecture 1 - Formulation of Dynamical Systems - I

Lecture 2 - Formulation of Dynamical Systems - II

Lecture 3 - Existence and Uniqueness Theorem - I

Lecture 4 - Existence and Uniqueness Theorem - II

Lecture 5 - Linear Systems - I

Lecture 6 - Linear Systems - II

Lecture 7 - Solutions of Linear Systems - I

Lecture 8 - Solutions of Linear Systems - II

Lecture 9 - Solutions of Linear Systems - III

Lecture 10 - Fundamental Matrix - I

Lecture 11 - Fundamental Matrix - II

Lecture 12 - Fundamental Matrix for Non-Autonomous systems

Lecture 13 - Solutions of Non-Homogeneous Systems

Lecture 14 - Stability of Systems: Equilibrium Points

Lecture 15 - Stability of Linear Autonomous Systems - I

Lecture 16 - Stability of Linear Autonomous Systems - II

Lecture 17 - Stability of Linear Autonomous Systems - III

Lecture 18 - Stability of Weakly Non-Linear Systems - I

Lecture 19 - Stability of Weakly Non-Linear Systems - II

Lecture 20 - Stability of Non-Linear Systems using Linearization

Lecture 21 - Properties of Phase Portrait

Lecture 22 - Properties of Orbits

Lecture 23 - Phase Portrait: Types of Critical Points

Lecture 24 - Phase Portrait of Linear Differential Equations - I

Lecture 25 - Phase Portrait of Linear Differential Equations - II

Lecture 26 - Phase Portrait of Linear Differential Equations - III

Lecture 27 - Poincare Bendixson Theorem

Lecture 28 - Limit Cycle

Lecture 29 - Lyapunov Stability - I

Lecture 30 - Lyapunov Stability - II

Lecture 31 - Introduction to Control Systems - I

Lecture 32 - Introduction to Control Systems - II

Lecture 33 - Controllability of Autonomous Systems

Lecture 34 - Controllability of Non-autonomous Systems

Lecture 35 - Observability - I

Lecture 36 - Observability - II

Lecture 37 - Results on Controllability and Observability

Lecture 38 - Companion Form

Lecture 39 - Feedback Control - I

Lecture 40 - Feedback Control - II

Lecture 41 - Feedback Control - III

Lecture 42 - Feedback Control - IV

Lecture 43 - State Observer

Lecture 44 - Stabilizability

Lecture 45 - Introduction to Discrete Systems - I

Lecture 46 - Introduction to Discrete Systems - II

Lecture 47 - Lyapunov Stability Theory - I

Lecture 48 - Lyapunov Stability Theory - II

Lecture 49 - Lyapunov Stability Theory - III

Lecture 50 - Optimal Control - I

Lecture 51 - Optimal Control - II

Lecture 52 - Optimal Control - III

Lecture 53 - Optimal Control - IV

Lecture 54 - Optimal Control for Discrete Systems - I

Lecture 55 - Optimal Control for Discrete Systems - II

Lecture 56 - Controllability of Discrete Systems

Lecture 57 - Observability of Discrete Systems

Lecture 58 - Stability for Discrete Systems

Lecture 59 - Relation between Continuous and Discrete Systems - I

Lecture 60 - Relation between Continuous and Discrete Systems - II

NPTEL : NOC:Advanced Engineering Mathematics (Mathematics)

Co-ordinators : Prof. P.N. Agarwal

Lecture 1 - Analytic Function

Lecture 2 - Cauchy-Riemann Equations

Lecture 3 - Harmonic Functions, Harmonic Conjugates and Milne's Method

Lecture 4 - Applications to the Problems of Potential Flow - I

Lecture 5 - Applications to the Problems of Potential Flow - II

Lecture 6 - Complex Integration

Lecture 7 - Cauchy's Theorem - I

Lecture 8 - Cauchy's Theorem - II

Lecture 9 - Cauchy's Integral Formula for the Derivatives of Analytic Function

Lecture 10 - Morera's Theorem, Liouville's Theorem and Fundamental Theorem of Algebra

Lecture 11 - Winding Number and Maximum Modulus Principle

Lecture 12 - Sequences and Series

Lecture 13 - Uniform Convergence of Series

Lecture 14 - Power Series

Lecture 15 - Taylor Series

Lecture 16 - Laurent Series

Lecture 17 - Zeros and Singularities of an Analytic Function

Lecture 18 - Residue at a Singularity

Lecture 19 - Residue Theorem

Lecture 20 - Meromorphic Functions

Lecture 21 - Evaluation of real integrals using residues - I

Lecture 22 - Evaluation of real integrals using residues - II

Lecture 23 - Evaluation of real integrals using residues - III

Lecture 24 - Evaluation of real integrals using residues - IV

Lecture 25 - Evaluation of real integrals using residues - V

Lecture 26 - Bilinear Transformations

Lecture 27 - Cross Ratio

Lecture 28 - Conformal Mapping - I

Lecture 29 - Conformal Mapping - II

Lecture 30 - Conformal mapping from half plane to disk and half plane to half plane - I

Lecture 31 - Conformal mapping from disk to disk and angular region to disk

Lecture 32 - Application of Conformal Mapping to Potential Theory

Lecture 33 - Review of Z-transforms - I

Lecture 34 - Review of Z-transforms - II

Lecture 35 - Review of Z-transforms - III

Lecture 36 - Review of Bilateral Z-transforms

Lecture 37 - Finite Fourier Transforms

Lecture 38 - Fourier Integral and Fourier Transforms

Lecture 39 - Fourier Series

Lecture 40 - Discrete Fourier Transforms - I

Lecture 41 - Discrete Fourier Transforms - II

Lecture 42 - Basic Concepts of Probability

Lecture 43 - Conditional Probability

Lecture 44 - Bayes Theorem and Probability Networks

Lecture 45 - Discrete Probability Distribution

Lecture 46 - Binomial Distribution

Lecture 47 - Negative Binomial Distribution and Poisson Distribution

Lecture 48 - Continuous Probability Distribution

Lecture 49 - Poisson Process

Lecture 50 - Exponential Distribution

Lecture 51 - Normal Distribution

Lecture 52 - Joint Probability Distribution - I

Lecture 53 - Joint Probability Distribution - II

Lecture 54 - Joint Probability Distribution - III

Lecture 55 - Correlation and Regression - I

Lecture 56 - Correlation and Regression - II

Lecture 57 - Testing of Hypotheses - I

Lecture 58 - Testing of Hypotheses - II

Lecture 59 - Testing of Hypotheses - III

Lecture 60 - Application to Queuing Theory and Reliability Theory

NPTEL : NOC:Higher Engineering Mathematics (Mathematics)

Co-ordinators : Prof. P.N. Agarwal

Lecture 1 - Symbolic Representation of Statements - I

Lecture 2 - Symbolic Representation of Statements - II

Lecture 3 - Tautologies and Contradictions

Lecture 4 - Predicates and Quantifires - I

Lecture 5 - Predicates and Quantifiers - II

Lecture 6 - Validity of Arguments

Lecture 7 - Language and Grammers - I

Lecture 8 - Language and Grammers - II

Lecture 9 - Language and Grammers - III

Lecture 10 - Finite- State Machines

Lecture 11 - Partially Ordered Sets - I

Lecture 12 - Partially Ordered Sets - II

Lecture 13 - Partially Ordered Sets - III

Lecture 14 - Lattices - I

Lecture 15 - Lattices - II

Lecture 16 - Lattices - III

Lecture 17 - Lattices - IV

Lecture 18 - Lattices - V

Lecture 19 - Boolean Algebra - I

Lecture 20 - Boolean Algebra - II

Lecture 21 - Boolean Algebra - III

Lecture 22 - Boolean Algebra - IV

Lecture 23 - Logic Gates

Lecture 24 - Karnaugh Map - I

Lecture 25 - Karnaugh Map - II

Lecture 26 - Various type of Graphs - I

Lecture 27 - Various types of Graphs - II

Lecture 28 - Paths and Connectivity

Lecture 29 - Subgraphs and Traversable Multigraphs

Lecture 30 - Undirected and Directed Graphs

Lecture 31 - Eulerian and Hamiltonian Graphs

Lecture 32 - Planar Graphs

Lecture 33 - Representation of Graphs

Lecture 34 - Isomorphic and Homeomorphic Graphs

Lecture 35 - Kuratowski's Theorem

Lecture 36 - Dual of a Graph

Lecture 37 - Coloring of Graphs - I

Lecture 38 - Coloring of Graphs - II

Lecture 39 - Tree - I

Lecture 40 - Tree - II

Lecture 41 - Graphical Method - I

Lecture 42 - Graphical Method - II

Lecture 43 - General Linear Programming Problem

Lecture 44 - Simplex Method - I

Lecture 45 - Simplex Method - II

Lecture 46 - Big - M Method - I

Lecture 47 - Big - M Method - II (Special Cases)

Lecture 48 - Two Phase Method - I

Lecture 49 - Two Phase method - II

Lecture 50 - Duality - I

Lecture 51 - Duality - II

Lecture 52 - Dual Simplex Method

Lecture 53 - Transportation Problem - I

Lecture 54 - Transportation Problem - II

Lecture 55 - Assignment Problem - I

Lecture 56 - Assignment Problem - II

NPTEL : NOC:Operations Research (Mathematics)

Co-ordinators : Prof. Kusumdeep

Lecture 1 - Introduction to OR Models

Lecture 2 - More OR Models

Lecture 3 - Graphical Method for LPP

Lecture 4 - Convex sets

Lecture 5 - Simplex Method

Lecture 6 - Big M Method

Lecture 7 - Two Phase

Lecture 8 - Multiple solutions of LPP

Lecture 9 - Unbounded solution of LPP

Lecture 10 - Infeasible solution of LPP

Lecture 11 - Revised Simplex Method

Lecture 12 - Case studies and Exercises - I

Lecture 13 - Case studies and Exercises - II

Lecture 14 - Case studies and Exercises - III

Lecture 15 - Primal Dual Construction

Lecture 16 - Weak Duality Theorem

Lecture 17 - More Duality Theorems

Lecture 18 - Primal-Dual relationship of solutions

Lecture 19 - Dual Simplex Method

Lecture 20 - Sensitivity Analysis - I

Lecture 21 - Sensitivity Analysis - II

Lecture 22 - Case studies and Exercises - I

Lecture 23 - Case studies and Exercises - II

Lecture 24 - Integer Programming

Lecture 25 - Goal Programming

Lecture 26 - Multi-Objective Programming

Lecture 27 - Dynamic Programming

Lecture 28 - Transportation Problem

Lecture 29 - Assignment Problem

Lecture 30 - Case studies and Exercises

Lecture 31 - Processing n Jobs on Two Machines

Lecture 32 - Processing n Jobs through Three Machines

Lecture 33 - Processing two jobs through m machines

Lecture 34 - Processing n jobs through m machines

Lecture 35 - Case studies and Exercises

Lecture 36 - Two Person Zero-Sum Game

Lecture 37 - Theorems of Game Theory

Lecture 38 - Solution of Mixed Strategy Games

Lecture 39 - Linear Programming method for solving games

Lecture 40 - Case studies and Exercises

NPTEL : NOC:Essential Mathematics for Machine Learning (Mathematics)

Co-ordinators : Prof. S.K. Gupta, Dr. Sanjeev Kumar

Lecture 1 - Vectors in Machine Learning

Lecture 2 - Basics of Matrix Algebra

Lecture 3 - Vector Space: Definition and Examples

Lecture 4 - Vector Subspace: Examples and Properties

Lecture 5 - Basis and Dimension

Lecture 6 - Linear Transformations

Lecture 7 - Norms and Spaces

Lecture 8 - Orthogonal Complement and Projection Mapping

Lecture 9 - Eigenvalues and Eigenvectors

Lecture 10 - Special matrices and Properties

Lecture 11 - Spectral Decomposition

Lecture 12 - Singular Value Decomposition

Lecture 13 - SVD: Properties and Applications

Lecture 14 - Low Rank Approximations

Lecture 15 - Python Implementation of SVD and Low - rank Approximation

Lecture 16 - Principal Component Analysis - I

Lecture 17 - PCA: Derivation and Examples

Lecture 18 - Python Implementation of PCA

Lecture 19 - Linear Discriminant Analysis

Lecture 20 - Python Implementation of LDA

Lecture 21 - Least Square Approximation and Minimum Normed Solution

Lecture 22 - Linear and Multiple Regression - I

Lecture 23 - Linear and Multiple Regression - II

Lecture 24 - Logistic Regression - I

Lecture 25 - Logistic Regression - II

Lecture 26 - Classification Metrics

Lecture 27 - Gram Schmidt Process

Lecture 28 - Polar Decomposition

Lecture 29 - Minimal Polynomial and Jordan Canonical Form - I

Lecture 30 - Minimal Polynomial and Jordan Canonical Form - II

Lecture 31 - Basic Concepts of Calculus - I

Lecture 32 - Basic Concepts of Calculus - II

Lecture 33 - Basic Concepts of Calculus - III

Lecture 34 - Basic Concepts of Calculus - IV

Lecture 35 - Basic Concepts of Calculus - V

Lecture 36 - Calculus in Python

Lecture 37 - Convex Sets and Functions

Lecture 38 - Properties of convex functions - I

Lecture 39 - Properties of Convex functions - II

Lecture 40 - Introduction to Optimization

Lecture 41 - Unconstrained Optimization

Lecture 42 - Constrained Optimization - I

Lecture 43 - Constrained Optimization - II

Lecture 44 - Steepest Descent method

Lecture 45 - Newton's and Penalty function method

Lecture 46 - Optimization using Python

Lecture 47 - Operations on Sets

Lecture 48 - Review on Probability

Lecture 49 - Bayes' theorem and Random variables

Lecture 50 - Expectation and Variance

Lecture 51 - Discrete probability distributions

Lecture 52 - Continuous probability distributions

Lecture 53 - Joint probability distribution and covariance

Lecture 54 - Introduction to SVM

Lecture 55 - Error Minimizing LPP

Lecture 56 - Concepts of Duality

Lecture 57 - Hard Margin classifier

Lecture 58 - Soft margin classifier

Lecture 59 - SVM using Python - I

Lecture 60 - SVM using Python - II

NPTEL : NOC:Advanced Linear Algebra (Mathematics)

Co-ordinators : Prof. Premananda Bera

Lecture 1 - System of Linear Equations

Lecture 2 - Elementary Row Operations

Lecture 3 - Row-Reduced Echelon Form and its Applications

Lecture 4 - Vector Spaces - I

Lecture 5 - Vector Spaces - II

Lecture 6 - Basis and Dimensions - I

Lecture 7 - Basis and Dimensions - II

Lecture 8 - Change of Ordered Basis in F. D. V. S.

Lecture 9 - Row Space of a Matrix

Lecture 10 - Computations concerning Subspaces

Lecture 11 - Linear Transformations

Lecture 12 - Concept of Rank

Lecture 13 - Algebra of Linear Transformations - I

Lecture 14 - Algebra of Linear Transformations - II

Lecture 15 - Algebra of Linear Transformations - III

Lecture 16 - Matrix Representation of Linear Transformations - I

Lecture 17 - Matrix Representation of Linear Transformations - II

Lecture 18 - Linear Functional - I

Lecture 19 - Linear Functional - II

Lecture 20 - Linear Functional - III

Lecture 21 - Linear Functional and Transpose of L.T. - I

Lecture 22 - Linear Functional and Transpose of L.T. - II

Lecture 23 - Eigenvalue and Eigenvector of Linear Operator - I

Lecture 24 - Eigenvalue and Eigenvector of Linear Operator - II

Lecture 25 - Eigenvalue and Eigenvector of Digonalizable L.O.

Lecture 26 - Annihilating Polynomial of Linear Operator

Lecture 27 - Cayley-Hamilton Theorem and Its Applications - I

Lecture 28 - Cayley-Hamilton Theorem and its Applications - II

Lecture 29 - Invariant Subspaces - I

Lecture 30 - Invariant Subspaces - II

Lecture 31 - Application of Invariant Subspaces - I

Lecture 32 - Application of Invariant Subspaces - II

Lecture 33 - Direct Sum Decompositions - I

Lecture 34 - Direct Sum Decompositions - II

Lecture 35 - Invariant Direct Sums - I

Lecture 36 - Invariant Direct Sums - II

Lecture 37 - Decomposition of space and Operator - I

Lecture 38 - Decomposition of Space and Operator - II

Lecture 39 - Applications of Primary Decomposition Theorem - I

Lecture 40 - Applications of Primary Decomposition Theorem - II

Lecture 41 - Applications of Primary Decomposition Theorem - III

Lecture 42 - Inner Products - I

Lecture 43 - Inner Products - II

Lecture 44 - Inner Product Spaces - I

Lecture 45 - Inner Product Spaces - II

Lecture 46 - Best Approximation in I.P.S.

Lecture 47 - Orthogonal Projection in I.P.S.

Lecture 48 - Linear Functionals and Adjoints - I

Lecture 49 - Linear Functionals and Adjoints - II

Lecture 50 - Linear Functionals and Adjoints - III

Lecture 51 - Linear Functionals and Adjoints - IV

Lecture 52 - Isomorphism in Inner Product Spaces

Lecture 53 - Unitary Operators - I

Lecture 54 - Unitary Operators - II

Lecture 55 - Application of Unitary O. and Initiation of Normal Operator

Lecture 56 - Normal Operator - I

Lecture 57 - Normal Operator - II

Lecture 58 - Normal Operator and It's Spectral Resolution

Lecture 59 - Singular Value Decomposition of a Matrix

Lecture 60 - Forms on Inner product Spaces

NPTEL : NOC:EXCELing with Mathematical Modeling (Mathematics)

Co-ordinators : Prof. Sandip Banerjee

Lecture 1 - Introduction, Importance and Limitations

Lecture 2 - Units and Dimensions

Lecture 3 - Scaling

Lecture 4 - How to build mathematical models?

Lecture 5 - Basics of Excel - 1

Lecture 6 - Basics of Excel - 2

Lecture 7 - Basics of Excel - 3

Lecture 8 - Linear, Quadratic, Cubic Models

Lecture 9 - Linear Stability Analysis - I

Lecture 10 - Linear Stability Analysis - II

Lecture 11 - Lyapunov Stability

Lecture 12 - Phase Plane Analysis - 1

Lecture 13 - Phase Plane Analysis - 2

Lecture 14 - Phase Plane Analysis - 3

Lecture 15 - Growth Models (Continuous model)

Lecture 16 - Predator-Prey models

Lecture 17 - Two species competition model

Lecture 18 - Arms Race Model

Lecture 19 - Combat Model - I

Lecture 20 - Combat Model - II

Lecture 21 - Carbon Dating

Lecture 22 - Drug Distribution

Lecture 23 - Growth and decay in L-R circuit

Lecture 24 - Rectilinear motion under variable force

Lecture 25 - Dynamice of Rowing

Lecture 26 - Horizontal oscillations

Lecture 27 - Vertical oscillations

Lecture 28 - Epidemic model - 1

Lecture 29 - Epidemic model - 2

Lecture 30 - Rumor model

Lecture 31 - Varying Gravity model

Lecture 32 - Tumor model - I

Lecture 33 - Tumor model - II

Lecture 34 - Vegetation in a desert model

Lecture 35 - Mathematical model of love affairs

Lecture 36 - Discrete models: Difference Equation - I

Lecture 37 - Difference Equations - II

Lecture 38 - Basics of Excel - 4

Lecture 39 - Stability Analysis - I

Lecture 40 - Stability Analysis - II

Lecture 41 - Population Models

Lecture 42 - Bank Account Models

Lecture 43 - Economic Model (Harrod Model

Lecture 44 - Lake Pollutant Models

Lecture 45 - Mathematical Model of the Dynamics of Alcohol

Lecture 46 - Discrete Predator-Prey Model

Lecture 47 - Forsenic Model

Lecture 48 - Drug Delivery Models

Lecture 49 - Lanchester's Combat Model

Lecture 50 - Two-Species Competition Model (Discrete)

Lecture 51 - Infection model

Lecture 52 - Smoking Model

Lecture 53 - Price and Demand Model

Lecture 54 - Paper Towel model, Burning Calories Model

Lecture 55 - Learning model, Kidney function model

Lecture 56 - Empirical Modelling

Lecture 57 - Estimation of Parameters - I

Lecture 58 - Estimation of Parameters - II

Lecture 59 - Estimation of Parameters - III

Lecture 60 - Simulation Modeling

NPTEL : Advanced Matrix Theory and Linear Algebra for Engineers (Mathematics)

Co-ordinators : Prof. Vittal Rao

Lecture 1 - Prologue - Part 1

Lecture 2 - Prologue - Part 2

Lecture 3 - Prologue - Part 3

Lecture 4 - Linear Systems - Part 1

Lecture 5 - Linear Systems - Part 2

Lecture 6 - Linear Systems - Part 3

Lecture 7 - Linear Systems - Part 4

Lecture 8 - Vector Spaces - Part 1

Lecture 9 - Vector Spaces - Part 2

Lecture 10 - Linear Independence and Subspaces - Part 1

Lecture 11 - Linear Independence and Subspaces - Part 2

Lecture 12 - Linear Independence and Subspaces - Part 3

Lecture 13 - Linear Independence and Subspaces - Part 4

Lecture 14 - Basis - Part 1

Lecture 15 - Basis - Part 2

Lecture 16 - Basis - Part 3

Lecture 17 - Linear Transformations - Part 1

Lecture 18 - Linear Transformations - Part 2

Lecture 19 - Linear Transformations - Part 3

Lecture 20 - Linear Transformations - Part 4

Lecture 21 - Linear Transformations - Part 5

Lecture 22 - Inner Product and Orthogonality - Part 1

Lecture 23 - Inner Product and Orthogonality - Part 2

Lecture 24 - Inner Product and Orthogonality - Part 3

Lecture 25 - Inner Product and Orthogonality - Part 4

Lecture 26 - Inner Product and Orthogonality - Part 5

Lecture 27 - Inner Product and Orthogonality - Part 6

Lecture 28 - Diagonalization - Part 1

Lecture 29 - Diagonalization - Part 2

Lecture 30 - Diagonalization - Part 3

Lecture 31 - Diagonalization - Part 4

Lecture 32 - Hermitian and Symmetric matrices - Part 1

Lecture 33 - Hermitian and Symmetric matrices - Part 2

Lecture 34 - Hermitian and Symmetric matrices - Part 3

Lecture 35 - Hermitian and Symmetric matrices - Part 4

Lecture 36 - Singular Value Decomposition (SVD) - Part 1

Lecture 37 - Singular Value Decomposition (SVD) - Part 2

Lecture 38 - Back To Linear Systems - Part 1

Lecture 39 - Back To Linear Systems - Part 2

Lecture 40 - Epilogue

NPTEL : Ordinary Differential Equations and Applications (Mathematics)

Co-ordinators : Prof. A.K. Nandakumaran, Prof. Raju K. George, Prof. P.S. Datti

Lecture 1 - General Introduction

Lecture 2 - Examples

Lecture 3 - Examples (Continued - I)

Lecture 4 - Examples (Continued - II)

Lecture 5 - Linear Algebra

Lecture 6 - Linear Algebra (Continued - I)

Lecture 7 - Linear Algebra (Continued - II)

Lecture 8 - Analysis

Lecture 9 - Analysis (Continued...)

Lecture 10 - First Order Linear Equations

Lecture 11 - Exact Equations

Lecture 12 - Second Order Linear Equations

Lecture 13 - Second Order Linear Equations (Continued - I)

Lecture 14 - Second Order Linear Equations (Continued - II)

Lecture 15 - Well-posedness and Examples of IVP

Lecture 16 - Gronwall's Lemma

Lecture 17 - Basic Lemma and Uniqueness Theorem

Lecture 18 - Picard's Existence and Uniqueness Theorem

Lecture 19 - Picard's Existence and Uniqueness (Continued...)

Lecture 20 - Cauchy Peano Existence Theorem

Lecture 21 - Existence using Fixed Point Theorem

Lecture 22 - Continuation of Solutions

Lecture 23 - Series Solution

Lecture 24 - General System and Diagonalizability

Lecture 25 - 2 by 2 systems and Phase Plane Analysis

Lecture 26 - 2 by 2 systems and Phase Plane Analysis (Continued...)

Lecture 27 - General Systems

Lecture 28 - General Systems (Continued...) and Non-homogeneous Systems

Lecture 29 - Basic Definitions and Examples

Lecture 30 - Stability Equilibrium Points

Lecture 31 - Stability Equilibrium Points (Continued - I)

Lecture 32 - Stability Equilibrium Points (Continued - II)

Lecture 33 - Second Order Linear Equations (Continued - III)

Lecture 34 - Lyapunov Function

Lecture 35 - Lyapunov Function (Continued...)

Lecture 36 - Periodic Orbits and Poincare Bendixon Theory

Lecture 37 - Periodic Orbits and Poincare Bendixon Theory (Continued...)

Lecture 38 - Linear Second Order Equations

Lecture 39 - General Second Order Equations

Lecture 40 - General Second Order Equations (Continued...)

NPTEL : NOC:Linear Algebra (Mathematics)

Co-ordinators : Prof. Dilip P. Patil

Lecture 1 - Introduction to Algebraic Structures - Rings and Fields

Lecture 2 - Definition of Vector Spaces

Lecture 3 - Examples of Vector Spaces

Lecture 4 - Definition of subspaces

Lecture 5 - Examples of subspaces

Lecture 6 - Examples of subspaces (Continued...)

Lecture 7 - Sum of subspaces

Lecture 8 - System of linear equations

Lecture 9 - Gauss elimination

Lecture 10 - Generating system, linear independence and bases

Lecture 11 - Examples of a basis of a vector space

Lecture 12 - Review of univariate polynomials

Lecture 13 - Examples of univariate polynomials and rational functions

Lecture 14 - More examples of a basis of vector spaces

Lecture 15 - Vector spaces with finite generating system

Lecture 16 - Steinitzs exchange theorem and examples

Lecture 17 - Examples of finite dimensional vector spaces

Lecture 18 - Dimension formula and its examples

Lecture 19 - Existence of a basis

Lecture 20 - Existence of a basis (Continued...)

Lecture 21 - Existence of a basis (Continued...)

Lecture 22 - Introduction to Linear Maps

Lecture 23 - Examples of Linear Maps

Lecture 24 - Linear Maps and Bases

Lecture 25 - Pigeonhole principle in Linear Algebra

Lecture 26 - Interpolation and the rank theorem

Lecture 27 - Examples

Lecture 28 - Direct sums of vector spaces

Lecture 29 - Projections

Lecture 30 - Direct sum decomposition of a vector space

Lecture 31 - Dimension equality and examples

Lecture 32 - Dual spaces

Lecture 33 - Dual spaces (Continued...)

Lecture 34 - Quotient spaces

Lecture 35 - Homomorphism theorem of vector spaces

Lecture 36 - Isomorphism theorem of vector spaces

Lecture 37 - Matrix of a linear map

Lecture 38 - Matrix of a linear map (Continued...)

Lecture 39 - Matrix of a linear map (Continued...)

Lecture 40 - Change of bases

Lecture 41 - Computational rules for matrices

Lecture 42 - Rank of a matrix

Lecture 43 - Computation of the rank of a matrix

Lecture 44 - Elementary matrices

Lecture 45 - Elementary operations on matrices

Lecture 46 - LR decomposition

Lecture 47 - Elementary Divisor Theorem

Lecture 48 - Permutation groups

Lecture 49 - Canonical cycle decomposition of permutations

Lecture 50 - Signature of a permutation

Lecture 51 - Introduction to multilinear maps

Lecture 52 - Multilinear maps (Continued...)

Lecture 53 - Introduction to determinants

Lecture 54 - Determinants (Continued...)

Lecture 55 - Computational rules for determinants

Lecture 56 - Properties of determinants and adjoint of a matrix

Lecture 57 - Adjoint-determinant theorem

Lecture 58 - The determinant of a linear operator

Lecture 59 - Determinants and Volumes

Lecture 60 - Determinants and Volumes (Continued...)

Lecture 1 - Introduction to Algebraic Structures - Rings and Fields

Lecture 2 - Definition of Vector Spaces

Lecture 3 - Examples of Vector Spaces

Lecture 4 - Definition of subspaces

Lecture 5 - Examples of subspaces

Lecture 6 - Examples of subspaces (Continued...)

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Lecture 33 - Dual spaces (Continued...)

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Lecture 38 - Matrix of a linear map (Continued...)

Lecture 39 - Matrix of a linear map (Continued...)

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Lecture 53 - Introduction to determinants

Lecture 54 - Determinants (Continued...)

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Lecture 57 - Adjoint-determinant theorem

Lecture 58 - The determinant of a linear operator

Lecture 59 - Determinants and Volumes

Lecture 60 - Determinants and Volumes (Continued...)

NPTEL : NOC:An Introduction to Smooth Manifolds (Mathematics)

Co-ordinators : Prof. Harish Seshadri

Lecture 1 - Basic linear algebra

Lecture 2 - Multivariable calculus - 1

Lecture 3 - Multivariable calculus - 2

Lecture 4 - The derivative map

Lecture 5 - Inverse Function Theorem

Lecture 6 - Constant Rank Theorem

Lecture 7 - Smooth functions with compact support

Lecture 8 - Smooth manifold

Lecture 9 - Examples of smooth manifolds

Lecture 10 - Higher dimensional spheres as smooth manifolds

Lecture 11 - Smooth maps

Lecture 12 - Examples of smooth maps

Lecture 13 - Tangent spaces - 1

Lecture 14 - Tangent spaces - 2

Lecture 15 - Derivatives of smooth maps

Lecture 16 - Chain rule on manifolds

Lecture 17 - Dimension of tangent space - 1

Lecture 18 - Dimension of tangent space - 2

Lecture 19 - Derivative of inclusion map

Lecture 20 - Basis of tangent space

Lecture 21 - Inverse Function Theorem for manifolds

Lecture 22 - Submanifolds

Lecture 23 - Tangent space of a submanifold

Lecture 24 - Regular Value Theorem

Lecture 25 - Special linear group as a submanifold of the set of all square matrices

Lecture 26 - Hypersurfaces

Lecture 27 - Tangent spaces to level sets

Lecture 28 - Vector fields - 1

Lecture 29 - Vector fields - 2

Lecture 30 - Vector fields - 3

Lecture 31 - Lie groups - 1

Lecture 32 - Lie groups - 2

Lecture 33 - Integral curve and flows - 1

Lecture 34 - Integral curve and flows - 2

Lecture 35 - Integral curve and flows - 3

Lecture 36 - Complete vector fields

Lecture 37 - Vector fields and smooth maps

Lecture 38 - Lie Brackets - 1

Lecture 39 - Lie brackets - 2

Lecture 40 - Lie brackets - 3

Lecture 41 - Lie algebras of matrix groups - 1

Lecture 42 - Lie algebras of matrix groups - 2

Lecture 43 - Exponential map

Lecture 44 - Frobenius theorems

Lecture 45 - Tensors and differential forms - 1

Lecture 46 - Tensors and differential forms - 2

Lecture 47 - Pull-back form

Lecture 48 - Symmetric Tensors

Lecture 49 - Alternating Tensors - 1

Lecture 50 - Alternating Tensors - 2

Lecture 51 - Alternating Tensors - 3

Lecture 52 - Alternating Tensors - 4

Lecture 53 - Alternating Tensors - 5

Lecture 54 - Alternating Tensors - 6

Lecture 55 - Alternating Tensors - 7

Lecture 56 - Alternating Tensors - 8

Lecture 57 - Alternating Tensors - 9

Lecture 58 - Differential forms on manifolds - 1

Lecture 59 - Differential forms on manifolds - 2

Lecture 60 - The Exterior derivative - 1

Lecture 61 - The Exterior derivative - 2

Lecture 62 - The Exterior derivative - 3

Lecture 63 - The Exterior derivative - 4

Lecture 64 - The Exterior derivative - 5

Lecture 65 - Special classes of forms

Lecture 66 - Orientation on manifolds - 1

Lecture 67 - Orientation on manifolds - 2

Lecture 68 - Orientation on manifolds - 3

NPTEL : NOC:Measure Theory (Prof. E. K. Narayanan) (Mathematics)

Co-ordinators : Prof. E. K. Narayanan

Lecture 1 - Review of Riemann integration and introduction to sigma algebras

Lecture 2 - Sigma algebras and measurability

Lecture 3 - Measurable functions and approximation by simple functions

Lecture 4 - Properties of countably additive measures

Lecture 5 - Integration of positive measurable functions

Lecture 6 - Some properties of integrals of positive simple functions

Lecture 7 - Monotone convergence theorem and Fatou's lemma

Lecture 8 - Integration of complex valued measurable functions

Lecture 9 - Dominated convergence theorem

Lecture 10 - Sets of measure zero and completion

Lecture 11 - Consequences of MCT, Fatou's lemma and DCT

Lecture 12 - Rectangles in R^n and some properties

Lecture 13 - Outer measure on R^n

Lecture 14 - Properties of outer measure on R^n

Lecture 15 - Lebesgue measurable sets and Lebesgue measure on R^n

Lecture 16 - Lebesgue sigma algebra

Lecture 17 - Lebesgue measure

Lecture 18 - Fine properties of measurable sets

Lecture 19 - Invariance properties of Lebesgue measure

Lecture 20 - Non measurable set

Lecture 21 - Measurable functions

Lecture 22 - Riemann and Lebesgue integrals

Lecture 23 - Locally compact Hausdorff spaces

Lecture 24 - Riesz representation theorem

Lecture 25 - Positive Borel measures

Lecture 26 - Lebesgue measure via Riesz representation theorem

Lecture 27 - Construction of Lebesgue measure

Lecture 28 - Invariance properties of Lebesgue measure

Lecture 29 - Linear transformations and Lebesgue measure

Lecture 30 - Cantor set

Lecture 31 - Cantor function

Lecture 32 - Lebesgue set which is not Borel

Lecture 33 - L^p spaces

Lecture 34 - L^p norm

Lecture 35 - Completeness of L^p

Lecture 36 - Properties of L^p spaces

Lecture 37 - Examples of L^p spaces

Lecture 38 - Product sigma algebra

Lecture 39 - Product measures - I

Lecture 40 - Product measures - II

Lecture 41 - Fubini's theorem - I

Lecture 42 - Fubini's theorem - II

Lecture 43 - Completeness of product measures

Lecture 44 - Polar coordinates

Lecture 45 - Applications of Fubini's theorem

Lecture 46 - Complex measures - I

Lecture 47 - Complex measures - II

Lecture 48 - Absolutely continuous measures

Lecture 49 - L^2 space

Lecture 50 - Continuous linear functionals

Lecture 51 - Radon-Nikodym theorem - I

Lecture 52 - Radon Nikodym theorem - II

Lecture 53 - Consequences of Radon-Nikodym theorem - I

Lecture 54 - Consequences of Radon-Nikodym theorem - II

Lecture 55 - Continuous linear functionals on L^p spaces - I

Lecture 56 - Continuous linear functionals on L^p spaces - II

Lecture 57 - Riesz representation theorem - I

Lecture 58 - Riesz representation theorem - II

Lecture 59 - Hardy-Littlewood maximal function

Lecture 60 - Lebesgue differentiation theorem

Lecture 61 - Absolutely continuous functions - I

Lecture 62 - Absolutely continuous functions - II

NPTEL : NOC:Introduction to Algebraic Geometry and Commutative Algebra (Mathematics)

Co-ordinators : Prof. Dilip P. Patil

Lecture 1 - Motivation for K-algebraic sets

Lecture 2 - Definitions and examples of Affine Algebraic Set

Lecture 3 - Rings and Ideals

Lecture 4 - Operation on Ideals

Lecture 5 - Prime Ideals and Maximal Ideals

Lecture 6 - Krull's Theorem and consequences

Lecture 7 - Module, submodules and quotient modules

Lecture 8 - Algebras and polynomial algebras

Lecture 9 - Universal property of polynomial algebra and examples

Lecture 10 - Finite and Finite type algebras

Lecture 11 - K-Spectrum (K-rational points)

Lecture 12 - Identity theorem for Polynomial functions

Lecture 13 - Basic properties of K-algebraic sets

Lecture 14 - Examples of K-algebraic sets

Lecture 15 - K-Zariski Topology

Lecture 16 - The map V L

Lecture 17 - Noetherian and Artinian Ordered sets

Lecture 18 - Noetherian induction and Transfinite induction

Lecture 19 - Modules with Chain Conditions

Lecture 20 - Properties of Noetherian and Artinian Modules

Lecture 21 - Examples of Artinian and Noetherian Modules

Lecture 22 - Finite modules over Noetherian Rings

Lecture 23 - Hilbertâ€™s Basis Theorem (HBT)

Lecture 24 - Consequences of HBT

Lecture 25 - Free Modules and rank

Lecture 26 - More on Noetherian and Artinian modules

Lecture 27 - Ring of Fractions (Localization)

Lecture 28 - Nil radical, contraction of ideals

Lecture 29 - Universal property of S -1 A

Lecture 30 - Ideal structure in S -1 A

Lecture 31 - Consequences of the Correspondence of Ideals

Lecture 32 - Consequences of the Correspondence of Ideals (Continued...)

Lecture 33 - Modules of Fraction and universal properties

Lecture 34 - Exactness of the functor S -1

Lecture 35 - Universal property of Modules of Fractions

Lecture 36 - Further properties of Modules and Module of Fractions

Lecture 37 - Local-Global Principle

Lecture 38 - Consequences of Local-Global Principle

Lecture 39 - Properties of Artinian Rings

Lecture 40 - Krull-Nakayama Lemma

Lecture 41 - Properties of I K and V L maps

Lecture 42 - Hilbertâ€™s Nullstelensatz

Lecture 43 - Hilbertâ€™s Nullstelensatz (Continued...)

Lecture 44 - Proof of Zariskiâ€™s Lemma (HNS 3)

Lecture 45 - Consequences of HNS

Lecture 46 - Consequences of HNS (Continued...)

Lecture 47 - Jacobson Ring and examples

Lecture 48 - Irreducible subsets of Zariski Topology (Finite type K-algebra)

Lecture 49 - Spec functor on Finite type K-algebras

Lecture 50 - Properties of Irreducible topological spaces

Lecture 51 - Zariski Topology on arbitrary commutative rings

Lecture 52 - Spec functor on arbitrary commutative rings

Lecture 53 - Topological properties of Spec A

Lecture 54 - Example to support the term Spectrum

Lecture 55 - Integral Extensions

Lecture 56 - Elementwise characterization of Integral extensions

Lecture 57 - Properties and examples of Integral extensions

Lecture 58 - Prime and Maximal ideals in integral extensions

Lecture 59 - Lying over Theorem

Lecture 60 - Cohen-Siedelberg Theorem

NPTEL : NOC:First Course on Partial Differential Equations-I (Mathematics)

Co-ordinators : Prof. P. S. Datti, Prof. A. K. Nandakumaran

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Priliminaries - 1

Lecture 4 - Priliminaries - 2

Lecture 5 - Priliminaries - 3

Lecture 6 - Priliminaries - 4

Lecture 7 - First order equations in two variables - 1

Lecture 8 - First order equations in two variables - 2

Lecture 9 - First order equations in two variables - 3

Lecture 10 - First order equations in two variables - 4

Lecture 11 - First order equations in two variables - 5

Lecture 12 - First order equations in more than two variables - 6

Lecture 13 - First order equations in more than two variables - 7

Lecture 14 - First order equations in more than two variables - 8

Lecture 15 - Classification - 1

Lecture 16 - Classification - 2

Lecture 17 - Classification - 3

Lecture 18 - Laplace and Poisson equations - 1

Lecture 19 - Laplace and Poisson equations - 2

Lecture 20 - Laplace and Poisson equations - 3

Lecture 21 - Laplace and Poisson equations - 4

Lecture 22 - Laplace and Poisson equations - 5

Lecture 23 - Laplace and Poisson equations - 6

Lecture 24 - Laplace and Poisson equations - 7

Lecture 25 - Laplace and Poisson equations - 8

Lecture 26 - Laplace and Poisson equations - 9

Lecture 27 - Laplace and Poisson equations - 10

Lecture 28 - One dimensional heat equation - 1

Lecture 29 - One dimensional heat equation - 2

Lecture 30 - One dimensional heat equation - 3

Lecture 31 - One dimensional heat equation - 4

Lecture 32 - One dimensional heat equation - 5

Lecture 33 - One dimensional heat equation - 6

Lecture 34 - One dimensional wave equation - 1

Lecture 35 - One dimensional wave equation - 2

Lecture 36 - One dimensional wave equation - 3

Lecture 37 - One dimensional wave equation - 4

Lecture 38 - One dimensional wave equation - 5

Lecture 39 - One dimensional wave equation - 6

Lecture 40 - One dimensional wave equation - 7

Lecture 41 - One dimensional wave equation - 8

NPTEL : NOC:First Course on Partial Differential Equations - II (Mathematics)

Co-ordinators : Prof. A. K. Nandakumaran

Lecture 1 - Introduction

Lecture 2 - HJE 1

Lecture 3 - HJE 2

Lecture 4 - HJE 3

Lecture 5 - HJE 4

Lecture 6 - HJE 5

Lecture 7 - HJE 6

Lecture 8 - CL1

Lecture 9 - CL2

Lecture 10 - CL3

Lecture 11 - CL4

Lecture 12 - CL5

Lecture 13 - CL6

Lecture 14 - Perron Method - 1

Lecture 15 - Perron Method - 2

Lecture 16 - Perron Method - 3

Lecture 17 - Perron Method - 4

Lecture 18 - Newtonian Potential - 1

Lecture 19 - Newtonian Potential - 2

Lecture 20 - Newtonian Potential - 3

Lecture 21 - Newtonian Potential - 4

Lecture 22 - Newtonian Potential - 5

Lecture 23 - Eigen Value Problem - 1

Lecture 24 - Eigen Value Problem - 2

Lecture 25 - Heat Equation - 1

Lecture 26 - Heat Equation - 2

Lecture 27 - Heat Equation - 3

Lecture 28 - Heat Equation - 4

Lecture 29 - Heat Equation - 5

Lecture 30 - Wave Equation - 1

Lecture 31 - Wave Equation - 2

Lecture 32 - Wave Equation - 3

Lecture 33 - Wave Equation - 4

Lecture 34 - Wave Equation - 5

Lecture 35 - Wave Equation - 6

Lecture 36 - Wave Equation - 7

Lecture 37 - Weak Solutions - 1

Lecture 38 - Weak Solutions - 2

Lecture 39 - Weak Solutions - 3

Lecture 40 - Weak Solutions - 4

Lecture 41 - Weak Solutions - 5

NPTEL : Matrix Theory (Mathematics)

Co-ordinators : Prof. Chandra Murthy

Lecture 1 - Course introduction and properties of matrices

Lecture 2 - Vector spaces

Lecture 3 - Basis, dimension

Lecture 4 - Linear transforms

Lecture 5 - Fundamental subspaces of a matrix

Lecture 6 - Fundamental theorem of linear algebra

Lecture 7 - Properties of rank

Lecture 8 - Inner product

Lecture 9 - Gram-schmidt algorithm

Lecture 10 - Orthonormal matrices definition

Lecture 11 - Determinant

Lecture 12 - Properties of determinants

Lecture 13 - Introduction to norms and inner products

Lecture 14 - Vector norms and their properties

Lecture 15 - Applications and equivalence of vector norms

Lecture 16 - Summary of equivalence of norms

Lecture 17 - Dual norms

Lecture 18 - Properties and examples of dual norms

Lecture 19 - Matrix norms

Lecture 20 - Matrix norms: Properties

Lecture 21 - Induced norms

Lecture 22 - Induced norms and examples

Lecture 23 - Spectral radius

Lecture 24 - Properties of spectral radius

Lecture 25 - Convergent matrices, Banach lemma

Lecture 26 - Recap of matrix norms and Levy-Desplanques theorem

Lecture 27 - Equivalence of matrix norms and error in inverses of linear systems

Lecture 28 - Errors in inverses of matrices

Lecture 29 - Errors in solving systems of linear equations

Lecture 30 - Introduction to eigenvalues and eigenvectors

Lecture 31 - The characteristic polynomial

Lecture 32 - Solving characteristic polynomials, eigenvectors properties

Lecture 33 - Similarity

Lecture 34 - Diagonalization

Lecture 35 - Relationship between eigenvalues of BA and AB

Lecture 36 - Eigenvector and principle of biorthogonality

Lecture 37 - Unitary matrices

Lecture 38 - Properties of unitary matrices

Lecture 39 - Unitary equivalence

Lecture 40 - Schur's triangularization theorem

Lecture 41 - Cayley-Hamilton theorem

Lecture 42 - Uses of cayley-hamilton theorem and diagonalizability revisited

Lecture 43 - Normal matrices: Definition and fundamental properties

Lecture 44 - Fundamental properties of normal matrices

Lecture 45 - QR decomposition and canonical forms

Lecture 46 - Jordan canonical form

Lecture 47 - Determining the Jordan form of a matrix

Lecture 48 - Properties of the Jordan canonical form - Part 1

Lecture 49 - Properties of the Jordan canonical form - Part 2

Lecture 50 - Properties of convergent matrices

Lecture 51 - Polynomials and matrices

Lecture 52 - Other canonical forms and factorization of matrices: Gaussian elimination and LU factorization

Lecture 53 - LU decomposition

Lecture 54 - LU decomposition with pivoting

Lecture 55 - Solving pivoted system and LDM decomposition

Lecture 56 - Cholesky decomposition and uses

Lecture 57 - Hermitian and symmetric matrix

Lecture 58 - Properties of hermitian matrices

Lecture 59 - Variational characterization of Eigenvalues: Rayleigh-Ritz theorem

Lecture 60 - Variational characterization of eigenvalues (Continued...)

Lecture 61 - Courant-Fischer theorem

Lecture 62 - Summary of Rayliegh-Ritz and Courant-Fischer theorems

Lecture 63 - Weyl's theorem

Lecture 64 - Positive semi-definite matrix, monotonicity theorem and interlacing theorems

Lecture 65 - Interlacing theorem - I

Lecture 66 - Interlacing theorem - II (Converse)

Lecture 67 - Interlacing theorem (Continued...)

Lecture 68 - Eigenvalues: Majorization theorem and proof

Lecture 69 - Location and perturbation of Eigenvalues - Part 1: Dominant diagonal theorem

Lecture 70 - Location and perturbation of Eigenvalues - Part 2: Gersgorin's theorem

Lecture 71 - Implications of Gersgorin disc theorem, condition of eigenvalues

Lecture 72 - Condition of eigenvalues for diagonalizable matrices

Lecture 73 - Perturbation of eigenvalues Birkhoff's theorem Hoffman-Weiland ttheorem

Lecture 74 - Singular value definition and some remarks

Lecture 75 - Proof of singular value decomposition theorem

Lecture 76 - Partitioning the SVD

Lecture 77 - Properties of SVD

Lecture 78 - Generalized inverse of matrices

Lecture 79 - Least squares

Lecture 80 - Constrained least squares

NPTEL : NOC:C* Algebras and Spectral Theorem (Mathematics)

Co-ordinators : Prof. E K Narayanan

Lecture 1 - Finite dimensional Spectral theorem

Lecture 2 - Compact operators

Lecture 3 - Spectral theorem for Compact self-adjoint operators

Lecture 4 - Spectral theorem for Compact Normal operators

Lecture 5 - Banach algebras

Lecture 6 - Gelfand-Mazur theorem

Lecture 7 - Spectral radius

Lecture 8 - Multiplicative functionals

Lecture 9 - Gelfand transform - I

Lecture 10 - Gelfand transform - II

Lecture 11 - C* algebras

Lecture 12 - Examples and Wienerâ€™s theorem

Lecture 13 - Gelfand-Naimark theorem

Lecture 14 - Non-unital Banach algebras

Lecture 15 - Non-unital C* algebra

Lecture 16 - Gelfand transform of non-unital C*algebras

Lecture 17 - Gelfand-Naimark theorem for non-unital C* algebras

Lecture 18 - Continuous functional calculus

Lecture 19 - Bounded functional calculus - I

Lecture 20 - Bounded functional calculus - II

Lecture 21 - Projection valued measures

Lecture 22 - Bounded functional calculus with respect to a projection valued measure

Lecture 23 - Spectral Theorem - I

Lecture 24 - Spectral theorem - II

Lecture 25 - Some applications

Lecture 26 - Spectral theorem for a bounded normal operator

Lecture 27 - Resolution of identity - I

Lecture 28 - Resolution of identity - II

Lecture 29 - Resolution of identity - III

Lecture 30 - Resolution of identity - IV

Lecture 31 - Equivalence of various forms of spectral theorems - I

Lecture 32 - Equivalence of various forms of spectral theorems - II

Lecture 33 - Spectrum of a self-adjoint operator - I

Lecture 34 - Spectrum of a self-adjoint operator - II

Lecture 35 - Commuting family of self-adjoint operators

Lecture 36 - Continuous functional calculus for commuting family of self-adjoint operators - I

Lecture 37 - Continuous functional calculus for commuting family of self-adjoint operators - II

Lecture 38 - Fugledeâ€™s theorem

Lecture 39 - Spectral theorem for commuting finite family of normal operators

Lecture 40 - Multiplicity theory

NPTEL : NOC:Advanced Partial Differential Equations (Part I: Distributions and Sobolev Spaces) (Mathematics)

Co-ordinators : Prof. P.S. Datti, Prof. A K Nandakumaran

Lecture 1 - Introduction - 1

Lecture 2 - Preliminaries - 1

Lecture 3 - Preliminaries - 2

Lecture 4 - Priliminaries - 3

Lecture 5 - Priliminaries - 4

Lecture 6 - Preliminaries - 5

Lecture 7 - Prelimunaries - 6

Lecture 8 - Preliminaries - 7

Lecture 9 - Preliminaries - 8

Lecture 10 - Preliminaries - 9

Lecture 11 - Introduction to Distributions

Lecture 12 - Properties and Examples

Lecture 13 - Convergence of distributions

Lecture 14 - Convergence of distributions

Lecture 15 - Calculus in the space of distributions

Lecture 16 - Further discussion on Distributions

Lecture 17 - Order and support of a distribution

Lecture 18 - Laplace and Poisson equations - Distributions with compact support

Lecture 19 - Validity of the definition of the support

Lecture 20 - Convolution and Fourier transform of distributions

Lecture 21 - The Schwartz space andAKN Lec 15 its dual

Lecture 22 - Fourier transform of a tempered distribution, convolution

Lecture 23 - Properties of Convolution

Lecture 24 - Further discussion on Fourier transform and convolution

Lecture 25 - Convolution of two distributions

Lecture 26 - Convolution of distributions

Lecture 27 - Introduction to Sobolev spaces

Lecture 28 - Properties of Sobloev Spaces

Lecture 29 - Extension and Density results

Lecture 30 - General Extension result

Lecture 31 - Integration on a smooth surface

Lecture 32 - A more general extension result

Lecture 33 - Notion of the trace

Lecture 34 - A compactness theorem

Lecture 35 - Equivalent norms

Lecture 36 - Sobolev lemma

Lecture 37 - Sobolev lemma (Continued...)

Lecture 38 - Analysis near the boundary

Lecture 39 - Trace in the upper half space

Lecture 40 - Trace in the upper half space

Lecture 41 - Supplementary lecture

Lecture 42 - Supplementary lecture

NPTEL : NOC:Advanced Course on Partial Differential Equations - II (Mathematics)

Co-ordinators : Prof. A K Nandakumaran, Prof. P.S. Datti

Lecture 1 - Introduction and Outline

Lecture 2 - Review of Sobolev spaces - 1

Lecture 3 - Review of Sobolev spaces - 2

Lecture 4 - Review of Sobolev spaces - 3

Lecture 5 - Review of Sobolev spaces - 4

Lecture 6 - Review of Sobolev spaces - 5

Lecture 7 - Elliptic equations and weak formulation

Lecture 8 - Abstract Formulation

Lecture 9 - Variational Inequality

Lecture 10 - Babuska-Brezzi Theorem

Lecture 11 - Strong vs Weak Form of PDE

Lecture 12 - General Second Order Equations

Lecture 13 - Non-uniqueness of Neumann problem

Lecture 14 - Biharmonic equation, Stokes system

Lecture 15 - Stokes system (Continued...)

Lecture 16 - Regularity of Ellptic Equations

Lecture 17 - Regularity (Continued...)

Lecture 18 - Maximum and Minimum Principles for weak formulation

Lecture 19 - Spectrum of the Laplace operator

Lecture 20 - First eigenvalue of the Laplace operator and a brief discussion of a Galerkin method

Lecture 21 - Introduction to semi-groups and unbounded operators

Lecture 22 - Spectrum of an operator

Lecture 23 - Examples of operators and operators in a Hilbert space

Lecture 24 - Perturbation of an operator, Kato theorems. Definition of a semi-group

Lecture 25 - Semi-group and its infinitesimal generator

Lecture 26 - Examples of semi-groups; spectrum and resolvent of the infinitesimal generator

Lecture 27 - An application. Saturation theorem

Lecture 28 - Hille-Yosida Theorem

Lecture 29 - Lumer-Philips Theorem. Stone's theorem

Lecture 30 - Abstract Cauchy Problem

Lecture 31 - Semi-group arising from the heat equation

Lecture 32 - Geneartor of the heat semi-group

Lecture 33 - Semi-group arising from the wave equation

Lecture 34 - Semi-group arising from the wave equation in energy space

Lecture 35 - Wave equation in energy space

Lecture 36 - Wave equation in energy space (Continued...)

Lecture 37 - Semi-group arising from the wave equation in H^1 x L^2

Lecture 38 - Schroedinger equation in free space

Lecture 39 - Schroedinger equation with a potential. Application of Kato's theorem

Lecture 40 - Equations in a bounded domain. Concluding remarks

NPTEL : NOC:Introduction to Group Theory (Mathematics)

Co-ordinators : Prof. R. Venkatesh

Lecture 1 - Motivation of group theory

Lecture 2 - Definition of a group

Lecture 3 - Examples of groups

Lecture 4 - The symmetric group

Lecture 5 - Subgroups of integers

Lecture 6 - Basic properties of groups

Lecture 7 - Subgroups of a group

Lecture 8 - Subgroup generated by subsets of a group

Lecture 9 - Group of integers modulo n

Lecture 10 - Some elementary number theory - I

Lecture 11 - Some elementary number theory - II

Lecture 12 - Order of an elements in a group

Lecture 13 - Cyclic groups and its subgroups

Lecture 14 - Characterization of cyclic groups

Lecture 15 - Examples of cosets of a subgroup in a group

Lecture 16 - Cosets of a subgroup of a group

Lecture 17 - Lagrange's Theorem

Lecture 18 - Number theoretic applications of Lagrange's Theorem

Lecture 19 - Normal subgroup

Lecture 20 - Some useful definitions

Lecture 21 - Internal direct product

Lecture 22 - More on normal subgroups

Lecture 23 - Normalizer of a subgroup

Lecture 24 - First Isomorphism Theorem

Lecture 25 - Second Isomorphism Theorem

Lecture 26 - Third Isomorphism Theorem

Lecture 27 - Group acting on a set

Lecture 28 - Group action - Examples

Lecture 29 - Isometries of the plane is a group

Lecture 30 - Orthogonal maps

Lecture 31 - Dihedral groups

Lecture 32 - Finite subgroups of the orthogonal group

Lecture 33 - Group acting on a set

Lecture 34 - Group action - Examples

Lecture 35 - Orbit-decomposition Theorem

Lecture 36 - Stabilizer of a subset

Lecture 37 - Applications of group action

Lecture 38 - Class equation

Lecture 39 - Some more applications of group action

Lecture 40 - G-sets and morphisms

Lecture 41 - More examples

Lecture 42 - Burnside's lemma

Lecture 43 - The Sylow's theorems

Lecture 44 - The Sylow's theorems (Continued...)

Lecture 45 - Application of Sylow's Theorems

Lecture 46 - Semidirect product of groups

Lecture 47 - Automorphisms of groups

Lecture 48 - Symmetric and alternating groups

Lecture 49 - Conjugacy in the symmetric group

Lecture 50 - Conjugacy in the symmetric group (Continued...)

Lecture 51 - Simplicity of the alternating groups

Lecture 52 - The sign map

Lecture 53 - The sign map (Continued...)

Lecture 54 - Structure theorem for finite abelian groups (using invariant factors)

Lecture 55 - The structure theorem for finite abelian groups

Lecture 56 - Proof of the structure theorem for finite abelian groups (Continued...)

Lecture 57 - Proof of the structure theorem for finite abelian groups

Lecture 58 - Structure theory of finite abelian p-groups

NPTEL : NOC:Introduction to Lie Algebras (Mathematics)

Co-ordinators : Prof. R. Venkatesh

Lecture 1 - An Introduction to Lie Algebras

Lecture 2 - Lie subalgebra and Homomorphism

Lecture 3 - Some Problems

Lecture 4 - Ideals and Quotient algebras

Lecture 5 - Isomorphism theorems

Lecture 6 - Correspondence between ideals

Lecture 7 - Low dimensional Lie algebra - 1

Lecture 8 - Low dimensional Lie algebra - 2

Lecture 9 - Some more definitions

Lecture 10 - Solvable and nilpotent Lie algebra

Lecture 11 - Nilpotent Lie algebra

Lecture 12 - The invariance Lemma

Lecture 13 - Engel's and Lie's Theorem

Lecture 14 - Engel's and Lie's Theorem (Continued...)

Lecture 15 - Lie's Theorem

Lecture 16 - Basics of Representation Theory

Lecture 17 - Basics of Representation Theory (Continued...)

Lecture 18 - Schur's lemma

Lecture 19 - Finite dimensional representations of of sl2(C)

Lecture 20 - Classification of finite dimensional representations of sl2(C)

Lecture 21 - Complete reducibility of finite dimensional representation of sl2(C) - Part 1

Lecture 22 - Complete reducibility of finite dimensional representation of sl2(C) - Part 2

Lecture 23 - Applications of Lie's and Engel's theorem

Lecture 24 - Applications of Weyl's Theorem for sl2(C)

Lecture 25 - New representations form given representations

Lecture 26 - Primary decomposition Theorem and Jordan-Chevalley decomposition

Lecture 27 - Cartan's criteria for solvability

Lecture 28 - Cartan's criteria for semisimplicity and its consequences

Lecture 29 - Abstract Jordan decomposition in semisimple Lie algebras

Lecture 30 - Casimir element of a representation of a semisimple Lie algebra

Lecture 31 - Weyl's Theorem of complete reducibility for semisimple Lie algebras

Lecture 32 - Root space decomposition of semisimple Lie algebras

Lecture 33 - Centralizer of a maximal toral subalgebra

Lecture 34 - Properties of roots

Lecture 35 - More properties of roots

Lecture 36 - Rationality of roots

Lecture 37 - Abstract root system and Weyl groups

Lecture 38 - Isomorphism of Root systems and dual root systems

Lecture 39 - Root systems of Ranks 1 and 2

Lecture 40 - Classification of rank 2 root systems

Lecture 41 - Base of a root system

Lecture 42 - Classification of bases

Lecture 43 - Basic properties of simple roots

Lecture 44 - Characterization of length function

Lecture 45 - Decomposition of root systems

Lecture 46 - Root lengths, Cartan Matrices

Lecture 47 - Cartan matrices and Dynkin diagrams

Lecture 48 - Classification of Root systems

Lecture 49 - Classification of Root systems (Continued...)

Lecture 50 - Concrete description of root systems

Lecture 51 - Uniqueness of root systems

Lecture 52 - Isomorphism theorem

Lecture 53 - Isomorphism theorem (Continued...)

Lecture 54 - Generators and relations

Lecture 55 - Serre presentation

NPTEL : NOC:Representation Theory of General Linear Lie Algebra (Mathematics)

Co-ordinators : Prof. R. Venkatesh

Lecture 1 - Basic Theory of Lie algebras

Lecture 2 - Basic Theory of Lie algebras (Continued...)

Lecture 3 - Basic Theory of Lie algebras (Continued...)

Lecture 4 - Representation Theory of Lie algebras

Lecture 5 - Representation Theory of Lie algebras (Continued...)

Lecture 6 - Representation of Lie algebras

Lecture 7 - Classification of 2 dimensional representation of two dimensional non-abelian Lie algebra

Lecture 8 - Isomorphism Theorem

Lecture 9 - Characterization of completely reducible module

Lecture 10 - Representation theory of sl2(C)

Lecture 11 - Irreducible representation of sl2(C)

Lecture 12 - Irreducible representation of sl2(C) (Continued...)

Lecture 13 - Complete reducibility of sl2(C)

Lecture 14 - Complete reducibility of sl2(C) (Continued...)

Lecture 15 - Representation theory of sl2(C)-basic observation

Lecture 16 - Application of sl2(C) representation theory in combinatorics

Lecture 17 - Constructions of new representations

Lecture 18 - Construction of universal algebras - I

Lecture 19 - Construction of universal algebras - II

Lecture 20 - Non-degenerate and invariant bilinear forms

Lecture 21 - SchurÃ¢â‚¬â„¢s lemma and Killing form

Lecture 22 - Killing form of general and special linear Lie algebras

Lecture 23 - The universal enveloping algebra

Lecture 24 - Properties of the universal enveloping algebra

Lecture 25 - The Casimir operator for representations of gln(C) and sln(C)

Lecture 26 - Weylâ€™s theorem of complete reducibility

Lecture 27 - The structure of sln+1(C)

Lecture 28 - Representations of sln+1(C) - I

Lecture 29 - Representations of sln+1(C) - II

Lecture 30 - Representations of sln+1(C) - III

Lecture 31 - Casimir operator and highest weight modules - I

Lecture 32 - Casimir operator and highest weight modules - II

Lecture 33 - Irreducible representations of sln+1(C)

Lecture 34 - Verma module and its irreducible quotient

Lecture 35 - Verma modules and standard cyclic irreducible modules

Lecture 36 - Finite dimensional standard cyclic irreducible modules

Lecture 37 - Standard cyclic irreducible modules

Lecture 38 - Character Theory - I

Lecture 39 - Character Theory - II

Lecture 40 - Deniminator Identity - Prep 1

Lecture 41 - Deniminator Identity - Prep 2

Lecture 42 - Proof of the denominator identity

Lecture 43 - Freudenthal's formula

Lecture 44 - The Weyl character formula

Lecture 45 - The Laplacian operator and the Weyl Character Formula

Lecture 46 - Proof of the Weyl Character Formula

Lecture 47 - Applications of Weyl Character formula

Lecture 48 - The Weyl dimension formula, Schur polynomials

Lecture 49 - Semi-standard Young Tableaux

Lecture 50 - BGG resolution

NPTEL : Convective Heat and Mass Transfer (Mechanical Engineering)

Co-ordinators : Prof. A.W. Date

Lecture 1 - Introduction

Lecture 2 - Flow Classifications

Lecture 3 - Laws of Convection

Lecture 4 - Scalar Transport Equations

Lecture 5 - Laminar Boundary Layers

Lecture 6 - Similarity Method

Lecture 7 - Similaity Solns Velocity BL

Lecture 8 - Similaity Solns Temperature BL - I

Lecture 9 - Similaity Solns Temperature BL - II

Lecture 10 - Integral BL Equations

Lecture 11 - Integral Solns Laminar Velocity BL

Lecture 12 - Integral Solns Laminar Temperature BL

Lecture 13 - Superposition Theory

Lecture 14 - Laminar Internal Flows

Lecture 15 - Fully-Developed Laminar Flows - 1

Lecture 16 - Fully-Developed Laminar Flows - 2

Lecture 17 - Fully-Developed Laminar Flows Heat Transfer - 1

Lecture 18 - Fully-Developed Laminar Flows Heat Transfer - 2

Lecture 19 - Laminar Internal Developing Flows Heat Transfer

Lecture 20 - Superposition Technique

Lecture 21 - Nature of Turbulent Flows

Lecture 22 - Sustaining Mechanism of Turbulence - 1

Lecture 23 - Sustaining Mechanism of Turbulence - 1

Lecture 24 - Sustaining Mechanism of Turbulence - 2

Lecture 25 - Near-Wall Turbulent Flows - 1

Lecture 26 - Near-Wall Turbulent Flows - 2

Lecture 27 - Turbulence Models - 1

Lecture 28 - Turbulence Models - 2

Lecture 29 - Turbulence Models - 3

Lecture 30 - Prediction of Turbulent Flows

Lecture 31 - Prediction of Turbulent Heat Transfer

Lecture 32 - Convective Mass Transfer

Lecture 33 - Stefan Flow Model

Lecture 34 - Couette Flow Model

Lecture 35 - Reynolds Flow Model

Lecture 36 - Boundary Layer Flow Model

Lecture 37 - Evaluation of g and Nw

Lecture 38 - Diffusion Mass Transfer Problems

Lecture 39 - Convective MT Couette Flow

Lecture 40 - Convective MT Reynolds Flow Model - 1

Lecture 41 - Convective MT Reynolds Flow Model - 2

Lecture 42 - Natural Convection

Lecture 43 - Diffusion Jet Flames

NPTEL : Cryogenic Engineering (Mechanical Engineering)

Co-ordinators : Prof. M.D. Atrey

Lecture 1 - Introduction to Cryogenic Engineering

Lecture 2 - Properties of Cryogenic Fluids - I

Lecture 3 - Properties of Cryogenic Fluids - II

Lecture 4 - Properties of Cryogenic

Lecture 5 - Material Properties at Low Temperature - I

Lecture 6 - Material Properties at Low Temperature - II

Lecture 7 - Material Properties at Low Temperature - III

Lecture 8 - Gas Liquefaction and Refrigeration Systems - I

Lecture 9 - Gas Liquefaction and Refrigeration Systems - II

Lecture 10 - Gas Liquefaction and Refrigeration Systems - III

Lecture 11 - Gas Liquefaction and Refrigeration Systems - IV

Lecture 12 - Gas Liquefaction and Refrigeration Systems - V

Lecture 13 - Gas Liquefaction and Refrigeration Systems - VI

Lecture 14 - Gas Liquefaction and Refrigeration Systems - VII

Lecture 15 - Gas Liquefaction and Refrigeration Systems - VIII

Lecture 16 - Gas Liquefaction and Refrigeration Systems - IX

Lecture 17 - Gas Liquefaction and Refrigeration Systems - X

Lecture 18 - Gas Separation - I

Lecture 19 - Gas Separation - II

Lecture 20 - Gas Separation - III

Lecture 21 - Gas Separation - IV

Lecture 22 - Gas Separation - V

Lecture 23 - Gas Separation - VI

Lecture 24 - Gas Separation - VII

Lecture 25 - Gas Separation - VIII

Lecture 26 - Cryocoolers

Lecture 27 - Cryocoolers Ideal Stirling Cycle - I

Lecture 28 - Cryocoolers Ideal Stirling Cycle - II

Lecture 29 - Cryocoolers Ideal Stirling Cycle - III

Lecture 30 - Cryocoolers Ideal Stirling Cycle - IV

Lecture 31 - Cryocoolers Ideal Stirling Cycle - V

Lecture 32 - Cryocoolers

Lecture 33 - Cryogenic Insulation - I

Lecture 34 - Cryogenic Insulation - II

Lecture 35 - Cryogenic Insulation - III

Lecture 36 - Vacuum Technology - I

Lecture 37 - Vacuum Technology - II

Lecture 38 - Vaccum Technology - III

Lecture 39 - Instrumentation in Cryogenics - I

Lecture 40 - Instrumentation in Cryogenics - II

Lecture 41 - Instrumentation in Cryogenics - III

Lecture 42 - Safety in Cryogenics

NPTEL : Advanced Strength of Materials (Mechanical Engineering)

Co-ordinators : Prof. S.K. Maiti

Lecture 1 - Stress and Strain Tensor

Lecture 2 - Stress and Strain Tensor (Continued) and Cauchy Formula for Traction

Lecture 3 - Examples on Calculation of Strains and Tractions, Principal Stresses and Directions

Lecture 4 - Example on Calculation of Principal Stresses and Directions, Orthogonality of Principal Directions, Principal Stresses are all Real

Lecture 5 - Maximum Shear Stress and Octahedral Shear Stress, Deviatoric and Hydrostatic Stresses

Lecture 6 - Transformation of Stresses and Mohr Circle in 3-D

Lecture 7 - Mohr Circle (Continued)

Lecture 8 - Deformation, Rotation and Strain Tensors, Principal Strains,Deviatoric and Hydrostatic Strains

Lecture 9 - Strain Transformations, Strains in Polar Coordinates, Equilibrium Equations in 2-D

Lecture 10 - Equilibrium Equations in 2-D Polar Coordinates Plane Stress and Plane Strain Conditions

Lecture 11 - Stress-Strain Relations for Isotropic, Orthotropic and Anisotropic Materials Stress-Strain-Temperature Relations

Lecture 12 - Relation between Elastic Constants and Strain Energy Densities Recap of Lectures 1 to 11

Lecture 13 - Stress Distribution in Thick Cylinder

Lecture 14 - Stresses due to Shrink Fitting

Lecture 15 - Stresses in Rotating Disc

Lecture 16 - Examples on Shrink Fitting and Rotating Disc

Lecture 17 - Torsion of Non-Circular Shaft

Lecture 18 - Torsion of Non-Circular Shaft (Continued)

Lecture 19 - Membrane Analogy for Torsion

Lecture 20 - Torsion of Thin Box Sections

Lecture 21 - Torsion of Box and Open Sections

Lecture 22 - Bending of Curved Bars

Lecture 23 - Bending of Curved Bars (Continued)

Lecture 24 - Theories of Failure

Lecture 25 - Theories of Failure (Continued)

Lecture 26 - Theories of Failure (Continued) and Their Applications, Griffith Theory of Brittle Fracture

Lecture 27 - Application of Griffith Theory, Irwin-Orowan Modification of Griffith Theory, Assessment of Effect of Dynamic Loading

Lecture 28 - Theorems of Elasticity

Lecture 29 - Theorems of Elasticity (Continued)

Lecture 30 - Thermal Stress Distribution in Rectangular Sheet due to Symmetric and Asymmetric Temperature Fields

Lecture 31 - Thermal Stress Distribution in Cylinders

Lecture 32 - Unsymmetrical Bending

Lecture 33 - Shear Centre

Lecture 34 - Plate Bending

Lecture 35 - Plate Bending (Continued)

Lecture 36 - Examples on Plate Bending

Lecture 37 - Approximate Solutions for Bending of Rectangular and Circular Plates

Lecture 38 - Thin Shells of Revolution

Lecture 39 - Beam on Elastic Foundation

Lecture 40 - Application of Beam on Elastic Foundation Analysis to Pressure Vessels for Calculation of Discontinuity Stresses

NPTEL : Heat and Mass Transfer (Mechanical Engineering)

Co-ordinators : Prof. S.P. Sukhatme, Prof. U.N. Gaitonde

Lecture 1 - Introduction to Heat and Mass Transfer

Lecture 2 - Introduction

Lecture 3 - Introduction

Lecture 4 - Heat Conduction - 1

Lecture 5 - Heat Conduction - 2

Lecture 6 - Heat Conduction - 3

Lecture 7 - Heat Conduction - 4

Lecture 8 - Heat Conduction - 5

Lecture 9 - Heat Conduction - 6

Lecture 10 - Thermal Radiation - 1

Lecture 11 - Thermal Radiation - 2

Lecture 12 - Thermal Radiation - 3

Lecture 13 - Thermal Radiation - 4

Lecture 14 - Thermal Radiation - 5

Lecture 15 - Thermal Radiation - 6

Lecture 16 - Review Of Fluid Mechanics - 1

Lecture 17 - Review Of Fluid Mechanics - 2

Lecture 18 - Forced Convection - 1

Lecture 19 - Forced Convection - 2

Lecture 20 - Forced Convection - 3

Lecture 21 - Forced Convection - 4

Lecture 22 - Natural Convection - 1

Lecture 23 - Natural Convection - 2

Lecture 24 - Natural Convection - 3

Lecture 25 - Heat Exchangers - 1

Lecture 26 - Heat Exchangers - 2

Lecture 27 - Heat Exchangers - 3

Lecture 28 - Heat Exchangers - 4

Lecture 29 - Boiling and Condensation - 1

Lecture 30 - Boiling and Condensation - 2

Lecture 31 - Boiling and Condensation - 3

Lecture 32 - Boiling and Condensation - 4

Lecture 33 - Introduction to Mass Transfer - 1

Lecture 34 - Introduction to Mass Transfer - 2

Lecture 35 - Introduction to Mass Transfer - 3

NPTEL : Robotics (Mechanical Engineering)

Co-ordinators : Prof. P. Seshu, Prof. P.S. Gandhi, Prof. K. Kurien Issac, Prof. B. Seth, Prof. C. Amarnath

Lecture 1 - Introduction to Robotics

Lecture 2 - Technologies in Robots

Lecture 3 - Industrial Robots

Lecture 4 - Industrial Manipulators and its Kinematics

Lecture 5 - Parallel Manipulators

Lecture 6 - Grippers manipulators

Lecture 7 - Electric Actuators

Lecture 8 - Actuators - Electric, Hydraulic, Pneumatic

Lecture 9 - Internal State Sensors

Lecture 10 - Internal State Sensors

Lecture 11 - External State Sensors

Lecture 12 - Trajectory planning

Lecture 13 - Trajectory planning

Lecture 14 - Trajectory planning

Lecture 15 - Trajectory planning

Lecture 16 - Trajectory planning

Lecture 17 - Trajectory planning

Lecture 18 - Trajectory planning

Lecture 19 - Trajectory planning

Lecture 20 - Forward Position Control

Lecture 21 - Inverse Problem

Lecture 22 - Velocity Analysis

Lecture 23 - Velocity Analysis

Lecture 24 - Dynamic Analysis

Lecture 25 - Image Processing

Lecture 26 - Image Processing

Lecture 27 - Image Processing

Lecture 28 - Image Processing

Lecture 29 - Image Processing

Lecture 30 - Image Processing

Lecture 31 - Robot Dynamics and Control

Lecture 32 - Robot Dynamics and Control

Lecture 33 - Robot Dynamics and Control

Lecture 34 - Robot Dynamics and Control

Lecture 35 - Robot Dynamics and Control

Lecture 36 - Robot Dynamics and Control

Lecture 37 - Futuristic Topics in Robotics

Lecture 38 - Robot Dynamic and Control-Case Studies

Lecture 39 - Robot Dynamic and Control-Case Studies

Lecture 40 - Futuristic Topics in Robotics

NPTEL : NOC:Optimization from Fundamentals (Mechanical Engineering)

Co-ordinators : Prof. Ankur A. Kulkarni

Lecture 1 - Introduction

Lecture 2 - Isoperimetric problem

Lecture 3 - Review of real analysis (sequences and convergence)

Lecture 4 - Bolzano-Weierstrass theorem and completeness axiom

Lecture 5 - Open sets, closed sets and compact sets

Lecture 6 - Continuity and Weierstrass theorem

Lecture 7 - Weierstrass theorem

Lecture 8 - Different solution concepts

Lecture 9 - Different types of constraints

Lecture 10 - Taylor's theorem

Lecture 11 - First order sufficient condition

Lecture 12 - Second order necessary condition

Lecture 13 - Least square regression

Lecture 14 - Least square regression (Continued...)

Lecture 15 - Implicit function theorem

Lecture 16 - Optimization with equality constraints and introduction to Lagrange multipliers - I

Lecture 17 - Optimization with equality constraints and introduction to Lagrange multipliers - II

Lecture 18 - Least norm solution of underdetermined linear system

Lecture 19 - Transformation of optimization problems - I

Lecture 20 - Transformation of optimization problems - II

Lecture 21 - Transformation of optimization problems - III

Lecture 22 - Convex Analysis - I

Lecture 23 - Convex Analysis - II

Lecture 24 - Convex Analysis - III

Lecture 25 - Polyhedrons

Lecture 26 - Minkowski-Weyl Theorem

Lecture 27 - Linear Programming Problems

Lecture 28 - Extreme points and optimal solution of an LP

Lecture 29 - Extreme points and optimal solution of an LP (Continued...)

Lecture 30 - Extreme points and basic feasible solutions

Lecture 31 - Equivalence of extreme point and BFS

Lecture 32 - Equivalence of extreme point and BFS (Continued...)

Lecture 33 - Examples of Linear Programming

Lecture 34 - Weak and Strong duality

Lecture 35 - Proof of strong duality

Lecture 36 - Proof of strong duality (Continued...)

Lecture 37 - Farkas' lemma

Lecture 38 - Max-flow Min-cut problem

Lecture 39 - Shortest path problem

Lecture 40 - Complementary Slackness

Lecture 41 - Proof of complementary slackness

Lecture 42 - Tangent cones

Lecture 43 - Tangent cones (Continued...)

Lecture 44 - Constraint qualifications, Farkas' lemma and KKT

Lecture 45 - KKT conditions

Lecture 46 - Convex optimization and KKT conditions

Lecture 47 - Slater condition and Lagrangian Dual

Lecture 48 - Weak duality in convex optimization and Fenchel dual

Lecture 49 - Geometry of the Lagrangian

Lecture 50 - Strong duality in convex optimization - I

Lecture 51 - Strong duality in convex optimization - II

Lecture 52 - Strong duality in convex optimization - III

Lecture 53 - Line search methods for unconstrained optimization

Lecture 54 - Wolfe conditions

Lecture 55 - Line search algorithm and convergence

Lecture 56 - Steepest descent method and rate of convergence

Lecture 57 - Newton's method

Lecture 58 - Penalty methods

Lecture 59 - L1 and L2 Penalty methods

Lecture 60 - Augmented Lagrangian methods

Lecture 61 - Cutting plane methods

Lecture 62 - Interior point methods for linear programming

Lecture 63 - Dynamic programming: Inventory control problem

Lecture 64 - Policy and value function

Lecture 65 - Principle of optimality in dynamic programming

Lecture 66 - Principle of optimality applied to inventory control problem

Lecture 67 - Optimal control for a system with linear state dynamics and quadratic cost

NPTEL : NOC:Design of Mechatronic Systems (Mechanical Engineering)

Co-ordinators : Prof. Prasanna Gandhi

Lecture 1 - Introduction

Lecture 2 - Elements of Mechatronic Systems - Part I

Lecture 3 - Elements of Mechatronic Systems - Part II

Lecture 4 - Elements of Mechatronic Systems - Part III

Lecture 5 - CD-ROM - Part I

Lecture 6 - CD-ROM - Part II

Lecture 7 - CD-ROM - Part III

Lecture 8 - Scanner

Lecture 9 - Integrated Mechanical-Electronics Philosophy - Part I

Lecture 10 - Integrated Mechanical-Electronics Philosophy - Part II

Lecture 11 - Smart Sensors Concept

Lecture 12 - Compliant Mechanisms

Lecture 13 - Microprocessor Building Blocks I - Combinational Circuits

Lecture 14 - Microprocessor Building Blocks II - Sequential Circuits

Lecture 15 - Microprocessor Memory and Addressing

Lecture 16 - Timing and control unit: Primitive Microprocessor

Lecture 17 - Microcontroller Architecture - I

Lecture 18 - Microcontroller Architecture - II

Lecture 19 - Microcontroller Programming Philosophy

Lecture 20 - Hardware Interfaces

Lecture 21 - Interfacing Actuator using PWM in Tiva Microcontroller

Lecture 22 - Interfacing Encoder using QEI in Tiva Launchpad + ISR

Lecture 23 - Mathematical Modelling: Overview and Context

Lecture 24 - Modelling Friction in a System

Lecture 25 - Modelling DC Motor with loads

Lecture 26 - Lagrange formulation fundamentals

Lecture 27 - Lagrange formulation examples

Lecture 28 - Dynamics: 2-R Manipulator

Lecture 29 - Control formulation: Regulation and Tracking

Lecture 30 - Fundamentals of Simulation of dynamics using MATLAB

Lecture 31 - Selection of Sensors and Actuators - Part I

Lecture 32 - Selection of Sensors and Actuators - Part II

Lecture 33 - Concept of feedback

Lecture 34 - Closed loop control implementation in microcontroller

Lecture 35 - Mathematical representations of systems for control

Lecture 36 - Control design for linear systems

Lecture 37 - Application of control design for linear systems

Lecture 38 - Mathematical Preliminaries- Nonlinear Control

Lecture 39 - Fundamentals of Lyapunov theory

Lecture 40 - Application of Lyapunov stability analysis

Lecture 41 - Trajectory tracking controller: Robotic system

Lecture 42 - Fundamentals of sampling

Lecture 43 - Shannon sampling theorem and signal reconstruction

Lecture 44 - Signal processing

Lecture 45 - Digital system representation and filters for mechatronics

Lecture 46 - Case study: Development of 3D microprinting system

Lecture 47 - Case study: 3D microprinting via Bulk lithography

Lecture 48 - Case study: Hele-Shaw system for novel fabrication

NPTEL : NOC:Nonlinear Adaptive Control (Mechanical Engineering)

Co-ordinators : Prof. Srikant Sukumar

Lecture 1 - Basic Concepts and Nomenclature

Lecture 2 - Preliminaries - Part 1

Lecture 3 - Preliminaries - Part 2

Lecture 4 - Preliminaries - Part 3

Lecture 5 - Preliminaries - Part 4

Lecture 6 - Preliminaries - Part 5

Lecture 7 - Barbalat's Lemma - Part 1

Lecture 8 - Barbalat's Lemma - Part 2

Lecture 9 - Convergence of Signals using Barbalat's Lemma - Part 1

Lecture 10 - Convergence of Signals using Barbalat's Lemma - Part 2

Lecture 11 - Notions of Stability - Part 1

Lecture 12 - Notions of Stability - Part 2

Lecture 13 - Stability Analysis with Examples - Part 1

Lecture 14 - Stability Analysis with Examples - Part 2

Lecture 15 - Stability Analysis with Examples - Part 3

Lecture 16 - Stability Analysis with Examples - Part 4

Lecture 17 - Stability Analysis in Linear Systems

Lecture 18 - Function Classes and Definiteness

Lecture 19 - Positive Definite Functions

Lecture 20 - Radially Unbounded Functions

Lecture 21 - Decrescent Functions

Lecture 22 - Lyapunov Stability Theorems - Part 1

Lecture 23 - Lyapunov Stability Theorems - Part 2

Lecture 24 - Lyapunov Stability Theorems - Part 3

Lecture 25 - Exponential Stability and Converse Lyapunov Theorems

Lecture 26 - Persistence of Excitation (PE): Introduction

Lecture 27 - Connection of PE to Stability, Uniform Complete Observability (UCO)

Lecture 28 - Exponential Stability of LTV systems, PE and Exponential Stability

Lecture 29 - Parameter Identifier Convergence under PE Condition

Lecture 30 - Analysis of Parameter Varying Systems using General Integral Lemma - Part 1

Lecture 31 - Analysis of Parameter Varying Systems using General Integral Lemma - Part 2

Lecture 32 - Adaptive Control Design: First Order Scalar Systems

Lecture 33 - Barbalat's Lemma and Signal Chasing Anslysis

Lecture 34 - Parameter Convergence in Adaptive Control Design

Lecture 35 - Adaptive Control Design: Second-Order Systems

Lecture 36 - Overcoming the Detectability Obstacle: Ortega Construction

Lecture 37 - Backstepping in Adaptive Control: Introduction - Part 1

Lecture 38 - Backstepping in Adaptive Control: Introduction - Part 2

Lecture 39 - Backstepping in Adaptive Control: Parameters Unmatched with Control - Part 1

Lecture 40 - Backstepping in Adaptive Control: Parameters Unmatched with Control - Part 2

Lecture 41 - How to Deal with Unknown Gains in Control

Lecture 42 - Setup of Model Reference Adaptive Control (MRAC) Problem

Lecture 43 - Model Reference Adaptive control: For Known and Unknown Parameters

Lecture 44 - Model Reference Adaptive control: Lyapunov Stability Analysis

Lecture 45 - Generalization of Adaptive Integrator Backstepping Method - Part 1

Lecture 46 - Generalization of Adaptive Integrator Backstepping Method - Part 2

Lecture 47 - Extended Matching Design for Avoiding Overparameterization

Lecture 48 - Adaptive Integrator Backstepping Method: An Example - Part 1

Lecture 49 - Adaptive Integrator Backstepping Method: An Example - Part 2

Lecture 50 - Extended Matching Design: An Example

Lecture 51 - Control Lyapunov Function

Lecture 52 - Tuning Function Adaptive Method

Lecture 53 - Adaptive Backstepping via Control Lyapunov Function (CLF)

Lecture 54 - Adaptive Backstepping via CLF: An Example

Lecture 55 - Robustness in Adaptive Control - Part 1

Lecture 56 - Robustness in Adaptive Control - Part 2

Lecture 57 - Parameter Projection in Adaptive Control - Part 1

Lecture 58 - Parameter Projection in Adaptive Control - Part 2

Lecture 59 - Parameter Projection in Adaptive Control - Part 3

Lecture 60 - Sigma- Modification and Epsilon-Modification in Adaptive Control

Lecture 61 - Initial Excitation in Adaptive Control - Part 1

Lecture 62 - Initial Excitation in Adaptive Control - Part 2

Lecture 63 - Initial Excitation in Adaptive Control - Part 3

Lecture 64 - Initial Excitation in Adaptive Control - Part 4

Lecture 65 - Initial Excitation in Adaptive Control - Part 5

Lecture 66 - Discussion on Historical Developments in Adaptive Control and Learning

Lecture 67 - Real Time Neural Network Based Control of a Robotic Manipulator - Part 1

Lecture 68 - Real Time Neural Network Based Control of a Robotic Manipulator - Part 2

Lecture 69 - Real Time Neural Network Based Control of a Robotic Manipulator - Part 3

Lecture 70 - Real Time Neural Network Based Control of a Robotic Manipulator - Part 4

Lecture 71 - Real Time Neural Network Based Control of a Robotic Manipulator - Part 5

NPTEL : NOC:Nonlinear Control Design (Mechanical Engineering)

Co-ordinators : Prof. Srikant Sukumar

Lecture 1 - Course Introduction

Lecture 2 - Examples of Nonlinear systems

Lecture 3 - Existence and uniqueness of solutions

Lecture 4 - Preliminaries and notations

Lecture 5 - Preliminaries: Normed linear space

Lecture 6 - Preliminaries: Induced Matrix Norms and Signal Norms

Lecture 7 - Signal Norms and Cauchy-Schwarz Inequality

Lecture 8 - Stability - Part 1

Lecture 9 - Stability - Part 2

Lecture 10 - Stability - Part 3

Lecture 11 - Stability - Part 4

Lecture 12 - Stability - Part 5

Lecture 13 - Lyapunov stability Theorems - Part 1

Lecture 14 - Lyapunov stability Theorems - Part 2

Lecture 15 - Lyapunov stability Theorems - Part 3

Lecture 16 - Lyapunov stability Theorems - Part 4

Lecture 17 - Lyapunov stability Theorems - Part 5

Lecture 18 - Lyapunov stability Theorems - Part 6

Lecture 19 - Proofs of Lyapunov Stability Theorems - Part 1

Lecture 20 - Proofs of Lyapunov Stability Theorems - Part 2

Lecture 21 - Proofs of Lyapunov Stability Theorems - Part 3

Lecture 22 - Proofs of Lyapunov Stability Theorems - Part 4

Lecture 23 - La Salle's Invariance Principle - Part 1

Lecture 24 - La Salle's Invariance Principle - Part 2

Lecture 25 - La Salle's Invariance Principle - Part 3

Lecture 26 - La Salle's Invariance Principle - Part 4

Lecture 27 - La Salle's Invariance Principle - Part 5

Lecture 28 - La Salle's Invariance Principle - Part 6

Lecture 29 - Control Lyapunov functions - Part 1

Lecture 30 - Control Lyapunov functions - Part 2

Lecture 31 - Control Lyapunov functions - Part 3

Lecture 32 - Control Lyapunov functions - Part 4

Lecture 33 - Control Lyapunov functions - Part 5

Lecture 34 - Backstepping method for control design - Part 1

Lecture 35 - Backstepping method for control design - Part 2

Lecture 36 - Backstepping method for control design - Part 3

Lecture 37 - Backstepping method for control design - Part 4

Lecture 38 - Passivity based control - Part 1

Lecture 39 - Passivity based control - Part 2

Lecture 40 - Passivity based control - Part 3

Lecture 41 - Passivity in control systems - Part 1 (Prof. Antonio Loria)

Lecture 42 - Passivity in control systems - Part 2 (Prof. Antonio Loria)

Lecture 43 - Passivity in control systems - Part 3 (Prof. Antonio Loria)

Lecture 44 - Passivity in control systems - Part 4 (Prof. Antonio Loria)

Lecture 45 - Passivity based control - Part 4

Lecture 46 - Passivity based control - Part 5

Lecture 47 - Passivity based control - Part 6

Lecture 48 - Passivity based control - Part 7

Lecture 49 - Feedback Linearization - Part 1

Lecture 50 - Feedback Linearization - Part 2

Lecture 51 - Feedback Linearization - Part 3

Lecture 52 - Feedback Linearization - Part 4

Lecture 53 - Feedback Linearization - Part 5

Lecture 54 - Feedback Linearization - Part 6

Lecture 55 - Feedback Linearization - Part 6

Lecture 56 - Feedback Linearization - Part 7

Lecture 57 - Feedback Linearization - Part 8

Lecture 58 - Feedback Linearization - Part 9

Lecture 59 - Feedback Linearization - Part 10

Lecture 60 - Feedback Linearization - Part 11

Lecture 61 - Barbalat's Lemma

Lecture 62 - Application of Barbalat's Lemma

Lecture 63 - Adaptive control - Part 1

Lecture 64 - Adaptive control - Part 2

Lecture 65 - State constrained control - Part 1

Lecture 66 - State constrained control - Part 2

Lecture 67 - State constrained control - Part 3

Lecture 68 - Finite time stability - Part 1

Lecture 69 - Finite time stability - Part 2

Lecture 70 - Finite time stability - Part 3

Lecture 71 - Sliding mode control - Part 1

Lecture 72 - Sliding mode control - Part 2

Lecture 73 - Sliding mode control - Part 3

NPTEL : Tribology (Mechanical Engineering)

Co-ordinators : Dr. Harish Hirani

Lecture 1 - Introduction

Lecture 2 - Interdisciplinary Approach and Economic Benefits

Lecture 3 - Friction

Lecture 4 - Friction Estimation

Lecture 5 - Friction Instability

Lecture 6 - Wear

Lecture 7 - Adhesive Wear

Lecture 8 - Wear Mechanisms

Lecture 9 - Wear Mechanisms - 2

Lecture 10 - Wear Analysis

Lecture 11 - Lubrication and Lubricants

Lecture 12 - Boundary Lubrication

Lecture 13 - Lubrication Mechanisms

Lecture 14 - Hydrodynamic Lubrication

Lecture 15 - Lubricant Classifications

Lecture 16 - Solid and Semi Solid Lubricants

Lecture 17 - Liquid Lubricants

Lecture 18 - Lubricant Additives

Lecture 19 - Fluid Film Lubrication

Lecture 20 - Reynolds Equation

Lecture 21 - Solution of Reynolds Equation

Lecture 22 - Hybrid Solution Approach (to solve Reynolds Equation)

Lecture 23 - Finite Difference Method to Solve Reynolds Equation

Lecture 24 - Viscosity Variation

Lecture 25 - Estimating Elastic Deformation

Lecture 26 - Thermo Hydrodynamic Lubrication

Lecture 27 - Application of Tribology

Lecture 28 - Rolling Element Bearings

Lecture 29 - Rolling Element Bearings (Continued...)

Lecture 30 - Rolling Element Bearings (Continued...)

Lecture 31 - Selection of Rolling Element Bearings

Lecture 32 - Friction of Rolling Element Bearing

Lecture 33 - Bearing Clearance

Lecture 34 - Bearing Lubrication

Lecture 35 - Tribology of Gears

Lecture 36 - Friction and Lubrication of Gears

Lecture 37 - Friction and Lubrication of Gears (Continued...)

Lecture 38 - Surface Fatigue of Spur Gears

Lecture 39 - Journal Bearings

Lecture 40 - Hydrostatic Bearings

Lecture 41 - Hydrodynamic Journal Bearings

Lecture 42 - Design of Hydrodynamic Journal Bearings

NPTEL : Computer Aided Design and Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. P.V. Madhusudan Rao, Prof. Anoop Chawla

Lecture 1 - An Introduction to CAD

Lecture 2 - Input Output Devices, Raster Graphics

Lecture 3 - Raster Graphics - I

Lecture 4 - Raster Graphics - II

Lecture 5 - Polygon Filling

Lecture 6 - Windowing and Clipping

Lecture 7 - Clipping of Polygons

Lecture 8 - 2D Transformations

Lecture 9 - 3D Transformations and Projection

Lecture 10 - Perspective Projections

Lecture 11 - Projections and Hidden Surface Removal

Lecture 12 - Hidden Surface Removal

Lecture 13 - Hidden Surface Removal

Lecture 14 - Hidden Surface Removal

Lecture 15 - Finite Element Method : An Introduction

Lecture 16 - Galerkin's Approach

Lecture 17 - Galerkin's Method : 1D Finite Element Method

Lecture 18 - 1D Finite Element Problems

Lecture 19 - 1D Finite Element Problems

Lecture 20 - FE Problems : Solving for Q

Lecture 21 - 1D - FE Problems : Galerkin's Approach

Lecture 22 - Penalty Approach and Multi Point Boundary

Lecture 23 - Quadratic Shape Functions

Lecture 24 - 2D - FE Problems

Lecture 25 - 2D - FE Problems (Continued.)

Lecture 26 - 3D - FE Problems

Lecture 27 - 3D - Tetrahedral and 2D - Quadrilateral Element

Lecture 28 - Mesh Preparation

Lecture 29 - Modeling of Curves

Lecture 30 - Modeling of Curves

Lecture 31 - Modeling of Curves

Lecture 32 - Modeling of B-Spline Curves

Lecture 33 - Modeling of B-spline Curves

Lecture 34 - Surface Modeling

Lecture 35 - Surface Modeling

Lecture 36 - Display of Curves and Surfaces

Lecture 37 - Solid Modeling

Lecture 38 - Solid Modeling

Lecture 39 - Solid Modeling Using Octrees

Lecture 40 - (Lecture Missing)

Lecture 41 - Computer Aided Design

Lecture 42 - Computer Aided Manufacturing

Lecture 43 - What is CAD/CAM

Lecture 44 - An Overview of Geometric Modeling

Lecture 45 - Parametric Cubic Curve

Lecture 46 - Parametric Bezier Curve

Lecture 47 - B-Spline Curve

Lecture 48 - Parametric Surfaces - Part-1

Lecture 49 - Parametric Surfaces - Part-2

Lecture 50 - Solid Modeling

Lecture 51 - Geometric & Product Data Exchange

Lecture 52 - Reverse Engineering

NPTEL : Project and Production Management (Mechanical Engineering)

Co-ordinators : Prof. Arun Kanda

Lecture 1 - Project and Production Management - An Overview

Lecture 2 - Project Management: An Overview

Lecture 3 - Project Identification and Screening

Lecture 4 - Project Appraisal - Part I

Lecture 5 - Project Appraisal - Part II

Lecture 6 - Project Selection

Lecture 7 - Project Representation

Lecture 8 - Consistency and Redundancy in Project Networks

Lecture 9 - Basic scheduling with A-O-A Networks

Lecture 10 - Basic Scheduling with A-O-N Networks

Lecture 11 - Project Scheduling with Probabilistic Activity

Lecture 12 - Linear Time-Cost Tradeoffs in Projects

Lecture 13 - Project Crashing with Multiple Objectives

Lecture 14 - Resource Profiles and Leveling

Lecture 15 - Limited Resource Allocation

Lecture 16 - Project Monitoring and Control with PERT/Cost

Lecture 17 - Team Building and Leadership in Projects

Lecture 18 - Organizational and Behavioral Issues

Lecture 19 - Computers in Project Management

Lecture 20 - Project Completion and Review

Lecture 21 - Life Cycle of a Production System

Lecture 22 - Role of Models in Production Management

Lecture 23 - Financial Evaluation of capital Decisions

Lecture 24 - Decision Trees and Risk Evaluation

Lecture 25 - Introducing New Products & Services

Lecture 26 - Economic Evaluation of New Products & Services

Lecture 27 - Product Mix Decisions

Lecture 28 - Product & Process Design

Lecture 29 - Issues in Location of Facilities

Lecture 30 - Mathematical Models for Facility Location

Lecture 31 - Layout planning

Lecture 32 - Computerised Layout Planning

Lecture 33 - Product Layouts and Assembly Line Balancing

Lecture 34 - Forecasting

Lecture 35 - The Analysis of Time Series

Lecture 36 - Aggregate Production Planning: Basic Concepts

Lecture 37 - Modelling Approaches

Lecture 38 - Basic Inventory Principles

Lecture 39 - Inventory Modelling

Lecture 40 - Material Requirements Planning

Lecture 41 - Scheduling of Job Shops

NPTEL : NOC:RAC Product Design (Mechanical Engineering)

Co-ordinators : Prof. Sanjeev Jain

Lecture 1 - Introduction to Design

Lecture 2 - Design Considerations

Lecture 3 - Basic Concepts Psychrometry and Air-Conditioning

Lecture 4 - Refrigerants

Lecture 5 - Refrigerant Properties and Applications

Lecture 6 - Refrigeration Cycle and Components

Lecture 7 - Compressor Selection

Lecture 8 - Expansion Devices

Lecture 9 - Condensers and Evaporators

Lecture 10 - Types of Heat Exchangers and Air Conditioning Systems

Lecture 11 - Selection of Air Conditioning Systems for Hostels

Lecture 12 - Case Study on a Railway Air Conditioning System

Lecture 13 - Vibration and noise issues in railway AC systems

Lecture 14 - New product launch process

Lecture 15 - Case study on a telecom cooling system and Emerging technologies

NPTEL : NOC:Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. S.R kale

Lecture 1 - Thermodynamic Concepts: Applications of thermodynamics

Lecture 2 - Thermodynamic Concepts: System definition,Heat, Work and Mass Flow

Lecture 3 - Thermodynamic Concepts: Questions and Answers

Lecture 4 - Thermodynamic Concepts: Properties,State and Equilibrium

Lecture 5 - Thermodynamic Concepts: Process, Cycles and Applications

Lecture 6 - Thermodynamic Concepts: Steady state, Reversible and Irreversible processes

Lecture 7 - Thermodynamic Concepts: Causes of irreversibility

Lecture 8 - Thermodynamic Concepts: Thermal reservoirs

Lecture 9 - Thermodynamic Concepts: Pressure and temperature

Lecture 10 - Thermodynamic Concepts: Revision and Summary

Lecture 11 - Laws Of Thermodynamics: Mass flow rate, Conservation of mass, Flow work

Lecture 12 - Laws Of Thermodynamics: Zeroth Law

Lecture 13 - Laws Of Thermodynamics: First Laws Of Thermodynamics, 1st law for Control Mass, Internal Energy, enthalpy

Lecture 14 - Laws Of Thermodynamics: 1st law for Control Volume

Lecture 15 - Laws Of Thermodynamics: Revision, Cycles, Second Law statements, Clausius inequality

Lecture 16 - Laws Of Thermodynamics: Introduction to carnot Cycle

Lecture 17 - Laws Of Thermodynamics: Entropy,Entropy change for a system

Lecture 18 - Laws Of Thermodynamics: Thermodynamics relations,Bernoulli's equation

Lecture 19 - Laws Of Thermodynamics: Devices, Cycles

Lecture 20 - Properties of a Pure Substance: Thermodynamic behaviour of a pure substance

Lecture 21 - Properties of a Pure Substance: Saturated states, Subcooled liquid, Superheated vapour

Lecture 22 - Properties of a Pure Substance: Vapour pressure curve, Reference state

Lecture 23 - Properties of a Pure Substance: Saturated states

Lecture 24 - Properties of a Pure Substance: p-h diagram

Lecture 25 - Properties of a Pure Substance: T-s diagram, h-s diagram

Lecture 26 - Properties of a Pure Substance: Critical state, Compressibility factor

Lecture 27 - Properties of a Pure Substance: Ideal gas behaviour, Equations of state, Specific heat

Lecture 28 - Properties of a Pure Substance: Ideal gas processes

Lecture 29 - Properties of a Pure Substance: Gibbs energy, Helmholtz function, Property relations

Lecture 30 - Properties of a Pure Substance: Process analysis, Summary

Lecture 31 - Laws of Thermodynamics: Carnot Cycle Realization

Lecture 32 - Applications, Problem Solving: Devices, Schematic/Flow Diagrams

Lecture 33 - Applications, Problem Solving: Positive Displacement Devices

Lecture 34 - Applications, Problem Solving: Heat Exchangers

Lecture 35 - Applications, Problem Solving: Compressors, Fans and Blowers, Pumps

Lecture 36 - Applications, Problem Solving: Turbines

Lecture 37 - Applications, Problem Solving: Nozzle, Diffuser, Expansion Valve, Pipe/duct flow

Lecture 38 - Applications, Problem Solving: De-Superheater, Deaerator, Separation

Lecture 39 - Applications, Problem Solving: Unsteady processes, Filling, Evacuation

Lecture 40 - Applications, Problem Solving: Realization of Carnot cycle, Practical cycles, Air-standard cycles

Lecture 41 - Applications, Problem Solving: Materials, Compressible flow

Lecture 42 - Applications, Problem Solving: Otto cycle, Diesel cycle

Lecture 43 - Applications, Problem Solving: Closed system

Lecture 44 - Applications, Problem Solving: Open System

Lecture 45 - Properties of Ideal Gas Mixtures: Introduction to mixtures properties

Lecture 46 - Properties of Ideal Gas Mixtures: Equation of state, Conservation equations

Lecture 47 - Gas-Vapour Mixtures: Psychrometry, Moist air Properties,

Lecture 48 - Gas-Vapour Mixtures: Properties, Conservation of Mass and Energy

Lecture 49 - Gas-Vapour Mixtures: Psychrometric chart, Applications

Lecture 50 - Thermodynamics of Reacting sytems: Introduction to reacting systems and combustion

Lecture 51 - Thermodynamics of Reacting sytems: Flames, Stoichiometry

Lecture 52 - Thermodynamics of Reacting sytems: Analysis of Closed and Open Systems, Enthalpy of Formation

Lecture 53 - Phase and Chemical Equilibrium: Introduction. Chemical equilibrium. Gibbs function

Lecture 54 - Phase and Chemical Equilibrium: Equilibrium constant. Phase equilibrium

NPTEL : NOC:Solid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Ajeet Kumar

Lecture 1 - Mathematical Concepts: Working with Vectors and Tensors

Lecture 2 - Traction Vector

Lecture 3 - Stress Tensor and its Matrix Representation

Lecture 4 - Transformation of Stress Matrix

Lecture 5 - Stress Equilibrium Equations : Balance of Linear and Angular Momentum

Lecture 6 - Balance of Angular Momentum (Continued...)

Lecture 7 - Principal Planes and Principal stress components

Lecture 8 - Maximizing the Shear Component of Traction

Lecture 9 - Mohr's Circle

Lecture 10 - Mohr's Circle (Continued...), Stress Invariants, Decomposition of the Stress Tensor

Lecture 11 - Concept of Strain Tensor

Lecture 12 - Longitudinal and Shear Strains

Lecture 13 - Local Volumetric Strain and Local Infinitesimal Rotation

Lecture 14 - Similarity in Properties of Stress and Strain Tensors

Lecture 15 - Stress-Strain Relation

Lecture 16 - Stress-Strain Relation for Isotropic Materials

Lecture 17 - Linear Momentum Balance in Cylinderical Coordinate System

Lecture 18 - Linear Momentum Balance in Cylinderical Coordinate System (Continued...)

Lecture 19 - Strain Matrix Cylinderical Coordinate System

Lecture 20 - Extension-Torsion-Inflation in a Hollow Cylinder

Lecture 21 - Extension-Torsion-Inflation in a Hollow Cylinder (Continued...)

Lecture 22 - Solving Problems Involving Torsion of Shafts

Lecture 23 - Pure Bending of Rectangular Beams

Lecture 24 - Bending of Beams (Continued...)

Lecture 25 - Bending of Unsymmetrical Beams

Lecture 26 - Concept of Shear Center

Lecture 27 - Theoy of Beams

Lecture 28 - Theoy of Beams (Continued...) and Beam Buckling

Lecture 29 - Energy Methods

Lecture 30 - Energy Methods (Continued...)

Lecture 31 - Theories of Failure

Lecture 32 - Theories of Failure (Continued...)

NPTEL : NOC:Introduction to Uncertainty Analysis and Experimentation (Mechanical Engineering)

Co-ordinators : Unknown

Lecture 1 - Course Outline, Introduction

Lecture 2 - Experimentation Processes and Applications Overview

Lecture 3 - Developments in Uncertainty Analysis, Approach

Lecture 4 - Errors, Their Causes and Classification

Lecture 5 - Errors to Uncertainty via Statistics

Lecture 6 - Sources of Errors, Uncertainty Definitions

Lecture 7 - Experimentation - I

Lecture 8 - Experimentation Stages / Phases I

Lecture 9 - Experimentation Stages / Phases II

Lecture 10 - Uncertainty Analysis Processes

Lecture 11 - Instrument ans DAS

Lecture 12 - Basic procedure - I

Lecture 13 - Basic procedure - II

Lecture 14 - Evaluating systematic uncertainties

Lecture 15 - Worksheets for uncertainty in a measurement, Examples

Lecture 16 - Examples of uncertainty in a measurement

Lecture 17 - Methodologies, Multiple tests method

Lecture 18 - Single test, Basics of taylor Series Method

Lecture 19 - Sensitivity coefficient, Result uncertainty from TSM

Lecture 20 - Result uncertainty TSM: Special cases

Lecture 21 - Method selection, Worksheets for result uncertainty

Lecture 22 - Examples for result uncertainty - 1

Lecture 23 - Examples for result uncertainty - 2

Lecture 24 - Regression Introduction

Lecture 25 - Regression analysis - Linear, single variable

Lecture 26 - Correlation, Related topics

Lecture 27 - Reporting uncertainties

Lecture 28 - Validation and verification aspects, Data archiving

Lecture 29 - Course overview

NPTEL : NOC:Engineering Graphics and Design (Mechanical Engineering)

Co-ordinators : Prof. Naresh Varma Datla and Prof. S.R Kale

Lecture 1 - Introduction

Lecture 2 - Examples of visualization - 1

Lecture 3 - Examples of visualization - 2

Lecture 4 - Visualization and drawing

Lecture 5 - Sketch to engineering drawing

Lecture 6 - Types of projections

Lecture 7 - Multiview projections

Lecture 8 - 1st and 3rd angle projections

Lecture 9 - Sketching

Lecture 10 - Visualization

Lecture 11 - Drawing sheet

Lecture 12 - Lines

Lecture 13 - Dimensioning

Lecture 14 - Projection of a point line and plane

Lecture 15 - Projection of simple objects

Lecture 16 - Example Projection of a solid

Lecture 17 - Example Projection of an object

Lecture 18 - Types of Solids

Lecture 19 - Polygons Construction and Projections

Lecture 20 - Rotation of Solids

Lecture 21 - Example Rotation of Solids

Lecture 22 - Section views

Lecture 23 - Sectioning practices

Lecture 24 - Auxiliary views

Lecture 25 - Example Section View

Lecture 26 - Example Auxiliary View

Lecture 27 - Pictorial Drawings

Lecture 28 - Construction of Isometric Drawings

Lecture 29 - Example Isometric drawings

Lecture 30 - Working Drawing

Lecture 31 - Example Sectional View of Assembly

Lecture 32 - Computer Aided Design

Lecture 33 - Autodesk Inventor Environment

Lecture 34 - Sketching for Solid Modelling

Lecture 35 - Example 1 Extrude Hole Fillet Chamfer

Lecture 36 - Example 2 Rib Mirror

Lecture 37 - Example 3

Lecture 38 - Revolve Loft Pattern

Lecture 39 - Example 4

Lecture 40 - Example 5

Lecture 41 - Spline Sweep Shell

Lecture 42 - Example 6

Lecture 43 - Example 7

Lecture 44 - Drawing from Solid Model

Lecture 45 - Assembly with constraints

Lecture 46 - Example 8

Lecture 47 - Example 9

Lecture 48 - Example 10

Lecture 49 - Example 11

Lecture 50 - Civil and architectural drawings

NPTEL : NOC:Ideal Fluid Flows using Complex Analysis (Mechanical Engineering)

Co-ordinators : Prof. Amit Gupta

Lecture 1 - Ideal fluids, Velocity potential, Potential flows

Lecture 2 - Stream function, Orthogonality of streamlines and equipotential lines

Lecture 3 - Complex variables, Analyticity, Cauchy - Riemann equations, Complex potential, Complex velocity

Lecture 4 - Elementary flows : Uniform flow, Source and Sink, Free vortex

Lecture 5 - Flow in a bend, Flow around a sharp edge

Lecture 6 - Superposition of source and sink : doublet flow

Lecture 7 - Superposition of uniform flow and doublet

Lecture 8 - Superposition of uniform flow, doublet and free vortex

Lecture 9 - Superposition of source and uniform flow

Lecture 10 - Problem solving session - 1

Lecture 11 - Problem solving session - 2

Lecture 12 - Method of images, Forces on a body, Blasius theorem

Lecture 13 - Calculation of forces using derived flow field

Lecture 14 - Introduction to conformal transformation

Lecture 15 - Singularities and their transformations

NPTEL : NOC:Experimental Modal Analysis (Mechanical Engineering)

Co-ordinators : Subodh V. Modak

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : NOC:Mechanical Behavior of Polymers and Composites (Mechanical Engineering)

Co-ordinators : Dr. Naresh V Datla

Lecture 1 - Introduction to polymers

Lecture 2 - Polymer structure

Lecture 3 - Polymer classification

Lecture 4 - Polymer length, packing and tacticity

Lecture 5 - Glass transition temperature

Lecture 6 - Temperature effects, glassy regime

Lecture 7 - Viscoelastic, rubbery, viscous, decomposition

Lecture 8 - Relaxation and creep tests

Lecture 9 - Failure of polymers

Lecture 10 - Heaviside, Dirac delta, Laplace

Lecture 11 - Introduction to linear viscoelasticity

Lecture 12 - Phenomenological models for linear viscoelasticity

Lecture 13 - Maxwell model

Lecture 14 - Kelvin model

Lecture 15 - Three and four parameter models

Lecture 16 - Generalized Maxwell and Kelvin models

Lecture 17 - Boltzman superposition principle

Lecture 18 - Alfrey's correspondence principle

Lecture 19 - Analysis of viscoelastic bars

Lecture 20 - Analysis of viscoelastic beams

Lecture 21 - Dynamic mechanical analysis (DMA)

Lecture 22 - Dynamic mechanical thermal analysis (DMTA)

Lecture 23 - Time temperature superposition principle (TTSP)

Lecture 24 - Plastic design consideration and practices

Lecture 25 - What are composites?

Lecture 26 - Composite materials and types

Lecture 27 - Composite advantages and applications

Lecture 28 - Fabrication and other aspects of composites

Lecture 29 - 3D stress and strain components

Lecture 30 - Symmetry in stress, strain and stiffness matrix

Lecture 31 - Monoclinic, orthotropic and isotropic materials

Lecture 32 - 3D stress strain relation for orthotropic material

Lecture 33 - Plane stress: Specially orthotropic material

Lecture 34 - Plane stress: Generally orthotropic material

Lecture 35 - Lamina engineering constants

Lecture 36 - Lamina hygrothermal effects

Lecture 37 - Lamina fundamental strengths

Lecture 38 - Lamina failure criteria

Lecture 39 - Tsai-Hill and Hoffman failure criteria

Lecture 40 - Micromechanics: Assumptions, RVE

Lecture 41 - Micromechanics: Stiffness prediction

Lecture 42 - Micromechanics: Stiffness and strength

Lecture 43 - Macromechanics of laminate

Lecture 44 - Classical laminate theory

Lecture 45 - Classical laminate theory - II

Lecture 46 - Symmetric laminates, orthotropic laminates

Lecture 47 - Angle-ply, cross-ply and quasi-isotropic laminates

Lecture 48 - Hygrothermal stresses in laminates

Lecture 49 - Laminate failure

Lecture 50 - Design practices with laminates

Lecture 51 - Sandwich structures

Lecture 52 - Composites testing

Lecture 53 - Joining of composites

NPTEL : NOC:Data-Enabled Tribological Engineering: From Experiments to Predictive Models (Mechanical Engineering)

Co-ordinators : Prof. (HAG) Harish Hirani

Lecture 1 - Introduction to Tribology

Lecture 2 - Tribological Interfaces

Lecture 3 - Fundamentals of Friction and Wear

Lecture 4 - Adhesion, Abrasion, and Surface Fatigue Mechanisms

Lecture 5 - Wear Measurement Techniques

Lecture 6 - Principles of Lubrication, types of Lubricants and their properties

Lecture 7 - Lubrication regimes and film thickness calculations

Lecture 8 - Mixed Lubrication

Lecture 9 - Hydrodynamic Lubrication Theory

Lecture 10 - Design Considerations for Hydrodynamic Lubrication Systems

Lecture 11 - Elastohydrodynamic Lubrication

Lecture 12 - Solid Lubrication

Lecture 13 - Surface modification techniques for tribological applications

Lecture 14 - Thin film coatings and their tribological properties

Lecture 15 - Nanotribology

Lecture 16 - Tribocorrosion

Lecture 17 - Wear testing techniques and standards

Lecture 18 - Measurement and analysis of wear debris

Lecture 19 - Experimental Design and Statistical Analysis

Lecture 20 - Introduction to Data-Enabled Engineering

Lecture 21 - Data Collection and Preprocessing

Lecture 22 - Feature Extraction and Selection

Lecture 23 - Introduction to Machine Learning Algorithms

Lecture 24 - Regression and Classification Algorithms for Tribological Modeling

Lecture 25 - Deep Learning for Tribological Engineering

Lecture 26 - Data-Driven Models for Friction Prediction

Lecture 27 - Data-Driven Models for Wear Prediction

Lecture 28 - Data-Driven Models for Lubricant Optimization

Lecture 29 - Data-Driven Models for Tribofilm Formation

Lecture 30 - Data-Driven Models for Tribocorrosion Prediction

Lecture 31 - Prediction of Coating and Surface Treatment Performance

Lecture 32 - Optimization of Surface Engineering Processes using Machine Learning

Lecture 33 - Uncertainty Quantification and Sensitivity Analysis

Lecture 34 - Data Management and Ethics in Data-Enabled Engineering

Lecture 35 - Case Studies in Data-Enabled Tribological Engineering

Lecture 36 - Future Directions in Data-Enabled Tribological Engineering

NPTEL : Nonlinear Vibration (Mechanical Engineering)

Co-ordinators : Prof. S.K. Dwivedy

Lecture 1 - Introduction of Nonlinear systems

Lecture 2 - Review of Linear vibrating systems

Lecture 3 - Phenomena associated with Nonlinear systems

Lecture 4 - Commonly observed Phenomena in Nonlinear systems

Lecture 5 - Force and Moment based Approach

Lecture 6 - Energy based approach Extended Hamiltonâ€™s principle and Lagrange Priciple

Lecture 7 - Derivation of Equation of motion of nonlinear discrete system (More examples)

Lecture 8 - Derivation of Equation of motion of nonlinear continuous system - 1

Lecture 9 - Derivation of Equation of motion of nonlinear continuous system - 2

Lecture 10 - Ordering of nonlinear Equation of motion

Lecture 11 - Qualitative Analysis Straight forward expansion

Lecture 12 - Numerical method Straight forward expansion

Lecture 13 - Lindstedt Poincareâ€™ technique

Lecture 14 - Method of multiple scales

Lecture 15 - Method of Harmonic balance

Lecture 16 - Method of averaging

Lecture 17 - Generalized Method of averaging

Lecture 18 - Krylov-Bogoliubov-Mitropolski technique

Lecture 19 - Incremental harmonic balance method and Intrinsic multiple scale harmonic balance method

Lecture 20 - Modified Lindstedt Poincareâ€™ technique

Lecture 21 - Stability and Bifurcation of Fixed-point response - 1

Lecture 22 - Stability and Bifurcation of Fixed-point response - 2

Lecture 23 - Stability and Bifurcation of Fixed-point response - 3

Lecture 24 - Stability and Bifurcation of Fixed-point response - 4

Lecture 25 - Stability Analysis of Periodic response

Lecture 26 - Bifurcation of Periodic response And Introduction to quasi-periodic and Chaotic response

Lecture 27 - Quasi-Periodic and Chaotic response

Lecture 28 - Numerical methods to obtain roots of characteristic equation and time response

Lecture 29 - Numerical methods to obtain time response

Lecture 30 - Numerical methods to obtain frequency response

Lecture 31 - Free Vibration of Single degree of freedom Nonlinear systems with Cubic and quadratic nonlinearities

Lecture 32 - Free Vibration of Single degree of freedom Nonlinear systems with Cubic and quadratic nonlinearities: effect of damping

Lecture 33 - Free Vibration of multi- degree of freedom Nonlinear systems with Cubic and quadratic nonlinearities

Lecture 34 - Forced nonlinear Vibration Single degree of freedom Nonlinear systems with Cubic nonlinearities:

Lecture 35 - Forced nonlinear Vibration Single and multi- degree of freedom Nonlinear systems

Lecture 36 - Nonlinear Forced-Vibration of Single and Multi Degree-of-Freedom System

Lecture 37 - Analysis of Multi- degree of freedom system

Lecture 38 - Nonlinear Vibration of Parametrically excited system: Axially loaded sandwich beam

Lecture 39 - Nonlinear Vibration of Parametrically excited system: Elastic and Magneto-elastic beam

Lecture 40 - Nonlinear Vibration of Parametrically excited system with internal resonance

NPTEL : Theory and Practice of Rotor Dynamics (Mechanical Engineering)

Co-ordinators : Prof. Rajiv Tiwari

Lecture 1 - Introduction

Lecture 2 - A Brief History of Rotor Dynamics

Lecture 3 - The State of the Art of Rotor Dynamics

Lecture 4 - Simple Rotor Models with Rigid Bearings

Lecture 5 - Jeffcott Rotor Model

Lecture 6 - Variant of Jeffcott Rotor Model

Lecture 7 - Rigid Rotor Mounted on Simple Anistropic Springs as Bearings

Lecture 8 - Rigid Rotor Mounted on Complex Anisotropic Bearings

Lecture 9 - Flexible Shaft with a Rigid Disc Mounted on Anistropic Supports

Lecture 10 - Gyroscopic Effects : Synchronous whirl of a Rotor Systems with a thin Disc

Lecture 11 - Gyroscopic Effects : Synchronous and Asynchronous pure wobbling motions

Lecture 12 - Gyroscopic Effects : Asynchronous whirl of a Rotor system with a thin Disc

Lecture 13 - Gyroscopic Effects : Asynchronous whirl analysis with Dynamic Approach

Lecture 14 - Torsional Vibrations: Simple Rotor Systems

Lecture 15 - Three Disc Rotor System

Lecture 16 - Transfer Matrix Approach - Part I

Lecture 17 - Transfer Matrix Approach - Part II

Lecture 18 - Transfer Matrix Approach - Part III

Lecture 19 - Geared and Branched Systems

Lecture 20 - Continuous System and Finite Element Method

Lecture 21 - Finite Element Method

Lecture 22 - Finite Element Analysis

Lecture 23 - Finite Element Analysis - Part III

Lecture 24 - Influence Coefficient Method

Lecture 25 - Transfer Matrix Method - Part I

Lecture 26 - Transfer Matrix Method - Part II

Lecture 27 - Transfer Matrix Method - Part III

Lecture 28 - Continuous System Approach

Lecture 29 - Finite Element Method - Part I

Lecture 30 - Finite Element Method - Part II

Lecture 31 - Finite Element Method - Part III

Lecture 32 - Instability in Rotor Systems: Bearings

Lecture 33 - Fluid-Film Bearings

Lecture 34 - Internal Damping & Asymmetrical Shaft

Lecture 35 - Steam Whirl and Seals

Lecture 36 - Subcritical Speed Whirl

Lecture 37 - Introduction to Rigid Rotor Balancing

Lecture 38 - Dynamic Balancing of Rotors: Rigid Rotor Balancing

Lecture 39 - Dynamic Balancing of Rotors:Flexible Rotor Model Balancing

Lecture 40 - Dynamic Balancing of Rotors:Influence Coefficient Method for Flexible Rotor

Lecture 41 - Common Faults & Vibration signatures

Lecture 42 - Condition Based Monitoring

NPTEL : Engineering Mechanics (Mechanical Engineering)

Co-ordinators : Prof. U.S. Dixit, Dr. G. Saravana Kumar

Lecture 1 - Fundamentals Of Engineering Mechanics

Lecture 2 - Equations of Equilibrium

Lecture 3 - Truss Analysis - Part 1

Lecture 4 - Truss Analysis - Part 2

Lecture 5 - Analysis of Frames Machines

Lecture 6 - Internal Forces

Lecture 7 - Internal Forces in Beams

Lecture 8 - Cables

Lecture 9 - Friction

Lecture 10 - Application of Friction - Part 1

Lecture 11 - Application of Friction - Part 2

Lecture 12 - Application of Friction - Part 3

Lecture 13 - Centroids Center of Mass

Lecture 14 - Centroids Area of Moments

Lecture 15 - Product of Inertia, Rotation of Axis and Principle Moments of Inertia

Lecture 16 - Principle Mass Moments of Inertia

Lecture 17 - Second Moment of Mass

Lecture 18 - Virtual Work of Ideal System

Lecture 19 - Principle of Virtual Work

Lecture 20 - Systems with Friction

Lecture 21 - Potential Energy

Lecture 22 - Stability of Equilibrium

Lecture 23 - Kinematics of a Particles

Lecture 24 - Kinematics of a Particle Moving on a Curve

Lecture 25 - Relative Motion

Lecture 26 - Plane Kinematics of Rigid Bodies

Lecture 27 - Kinematics of a Particle

Lecture 28 - Work and Energy

Lecture 29 - Impulse and Momentum

Lecture 30 - Direct and Oblique Impulse

Lecture 31 - Plane Kinetics of Rigid Bodies

Lecture 32 - Kinetics of a Body

Lecture 33 - Method of Momentum and Analysis of Robot Manipulator

Lecture 34 - Kinematics in 3D

Lecture 35 - Kinetics in 3D

Lecture 36 - Free Vibration

Lecture 37 - Forced Vibration Damped Undamped

Lecture 38 - Vibration of Rigid Bodies - Part 1

Lecture 39 - Vibration of Rigid Bodies - Part 2

Lecture 40 - Some Problems of Vibration

NPTEL : Mechanical Vibrations (Mechanical Engineering)

Co-ordinators : Prof. S.K. Dwivedy, Prof. Rajiv Tiwari

Lecture 1 - Overview of the Course, Practical and Research Trends

Lecture 2 - Harmonic and Periodic Motions, Vibration Terminology

Lecture 3 - Vibration Model, Equation of Motion-Natural Frequency

Lecture 4 - Energy Method, Principle of Virtual Work

Lecture 5 - Viscously Damped Free Vibration Special Cases: Oscillatory

Lecture 6 - Logarithmic Decrement Experimental Determination of Damping Coefficient Hystersis Loop

Lecture 7 - Coulomb Damping other Damping Models

Lecture 8 - Forced Harmonic Vibration, Magnification Factor

Lecture 9 - Laplace Transform, Superposition Theorem

Lecture 10 - Rotor Unbalance and Whirling of Shaft, Transmissibility

Lecture 11 - Support Motion, Vibration Isolation

Lecture 12 - Sharpness of Resonance, Vibration Measuring Instruments

Lecture 13 - Generalized and Principle Coordinates, Derivation of Equation of Motion

Lecture 14 - Lagranges's Equation

Lecture 15 - Coordinate Coupling

Lecture 16 - Forced Harmonic Vibration

Lecture 17 - Tuned Absorber, Determination of Mass Ratio

Lecture 18 - Tuned and Damped Absorber, Untuned Viscous Damper

Lecture 19 - Derivation of Equations of Motion, Influence Coefficient Method

Lecture 20 - Properties of Vibrating Systems: Flexibility & Stiffness Matrices, Reciprocity Theorem

Lecture 21 - Modal Analysis: Undamped

Lecture 22 - Modal Analysis: Damped

Lecture 23 - Simple Systems With One Two or Three Discs Geared System

Lecture 24 - Multi-Degree of Freedom Systems-Transfer Matrix Method Branched Systems

Lecture 25 - Derivation of Equations of Motion Part 1 - Newton

Lecture 26 - Derivation of Equations of Motion Part 2 - Newton

Lecture 27 - Vibration of Strings

Lecture 28 - Longitudinal and Torsional Vibration of Rods

Lecture 29 - Transverse Vibration of Beams, Equations of Motion and Boundary Conditions

Lecture 30 - Transverse Vibration of Beams: Natural Frequencies and Mode Shapes

Lecture 31 - Rayleigh's Energy Method

Lecture 32 - Matrix Iteration Method

Lecture 33 - Durkerley, Rayleigh-Ritz and Galerkin Method

Lecture 34 - Finite Element Formulation for Rods, Gear Train and Branched System

Lecture 35 - Finite Element Formulation for Beams: Galerkin

Lecture 36 - Global Finite Element Assembly and Imposition of Boundary Conditions

Lecture 37 - Vibration Testing Equipments: Signal Measurements

Lecture 38 - Vibration Testing Equipments: Signal Analysis

Lecture 39 - Field Balancing of Rotors

Lecture 40 - Condition Monitoring

NPTEL : NOC:Advanced Machining Processes (Mechanical Engineering)

Co-ordinators : Prof. Manas Das

Lecture 1 - Introduction to advanced machining processes

Lecture 2 - Ultrasonic machining - Part I

Lecture 3 - Ultrasonic machining - Part II

Lecture 4 - Abrasive jet machining

Lecture 5 - Water jet cutting and Abrasive water jet machining

Lecture 6 - Magnetic abrasive finishing

Lecture 7 - Abrasive Flow Finishing

Lecture 8 - Magnetorheological Finishing

Lecture 9 - Magnetorheological Abrasive Flow Finishing - Part I

Lecture 10 - Magnetorheological Abrasive Flow Finishing - Part II

Lecture 11 - Magnetorheological Abrasive Flow Finishing - Part III

Lecture 12 - Electric discharge machining (EDM)

Lecture 13 - Electric Discharge Grinding, Electric Discharge Diamond Grinding and Wire Electric Discharge Machining

Lecture 14 - Electrochemical Machining (ECM)

Lecture 15 - Electrochemical Grinding, Electrostream Drilling, Shaped Tube Electrolytic Machining

Lecture 16 - Plasma Arc Machining (PAM)

Lecture 17 - Electron Beam Machining (EBM) Edit Lesson

Lecture 18 - Laser Beam Machining (LBM)

Lecture 19 - Chemical Machining (ChM)

NPTEL : NOC:Fundamentals of Nuclear Power Generation (Mechanical Engineering)

Co-ordinators : Prof. Dipankar N. Basu

Lecture 1 - Introduction of nuclear energy

Lecture 2 - Binding energy and mass defect

Lecture 3 - Radioactivity and radioactive decay

Lecture 4 - Different types of nuclear transmutation

Lecture 5 - Artificial radioactivity and neutron-nucleus interactions

Lecture 6 - Energy and momentum conservation

Lecture 7 - Fission and role of neutron energy

Lecture 8 - Theory of elastic scattering

Lecture 9 - Neutron multiplication factor

Lecture 10 - Neutron diffusion theory

Lecture 11 - Solution of one-group diffusion equation

Lecture 12 - Simple reactor theory

Lecture 13 - Nuclear fuel and simple energy consideration

Lecture 14 - Axial temperature distribution and heat transfer coefficient

Lecture 15 - Prompt and delayed neutrons

Lecture 16 - Delayed neutron kinetics

Lecture 17 - Different control mechanisms and various effects

Lecture 18 - Classical reactor designs

Lecture 19 - Evolution of reactors from Gen-I to Gen-IV

Lecture 20 - The concept of breeding

Lecture 21 - Fuel cycles and FBR

Lecture 22 - Gen-IV FBR designs

Lecture 23 - Hydrogen fusion reactions

Lecture 24 - Coulomb barrier and other critical factors

Lecture 25 - Radiation dose and gross biological effects

Lecture 26 - Stochastic and deterministic effects of human cells

Lecture 27 - Lessons from TMI and Chernobyl

Lecture 28 - Defence-in-depth Philosophy

Lecture 29 - Waste classification and Disposal of Mill Tailings

Lecture 30 - Disposal methodologies for HLW and IMW

NPTEL : NOC:Advances in Welding and Joining Technologies (Mechanical Engineering)

Co-ordinators : Prof. Swarup bag

Lecture 1 - Fundamentals of Welding and Joining - Part I

Lecture 2 - Fundamentals of Welding and Joining - Part II

Lecture 3 - Fundamentals of Welding and Joining - Part III

Lecture 4 - Fundamentals of Welding and Joining - Part IV

Lecture 5 - Fundamentals of Welding and Joining - Part V

Lecture 6 - Laser and Electron Beam Welding - Part I

Lecture 7 - Laser and Electron Beam Welding - Part II

Lecture 8 - Solid State Welding Processes - Part I

Lecture 9 - Solid State Welding Processes - Part II

Lecture 10 - Solid State Welding Processes - Part III

Lecture 11 - Computational Welding Mechanics - Part I

Lecture 12 - Computational Welding Mechanics - Part II

Lecture 13 - Computational Welding Mechanics - Part III

Lecture 14 - Micro and Nano Joining Processes - Part I

Lecture 15 - Micro and Nano Joining Processes - Part II

Lecture 16 - Micro and Nano Joining Processes - Part III

Lecture 17 - Welding Metallurgy - Part I

Lecture 18 - Welding Metallurgy - Part II

Lecture 19 - Welding Metallurgy - Part III

Lecture 20 - Welding Metallurgy - Part IV

Lecture 21 - Welding and Joining of Non-Metals - Part I

Lecture 22 - Welding and Joining of Non-Metals - Part II

Lecture 23 - Metal Transfer in Welding and Metal Printing

NPTEL : NOC:Introduction to Machining and Machining Fluids (Mechanical Engineering)

Co-ordinators : Prof. Mamilla Ravi Sankar

Lecture 1 - Introduction

Lecture 2 - Introduction and Importance of Machining

Lecture 3 - Principles of Machining or Metal Cutting

Lecture 4 - Cutting Tools

Lecture 5 - Forces in Machining

Lecture 6 - Tribology in Machining

Lecture 7 - Lubrication surface roughness in Machining

Lecture 8 - Machinability and Thermal Aspects

Lecture 9 - Tool Wear and Tool life - Part 1

Lecture 10 - Tool Wear and Tool life - Part 2

Lecture 11 - Tool Wear and Tool life - Part 3

Lecture 12 - Tool Materials and Coatings

Lecture 13 - Machining Fluids / Cutting Fluids and its Additives - Part 1

Lecture 14 - Machining Fluids / Cutting Fluids and its Additives - Part 2

Lecture 15 - Machining Fluids / Cutting Fluids and its Emissions

Lecture 16 - Eco Friendly Cutting Fluids - Part 1

Lecture 17 - Eco Friendly Cutting Fluids - Part 2

Lecture 18 - Rheology and Thermal Characterization of Machining / Cutting Fluids

Lecture 19 - Bio-degradation Studies of Machining / Cutting Fluids

Lecture 20 - Cutting Fluid Application in Machining Region

Lecture 21 - Practical Machining Processes - 1

Lecture 22 - Practical Machining Processes - 2

Lecture 23 - Introduction to Abrasive Processes - Grinding

Lecture 24 - Cutting fluids in Grinding Process

Lecture 25 - Unbonded Conventional Abrasive Processes

Lecture 26 - Advances in Metal Cutting_Machining Processes

Lecture 27 - Advances in Metal Cutting_Machining Processes - 2

NPTEL : NOC:Mechanics of Machining (Mechanical Engineering)

Co-ordinators : Dr. Uday S. Dixit

Lecture 1 - Deformation of Metals

Lecture 2 - Mechanism of Plastic Deformation

Lecture 3 - Machining Processes: Single Edge Tool, Types of Chips

Lecture 4 - Tool Geometry: Single Point Cutting Tool Specifications

Lecture 5 - Tool Specifications, Conversion Of Tool Angles, Multi-Point Cutting Tools

Lecture 6 - Mechanics of Orthogonal Cutting, Force Relationships

Lecture 7 - Determination of Stress, Strain, and Strain Rate

Lecture 8 - Measurement of Shear Angle

Lecture 9 - Other Analysis for Force Relationships

Lecture 10 - Mechanics of Oblique Cutting

Lecture 11 - Measurement of Cutting Forces

Lecture 12 - Thermal Aspects Of Machining: Temperatures in Orthogonal Cutting

Lecture 13 - Tool Wear and Tool Life and Tool Life Equations

Lecture 14 - Economics in Machining

Lecture 15 - Practical Machining Operations: Turning And Shaping and Planning Operation

Lecture 16 - Practical Machining Operations: Milling And Drilling

Lecture 17 - Grinding of Metals and Mechanics of Grinding Process

Lecture 18 - Abrasive Machining and Finishing Operations

Lecture 19 - CNC Machines and CNC Programming

Lecture 20 - Introduction to Advanced Machining Processes

NPTEL : NOC:Principle of Hydraulic Machines and System Design (Mechanical Engineering)

Co-ordinators : Prof. Pranab K. Mondal

Lecture 1 - Introduction to hydraulic machines: classifications and operational principles

Lecture 2 - Euler equation for turbomachines: net head developed by the pump/turbines

Lecture 3 - Velocity triangles of pumps, effect of inlet swirl on pump operation

Lecture 4 - Velocity triangles of pumps, effect of inlet swirl on pump operation

Lecture 5 - Pump casings, Efficiencies and Problems - I

Lecture 6 - Pump casings, Efficiencies and Problems - II

Lecture 7 - Pump casings, Efficiencies and Problems - III

Lecture 8 - Axial flow pump, HQ curve, System Resistance Curve - I

Lecture 9 - Axial flow pump, HQ curve, System Resistance Curve - II

Lecture 10 - HQ Curve, System Resistance Curve - I

Lecture 11 - HQ Curve, System Resistance Curve - II

Lecture 12 - Introduction to Cavitation

Lecture 13 - Condition for Cavitation and NPSH

Lecture 14 - Net Positive Suction Head (NPSH)

Lecture 15 - Suction number and Introduction to off design condition

Lecture 16 - Cavitation: The effect of off-design Conditions

Lecture 17 - Cavitation: Preventive Measures

Lecture 18 - Cavitation: Preventive Measures, Effect on Pump Characteristic

Lecture 19 - Problems on Cavitation

Lecture 20 - Introduction to Slip : Stodola Slip Model

Lecture 21 - Departure from Euler theory

Lecture 22 - Slip Velocity - I

Lecture 23 - Slip Velocity - II

Lecture 24 - Problem on slip

Lecture 25 - Degree of reaction of pump

Lecture 26 - Degree of reaction and axial pump design

Lecture 27 - Testing of radial flow pump - I

Lecture 28 - Testing of radial flow pump - II

Lecture 29 - Problem on radial flow pump testing

Lecture 30 - Radial equilibrium of axial flow pump - I

Lecture 31 - Radial equilibrium of axial flow pump - II

Lecture 32 - Pump operation: series and parallel connection

Lecture 33 - Series and parallel operation of dissimilar pumps

Lecture 34 - Pumping system design

Lecture 35 - Design of parellel pumping system

Lecture 36 - Numerical problem on pumps - I

Lecture 37 - Numerical problem on pumps - II

Lecture 38 - Numerical problem on pumps - III

Lecture 39 - Working principle and Indicator diagram of PD pump

Lecture 40 - Working principle and Indicator diagram of PD pump (Continued...)

Lecture 41 - Modified indicator diagram and Head-Discharge curve

Lecture 42 - Analysis and Head-Discharge curve of PD pump

Lecture 43 - Analysis and efficiencies of PD pump

Lecture 44 - Requirement of air chamber in PD pump

Lecture 45 - Numerical problem on PD pump with air chamber

Lecture 46 - Similarity and dimensional analysis of hydraulic machines

Lecture 47 - Dimensional analysis of hydraulic machines: Buckingham's theorem

Lecture 48 - Buckingham's theorem: Specific speed of hydraulic machines

Lecture 49 - Turbine Classification and Operational principle of Pelton wheel

Lecture 50 - Velocity Tiangles and analysis

Lecture 51 - Operational Principle of Reaction turbine

Lecture 52 - Degree of Reaction and Introduction to axial flow turbine

Lecture 53 - Kaplan Turbine: Operational Principle, Turbine efficiencies

Lecture 54 - Draft Tube for Reaction Turbine and Cavitation

Lecture 55 - Energy Balance and NPSH

Lecture 56 - Thoma Cavitation Factor

Lecture 57 - Reaction Turbine: Design aspects and Characteristic Curves

Lecture 58 - Problems on Impulse and Reaction Turbines

NPTEL : NOC:Introduction to Abrasive Machining and Finishing Processes (Mechanical Engineering)

Co-ordinators : Prof. Mamilla Ravi Sankar

Lecture 1 - Introduction to Abrasive Machining and Finishing Processes

Lecture 2 - Grinding Process

Lecture 3 - Grinding Fluids and Its Additives

Lecture 4 - Grinding Fluids and its Emissions

Lecture 5 - Sustainable Grinding Process: Biodegradation of Grinding Fluids

Lecture 6 - Sustainable Grinding Process: MQL in Grinding Process

Lecture 7 - Honing Process

Lecture 8 - Lapping Process

Lecture 9 - Super Finishing and Sand Blasting

Lecture 10 - Vibratory Bowl Finishing,Rotary Barrel Finishing or Tumbling

Lecture 11 - Drag Finishing, Ice-bonded Abrasive Finishing, Pitch Polishing, Pad Polishing

Lecture 12 - Introduction to Surface Texture in abrasive Process

Lecture 13 - Representation of Surface Roughness

Lecture 14 - Abrasive Jet Machining (AJM)

Lecture 15 - Abrasive Water Jet Machining (AWJM)

Lecture 16 - Ultrasonic Machining (USM)

Lecture 17 - EDM, Wire-EDM, EDG, EDDG, AW-EDG

Lecture 18 - Elastic Emission Machining

Lecture 19 - PMEDM and ECD and ELID, ECH

Lecture 20 - Abrasive Flow Finishing: Part 1

Lecture 21 - Abrasive Flow Finishing: Part 2

Lecture 22 - Magnetic Field Assisted Abrasive Finishing: MAF, MADe, MFP

Lecture 23 - Magneto Rheological Finishing and BE-MRF

Lecture 24 - Magnetic Field Assisted Abrasive Finishing:CNP,CMMRF,MRAFF,R-MRAFF

Lecture 25 - Summary of the Course

NPTEL : NOC:Theory of Rectangular Plates - Part 1 (Mechanical Engineering)

Co-ordinators : Prof. Poonam Kumari

Lecture 1 - Basic of Solid Mechanics

Lecture 2 - Enegry Principles

Lecture 3 - Classification of Plate Theories and Some Basics

Lecture 4 - Tutorial: Transformation of Tensors

Lecture 5 - Governing Equation for Plate - 1

Lecture 6 - Governing Equation for Plate - 2

Lecture 7 - Tutorial: Reduced Stiffness and Plate Stiffness

Lecture 8 - Navier Solution + Levy solution

Lecture 9 - Levy Solution

Lecture 10 - Tutorial: Load Matrices Calculation

Lecture 11 - EKM and buckling of plates

Lecture 12 - 3D Solutions

Lecture 13 - Matlab Coding + ABAQUS

Lecture 14 - Tutorial: Levy Solutions

NPTEL : NOC:Principles of Mechanical Measurement (Mechanical Engineering)

Co-ordinators : Prof. Dipankar N. Basu

Lecture 1 - Introduction to measurement

Lecture 2 - Generalized measurement system and static characteristics

Lecture 3 - Uncertainties in measurement

Lecture 4 - Statistical treatment of random errors

Lecture 5 - System response to periodic inputs

Lecture 6 - Zeroth and first order systems

Lecture 7 - First and second order systems

Lecture 8 - Basics of digitization and number systems

Lecture 9 - Binary logic gates and binary codes

Lecture 10 - Analog-to-digital conversion

Lecture 11 - Digital-to-analog conversion

Lecture 12 - Electromagnetic indicators

Lecture 13 - Electronic amplifiers and filters

Lecture 14 - Resistive devices

Lecture 15 - Inductive, capacitive and optical devices

Lecture 16 - Piezoelectric and nozzle-flapper transducers

Lecture 17 - Resistive strain gages and associated circuitry

Lecture 18 - Strain gage rosettes and gage orientation

Lecture 19 - Elastic and strain gage load cells

Lecture 20 - Various load cells and dynamometers

Lecture 21 - Principles of manometry

Lecture 22 - Piezometer and elastic pressure transducer

Lecture 23 - Electric pressure transducer and high and low pressure measurement

Lecture 24 - Bernoulli's equation in obstruction meters

Lecture 25 - Obstruction meters and volume flowmeters

Lecture 26 - Mass flowmeters and velocity probes

Lecture 27 - Expansion-based devices

Lecture 28 - RTD, Thermistor and Thermocouple

Lecture 29 - Introduction to pyrometers

Lecture 30 - Basic seismic transducer

Lecture 31 - Vibro-, velo- and accelerometer

Lecture 32 - Introduction to acoustic measurement

Lecture 33 - Radioactivity and its biological effects

NPTEL : NOC:IC Engines and Gas Turbines (Mechanical Engineering)

Co-ordinators : Dr. Vinayak Kulkarni, Prof. Pranab K. Mondal

Lecture 1 - External and Internal combustion engines, Engine components, SI and CI engines

Lecture 2 - Four-stroke and Two-stroke engines, Comparison between SI and CI engines, and Four-stroke and Two-stroke engines

Lecture 3 - Classification of IC engines

Lecture 4 - Engine operating characteristics

Lecture 5 - Otto, Diesel and Dual cycles

Lecture 6 - Otto, Diesel and Dual cycles (Continued...)

Lecture 7 - Otto, Diesel and Dual cycles (Continued...)

Lecture 8 - Otto, Diesel and Dual cycles (Continued...)

Lecture 9 - Comparison between the cycles, Actual cycles and their analysis

Lecture 10 - Carburetor, Mixture requirements

Lecture 11 - Carburetor, Mixture requirements (Continued...)

Lecture 12 - Idling, cruising and power ranges

Lecture 13 - Idling, cruising and power ranges (Continued...)

Lecture 14 - Classification, types of nozzles, Ignition system, Battery and Magneto ignition systems

Lecture 15 - Classification, types of nozzles, Ignition system, Battery and Magneto ignition systems (Continued...)

Lecture 16 - Classification, types of nozzles, Ignition system, Battery and Magneto ignition systems (Continued...)

Lecture 17 - Engine friction, Lubrication systems, forces on piston

Lecture 18 - Lubricating oils, Thermochemistry and Fuels, Self-ignition

Lecture 19 - Octane and Cetane Numbers, Alternative Fuels - Methanol, Ethanol, hydrogen, Natural Gas

Lecture 20 - Octane and Cetane Numbers, Alternative Fuels - Methanol, Ethanol, hydrogen, Natural Gas (Continued...)

Lecture 21 - Combustion in SI and CI Engines, Pressure Crank Angle Diagram

Lecture 22 - Combustion in SI and CI Engines, Pressure Crank Angle Diagram (Continued...)

Lecture 23 - Combustion in SI and CI Engines, Pressure Crank Angle Diagram (Continued...)

Lecture 24 - SI engine injection system, Energy distribution, Engine temperatures, Heat transfer in combustion chambers

Lecture 25 - SI engine injection system, Energy distribution, Engine temperatures, Heat transfer in combustion chambers (Continued...)

Lecture 26 - CI engine injection systems, Air-cooled and liquid-cooled engines, Modern trends

Lecture 27 - CI engine injection systems, Air-cooled and liquid-cooled engines, Modern trends (Continued...)

Lecture 28 - CI engine injection systems, Air-cooled and liquid-cooled engines, Modern trends (Continued...)

Lecture 29 - Problems on IC engine

Lecture 30 - Turbomachines, Gas Turbine theory

Lecture 31 - Open Cycle Gas Turbine Power Plant, Twin Shaft Arrangement

Lecture 32 - Closed Cycle, Multi-Spool Arrangement, Steam Power Plant

Lecture 33 - Basic Thermodynamics

Lecture 34 - Brayton Cycle: Introducton and General Relationships

Lecture 35 - Brayton Cycle: Efficiency, Work Ratio and Optimum Work Output Condition

Lecture 36 - Brayton Cycle with Heat Exchanger/Reheater

Lecture 37 - Brayton Cycle with Intercooler

Lecture 38 - Real Brayton Cycle, Solved Example for Ideal Cycle

Lecture 39 - Solved Examples for Real Brayton Cycle

Lecture 40 - Introduction and Performance Parameters of Propulsion System

Lecture 41 - Basics of Various Aircraft Engine

Lecture 42 - Eular Turbomachinary Equation

Lecture 43 - Introduction and Flow Analysis of Centrifugal Compressors

Lecture 44 - Thermodynamics Analysis of Centrifugal Compressors

Lecture 45 - Axial Compressor: Basics, Velocity triangles, T-S diagram and Work Intraction

Lecture 46 - Axial Compressor: Different factors, Degree of Reaction and Free Vortex Condition

Lecture 47 - Complete Analysis of Axial Flow Gas Turbine

Lecture 48 - Solved Examples for Axial Compressors,Centrifugal Compressors and Turbine

Lecture 49 - Radial Flow Turbine, Solved Example of Free vortex Condition

Lecture 50 - Nozzles and Diffuers: Introduction, Intake efficiency,Nozzle efficiency

NPTEL : NOC:Fundamental of Welding Science and Technology (Mechanical Engineering)

Co-ordinators : Prof. Pankaj Biswas

Lecture 1 - Introduction of welding

Lecture 2 - Classification of welding and joints

Lecture 3 - Parts of weld joint

Lecture 4 - Welding Symbol

Lecture 5 - welding power source - 1

Lecture 6 - Welding power source - 2

Lecture 7 - Welding Power sources characteristics - 1

Lecture 8 - Welding Power sources characteristics - 2

Lecture 9 - Physics of welding - 1

Lecture 10 - Physics of welding - 2

Lecture 11 - Physics of welding - 4 (Arc Stability and Arc Blow)

Lecture 12 - Physics of welding - 3

Lecture 13 - Physics of welding - 5 (Metal Transfer-1)

Lecture 14 - Physics of welding - 6 (Metal Transfer-2)

Lecture 15 - Physics of welding - 7 (Metal Transfer-3)

Lecture 16 - Physics of welding - 8 (Metal Transfer-4)

Lecture 17 - Physics of welding - 9 (Metal Transfer-5)

Lecture 18 - Physics of welding - 10 (Metalting Efficiency)

Lecture 19 - Oxy-Fuel Gas Welding

Lecture 20 - Shielded Metal Arc Welding

Lecture 21 - Gas Tungsten Arc Welding

Lecture 22 - Gas Metal Arc Welding

Lecture 23 - Submerged Arc Welding

Lecture 24 - Welding Defects and Inspection

NPTEL : NOC:Polymer Assisted Abrasive Finishing Processes (Mechanical Engineering)

Co-ordinators : Prof. Mamilla Ravi Sankar

Lecture 1 - Introduction to Polymer Assisted Abrasive Finishing Processes

Lecture 2 - Surface Integrity and Surface roughness representation - Part I

Lecture 3 - Surface Integrity and Surface roughness representation - Part II

Lecture 4 - Introduction to Grinding and Polymer assisted Grinding Wheels

Lecture 5 - Polymer medium for vibratory bowl finishing, Tumbling, Drag finishing

Lecture 6 - Polymer Pad and Chemo-mechanical Polishing

Lecture 7 - Elastic Emission Machining

Lecture 8 - Hydrodynamic Polishing, Elasto Abrasive Finishing

Lecture 9 - Abrasive Flow Machining and Finishing - Part I

Lecture 10 - Abrasive Flow Machining and Finishing - Part II

Lecture 11 - Advances in Abrasive Flow Finishing: DBGAFF, CFAAFM

Lecture 12 - Advances in Abrasive Flow Finishing: Spiral Polishing, R-AFF

Lecture 13 - AFF Processes: Magnetio AFF (MRAFF), UAA-AFF, EC-AFF

Lecture 14 - Finishing of Biomedical implants (Micro AFF: Micro holes, Micro slots, Bio Implants: Knee implants , Hip implants and Applications of one way, two way and orbital AFF)

Lecture 15 - Summary of the Course

NPTEL : NOC:Mathematical Modeling of Manufacturing Processes (Mechanical Engineering)

Co-ordinators : Prof. Swarup bag

Lecture 1 - Materials and manufacturing Processes - 1

Lecture 2 - Materials and manufacturing Processes - 2

Lecture 3 - Physics based modeling approach at different scale

Lecture 4 - Evaluation of properties and process modelling

Lecture 5 - Thermofluid and electromagnetic analysis

Lecture 6 - Solid-state deformation and residual stress - 1

Lecture 7 - Solid-state deformation and residual stress - 2

Lecture 8 - Meltiing, solidification and additive manufacturing

Lecture 9 - Force and velocity diagram - 1

Lecture 10 - Force and velocity diagram - 2

Lecture 11 - Heat transfer analysis

Lecture 12 - Principal and mechanism at different processes - 1

Lecture 13 - Principal and mechanism at different processes - 2

Lecture 14 - Mechanics of bulk metal forming

Lecture 15 - Mechanics of sheet metal forming - 1

Lecture 16 - Mechanics of sheet metal forming - 2

Lecture 17 - Heat transfer and thermomechanical processing

Lecture 18 - Fusion welding processes - 1

Lecture 19 - Fusion welding processes - 2

Lecture 20 - Physics of welding and metal transfer

Lecture 21 - Heat source model in fusion welding

Lecture 22 - Heat transfer and material flow

Lecture 23 - Solidification in welding - 1

Lecture 24 - Solidification in welding - 2

Lecture 25 - Solid state welding - 1

Lecture 26 - Solid state welding - 2

Lecture 27 - Hybrid welding, residual stress and distortion

Lecture 28 - Cooling and solidification at different casting processes

Lecture 29 - Powder metallurgy

Lecture 30 - Principle of surface and coating technologies

Lecture 31 - Principle and development of additive manufacturing technologies - 1

Lecture 32 - Principle and development of additive manufacturing technologies - 2

Lecture 33 - Fundamentals of heat treatment

Lecture 34 - Evaluation of microstructural properties and residual stress

Lecture 35 - Down-scaling of conventional manufacturing processes and Micro-to-nano manufacturing

Lecture 36 - Packaging, micro-finishing and micro-manufacturing processes

Lecture 37 - Processing and shaping of non-metals and bio-materials

Lecture 38 - Principle of glass and ceramics processing and their shaping

NPTEL : NOC:Two-Phase flow with phase change in Conventional and Miniature Channels (Mechanical Engineering)

Co-ordinators : Prof. Manmohan Pandey

Lecture 1 - Introduction and Notation

Lecture 2 - Flow Regimes and Flow Regime Maps

Lecture 3 - The Homogeneous Model

Lecture 4 - The Separated Flow Model

Lecture 5 - The Separated Flow Model (Continued...)

Lecture 6 - The Drift Flux Model

Lecture 7 - Estimation of pressure drop in two phase flow

Lecture 8 - Two phase flow and pressure drop in miniature channels

NPTEL : NOC:Applied Thermodynamics for Engineers (Mechanical Engineering)

Co-ordinators : Prof. Dipankar N. Basu

Lecture 1 - Overview of thermodynamic system and state

Lecture 2 - First and second laws of thermodynamics

Lecture 3 - Concept of entropy and entropy generation

Lecture 4 - Concept of exergy and exergy destruction

Lecture 5 - Thermodynamic potentials and Maxwell relations

Lecture 6 - Generalized relations for entropy and specific heats

Lecture 7 - Joule-Thomson coefficient and Clapeyron equation

Lecture 8 - Liquid-vapor phase-change process

Lecture 9 - Use of property tables

Lecture 10 - Equations-of-state and Compressibility factor

Lecture 11 - Ideal cycles for reciprocating engines

Lecture 12 - Otto, Diesel and Dual combustion cycles

Lecture 13 - Stirling and Ericsson cycles

Lecture 14 - Fuel-air cycle

Lecture 15 - Numerical exercise on Fuel-air cycles

Lecture 16 - Losses in actual cycle and valve-timing diagram

Lecture 17 - Ideal Brayton cycle

Lecture 18 - Intercooling and reheating in Brayton cycle

Lecture 19 - Regeneration in Brayton cycle

Lecture 20 - Ideal Rankine cycle

Lecture 21 - Improvements and modifications in Rankine cycle

Lecture 22 - Regenerative Rankine cycle

Lecture 23 - Binary vapor power cycle

Lecture 24 - Combined gas-steam power plant

Lecture 25 - Different arrangments in combined cycles

Lecture 26 - Vapor compression refrigeration cycle

Lecture 27 - SSS cycles and refrigerants

Lecture 28 - Modifications in VCR systems

Lecture 29 - Vapor absorption refrigeration cycle

Lecture 30 - P-v-T behavior of gas mixtures

Lecture 31 - Numerical examples

Lecture 32 - Properties of moist air

Lecture 33 - Psychrometric chart and various psychrometric processes

Lecture 34 - Sensible heat factor and bypass factor

Lecture 35 - Theoretical and actual combustion process

Lecture 36 - Thermodynamic analyses of reacting systems

NPTEL : NOC:Fundamentals of Conduction and Radiation (Mechanical Engineering)

Co-ordinators : Prof. Dipankar N. Basu

Lecture 1 - Relationship of Thermodynamics with Heat transfer

Lecture 2 - Modes of heat transfer

Lecture 3 - Fourier's law and thermal conductivity

Lecture 4 - Generalized heat diffusion equation

Lecture 5 - Heat diffusion equation in curvilinear coordinates

Lecture 6 - Concept of thermal resistance

Lecture 7 - Use of network of resistances in wall and cylinder

Lecture 8 - Critical thickness of insulation

Lecture 9 - Conduction with energy generation - I

Lecture 10 - Conduction with energy generation - II

Lecture 11 - General Heat Transfer Analysis

Lecture 12 - Fins with uniform cross-section area - I

Lecture 13 - Fins with uniform cross-section area - II

Lecture 14 - Fins with non-uniform cross-section area

Lecture 15 - Method of Separation of Variables

Lecture 16 - Graphical approach

Lecture 17 - Method of Superposition

Lecture 18 - Lumped capacitance approach - I

Lecture 19 - Lumped capacitance approach - II

Lecture 20 - Semi-infinite Solid

Lecture 21 - Steady Heat Conduction

Lecture 22 - Unsteady Heat Conduction

Lecture 23 - Problem solving using Energy Balance Method

Lecture 24 - Introduction to radiative heat fluxes

Lecture 25 - Spectral and directional definitions

Lecture 26 - Blackbody radiation

Lecture 27 - Emissivity

Lecture 28 - Irradiation of real surfaces

Lecture 29 - View factor

Lecture 30 - Blackbody radiation exchange

Lecture 31 - Radiation networks

Lecture 32 - Gas radiation

Lecture 33 - Radiative Transfer Equation

NPTEL : NOC:Steam Power Engineering (Mechanical Engineering)

Co-ordinators : Dr. Vinayak Kulkarni

Lecture 1 - Review of thermodynamics

Lecture 2 - Rankine cycle

Lecture 3 - Performance estimation of steam power cycles

Lecture 4 - Carnot cycle examples

Lecture 5 - Rankine cycle with superheat

Lecture 6 - Rankine cycle with reheat theory and example

Lecture 7 - Examples of Rankine cycle

Lecture 8 - Examples of reheat Rankine cycle

Lecture 9 - Rankine cycle with regeneration

Lecture 10 - Feedwater heaters

Lecture 11 - Cogeneration of power and process heat

Lecture 12 - Examples of regeneration

Lecture 13 - Examples of regenerative Rankine cycle

Lecture 14 - Binary/multi-fluid cycles

Lecture 15 - Low temperature power cycles

Lecture 16 - Examples of binary cycles

Lecture 17 - Types of boilers

Lecture 18 - Boiler accessories

Lecture 19 - Practice examples

Lecture 20 - Stagnation conditions and Nozzle flow

Lecture 21 - Nozzle flow

Lecture 22 - Examples of Nozzle

Lecture 23 - Impulse Turbine - 1

Lecture 24 - Impulse Turbine - 2

Lecture 25 - Examples on Impulse Turbine

Lecture 26 - Reaction Turbine

Lecture 27 - Reheat Factor

Lecture 28 - Examples on Turbine - 1

Lecture 29 - Examples on Turbine - 2

Lecture 30 - Gas Mixture

Lecture 31 - Psychrometry - 1

Lecture 32 - Psychrometry - 2

Lecture 33 - Condensers

NPTEL : NOC:Dynamic Behaviour of Materials (Mechanical Engineering)

Co-ordinators : Prof. Prasenjit Khanikar

Lecture 1 - Introduction to Dynamic Behaviour of Materials - I

Lecture 2 - Introduction to Dynamic Behaviour of Materials - II

Lecture 3 - Introduction to Waves

Lecture 4 - Quasi-static vs Dynamic Deformation

Lecture 5 - Elastic Wave and its Classification

Lecture 6 - Propagation of Elastic Waves in Continuum

Lecture 7 - Wave Reflection, Refraction and Interaction

Lecture 8 - General Solution of Elastic Wave Equation

Lecture 9 - Additional Considerations of Elastic Wave in Cylindrical Bar

Lecture 10 - Introduction to Plastic Waves

Lecture 11 - Plastic Waves of Uniaxial Stress

Lecture 12 - Plastic Waves of Combined Stress

Lecture 13 - Taylor's Experiment for Plastic Wave Propagation - 1

Lecture 14 - Taylor's Experiment for Plastic Wave Propagation - 2

Lecture 15 - Taylor's Experiment: Wilkins-Guinan Analysis

Lecture 16 - Introduction to Shock Waves - I

Lecture 17 - Introduction to Shock Waves - II

Lecture 18 - Shock Wave: Rankine Hugonoit Treatment

Lecture 19 - Rankine Hugonoit Treatment and Shock Wave under Impact

Lecture 20 - Shock Wave under Impact

Lecture 21 - Equations of States (Shock Waves) : Experimental Methods

Lecture 22 - Equations of States (Shock Waves) : Theoretical Calculations

Lecture 23 - Complex Problems of Shock Waves and Temperature Rise under Shock Wave

Lecture 24 - Shock Wave Attenuation, Interaction and Reflection - I

Lecture 25 - Shock Wave Attenuation, Interaction and Reflection - II

Lecture 26 - Shock Wave Interaction and Reflection

Lecture 27 - Fundamentals of Materials Science and Engineering

Lecture 28 - Shock Wave Induced Phase Transformations - 1

Lecture 29 - Shock Wave Induced Phase Transformations - 2

Lecture 30 - Shock Wave Induced Phase Transformations - 3

Lecture 31 - Shock Wave Induced Phase Transformations - 4

Lecture 32 - Experimental Techniques for Dynamic Deformation - 1

Lecture 33 - Experimental Techniques for Dynamic Deformation - 2

Lecture 34 - Plastic Deformation at High Strain Rates - 1

Lecture 35 - Plastic Deformation at High Strain Rates - 2

Lecture 36 - Plastic Deformation at High Strain Rates - 3

Lecture 37 - Plastic Deformation at High Strain Rates - 4

Lecture 38 - Plastic Deformation at High Strain Rates - 5

Lecture 39 - Plastic Deformation Under Shock Waves - 1

Lecture 40 - Plastic Deformation Under Shock Waves - 2

Lecture 41 - Plastic Deformation Under Shock Waves - 3

Lecture 42 - Shear Band - 1

Lecture 43 - Shear Band - 2

Lecture 44 - Dynamic Fracture - 1

Lecture 45 - Dynamic Fracture - 2

NPTEL : NOC:Plastic Working of Metallic Materials (Mechanical Engineering)

Co-ordinators : Prof. P.S. Robi

Lecture 1 - Introduction to Plastic Working of Metals

Lecture 2 - Uniaxial Tension Test Analysis

Lecture 3 - Temperature effects in metal forming

Lecture 4 - Friction and Lubrication

Lecture 5 - Friction and Lubrication (Continued...)

Lecture 6 - Deformation zone + worked examples

Lecture 7 - Stresses at point and Theory of Plasticity

Lecture 8 - Slab Analysis

Lecture 9 - Slip Line Field Theory - Part 1

Lecture 10 - Slip Line Field Theory - Part 2

Lecture 11 - Upper Bound Theorem

Lecture 12 - Plasticity equations

Lecture 13 - Forging

Lecture 14 - Analysis of Forging

Lecture 15 - Analysis of Forging (Continued...)

Lecture 16 - Forging Die Design consideration

Lecture 17 - Forging Load

Lecture 18 - Rolling of Metals

Lecture 19 - Analysis of Rolling

Lecture 20 - Analysis of Rolling (Continued...)

Lecture 21 - Strain rate in the deformation zone

Lecture 22 - Rolling mills

Lecture 23 - Prblem on rolling

Lecture 24 - Drawing of Rods, Wires and Tubes

Lecture 25 - Drawing of Rods, Wires and Tubes (Continued...)

Lecture 26 - Analysis of Wire Drawing

Lecture 27 - Wire Drawing: Tutorial Problems

Lecture 28 - Extrusion Process

Lecture 29 - Analysis of Extrusion

Lecture 30 - Introduction

Lecture 31 - Sheet deformation process

Lecture 32 - Deformation of sheet in plane stress

Lecture 33 - Analysis of stamping

Lecture 34 - Instability in sheet metal forming

Lecture 35 - Deep drawing

Lecture 36 - Hydroforming

NPTEL : NOC:Fundamentals of Artificial Intelligence (Mechanical Engineering)

Co-ordinators : Prof. Shyamanta M. Hazarika

Lecture 1 - Introduction to Artificial Intelligence

Lecture 2 - Problem Solving as State Space Search

Lecture 3 - Uninformed Search

Lecture 4 - Heuristic Search

Lecture 5 - Informed Search

Lecture 6 - Constraint Satisfaction Problems

Lecture 7 - Searching AND/OR Graphs

Lecture 8 - Game Playing

Lecture 9 - Minimax + Alpha-Beta

Lecture 10 - Introduction to Knowledge Representation

Lecture 11 - Propositional Logic

Lecture 12 - First Order Logic - I

Lecture 13 - First Order Logic - II

Lecture 14 - Inference in First Order Logic - I

Lecture 15 - Inference in First Order Logic - II

Lecture 16 - Answer Extraction

Lecture 17 - Procedural Control of Reasoning

Lecture 18 - Reasoning under Uncertainty

Lecture 19 - Bayesian Network

Lecture 20 - Decision Network

Lecture 21 - Introduction to Planning

Lecture 22 - Plan Space Planning

Lecture 23 - Planning Graph and GraphPlan

Lecture 24 - Practical Planning and Acting

Lecture 25 - Sequential Decision Problems

Lecture 26 - Making Complex Decisions

Lecture 27 - Introduction to Machine Learning

Lecture 28 - Learning Decision Trees

Lecture 29 - Linear Regression

Lecture 30 - Support Vector Machines

Lecture 31 - Unsupervised Learning

Lecture 32 - Reinforcement Learning

Lecture 33 - Learning in Neural Networks

Lecture 34 - Deep Learning: A Brief Overview

NPTEL : NOC:Aircraft Propulsion (Mechanical Engineering)

Co-ordinators : Dr. Vinayak Kulkarni

Lecture 1 - Overview of Basic Thermodynamics

Lecture 2 - Solved Examples for Flow process

Lecture 3 - Turbomachines: Introduction, Classification, Types

Lecture 4 - Components of Gas Turbine Power Plant, Gas Turbine Attachments

Lecture 5 - Introduction to Various Aircraft engines, Engine Performance parameters

Lecture 6 - Air Standard Ideal Brayton Cycle

Lecture 7 - Examples for Ideal Brayton Cycle

Lecture 8 - Non-Ideal Brayton Cycle

Lecture 9 - Examples for Non-Ideal Brayton Cycle

Lecture 10 - Brayton Cycle with Heat Exchanger / Re-heater

Lecture 11 - Brayton Cycle with Intercooler / All Attachments

Lecture 12 - Examples of Gas Turbine Attachment

Lecture 13 - Examples of Gas Turbine Attachment

Lecture 14 - Stagnation Conditions, Real Brayton Cycle with Stagnation Conditions

Lecture 15 - Polytropic Efficiency of Compressor and Turbine

Lecture 16 - Examples of Real Cycle

Lecture 17 - Nozzle Flow: Isentropic Relations, Area Velocity Relation, Choked Mass Flow Rate

Lecture 18 - Aircraft Engine Intake, Intake Efficiency

Lecture 19 - Propelling Nozzle, Nozzle Efficiency

Lecture 20 - Turbojet engine: Confriguration and Examples

Lecture 21 - Turbofan engine: Confriguration and Examples

Lecture 22 - Ramjet engine: Parameters and losses

Lecture 23 - Examples of Ramjet Engine

Lecture 24 - Thrust Augmentation and Engine performance parameters for Aircrafts

Lecture 25 - Introduction to Turbomachinary

Lecture 26 - Centrifugal Compressor: Velocity diagrams, Workdone

Lecture 27 - Centrifugal Compressor: Thermodynamic analysis, Stage efficiency and Degree of reaction

Lecture 28 - Examples of Centrifugal compressor

Lecture 29 - Axial Flow Compressor: Velocity diagrams, Workdone and Degree of Reaction

Lecture 30 - Axial Flow Compressor: Free vortex Condition

Lecture 31 - Examples of Axial Flow Compressor

Lecture 32 - Examples of Axial Flow Compressor

Lecture 33 - Examples of Axial Flow Compressor

Lecture 34 - Axial Turbine: Velocity diagrams, Workdone, and Degree of Reaction

Lecture 35 - Radial Turbine: Velocity diagrams, h-s diagram, Stage effieciency and degree of reaction

Lecture 36 - Examples of Axial Turbine

Lecture 37 - Practice examples of Axial Turbine and cetrifugal compressor

Lecture 38 - Cascade theory and Blade design

Lecture 39 - Cascade variables and Turbine Cascade

Lecture 40 - Velocity diagrams of Turbine Cascade, Compressor cascade

Lecture 41 - Turbine cooling methods

Lecture 42 - Practice examples of aircraft engine

NPTEL : NOC:Computational Fluid Dynamics for Incompressible Flows (Mechanical Engineering)

Co-ordinators : Prof. Amaresh Dalal

Lecture 1 - Applications of CFD

Lecture 2 - Basic equations of fluid dynamics and heat transfer

Lecture 3 - Initial and boundary conditions

Lecture 4 - Physical Classification, System of first-order PDEs

Lecture 5 - System of second-order PDEs

Lecture 6 - Finite difference by Taylor series expansion

Lecture 7 - Finite difference by general approximation and polynomials

Lecture 8 - Finite difference in non-uniform grid

Lecture 9 - Types of error and accuracy of FD solutions

Lecture 10 - Finite difference formulations of Elliptic Equations with boundary condition treatment

Lecture 11 - Iterative Methods

Lecture 12 - Applications

Lecture 13 - Linear Solvers

Lecture 14 - Finite difference formulations of Parabolic Equations

Lecture 15 - Finite difference formulations of Parabolic Equations: Implicit Methods

Lecture 16 - Finite difference formulations of Parabolic Equations: Unsteady Two-Dimensional Equation

Lecture 17 - Finite difference formulations of Parabolic Equations: Unsteady Three-Dimensional Equation

Lecture 18 - Finite difference formulations of the first order wave equation: Explicit Method

Lecture 19 - Finite difference formulations of the first order wave equation: Implicit Method

Lecture 20 - Von Neumann stability analysis of different schemes for Parabolic equations

Lecture 21 - Von Neumann stability analysis of different schemes for Parabolic equations

Lecture 22 - Von Neumann stability analysis of different schemes for Hyperbolic equations

Lecture 23 - Modified equation, Artificial viscosity, Numerical diffusion

Lecture 24 - Discretization vorticity-stream function equations using FDM

Lecture 25 - Boundary conditions for flow problems

Lecture 26 - Solutions of vorticity-stream function equations

Lecture 27 - Solution of Navier-Stokes Equation using FDM

Lecture 28 - Solution of Navier-Stokes Equation using FDM (Continued...)

Lecture 29 - Introduction to finite volume method

Lecture 30 - Finite volume discretization of steady diffusion equation

Lecture 31 - Finite volume discretization of unsteady diffusion equation

Lecture 32 - Finite volume discretization of steady convection-diffusion equation

Lecture 33 - Finite volume discretization of unsteady convection-diffusion equation

Lecture 34 - Convection Schemes

Lecture 35 - Solution of Navier-Stokes Equations using FVM - I

Lecture 36 - Solution of Navier-Stokes Equations using FVM - II

Lecture 37 - Boundary Conditions

NPTEL : NOC:Experimental Methods in Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Pranab K. Mondal

Lecture 1 - Basic concepts, Calibration

Lecture 2 - Dimensions, Units, Standards, Systems of dimensions, System of units, Unit conversion table

Lecture 3 - Basic concept of dynamic measurements

Lecture 4 - Basic concept of dynamic measurements (Continued...)

Lecture 5 - Basic concept of dynamic measurements (Continued...)

Lecture 6 - System response and distortion, Impedence matching

Lecture 7 - Dimensional measurement Gauge blocks, The pneumatic displacement gauge

Lecture 8 - Dimensional measurement Gauge blocks, The pneumatic displacement gauge

Lecture 9 - Pressure Measurements: Definition of pressure and Dynamic response considerations

Lecture 10 - Mechanical pressure measurement devices, U-tube manometer, The inclined well type manometer

Lecture 11 - The aneroid barometer, Diaphragm and Bellows Gauges

Lecture 12 - The Mcleod gauge, The Pirani gauge, The Ionization gauge

Lecture 13 - The Mcleod gauge, The Pirani gauge, The Ionization gauge (Continued...)

Lecture 14 - The Mcleod gauge, The Pirani gauge, The Ionization gauge (Continued...)

Lecture 15 - Pressure measurement using 3 holes/probes

Lecture 16 - Pressure measurement using 3 holes/probes (Continued...)

Lecture 17 - Flow obstruction flow rate measuerement(venturimeter/orificemeter), the Rotameter

Lecture 18 - Flow obstruction flow rate measuerement(venturimeter/orificemeter), the Rotameter (Continued...)

Lecture 19 - Thermal Anemometry(hot wire/hot film), Hot wire anemometer

Lecture 20 - Thermal Anemometry(hot wire/hot film), Hot wire anemometer (Continued...)

Lecture 21 - Laser Doppler anemometry

Lecture 22 - Measurement of velocity components by 3 holes and 4 holes probes

Lecture 23 - Ideal gas thermometer, Temperature measurement by mechanical and electrical effects

Lecture 24 - Ideal gas thermometer, Temperature measurement by mechanical and electrical effects (Continued...)

Lecture 25 - Thermostatic temperature, Resistance Temperature Detectors (RTD), Thermistors, Thermocouples

Lecture 26 - Temperature measurement by Radiation, The optical pyrometer

Lecture 27 - Transient response of thermal system, Thermocouple compensation, high speed flow

Lecture 28 - Transient response of thermal system, Thermocouple compensation, high speed flow (Continued...)

Lecture 29 - Transient response of thermal system, Thermocouple compensation, high speed flow (Continued...)

Lecture 30 - Constant temperature hot-wire anemometer, LDA

Lecture 31 - Use of PIV

Lecture 32 - Use of PIV (Continued...)

Lecture 33 - Use of PIV (Continued...)

Lecture 34 - Measurement of pitch angle

Lecture 35 - Measurement of torque by dynamometers, straingauge, transducers

Lecture 36 - Measurement of microscale flow features - I

Lecture 37 - Measurement of microscale flow features - II

Lecture 38 - Transient and Frequency response consideration

Lecture 39 - Examples

Lecture 40 - Analysis of experimental data, causes and types of experimental errors

Lecture 41 - Rejection of data: Chauvenets Criterion with example

Lecture 42 - Error propagation: function of two variables, several variables

Lecture 43 - The Method of Least square with example

NPTEL : NOC:Automation in Manufacturing (Mechanical Engineering)

Co-ordinators : Dr. Shrikrishna N. Joshi

Lecture 1 - Basic concepts

Lecture 2 - Mechatronics

Lecture 3 - Mechatronics based systems

Lecture 4 - Automated systems and equipment used in manufacturing - Part I

Lecture 5 - Automated systems and equipment used in manufacturing - Part II

Lecture 6 - Selection of electrical and electronics components for mechatronics based systems

Lecture 7 - Terms related to performance of electro-mechanical systems

Lecture 8 - Computer aided design of components

Lecture 9 - Fabrication Processes

Lecture 10 - Measurement system and potentiometer sensors

Lecture 11 - Displacement, position and proximity sensors - I

Lecture 12 - Displacement, position and proximity sensors - II

Lecture 13 - Fluid flow, pressure, and temperature measurement

Lecture 14 - Signal Conditioning: amplification, filtering

Lecture 15 - Pulse modulation, Protection devices, and Wheatstone bridge

Lecture 16 - Signal conversion

Lecture 17 - Microprocessor Technology

Lecture 18 - Introduction to Microprocessor Programming

Lecture 19 - Application of electric drives in automation

Lecture 20 - DC and AC motors

Lecture 21 - Stepper motor and servo motor

Lecture 22 - Types of industrial automation and mechanisms

Lecture 23 - Ball screw based linear motion drives

Lecture 24 - Application of cams in automation

Lecture 25 - Application of indexing mechanisms in automation

Lecture 26 - Application of tool magazines in automation

Lecture 27 - Material handling systems

Lecture 28 - Fundamental concepts

Lecture 29 - Hydraulic pumps

Lecture 30 - Direction control valves

Lecture 31 - Flow control and pressure relief valves

Lecture 32 - Graphical representation of hydraulic system elements

Lecture 33 - Basic concepts and air compressors

Lecture 34 - Air treatment and pressure regulation

Lecture 35 - Graphical representation and pneumatic circuits

Lecture 36 - Computer aided manufacturing and process planning

Lecture 37 - CNC machines and interpolation

Lecture 38 - CNC Programming

NPTEL : NOC:Fundamentals of Compressible Flow (Mechanical Engineering)

Co-ordinators : Prof. Niranjan Sahoo

Lecture 1 - Review Concepts of Fluid Mechanics and Thermodynamics - I

Lecture 2 - Review Concepts of Fluid Mechanics and Thermodynamics - II

Lecture 3 - Review Concepts of Fluid Mechanics and Thermodynamics - III

Lecture 4 - Wave Propagation in Compressible Medium - I

Lecture 5 - Wave Propagation in Compressible Medium - II

Lecture 6 - Wave Propagation in Compressible Medium - III

Lecture 7 - Quasi-One Dimensional Isentropic Flow - I

Lecture 8 - Quasi-One Dimensional Isentropic Flow - II

Lecture 9 - Quasi-One Dimensional Isentropic Flow - III

Lecture 10 - Normal Shock Waves - I

Lecture 11 - Normal Shock Waves - II

Lecture 12 - Normal Shock Waves - III

Lecture 13 - Normal Shock Waves - IV

Lecture 14 - Expansion Waves and Oblique Shocks - I

Lecture 15 - Expansion Waves and Oblique Shocks - II

Lecture 16 - Expansion Waves and Oblique Shocks - III

Lecture 17 - Expansion Waves and Oblique Shocks - IV

Lecture 18 - Expansion Waves and Oblique Shocks - V

Lecture 19 - Expansion Waves and Oblique Shocks - VI

Lecture 20 - Supersonic Nozzles and Diffusers - I

Lecture 21 - Supersonic Nozzles and Diffusers - II

Lecture 22 - Supersonic Nozzles and Diffusers - III

Lecture 23 - Measurement Diagnostics and Experimental Facilitates for Compressible Flow - II

Lecture 24 - Compressible Flow with Friction and Heat Transfer - II

Lecture 25 - Compressible Flow with Friction and Heat Transfer - III

Lecture 26 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - I

Lecture 27 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - II

Lecture 28 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - III

Lecture 29 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - IV

Lecture 30 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - V

Lecture 31 - Measurement Diagnostics and Experimental Facilities for Compressible Flow - VI

NPTEL : NOC:Finite Element Method: Variational Methods to Computer Programming (Mechanical Engineering)

Co-ordinators : Prof. Arup Nandy, Prof. Atanu Banerjee

Lecture 1 - Functional, First variation, Euler Lagrange equation; Several Dependent variables

Lecture 2 - Functional with higher order derivatives; Variational statement

Lecture 3 - Differential equation, Variational statement and Minimization problem; Rayleigh-Ritz method

Lecture 4 - FEM steps: Explained with discrete linear springs; Gaussian Quadrature rule for integration

Lecture 5 - Solving one Ordinary Differential Equation using Linear Finite Element

Lecture 6 - Solving one Ordinary Differential Equation using Quadratic Finite Element

Lecture 7 - Bar Element: Elemental equation; Matlab Implementation with Example

Lecture 8 - Bar Element: Postprocessing; Comparison with Analytical Solution; Bar with linear springs

Lecture 9 - Truss Element: Elemental equation; Matlab Implementation with Example

Lecture 10 - Beam Element: Variational statement; Hermite shape function

Lecture 11 - Beam Element: Elemental equation; Matlab implementation with Example

Lecture 12 - Beam Element: Matlab implementation for the example with Non-uniform distributed load

Lecture 13 - Frame Element: Derivation of elemental equation in global reference frame

Lecture 14 - Frame Element: Matlab implementation with one Example

Lecture 15 - Generalization of Geometry data; Stiffness matrix, Load vector formation at element level

Lecture 16 - Generalization of Assembly, Imposition of Boundary condition and Load information

Lecture 17 - Indicial Notation: Summation convention, Kronecker delta, Permutation symbol

Lecture 18 - Second order tensor; Gradient, Divergence, Curl and Laplacian in Indicial notation

Lecture 19 - Gauss Divergence theorem and its application in Heat transfer and Structural analysis

Lecture 20 - Derivation of weak form of 2D steady-state heat conduction problem

Lecture 21 - Triangular element, calculating element stiffness and element force vector

Lecture 22 - Numerical example, assembly, mapping

Lecture 23 - Numerical integration, Neumann boundary, and higher order shape functions

Lecture 24 - Quadrilateral element, Lagrange shape functions, Serendipity elements

Lecture 25 - Development of a MATLAB code for solving 2D steady-state heat conduction problem

Lecture 26 - Demonstration of the MATLAB code

Lecture 27 - Elasticity problems in two dimension and obtaining the weak form

Lecture 28 - Deriving element stiffness matrix and element force vector, numerical example

Lecture 29 - Development of a MATLAB code for solving planar elasticity problems

Lecture 30 - Superconvergent Patch Recovery, error estimator, adaptive refinement

Lecture 31 - Solving eigenvalue problem in bar and beam, writing FEM code in MATLAB

Lecture 32 - Solving eigenvalue problem of membrane, writing FEM code in MATLAB

Lecture 33 - Solving transient problems (parabolic type)

Lecture 34 - Solving transient problems (hyperbolic type)

Lecture 35 - Solving elasticity problems in 3D using FEM, Solvers

NPTEL : NOC:Computational Continuum Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Sachin Singh Gautam

Lecture 1 - Origin of nonlinearities - 1

Lecture 2 - Origin of nonlinearities - 2

Lecture 3 - Tensor and Tensor Algebra - 1

Lecture 4 - Tensor and Tensor Algebra - 2

Lecture 5 - Tensor and Tensor Algebra - 3

Lecture 6 - Tensor and Tensor Algebra - 4

Lecture 7 - Linearization and directional derivative, Tensor analysis - 1

Lecture 8 - Linearization and directional derivative, Tensor analysis - 2

Lecture 9 - Worked Examples - 1

Lecture 10 - Worked Examples - 2

Lecture 11 - Idea of Motion, Material and Spatial Descriptions, Deformation Gradient Tensor

Lecture 12 - Strain, Polar Decomposition - 1

Lecture 13 - Polar Decomposition - 2, Volume and Area Change

Lecture 14 - Worked Examples, Linearized Kinematics

Lecture 15 - Velocity, Acceleration, Material Time Derivative

Lecture 16 - Velocity Gradient, Rate of Deformation tensor, Area and Volume Rate, Reynolds Transport Theorem

Lecture 17 - Solved Examples

Lecture 18 - Conservation of Mass, Balance of Linear Momentum, Cauchy's Stress Principle - 1

Lecture 19 - Cauchy's Stress Principle - 2, Cauchy Stress Tensor

Lecture 20 - Objectivity, Stress Objectivity, Equilibrium Equations - 1

Lecture 21 - Equilibrium Equations - 2, Principle of Virtual Work

Lecture 22 - Work Conjugacy, First Piola-Kirchhoff Stress Tensor

Lecture 23 - Second Piola-Kirchhoff Stress Tensor, Decomposition of Stress - 1

Lecture 24 - Decomposition of Stress - 2, Objective Stress Measures

Lecture 25 - Solved Examples

Lecture 26 - Constitutive relations and constraints, Hyperelasticity, Material elasticity tensor

Lecture 27 - Spatial Elasticity Tensor, Solved Example

Lecture 28 - Isotropic hyperelasticity - material and spatial description, Hyperelastic models

Lecture 29 - Isotropic Hyperelasticity, Neo-Hookean Material Model, Solved Examples

Lecture 30 - Introduction, Linearization Process Overview

Lecture 31 - Linearization of Internal Virtual Work and External Virtual Work

Lecture 32 - Discretization of Kinematic Quantities, Equilibrium Equations

Lecture 33 - Discretization of Linearized Equilibrium Equations

Lecture 34 - Newton Raphson Method

Lecture 35 - Line Search Method

Lecture 36 - Arc Length Method, Solved Examples

Lecture 37 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Introduction

Lecture 38 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Formulation

Lecture 39 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - FEM

Lecture 40 - FE Formulation of Ductile Fracture in Dynamic Elasto-Plastic Contact Problem - Results

NPTEL : NOC:Fundamentals of Convective Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. Amaresh Dalal

Lecture 1 - Application of convective heat transfer

Lecture 2 - Foundations of heat transfer

Lecture 3 - Derivation of energy equation

Lecture 4 - Derivation of boundary layer equation

Lecture 5 - Derivation of boundary layer energy equation

Lecture 6 - Blasius solution: similarity method

Lecture 7 - Pohlhausen solution: similarity method

Lecture 8 - Pohlhausen solution: heat transfer parameters

Lecture 9 - Falkner-Skan equation: Boundary layer flow over a wedge

Lecture 10 - Momentum integral equation for flat plate boundary layer

Lecture 11 - Laminar BL flow over flat plate: Uniform surface temperature

Lecture 12 - Laminar BL flow over flat plate: Uniform surface heat flux

Lecture 13 - Solution of example problems

Lecture 14 - Hydrodynamic and thermal regions

Lecture 15 - Energy balance in channel flow

Lecture 16 - Determination of heat transfer coefficient

Lecture 17 - Velocity profile in fully-developed channel flows

Lecture 18 - Thermally fully developed laminar slug flow with uniform wall heat flux condition

Lecture 19 - Hydrodynamically and thermally fully developed flow with uniform wall heat flux condition

Lecture 20 - Fully developed flow through parallel plate channel with uniform wall temperature

Lecture 21 - Fully developed flow through circular pipe with uniform wall temperature

Lecture 22 - Thermally developing flow through circular pipe with uniform wall heat flux

Lecture 23 - Thermally developing flow through circular pipe with uniform wall temperature

Lecture 24 - Heat transfer in plane Couette flow

Lecture 25 - Solutions of example problems

Lecture 26 - Introduction and scale analysis

Lecture 27 - Natural convection over a vertical plate: Similarity Solution

Lecture 28 - Natural convection over a vertical plate: Similarity solution of energy equation

Lecture 29 - Natural convection over a vertical plate: Integral solution

Lecture 30 - Natural convection over inclined plate and mixed convection

Lecture 31 - Natural convection inside enclosures

Lecture 32 - Solution of example problems

Lecture 33 - Basics of finite difference method

Lecture 34 - Solution of Navier-Stokes equations

Lecture 35 - Solution of energy equation

Lecture 36 - Derivation of Reynolds Averaged Navier-Stokes Equations

Lecture 37 - External Turbulent Flow

Lecture 38 - Integral solution for turbulent boundary layer flow over a flat plate

Lecture 39 - Convection in turbulent pipe flow

Lecture 40 - Boiling regimes and boiling curve

Lecture 41 - Laminar film condensation on a vertical plate

Lecture 42 - Laminar film condensation on horizontal tube

Lecture 43 - Solution of example problems

NPTEL : NOC:Theory of Composite Shells (Mechanical Engineering)

Co-ordinators : Prof. Poonam Kumari

Lecture 1 - Introduction to composite materials

Lecture 2 - Basic terminology in Shell

Lecture 3 - Derivation of fundamental theorem of surfaces

Lecture 4 - Derivative of unit vectors and various theorems

Lecture 5 - Classification of shells

Lecture 6 - Derivation of strain-displacement relation

Lecture 7 - Derivation of shell governing equations - 1

Lecture 8 - Derivation of shell governing equations - 2

Lecture 9 - Derivation of shell governing equations - 3

Lecture 10 - Derivation of special cases

Lecture 11 - Derivation of shell constitutive relations

Lecture 12 - Solved examples on membrane theory and moment shell theory

Lecture 13 - Shell of revolution problems

Lecture 14 - Derivation of Navier solution for infinite shell panel

Lecture 15 - Basics of MATLAB coding

Lecture 16 - Derivation of Navier solution for finite shell panel

Lecture 17 - ABAQUS Modelling

Lecture 18 - Extended Kanatrovich method for shell panel

Lecture 19 - Free Vibration solution of shell panels under Navier and Levy supports - 1

Lecture 20 - Free Vibration solution of shell panels under Navier and Levy supports - 2

Lecture 21 - Basics of Buckling of shells

Lecture 22 - Buckling of cylindrical shells

Lecture 23 - Buckling of Levy-type cylindrical shells

Lecture 24 - 3D Bending

Lecture 25 - 3D Free vibration

Lecture 26 - 3D Buckling

Lecture 27 - Advanced Material

Lecture 28 - Free vibration of a composite cylindrical shell

NPTEL : NOC:Finite Element Modeling of Welding Processes (Mechanical Engineering)

Co-ordinators : Prof. Swarup bag

Lecture 1 - Properties, Modelling approaches, Process modelling and Optimization

Lecture 2 - Fusion welding - 1

Lecture 3 - Fusion welding - 2

Lecture 4 - Soldering, Brazing, Solid-state welding processes

Lecture 5 - Advanced welding processes

Lecture 6 - Advances in laser microwelding

Lecture 7 - Additive manufacturing processes

Lecture 8 - Elastic stress analysis - I

Lecture 9 - Elastic stress analysis - II and Potential energy method

Lecture 10 - Three-Dimensional element

Lecture 11 - Weighted residual method

Lecture 12 - Material nonlineaity - I

Lecture 13 - Material nonlineaity - II

Lecture 14 - Fluid flow and Natural coordinate system - I

Lecture 15 - Natural coordinate system in 3D and XFEM

Lecture 16 - Introduction to heat source model

Lecture 17 - Heat source models in welding - I

Lecture 18 - Heat source models in welding - II

Lecture 19 - Heat source model for Keyhole mode and solid state welding

Lecture 20 - Implementation of FEM in fusion welding processes

Lecture 21 - Implementation of FEM for fluid flow in fusion welding processes

Lecture 22 - FEM modeling of EBW and RSW

Lecture 23 - FEM modeling of FSW and hybrid FSW

Lecture 24 - Demonstration of thermal model development using commercial software

Lecture 25 - Fluid flow modeling in welding processes

Lecture 26 - Heat transfer and fluid flow analysis in quasi-steady state

Lecture 27 - Prediction of free surface profile

Lecture 28 - Principle stress, Hydrostatic and Deviatoric Components of Stress

Lecture 29 - Yield Function, Von Mises Yield Surface and Hardening rule

Lecture 30 - Material models, Residual stress and distortion

Lecture 31 - Phase transformation effect on Residual stress and distortion

Lecture 32 - Demonstration of thermo-mechanical model development using commercial software

Lecture 33 - Fundamentals of metal transfer in arc welding

Lecture 34 - FE-based modelling approaches

Lecture 35 - Theoretical development of heat transfer model

Lecture 36 - Heating of nano-film

Lecture 37 - Theoretical development of stress analysis model

Lecture 38 - Fundamentals of wire arc additive manufacturing processes - I

Lecture 39 - Fundamentals of wire arc additive manufacturing processes - II

Lecture 40 - Modelling approaches of additive manufacturing

NPTEL : NOC:Nonlinear Vibration (Mechanical Engineering)

Co-ordinators : Prof. S. K. Dwivedy

Lecture 1 - Introduction to mechanical systems

Lecture 2 - Superposition rule, Commonly used nonlinear equations

Lecture 3 - Equilibrium points: potential function

Lecture 4 - Force and moment based Approach, Lagrange Principle

Lecture 5 - Extended Hamiltonâ€™s principle

Lecture 6 - Use of scaling and book-keeping parameter for ordering

Lecture 7 - Numerical solution, Analytical solutions: Harmonic Balance method

Lecture 8 - Straight forward expansion

Lecture 9 - Lindstd-Poincareâ€™ method

Lecture 10 - Method of Averaging

Lecture 11 - Method of multiple scales

Lecture 12 - Method of generalized Harmonic Balance method

Lecture 13 - Free vibration of undamped and damped SDOF systems with quadratic and cubic nonlinearity

Lecture 14 - Super and sub harmonic resonance conditions

Lecture 15 - Bifurcation analysis of fixed-point response

Lecture 16 - Nonlinear system with hard excitations

Lecture 17 - Super and sub harmonic resonance conditions

Lecture 18 - Bifurcation analysis of fixed-point response

Lecture 19 - Floquet theory, Hill's infinite determinant, Resonance in parametrically excited systems

Lecture 20 - Parametrically excited pneumatic artificial muscle

Lecture 21 - Parametric instability of sandwich plate

Lecture 22 - Analysis of periodic, quasi-periodic and chaotic systems

Lecture 23 - Stability and bifurcation analysis of periodic and quasi-periodic response

Lecture 24 - Analysis of chaotic system

Lecture 25 - Numerical methods for finding roots and solutions of ODE

Lecture 26 - Time response, phase portraits, frequency response

Lecture 27 - Poincare section, FFT, Lyapunov exponent

Lecture 28 - Pasive and active vibration absorber with displacement and acceleration feedback

Lecture 29 - Active vibration absorber with time delay acceleration feedback by HBM

Lecture 30 - Application of Active vibration absorber with combination feedback

Lecture 31 - Cantilever beam with tip mass for principal parametric resonance

Lecture 32 - Cantilever beam with tip mass for combination resonance

Lecture 33 - Cantilever beam based piezoelectric based energy harvestor

Lecture 34 - Nonlinear dynamics of turning operation with delay and internal resonance

Lecture 35 - Chatter in rolling mills and dynamic analysis of artificial pneumatic muscle

Lecture 36 - Chaotic systems and control of chaos

NPTEL : NOC:Evolutionary Computation for Single and Multi Objective Optimization (Mechanical Engineering)

Co-ordinators : Prof. Deepak Sharma

Lecture 1 - Introduction to Optimization

Lecture 2 - Introduction to Evolutionary Computation

Lecture 3 - Binary-Coded Genetic Algorithm (BGA)

Lecture 4 - Operators and Simulations of Binary-Coded Genetic Algorithm

Lecture 5 - Real-Coded Genetic Algorithm (RGA)

Lecture 6 - Operators and Simulations of Real-Coded Genetic Algorithm

Lecture 7 - Algorithmic Implementation of BGA and RGA

Lecture 8 - Particle Swarm Optimization (PSO)

Lecture 9 - Simulations and Algorithmic Implementation of Particle Swarm Optimization

Lecture 10 - Differential Evolution (DE)

Lecture 11 - Simulations and Algorithmic Implementation of Differential Evolution

Lecture 12 - Constrained Optimization: Introduction and Optimality

Lecture 13 - Penalty Function Methods for Evolutionary Computing Techniques

Lecture 14 - Evolutionary Computing Techniques: Separation of Objective Function and Constraints

Lecture 15 - Simulations of Constraint Handling Techniques - Part 1

Lecture 16 - Simulations of Constraint Handling Techniques - Part 2

Lecture 17 - Introduction to Multi-Objective Optimization - Part 1

Lecture 18 - Introduction to Multi-Objective Optimization - Part 2

Lecture 19 - Multi-Objective Optimization: Ranking and Diversity

Lecture 20 - Classical Multi-Objective Optimization Methods

Lecture 21 - Non-Dominated Genetic Algorithm: NSGA-II: Introduction

Lecture 22 - Non-Dominated Genetic Algorithm: NSGA-II: Simulations

Lecture 23 - Strength Pareto Evolutionary Algorithm: SPEA2: Introduction

Lecture 24 - Strength Pareto Evolutionary Algorithm: SPEA2: Simulations

Lecture 25 - Performance Assessment of Multi-Objective EC Techniques

Lecture 26 - Closure of EC for Single and Multi-Objective Optimization

NPTEL : NOC:Viscous Fluid Flow (Mechanical Engineering)

Co-ordinators : Prof. Amaresh Dalal

Lecture 1 - Preliminary concepts

Lecture 2 - Fluid Kinematics

Lecture 3 - Derivation of incompressible Navier-Stokes equations

Lecture 4 - Initial and Boundary Conditions

Lecture 5 - Plane Couette Flow

Lecture 6 - Plane Poiseuille Flow

Lecture 7 - Plane Poiseuille Flow with Slip and Thin Film Flow

Lecture 8 - Combined Couette - Poiseuille Flow

Lecture 9 - Example Problems

Lecture 10 - Hagen - Poiseuille Flow

Lecture 11 - Thin Film Flow and Annular Flow

Lecture 12 - Steady Flow Between Rotating Cylinders

Lecture 13 - Flow near a plate suddenly set in motion

Lecture 14 - Flow due to an oscillating plate

Lecture 15 - Transient Plane Couette Flow

Lecture 16 - Transient Axisymmetric Poiseuille Flow

Lecture 17 - Flow Through Rectangular Duct

Lecture 18 - Flow Through Equilateral Triangular Duct

Lecture 19 - Flow Through Elliptical Duct

Lecture 20 - Example Problems

Lecture 21 - Creeping Flow Around a Sphere

Lecture 22 - Reynolds Equation for Lubrication

Lecture 23 - One-dimensional Slider Bearing

Lecture 24 - Journal Bearing and Piston-ring Lubrication

Lecture 25 - Derivation of Boundary Layer Equations

Lecture 26 - Blasius Flow Over A Flat Plate: Similarity Solution

Lecture 27 - Momentum Integral Equation For Flat Plate Boundary Layer

Lecture 28 - Falkner-Skan equation: Boundary layer flow over a wedge

Lecture 29 - Karman-Pohlhausen Method for Non-zero Pressure Gradient Flows

Lecture 30 - The Correlation Method by Thwaites

Lecture 31 - Separation of Boundary Layer

Lecture 32 - Example Problems

Lecture 33 - Two-dimensional Laminar Jet

Lecture 34 - Flow in the Wake of a Flat Plate

Lecture 35 - Free Shear Layer Between Two Different Streams

Lecture 36 - Derivation of Orr-Sommerfeld Equation

Lecture 37 - Viscous Stability

Lecture 38 - Inviscid Analysis

Lecture 39 - Introduction to Turbulent Flows

Lecture 40 - Derivation of Reynolds Averaged Navier-Stokes Equations

Lecture 41 - External Turbulent Flows

Lecture 42 - Integral Solution for Turbulent Boundary Layer Flow

Lecture 43 - Internal Turbulent Flow

Lecture 44 - Turbulence Modelling

NPTEL : NOC:Welding Application Technology (Mechanical Engineering)

Co-ordinators : Prof. Pankaj Biswas

Lecture 1 - Plasma Arc Welding (PAW)

Lecture 2 - Flux Cored Arc Welding (FCAW)

Lecture 3 - Thermit Welding

Lecture 4 - Resistance Welding - Part 1 (Resistance Spot Welding)

Lecture 5 - Resistance Welding - Part 2 (Types of Resistance Welding)

Lecture 6 - Friction Welding

Lecture 7 - Friction Stir Welding - Part 1

Lecture 8 - Friction Stir Welding - Part 2

Lecture 9 - Soldering

Lecture 10 - Brazing

Lecture 11 - Residual Stress - Part 1

Lecture 12 - Residual Stress - Part 2

Lecture 13 - Influencing Factors and Control of Residual Stresses

Lecture 14 - Residual Stress Measurement - 1

Lecture 15 - Residual Stress Measurement - 2

Lecture 16 - Residual Stress Measurement by NDT

Lecture 17 - Welding Induced Distortion

Lecture 18 - Welding Induced Distortion (Control and Measurement)

Lecture 19 - Welding Induced Distortion (Measurement and Prediction)

Lecture 20 - Welded Joint Analysis

Lecture 21 - Welded Joints Analysis (Strength of Parallel and Transverse Fillet Welds)

Lecture 22 - Welded Joints Analysis (Analysis of Eccentrically Loaded Welded Joint)

Lecture 23 - Welded Joints Static Analysis (Analysis of Eccentrically Loaded Welded Joint - Part 1)

Lecture 24 - Welded Joints Static Analysis (Analysis of Eccentrically Loaded Welded Joint - Part 2)

Lecture 25 - Welded Joints Static Analysis (Welded Joint Subjected to Bending Moment)

Lecture 26 - Welded Joints Static Analysis (Welded Joint Subjected to Bending Moment - Part 1)

Lecture 27 - Welded Joints Static Analysis (Welded Joint Subjected to Bending Moment - Part 2)

NPTEL : NOC:Fundamentals of Additive Manufacturing Technologies (Mechanical Engineering)

Co-ordinators : Prof. Sajan Kapil

Lecture 1 - Introduction to Additive Manufacturing

Lecture 2 - CAD Models for Additive Manufacturing

Lecture 3 - Manipulation of STL Files

Lecture 4 - Slicing Methods - Part A

Lecture 5 - Slicing Methods - Part B

Lecture 6 - Toolpath Planning

Lecture 7 - Demonstration of CAD-CAM Packages

Lecture 8 - Introduction to Liquid AM

Lecture 9 - Stereolithography Apparatus: Fundamentals of Photopolymerization - Part 1

Lecture 10 - Stereolithography Apparatus: Fundamentals of Photopolymerization - Part 2

Lecture 11 - Stereolithography Apparatus: Sub-systems - Part 1

Lecture 12 - Stereolithography Apparatus: Sub-systems - Part 2

Lecture 13 - Other Liquid AM Processes - 1

Lecture 14 - Other Liquid AM Processes - 2

Lecture 15 - Sheet Additive Manufacturing - Part 1

Lecture 16 - Sheet Additive Manufacturing - Part 2

Lecture 17 - Wire Additive Manufacturing

Lecture 18 - Fused Deposition Modeling

Lecture 19 - Metal Wire Additive Manufacturing

Lecture 20 - Metal Inert Gas-Wire Arc Additive Manufacturing (MIG-WAAM) - Part 1

Lecture 21 - Metal Inert Gas-Wire Arc Additive Manufacturing (MIG-WAAM) - Part 2

Lecture 22 - Tungsten Inert Gas/Plasma-Wire Arc Additive Manufacturing (TIG/Plasma-WAAM)

Lecture 23 - Electron beam-based Wire Beam Additive Manufacturing (WBAM)

Lecture 24 - Laser Metal Wire Additive Manufacturing

Lecture 25 - Powder-Feed Additive Manufacturing - Part 1

Lecture 26 - Powder-Feed Additive Manufacturing - Part 2

Lecture 27 - Process Modeling for Powder Feed Additive Manufacturing - Part 1

Lecture 28 - Process Modeling for Powder Feed Additive Manufacturing - Part 2

Lecture 29 - Laser Beam based Powder Bed Additive Manufacturing - Part 1

Lecture 30 - Laser Beam based Powder Bed Additive Manufacturing - Part 2

Lecture 31 - Electron Beam based Powder Bed Additive Manufacturing

Lecture 32 - Binder based Powder Bed Additive Manufacturing - Part 1

Lecture 33 - Binder based Powder Bed Additive Manufacturing - Part 2

NPTEL : NOC:Applied Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. Niranjan Sahoo

Lecture 1 - Thermodynamic Systems and Pure Substance

Lecture 2 - Heat and Work Transfer - First Law of Thermodynamics

Lecture 3 - Second Law of Thermodynamics

Lecture 4 - Entropy and Exergy

Lecture 5 - Introduction to Steam Power Plant

Lecture 6 - Thermodynamics aspects of Steam Power Plant-Efficiency and Work ration

Lecture 7 - Rankine Cycle and its analysis

Lecture 8 - Improvement in Rankine Cycle Efficiency: Superheating and Reheating

Lecture 9 - Improvement in Rankine Cycle Efficiency: Reheating and Regenerative Methods

Lecture 10 - Improvement in Rankine Cycle Efficiency: Regenerative Methods

Lecture 11 - Regenerative Cycles

Lecture 12 - Impulse Steam Turbine: Velocity Diagrams,Work Transfer,Blade Efficiency

Lecture 13 - Impulse Steam Turbine: Velocity Diagrams,Work Transfer,Blade Efficiency (Continued...)

Lecture 14 - Reaction Steam Turbine

Lecture 15 - Reaction Steam Turbine: Velocity Diagram, Work transfer, Blade Efficiency

Lecture 16 - Steam Nozzle: Analysis and Efficiency

Lecture 17 - Steam Nozzle: Analysis and Efficiency (Continued...)

Lecture 18 - Boilers and Condensers

Lecture 19 - Condensers and Second Law Analysis of Steam Power cycle

Lecture 20 - Exergy Analysis of a Steam Turbine

Lecture 21 - Numerical Problems: Steam Power Cycle

Lecture 22 - IC engine-Components, Nomenclature and Classifications

Lecture 23 - Basic Engine Cycle and Engine Kinematic Analysis

Lecture 24 - Engine Operating Characteristics

Lecture 25 - Thermodynamics Analysis of Air Standard Cycles

Lecture 26 - Valve Timing Diagram and Fuel-Air Cycle

Lecture 27 - Thermochemistry and Fuel Characteristics

Lecture 28 - Combustion Phenomena in Engines

Lecture 29 - Heat Transfer Analysis in Engines

Lecture 30 - Exergy Analysis and Engine Emission/Pollution

Lecture 31 - Gas Turbine Engine-Components and Thermal Circuit

Lecture 32 - Gas Turbine Performance Cycle - I

Lecture 33 - Gas Turbine Performance Cycle - II

Lecture 34 - Real Gas Turbine Performance Cycle

Lecture 35 - Aircraft Propulsion Cycle - I

Lecture 36 - Aircraft Propulsion Cycle - II

Lecture 37 - Vapour Compression Refrigeration System - I

Lecture 38 - Vapour Compression Refrigeration System - II

Lecture 39 - Absorption Refrigeration and Refrigerants

Lecture 40 - Fundamentals of Psychrometrics

Lecture 41 - Air-Conditioning Processes

Lecture 42 - Cooling Tower and Air Washers

Lecture 43 - Reciprocating Compressor - Analysis and Modelling

Lecture 44 - Multistage Compression - Analysis and Modelling

NPTEL : NOC:Mechanics of Fiber Reinforced Polymer Composite Structures (Mechanical Engineering)

Co-ordinators : Prof. Debabrata Chakraborty

Lecture 1 - Composite Materials - Introduction

Lecture 2 - Composite Materials - Classification

Lecture 3 - Anisotropic Elasticity

Lecture 4 - Orthotropic Materials

Lecture 5 - Hookeâ€™s Law for 2D Lamina

Lecture 6 - Engineering Constants for 2D Lamina

Lecture 7 - Strength Failure Criteria - Part I

Lecture 8 - Strength Failure Criteria - Part II

Lecture 9 - Hygrothermal Behavior of Lamina

Lecture 10 - Introduction and Terminologies

Lecture 11 - Evaluation of Elastic Moduli

Lecture 12 - Evaluation of Longitudinal Strength

Lecture 13 - Evaluation of Transverse and Shear Strengths

Lecture 14 - Evaluation of Hygrothermal Properties

Lecture 15 - Elasticity Approach

Lecture 16 - Experimental Evaluation

Lecture 17 - Laminate - Introduction

Lecture 18 - Classical Lamination Theory - Part I

Lecture 19 - Classical Lamination Theory - Part II

Lecture 20 - Response of Laminate - Significance of ABBD

Lecture 21 - Special Classes of Laminates

Lecture 22 - Engineering Constants of Laminates

Lecture 23 - Hygrothermal Behaviour of Laminates

Lecture 24 - Analysis of Laminates

Lecture 25 - Failure of Laminates

Lecture 26 - Failure Analysis under Combined Loading

Lecture 27 - Design Example - I

Lecture 28 - Design Example - II

Lecture 29 - Interlaminar Stresses- Delamination

Lecture 30 - Prediction of Delamination

Lecture 31 - Transverse Deflection

Lecture 32 - Buckling and Free Vibration

NPTEL : NOC:Laser Based Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. Shrikrishna N. Joshi

Lecture 1 - Lasers in Manufacturing: Importance and Applications

Lecture 2 - Fundamentals of Laser Technology

Lecture 3 - Laser System: Construction and Types

Lecture 4 - Principle of Operation, Types of Laser Cutting, and Kerf Geometry

Lecture 5 - Types of Lasers in Material Removal, Process and Performance Parameters

Lecture 6 - A Case-study on Cutting a Circular Part using CO2 Laser Machine

Lecture 7 - Mechanisms of Laser Welding - Part I

Lecture 8 - Mechanisms of Laser Welding - Part II

Lecture 9 - Effects of Process Parameters during Laser Welding and Study of Defects in Weld Beads

Lecture 10 - A Case Study on Welding of Mild Steel Sheets using 2.5 kW CO2 Laser Machine

Lecture 11 - Material Forming and Fundamentals of Laser Forming

Lecture 12 - Mechanisms of Laser Forming

Lecture 13 - Process Parameters and their Effects on the Performance of Laser Forming

Lecture 14 - Surface Treatment and Application of Lasers

Lecture 15 - Laser Surface Hardening

Lecture 16 - Laser Surface Alloying

Lecture 17 - Laser Cladding

Lecture 18 - Additive Manufacturing Techniques

Lecture 19 - Laser Scanning Stereolithography

Lecture 20 - Selective Laser Sintering and Selective Laser Melting

Lecture 21 - Process and Performance Parameters of Laser Based Additive Manufacturing Techniques

Lecture 22 - Lasers in Manufacturing Automation

Lecture 23 - CNC for Laser Based Manufacturing

Lecture 24 - CAD for Laser Based Manufacturing

Lecture 25 - Laser-assisted Material Forming

Lecture 26 - Effect of Coatings, 3D Laser Forming and Micro-forming

NPTEL : NOC:Advanced Thermodynamics and Combustion (Mechanical Engineering)

Co-ordinators : Prof. Niranjan Sahoo

Lecture 1 - Temperature and Zeroth Law of Thermodynamics

Lecture 2 - Work and Heat Transfer - First Law of Thermodynamics

Lecture 3 - Heat Engines and Refrigerators/Heat Pump - Second Law of Thermodynamics

Lecture 4 - Entropy Analysis - Part I

Lecture 5 - Entropy Analysis - Part II

Lecture 6 - Entropy Analysis - Part III

Lecture 7 - Exergy Analysis - Part I

Lecture 8 - Exergy Analysis - Part II

Lecture 9 - Exergy Analysis - Part III

Lecture 10 - Thermodynamic Functions and Maxwell's Equations

Lecture 11 - Property Relations for Phase Change Processes

Lecture 12 - Property Relations for Single Phase Systems

Lecture 13 - Heat Capacity Equations and its Applications

Lecture 14 - Joule - Thomson Coefficient and Liquefaction of Gases

Lecture 15 - Ideal Gas and Real Gas

Lecture 16 - Gas Mixtures and Multi-Component System

Lecture 17 - Ideal Gas Mixture

Lecture 18 - Mixing Analysis of Thermodynamic Systems

Lecture 19 - Thermodynamic Considerations of Combustion

Lecture 20 - Conservation of Energy for Reacting Systems

Lecture 21 - Adiabatic Flame Temperature, Entropy and Gibbs Function for Reacting System

Lecture 22 - Equilibrium Products of Combustion and Effective Energy Utilization

Lecture 23 - Fundamentals of Chemical Reactions

Lecture 24 - Reaction Mechanisms - Part I

Lecture 25 - Reaction Mechanisms - Part II

Lecture 26 - Chemical and Thermal Analysis of Reacting Systems

Lecture 27 - Simplified Conservation Equations for Reacting Flows

Lecture 28 - Laminar Premixed Flame - Part I

Lecture 29 - Laminar Premixed Flame - Part II

Lecture 30 - Laminar Diffusion Flame

Lecture 31 - Droplet Evaporation and Turbulent Flame

Lecture 32 - Engine Combustion and Pollution

NPTEL : NOC:Thermal Engineering: Basic and Applied (Mechanical Engineering)

Co-ordinators : Prof. Pranab K. Mondal

Lecture 1 - First law of Thermodynamics for control mass and control volume systems

Lecture 2 - First law of Thermodynamics for control volume system (Flow system)

Lecture 3 - Steady State Steady Flow Processes, combination of First and Second Laws

Lecture 4 - Second Law of Thermodynamics: A Brief Review

Lecture 5 - Combined First and Second Laws Applied to Processes

Lecture 6 - Combined First and Second Laws: Flow and Non-Flow Processes

Lecture 7 - Description of Steam Power Plant: Application of 1st and 2nd Laws to Different Processes

Lecture 8 - Second Law Applied to Processes of Power Plant and Ideal Cycle of Power Plant

Lecture 9 - Steam Power Plant: Thermodynamic aspects, Efficiency, Work ratio and Ideal Cycle

Lecture 10 - Ideal Power Cycle and its Limitations, Introduction to Actual Power Cycle

Lecture 11 - Limitations of Carnot Cycle, Simple Rankine Cycle and Analysis

Lecture 12 - Analysis of Simple Rankine Cycle and its Design Modifications

Lecture 13 - Reheat Cycle and Analysis

Lecture 14 - Reheat Cycle and Analysis (Continued...)

Lecture 15 - Regenerative Principle of Steam Power Cycles

Lecture 16 - Analysis of Regenerative Steam Power Cycles

Lecture 17 - Regenerative Steam Power Cycle with Closed Feed-Water Heater, Ideal Working Fluid

Lecture 18 - Multi-fluid Cycle and Analysis

Lecture 19 - Analysis of Multi-fluid Cycle; Second Law Analysis of Steam Power Cycle

Lecture 20 - Problems of Steam Power Cycle

Lecture 21 - Problems of Steam Power Cycle (Continued...)

Lecture 22 - Types of Boiler, Different Cycles in Boiler Operation, Boiler attachment

Lecture 23 - Cochran Boiler Operation, Boiler attachment

Lecture 24 - Boiler Attachments

Lecture 25 - Superheaters and their Arrangements, Steam Temperature Control

Lecture 26 - Characteristics of Convective and Radiant Superheaters; Steam Temperature Control

Lecture 27 - Problems on Boiler/Steam Generator

Lecture 28 - Use of nozzles in steam power plant, flow analysis of steam in nozzle

Lecture 29 - Flow analysis of steam in nozzle: Mass flow rate

Lecture 30 - Mass flow rate of steam in nozzle, Critical Pressure Ratio

Lecture 31 - Critical Pressure Ratio and its Physical Significance

Lecture 32 - Nozzle efficiency and factors that affect the efficiency

Lecture 33 - Factors that affect the efficiency, problem on flow nozzle

Lecture 34 - Problem on flow nozzle

Lecture 35 - Steam Turbines: types and analysis using velocity triangles

Lecture 36 - Analysis of Impulse Steam Turbine

Lecture 37 - Compounding of Steam Turbine

Lecture 38 - Analysis of Reaction Steam Turbine

Lecture 39 - Problems on Steam Turbine

Lecture 40 - The Role of Condenser in Power Plant

Lecture 41 - Cooling Tower: Types and Analysis

Lecture 42 - Cooling Tower Performance

Lecture 43 - IC Engines, Classification, Different Parts, SI and CI Engines

Lecture 44 - Comparison of 2-stroke and 4-stroke Engines

Lecture 45 - Comparison of SI and CI Engines, Compression Ratio

Lecture 46 - Introduction to Carburettor and Regimes of Engine Operation

Lecture 47 - Regimes of Engine Operation and Simple Float Type Carburettor

Lecture 48 - Simple Float Type Carburettor and its Analysis

Lecture 49 - Mass Flow Rate of Fuel and limitations of Simple Float Type Carburettor

Lecture 50 - Limitations of Simple Float Type Carburettor, Problem on Carburettion

Lecture 51 - Engine Operating Characteristics: MEP and Indicator diagram

Lecture 52 - Performance Analysis parameters of IC Engine

Lecture 53 - Fuel of IC Engines

Lecture 54 - Alternative Fuels and Self Ignition Characteristics of Fuel: Octane Numner, Cetane Number

Lecture 55 - Thermodynamic Analysis of SI Engine

Lecture 56 - Thermodynamic Analysis of CI Engine

Lecture 57 - Numerical Problems on Engine Performance

Lecture 58 - Pressure-Crank angle diagram, Engine Efficiencies

Lecture 59 - Numerical Problems on SI and CI Engines

Lecture 60 - Vapour Compression Refrigeration Cycle and its analysis

Lecture 61 - Problems on Vapour Compression Refrigeration Cycle

Lecture 62 - Gas Turbine Units and Thermodynamic Cycles

Lecture 63 - Gas Compressor and Optimum Pressure Ratio

Lecture 64 - Compressor Efficiency and Multistage Compression with Intercooling

Lecture 65 - Gas Turbine Unit: Combined Cycle

Lecture 66 - Problems On Gas Turbine Cycle

NPTEL : NOC:Mechanics of Sheet Metal Forming (Mechanical Engineering)

Co-ordinators : Prof. R Ganesh Narayanan

Lecture 1 - Introduction to sheet forming and tensile test of sheets

Lecture 2 - Tensile test, effect of properties, exercise problem

Lecture 3 - Sheet deformation processes

Lecture 4 - Sheet deformation processes (Continued...)

Lecture 5 - Sheet deformation processes (Continued...)

Lecture 6 - Sheet deformation in plane stress

Lecture 7 - Sheet deformation in plane stress (Continued...)

Lecture 8 - Stamping analyses

Lecture 9 - Load instability and tearing

Lecture 10 - Load instability and tearing

Lecture 11 - Formability testing of sheet metals

Lecture 12 - Sheet formability

Lecture 13 - Sheet formability (Continued...)

Lecture 14 - Bending of sheets

Lecture 15 - Bending of sheets (Continued...)

Lecture 16 - Cup deep drawing

Lecture 17 - Deep drawing, redrawing, ironing of cup

Lecture 18 - Stretching of sheet

Lecture 19 - Hydroforming

Lecture 20 - Yield functions with sheet anisotropy

Lecture 21 - Demonstration of sheet forming experiments

NPTEL : NOC:Power Plant System Engineering (Mechanical Engineering)

Co-ordinators : Prof. Niranjan Sahoo

Lecture 1 - Thermodynamics Concepts - Part I

Lecture 2 - Thermodynamics Concepts - Part II

Lecture 3 - Thermodynamic Analysis of Vapor Power Cycle

Lecture 4 - Rankine Cycle

Lecture 5 - Modified Rankine Cycle

Lecture 6 - Exergy Analysis of Vapor Power Cycles

Lecture 7 - Rotodynambic Machines

Lecture 8 - Impulse Turbine

Lecture 9 - Reaction Turbine

Lecture 10 - Performance Analysis of Steam Turbines

Lecture 11 - Steam Nozzles - Part I

Lecture 12 - Steam Nozzles - Part II

Lecture 13 - Steam Generator

Lecture 14 - Water Tube Boiler - Part I

Lecture 15 - Water Tube Boiler - Part II

Lecture 16 - Fuels and Combustion - Part I

Lecture 17 - Fuels and Combustion - Part II

Lecture 18 - Steam Condenser

Lecture 19 - Feed Water Heaters

Lecture 20 - Cooling Towers

Lecture 21 - Fundamentals of Gas turbine systems

Lecture 22 - Modifications of Brayton cycle

Lecture 23 - Combined Power cycle

Lecture 24 - Gas Turbines for Aircraft Propulsion

Lecture 25 - Hydro-Power System - Part I

Lecture 26 - Hydro-Power System - Part II

Lecture 27 - Wind Energy - Part I

Lecture 28 - Wind Energy - Part II

Lecture 29 - Energy From Oceans - Part I

Lecture 30 - Energy From Oceans - Part II

Lecture 31 - Geothermal Energy

Lecture 32 - Energy Storage - I

Lecture 33 - Energy Storage - II

Lecture 34 - Energy Storage - III

NPTEL : NOC:Introduction to Solidification Processing (Mechanical Engineering)

Co-ordinators : Prof. Swarup Bag

Lecture 1 - Introduction to phase diagrams

Lecture 2 - Thermodynamic relations

Lecture 3 - Single component system and binary solutions

Lecture 4 - Regular solutions

Lecture 5 - Real solutions

Lecture 6 - Phase transformations

Lecture 7 - Practice problems (Module 1)

Lecture 8 - Introduction to homogenous nucleation process

Lecture 9 - Fundamental to heterogeneous nucleation

Lecture 10 - Growth of pure metal

Lecture 11 - Alloy solidification

Lecture 12 - Formation of different S/L interface

Lecture 13 - Solidifcation structures and segregation

Lecture 14 - Weld Metal Solidification and Microstructure - I

Lecture 15 - Weld Metal Solidification and Microstructure - II

Lecture 16 - Solidification of additive manufacturing - I

Lecture 17 - Solidification of additive manufacturing - II

Lecture 18 - Rate of solidification-sand casting

Lecture 19 - Rate of solidification-die casting

Lecture 20 - Riser design and solidification of pure metal

Lecture 21 - Zone melting and rapid solidification

Lecture 22 - Semisolid processing and other solidification techniques

Lecture 23 - Demonstration of the solidification process and numerical problems

NPTEL : NOC:Materials Processing (Casting, Forming and Welding) (Mechanical Engineering)

Co-ordinators : Prof. Swarup Bag

Lecture 1 - Materials and microcture evolutions - 1

Lecture 2 - Materials and microcture evolutions - 2

Lecture 3 - Materials and microcture evolutions - 3

Lecture 4 - Basics of heat conduction - 1

Lecture 5 - Basics of heat conduction - 2

Lecture 6 - Basics of heat conduction - 3

Lecture 7 - Basics of heat conduction - 4

Lecture 8 - Basics of fluid flow - 1

Lecture 9 - Basics of fluid flow - 2

Lecture 10 - Solidification processing - 1

Lecture 11 - Solidification processing - 2

Lecture 12 - Casting and welding - 1

Lecture 13 - Casting and welding - 2

Lecture 14 - Casting and welding - 3

Lecture 15 - Casting and welding - 4

Lecture 16 - Material forming

Lecture 17 - Material forming: Numerical problem

Lecture 18 - Processing of metal: Casting Process - I

Lecture 19 - Processing of metal: Casting Process - II

Lecture 20 - Processing of polymer: Thermoplastic and thermosets

Lecture 21 - Processing of polymer: Extrusion

Lecture 22 - Processing of polymer: Injection molding

Lecture 23 - Processing of polymer: Blow molding

Lecture 24 - Processing of polymer: Thermosets

Lecture 25 - Processing of ceramics - I

Lecture 26 - Processing of ceramics - II

Lecture 27 - Processing of galss and fused depostion modeling

Lecture 28 - Arc wellding processes

Lecture 29 - Welding of polymers

Lecture 30 - Laser and electron beam welding processes

Lecture 31 - Advanced welding processes

Lecture 32 - Welding solidification

Lecture 33 - Metallic wire additive manufacturing

Lecture 34 - Mechanical responses of metals and polymers

Lecture 35 - Hot working and cold working

Lecture 36 - Types of metal forming processes - I

Lecture 37 - Types of metal forming processes - II

Lecture 38 - Types of metal forming processes - III and Hot rolling of steel

Lecture 39 - Solid state deformation - 1

Lecture 40 - Solid state deformation - 2

Lecture 41 - Powder processing - 1

Lecture 42 - Powder processing - 2

Lecture 43 - Powder processing - 3

Lecture 44 - Ceramic processing: Dry pressing and plastic forming methods

Lecture 45 - Ceramic processing: Colloidal processing, casting, and coating techniques

Lecture 46 - Introduction to steel making and single crystal production

Lecture 47 - Integrated Analysis of Steel Solidification, Fluid Flow, and Prodder Processing Technologies

Lecture 48 - Processing of electronics Materials, A case Study: semiconductor measurements

Lecture 49 - Processing of magnetic materials and Processing of magnetic materials for advanced materials

Lecture 50 - Processing of optics materials and pertaining case study

NPTEL : Acoustics (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Intro, sound wave versus vibration, different types of waves, octave, music scales, sense of SPL

Lecture 2 - Review: Linearity, complex numbers, and spring mass system

Lecture 3 - Review: Poles and zeroes, phase and magnitude plots, transfer functions, Bode plots

Lecture 4 - Review: Transfer functions, and Bode plots

Lecture 5 - 1-D wave equation, and its solution

Lecture 6 - Solution for 1-D wave equation

Lecture 7 - Waveguides, transmission line equations, and standing waves

Lecture 8 - Waveguides, transmission line equations, and standing waves

Lecture 9 - Examples of 1-D waves in tubes, short tubes, Kundt's tube

Lecture 10 - Thermodynamic processes during sound transmission

Lecture 11 - Numerical examples

Lecture 12 - Sound transmission through walls

Lecture 13 - Sound transmission through walls

Lecture 14 - Leakage in walls, STC Ratings, Octave bands

Lecture 15 - Instantaneous power flow

Lecture 16 - Radial propagation of sound, monopoles, and dipoles

Lecture 17 - Radial propagation of sound, monopoles, and dipoles

Lecture 18 - Radial propagation of sound, monopoles, and dipoles

Lecture 19 - Numerical examples

Lecture 20 - Numerical examples

Lecture 21 - Directivity

Lecture 22 - Directivity

Lecture 23 - Directivity

Lecture 24 - Directivity

Lecture 25 - Generalized elements

Lecture 26 - Examples of electromechanical systems

Lecture 27 - Transformers, radiation impedance, and Helmholtz resonator

Lecture 28 - Radiation impedance

Lecture 29 - Radiation impedance

Lecture 30 - Models of electro-mechanical-acoustic systems

Lecture 31 - Solution for a loudspeaker model

Lecture 32 - Microphones

Lecture 33 - Vibro-meter, seismometer, accelerometer, shaker table

Lecture 34 - Sound propagation in rooms, 1-D rooms, 2D rooms

Lecture 35 - Sound in 3-D rooms

Lecture 36 - Absorption coefficient, and irregular rooms

Lecture 37 - Room constant, and Sabine's coefficient

Lecture 38 - Design of a muffler

Lecture 39 - Noise in machines, basics of noise management

NPTEL : Advanced Machining Processes (Mechanical Engineering)

Co-ordinators : Prof. Vijay K. Jain

Lecture 1 - Advanced Machining Processes

Lecture 2 - Advanced Machining Processes

Lecture 3 - Advanced Machining Processes

Lecture 4 - Advanced Machining Processes

Lecture 5 - Advanced Machining Processes

Lecture 6 - Advanced Machining Processes

Lecture 7 - Advanced Machining Processes

Lecture 8 - Advanced Machining Processes

Lecture 9 - Advanced Machining Processes

Lecture 10 - Advanced Machining Processes

Lecture 11 - Advanced Machining Processes

Lecture 12 - Advanced Machining Processes

Lecture 13 - Advanced Machining Processes

Lecture 14 - Advanced Machining Processes

Lecture 15 - Advanced Machining Processes

Lecture 16 - Advanced Machining Processes

Lecture 17 - Advanced Machining Processes

Lecture 18 - Advanced Machining Processes

Lecture 19 - Advanced Machining Processes

Lecture 20 - Advanced Machining Processes

Lecture 21 - Advanced Machining Processes

Lecture 22 - Advanced Machining Processes

Lecture 23 - Advanced Machining Processes

Lecture 24 - Advanced Machining Processes

Lecture 25 - Advanced Machining Processes

Lecture 26 - Advanced Machining Processes

Lecture 27 - Advanced Machining Processes

Lecture 28 - Advanced Machining Processes

Lecture 29 - Advanced Machining Processes

Lecture 30 - Advanced Machining Processes

Lecture 31 - Advanced Machining Processes

Lecture 32 - Advanced Machining Processes

Lecture 33 - Advanced Machining Processes

Lecture 34 - Advanced Machining Processes

NPTEL : Biomicroelectromechanical systems (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10 (same as 9)

Lecture 11

Lecture 12 (Lecture Missing)

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Computer Aided Engineering Design (Mechanical Engineering)

Co-ordinators : Dr. Anupam Saxena

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

NPTEL : Mathematical Methods in Engineering and Science (Mechanical Engineering)

Co-ordinators : Dr. Bhaskar Dasgupta

Lecture 1 - Introduction

Lecture 2 - Basic Ideas of Applied Linear Algebra

Lecture 3 - Systems of Linear Equations

Lecture 4 - Square Non-Singular Systems

Lecture 5 - Ill-Conditioned and Ill-Posed Systems

Lecture 6 - The Algebraic Eigenvalue Problem

Lecture 7 - Canonical Forms, Symmetric Matrices

Lecture 8 - Methods of Plane Rotations

Lecture 9 - Householder Method, Tridiagonal Matrices

Lecture 10 - QR Decomposition, General Matrices

Lecture 11 - Singular Value Decomposition

Lecture 12 - Vector Space: Concepts

Lecture 13 - Multivariate Calculus

Lecture 14 - Vector Calculus in Geometry

Lecture 15 - Vector Calculus in Physics

Lecture 16 - Solution of Equations

Lecture 17 - Introdcution to Optimization

Lecture 18 - Multivariate Optimization

Lecture 19 - Constrained Optimization: Optimality Criteria

Lecture 20 - Constrained Optimization: Further Issues

Lecture 21 - Interpolation

Lecture 22 - Numerical Integration

Lecture 23 - Numerical Solution of ODE's as IVP

Lecture 24 - Boundary Value Problems, Question of Stability in IVP Solution

Lecture 25 - Stiff Differential Equations, Existence and Uniqueness Theory

Lecture 26 - Theory of First Order ODE's

Lecture 27 - Linear Second Order ODE's

Lecture 28 - Methods of Linear ODE's

Lecture 29 - ODE Systems

Lecture 30 - Stability of Dynamic Systems

Lecture 31 - Series Solutions and Special Functions

Lecture 32 - Sturm-Liouville Theory

Lecture 33 - Approximation Theory and Fourier Series

Lecture 34 - Fourier Integral to Fourier Transform, Minimax Approximation

Lecture 35 - Separation of Variables in PDE's, Hyperbolic Equations

Lecture 36 - Parabolic and Elliptic Equations, Membrane Equation

Lecture 37 - Analytic Functions

Lecture 38 - Integration of Complex Functions

Lecture 39 - Singularities and Residues

Lecture 40 - Calculus of Variations

NPTEL : Dynamics of Machines (Mechanical Engineering)

Co-ordinators : Prof. Amitabha Ghosh

Lecture 1 - Rigid Body Motion - Part 1

Lecture 2 - Rigid Body Motion - Part 2

Lecture 3 - Dynamic Force Analysis of Mechanisms

Lecture 4 - Space Motion of Rigid Bodies

Lecture 5 - Inertia Tensor Angular Momentum

Lecture 6 - Euler's Equation of Motion

Lecture 7 - Gyroscopic Action in Machines

Lecture 8 - Unbalance in Machines

Lecture 9 - Rotary Balancing

Lecture 10 - Balancing Machines

Lecture 11 - Field Balancing of Rotors

Lecture 12 - Single-Cylinder Engine Balancing

Lecture 13 - Balancing of Single Slider Machines

Lecture 14 - In-Line Engine Balancing

Lecture 15 - V and Radial Engine Balancing

Lecture 16 - Turning Moment Diagram

Lecture 17 - Flywheel Analysis

Lecture 18 - Dynamics of Machines

Lecture 19 - Dynamics of Machines

Lecture 20 - Dynamics of Machines

Lecture 21 - Dynamics of Machines

Lecture 22 - Dynamics of Machines

Lecture 23 - Dynamics of Machines

Lecture 24 - Dynamics of Machines

Lecture 25 - Dynamics of Machines

Lecture 26 - Dynamics of Machines

Lecture 27 - Dynamics of Machines

Lecture 28 - Dynamics of Machines

Lecture 29 - Rotating Vector Approach

Lecture 30 - Equivalent viscous damping

Lecture 31 - Dynamics of Machines

Lecture 32 - Systems with two degree of freedom

Lecture 33 - Tuned Vibration Absorber

Lecture 34 - Design of Vibration Absorbers

Lecture 35 - Flexibility Matrix Influence Coeff

Lecture 36 - Forced Vibration of multiple

Lecture 37 - Forced Vibration of Multiple degrees

Lecture 38 - Vibration of Continuous Systems

Lecture 39 - Vibration of Continuous Systems

Lecture 40 - Vibration of Beams

Lecture 41 - Rayleigh's method

Lecture 42 - Rayleigh-Ritz Method

Lecture 43 - Vibration Measurement

Lecture 44 - Vibration Measurement Types of Pickups

NPTEL : Finite Element Method (Mechanical Engineering)

Co-ordinators : Prof. C.S. Upadhyay

Module 1 - Lecture 1

Module 1 - Lecture 2

Module 1 - Lecture 3

Module 2 - Lecture 1

Module 2 - Lecture 2

Module 2 - Lecture 3

Module 2 - Lecture 4

Module 3 - Lecture 1

Module 3 - Lecture 2

Module 3 - Lecture 3

Module 4 - Lecture 1

Module 4 - Lecture 2

Module 4 - Lecture 3

Module 5 - Lecture 1

Module 5 - Lecture 2

Module 5 - Lecture 3

Module 6 - Lecture 1

Module 6 - Lecture 2

Module 6 - Lecture 3

Module 7 - Lecture 1

Module 7 - Lecture 2

Module 7 - Lecture 3

Module 7 - Lecture 4

Module 8 - Lecture 1

Module 8 - Lecture 2

Module 8 - Lecture 3

Module 9 - Lecture 1

Module 9 - Lecture 2

Module 9 - Lecture 3

Module 10 - Lecture 1

Module 10 - Lecture 2

Module 11 - Lecture 1

Module 11 - Lecture 2

Module 12 - Lecture 1

Module 13 - Lecture 1

Module 13 - Lecture 2

Module 14 - Lecture 1

Module 14 - Lecture 2

NPTEL : Kinematics of Machines (Mechanical Engineering)

Co-ordinators : Prof. Ashok K Mallik

Module 1 - Lecture 1

Module 1 - Lecture 2

Module 1 - Lecture 3

Module 2 - Lecture 1

Module 2 - Lecture 2

Module 2 - Lecture 3

Module 3 - Lecture 1

Module 3 - Lecture 2

Module 3 - Lecture 3

Module 3 - Lecture 4

Module 4 - Lecture 1

Module 4 - Lecture 2

Module 5 - Lecture 1

Module 5 - Lecture 2

Module 5 - Lecture 3

Module 6 - Lecture 1

Module 6 - Lecture 2

Module 6 - Lecture 3

Module 7 - Lecture 1

Module 7 - Lecture 2

Module 7 - Lecture 3

Module 8 - Lecture 1

Module 8 - Lecture 2

Module 9 - Lecture 1

Module 9 - Lecture 2

Module 9 - Lecture 3

Module 9 - Lecture 4

Module 10 - Lecture 1

Module 10 - Lecture 2

Module 10 - Lecture 3

Module 11 - Lecture 1

Module 11 - Lecture 2

Module 11 - Lecture 3

Module 12 - Lecture 1

Module 12 - Lecture 2

Module 12 - Lecture 3

Module 13 - Lecture 1

Module 13 - Lecture 2

Module 13 - Lecture 3

NPTEL : Advanced manufacturing process for micro sytem fabrication (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lab session 1 - Advanced manufacturing process for micro sytem fabrication

Lab session 2 - EDM Micro Machening

Lab session 3 - EDM Micro Drilling

Lab session 4 - Laser Machening Process

Lab session 5 - Vaccume Assisted Forming

Lab session 6 - Vaccume Forming

Lab session 7 - Photolithiography

Lab session 8 - Replication part 1

Lab session 9 - Replication part 2

Lab session 10 - PCB Making

NPTEL : Engineering Drawing (Dr. Anupam Saxena) (Mechanical Engineering)

Co-ordinators : Dr. Anupam Saxena

Lecture 1 - Technical Arts 101

Lecture 2 - Technical Arts 101

Lecture 3 - Technical Arts 101

Lecture 4 - Technical Arts 101

Lecture 5 - Technical Arts 101

Lecture 6 - Technical Arts 101

Lecture 7 - Technical Arts 101

Lecture 8 - Technical Arts 101

Lecture 9 - Technical Arts 101

Lecture 10 - Technical Arts 101

Lecture 11 - Technical Arts 101

Lecture 12 - Technical Arts 101

Lecture 13 - Technical Arts 101

Lecture 14 - Technical Arts 101

Lecture 15 - Technical Arts 101

Lecture 16 - Technical Arts 101

Lecture 17 - Technical Arts 101

Lecture 18 - Technical Arts 101

Lecture 19 - Technical Arts 101

Lecture 20 - Technical Arts 101

Lecture 21 - Technical Arts 101

Lecture 22 - Technical Arts 101

Lecture 23 - Technical Arts 101

Lecture 24 - Technical Arts 101

Lecture 25 - Technical Arts 101

Lecture 26 - Technical Arts 101

Lecture 27 - Technical Arts 101

Lecture 28 - Technical Arts 101

Lab Session 1

Lab Session 2

Lab Session 3

Lab Session 4

Lab Session 5

Lab Session 6

Lab Session 7

Lab Session 8

Lab Session 9

Lab Session 10

Lab Session 11

Lab Session 12

NPTEL : NOC:BioMEMS and Microsystems (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Lecture 1

Lecture 2 - Lecture 2

Lecture 3 - Lecture 3

Lecture 4 - Review Lecture 1,2,3

Lecture 5 - Lecture 4

Lecture 6 - Lecture 5

Lecture 7 - Lecture 6

Lecture 8 - Review Lecture 4,5,6

Lecture 9 - Lecture 7

Lecture 10 - Lecture 8

Lecture 11 - Lecture 9-10

Lecture 12 - Lecture-11

Lecture 13 - Lecture-12

Lecture 14 - Lecture-13

Lecture 15 - Lecture-14

Lecture 16 - Lecture-15

Lecture 17 - Lecture-16

Lecture 18 - Lecture-17

Lecture 19 - Lecture-18

Lecture 20 - Lecture-19

Lecture 21 - Review Lecture 7 to 10

Lecture 22 - Review Lecture 11 to 13

Lecture 23 - Review Lecture 14 to 16

Lecture 24 - Lecture-20

Lecture 25 - Lecture-21

Lecture 26 - Lecture-22

Lecture 27 - Lecture-23

Lecture 28 - Lecture-24

Lecture 29 - Lecture-25

Lecture 30 - Review Lecture 17,18,19

Lecture 31 - Review Lecture 20,21,22

Lecture 32 - Lecture-26

Lecture 33 - Lecture-27

Lecture 34 - Lecture-28

Lecture 35 - Lecture-29

Lecture 36 - Lecture-30

Lecture 37 - Lecture-31

Lecture 38 - Lecture-32

Lecture 39 - Lecture-33

Lecture 40 - Review lecture 23,24,25

Lecture 41 - Review lecture 26,27,28

Lecture 42 - Review lecture 29 to 33

NPTEL : NOC:Manufacturing Systems Technology (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

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Lecture 43

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Lecture 47

Lecture 48

NPTEL : NOC:Manufacturing Systems Technology - Part II (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Introduction to Quality Engineering

Lecture 2 - Quality Costs

Lecture 3 - Product Design

Lecture 4 - Design of Experiments

Lecture 5 - Applications of Quality Loss Function

Lecture 6 - Product Selection Strategies

Lecture 7 - Robust Design Approaches

Lecture 8 - Taguchi's Method

Lecture 9 - Failure mode and effects analysis

Lecture 10 - Problem Solving : Failure mode and effects analysis - 1

Lecture 11 - Problem solving : Failure mode and effects analysis - 2

Lecture 12 - Product quality improvement methods

Lecture 13 - Quality tools - Part 1

Lecture 14 - Quality Tools - Part 2

Lecture 15 - Different types of control charts

Lecture 16 - Mean, Variance and Standard deviation

Lecture 17 - X bar chart, R-chart

Lecture 18 - Plotting methods for control charts

Lecture 19 - Six Sigma - Part 1

Lecture 20 - Six Sigma - Part 2

Lecture 21 - Theory of probability

Lecture 22 - Determining the defective products using Probability

Lecture 23 - Sampling based on Permutations and Combinations

Lecture 24 - Bionomial distribution

Lecture 25 - Poisson distribution

Lecture 26 - Poisson distribution

Lecture 27 - Normal Distribution

Lecture 28 - Overview of control charts and different types of distribution

Lecture 29 - Fundamental of Robotics and its applications in Automated Systems

Lecture 30 - Joint configuration systems of Robot

NPTEL : NOC:Basics of Finite Element Analysis (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Introduction to Finite Element Analysis(FEA)

Lecture 2 - Introduction of FEA, Nodes, Elements and Shape Functions

Lecture 3 - Nodes, Elements and Shape Functions

Lecture 4 - Polynomials as Shape Functions, Weighted Residuals, Elements and Assembly Level Equations

Lecture 5 - Types of Errors in FEA, Overall FEA Process and Convergence

Lecture 6 - Strengths of FE Method, Continuity conditions at Interfaces

Lecture 7 - Key concepts and terminologies

Lecture 8 - Weighted integral statements

Lecture 9 - Integration by parts - Review

Lecture 10 - Gradient and Divergence Theorems-Part - I

Lecture 11 - Gradient and Divergence Theorems Part - II

Lecture 12 - Functionals

Lecture 13 - Variational Operator

Lecture 14 - Weighted Integral and Weak Formulation

Lecture 15 - Weak Formulation

Lecture 16 - Weak Formulation and Weighted Integral : Principle of minimum potential energy

Lecture 17 - Variational Methods : Rayleigh Ritz Method

Lecture 18 - Rayleigh Ritz Method

Lecture 19 - Method of Weighted Residuals

Lecture 20 - Different types of Weighted Residual Methods - Part I

Lecture 21 - Different types of Weighted Residual Methods - Part II

Lecture 22 - FEA formulation for 2nd order BVP - Part I

Lecture 23 - FEA formulation for 2nd order BVP - Part II

Lecture 24 - Element Level Equations

Lecture 25 - 2nd Order Boundary Value Problem

Lecture 26 - Assembly of element equations

Lecture 27 - Assembly of element equations and implementation of boundary conditions

Lecture 28 - Assembly process and the connectivity matrix

Lecture 29 - Radially Symmetric Problems

Lecture 30 - One dimensional heat transfer

Lecture 31 - 1D-Heat conduction with convective effects : examples

Lecture 32 - Euler-Bernoulli beam

Lecture 33 - Interpolation functions for Euler-Bernoulli beam

Lecture 34 - Finite element equations for Euler-Bernoulli beam

Lecture 35 - Assembly equations for Euler-Bernoulli beam

Lecture 36 - Boundary conditions for Euler-Bernoulli beam

Lecture 37 - Shear deformable beams

Lecture 38 - Finite element formulation for shear deformable beams : Part - I

Lecture 39 - Finite element formulation for shear deformable beams : Part - II

Lecture 40 - Equal interpolation but reduced integration element

Lecture 41 - Eigenvalue problems

Lecture 42 - Eigenvalue problems : examples

Lecture 43 - Introduction to time dependent problems

Lecture 44 - Spatial approximation

Lecture 45 - Temporal approximation for parabolic problems : Part - I

Lecture 46 - Temporal approximation for parabolic problems : Part - II

Lecture 47 - Temporal approximation for hyperbolic problems

Lecture 48 - Explicit and implicit method, diagonalization of mass matrix, closure

NPTEL : NOC:Basics of Noise and Its Measurements (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Introduction

Lecture 2 - Vibration versus Waves

Lecture 3 - Nature of Sound

Lecture 4 - The Decibel Scale

Lecture 5 - Some Key Terms

Lecture 6 - Adding Decibels

Lecture 7 - Modeling Sound Propagation

Lecture 8 - The Momentum Equation

Lecture 9 - The Continuity Equation and The Gas Law

Lecture 10 - 1-D Wave Equation

Lecture 11 - General Solution for 1-D Wave Equation

Lecture 12 - Complex Time Signal and Transfer Functions

Lecture 13 - Transmission line equations

Lecture 14 - Planar Waves in Closed Tubes

Lecture 15 - Planar Waves in 1-D Open Tubes

Lecture 16 - A Semi-Infinite Tube and Overall Summary

Lecture 17 - 1-D Tubes with Imperfect Terminations

Lecture 18 - Measuring Impedance Through KundtÂ's Apparatus

Lecture 19 - Classification of Microphones

Lecture 20 - Classification of Microphones - Continuation

Lecture 21 - Classification of Microphones by Application

Lecture 22 - Microphone Sensitivity

Lecture 23 - Microphone Sensitivity- Continuation

Lecture 24 - Selecting the Right Microphone

Lecture 25 - Fourier Series Expansion

Lecture 26 - Fourier Series Expansion - Continuation

Lecture 27 - Fourier Integral

Lecture 28 - Fourier Integral - Continuation

Lecture 29 - Fourier Transform

Lecture 30 - Fourier Transform - Continuation

Lecture 31 - Discrete Fourier Transform (DFT)

Lecture 32 - Discrete Fourier Transform (DFT) - Continuation

Lecture 33 - DFT - Calculating Frequencies and Padding

Lecture 34 - DFT - Influence of Duration and Sampling frequency on resolution

Lecture 35 - FFT and Inverse FFT

Lecture 36 - Considerations while deciding instrumentation

Lecture 37 - Considerations while selecting instruments for noise measurements

Lecture 38 - Measuring impedance through two microphone method

Lecture 39 - Designing an impedance measurement tube

Lecture 40 - Octave band analysis

Lecture 41 - Calculating results in octave bands

Lecture 42 - Weighting

Lecture 43 - Short time Fourier transforms (STFT)

Lecture 44 - Spectrograms

Lecture 45 - Reverberation time

Lecture 46 - Anechoic rooms

Lecture 47 - STC, NRC and sound attenuation

Lecture 48 - Reverberant rooms

NPTEL : NOC:Manufacturing Process Technology - Part I (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Introduction to Manufacturing Process Tecnology

Lecture 2 - Structure of Matter (Bonding of Solids,Crystal Structures)

Lecture 3 - Brief introduction of non-conventional machining processes

Lecture 4 - Structure of matters (bonding of solids, crystal structures)

Lecture 5 - Elastic and Plastic Deformation

Lecture 6 - Crystal imperfaction and dislocation

Lecture 7 - Plastic Deformation

Lecture 8 - Material Properties, Stress Strain Diagram for differnt types of materials

Lecture 9 - Friction and Wear, Solid solutions

Lecture 10 - Equilibrium Phase Diagram

Lecture 11 - Iron-carbon equilibrium phase diagram

Lecture 12 - Control of material properties (Alloying and heat treatment), Mechanical properties and Recrystallization

Lecture 13 - Introduction To Casting Process

Lecture 14 - Pattern and Mold Design

Lecture 15 - Mold Making Procedures

Lecture 16 - Fundamentals of Melting and Furnaces & Pouring and Gating Design

Lecture 17 - Vertical and Bottom Gating Systems Edit Lesson

Lecture 18 - Numerical Estimation To Find Mold Filling Time and Mold Design

Lecture 19 - Effects of friction and velocity distribution in time of filling

Lecture 20 - Numerical design of gating systems using frictional and bending losses

Lecture 21 - Principle of cooling and solidification in single and multiphase systems

Lecture 22 - Estimation of rate of solidification

Lecture 23 - Principles of cooling and solidification of casting

Lecture 24 - Modeling of Solidification Rates of Thin Casting in a Metal Mold

Lecture 25 - Solidification with Predominant Interface Resistance

Lecture 26 - Solidification with Constant Casting Surface Temperature

Lecture 27 - Solidification of Casting with Predominant Resistance in Mold and Solidified Metal

Lecture 28 - Solidification Time for Permanent Mold Casting

Lecture 29 - Solidification with Constant Casting Surface

Lecture 30 - Riser Design and Placement - Part 1

Lecture 31 - Riser Design and Placement - Part 2

Lecture 32 - Riser Design and Placement - Part 3

Lecture 33 - Introduction of Machining Processes

Lecture 34 - Review of Basic Machining Processes and the Mechanics of Chip Formation

Lecture 35 - Estimation of Cutting Ratio and Shear Angle

Lecture 36 - Merchant's Force Analysis

Lecture 37 - Merchant Theory (Cutting Forces Analysis)

Lecture 38 - Merchant Theory (Force analysis) Part-2

Lecture 39 - Lee Shaffer's Solution

Lecture 40 - Specific Energy Model for Cutting

Lecture 41 - Modeling of Heat Generation and Cutting Tool Temperature

Lecture 42 - Temperature in Cutting and Builtup Edge Formation

Lecture 43 - Metal Cutting Operation

Lecture 44 - Tool life and Tool wear

Lecture 45 - Economics of Machining

Lecture 46 - Joining Process

Lecture 47 - Principle of Solid State Welding

Lecture 48 - Numerical Design of Welding Power Sources in Arc Welding

NPTEL : Manufacturing Systems Technology - I and II (Mechanical Engineering)

Co-ordinators : Prof. Shantanu Bhattacharya

Lecture 1 - Introduction to Manufacturing Process Tecnology

Lecture 2 - Structure of Matter (Bonding of Solids, Crystal Structures)

Lecture 3 - Brief introduction of non-conventional machining processes

Lecture 4 - Structure of matters (bonding of solids, crystal structures)

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Lecture 11 - Iron-carbon equilibrium phase diagram

Lecture 12 - Control of material properties, Mechanical properties and Recrystallization

Lecture 13 - Introduction To Casting Process

Lecture 14 - Pattern and Mold Design

Lecture 15 - Mold Making Procedures

Lecture 16 - Fundamentals of Melting and Furnaces and Pouring and Gating Design

Lecture 17 - Vertical and Bottom Gating Systems Edit Lesson

Lecture 18 - Numerical Estimation To Find Mold Filling Time and Mold Design

Lecture 19 - Effects of friction and velocity distribution in time of filling

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Lecture 29 - Solidification with Constant Casting Surface

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Lecture 32 - Riser Design and Placement - Part 3

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Lecture 38 - Merchant Theory (Force analysis) - Part 2

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Lecture 43 - Metal Cutting Operation

Lecture 44 - Tool life and Tool wear

Lecture 45 - Economics of Machining

Lecture 46 - Joining Process

Lecture 47 - Principle of Solid State Welding

Lecture 48 - Numerical Design of Welding Power Sources in Arc Welding

Lecture 49 - Modes of metal transfer in arc welding

Lecture 50 - Metal forming Processes Edit Lesson

Lecture 51 - Yield Criterion used in Metal Forming Processes Edit Lesson

Lecture 52 - Concept of Principal stress, strain

Lecture 53 - Trescas' Yield criteria and Rolling Process

Lecture 54 - Rolling Processes - Part 1

Lecture 55 - Rolling Processes - Part 2

Lecture 56 - Introduction to Advanced Machining Processes

Lecture 57 - Classification of Machining Processes

Lecture 58 - Silicon growth and Crystallography

Lecture 59 - Micro Fabrication Technology

Lecture 60 - Photolithography

Lecture 61 - Soft Lithography

Lecture 62 - Introduction to Wet Etching Techniques

Lecture 63 - Introduction to Dry Etching Techniques

Lecture 64 - Introduction to Abrasive Jet Machining Process

Lecture 65 - Ultrasonic Machining Process

Lecture 66 - Determination of MRR of Ultrasonic Machining Process

Lecture 67 - Mechanics of Ultrasonic Machining (USM)

Lecture 68 - Effect of Process parameters of USM

Lecture 69 - Ultrasonic Machining Unit

Lecture 70 - Introductions of Electro-chemical Drilling Process

Lecture 71 - Electric Discharge Machining Process

Lecture 72 - EDM - Part 2

Lecture 73 - Effect of various process parameters on EDM process

Lecture 74 - Analysis of RC circuit for EDM

Lecture 75 - Electrodischarge machining sytem

Lecture 76 - Effect of various parameters on EDM Process

Lecture 77 - Tool Electrodes and Dielectric fluids and Electron Beam Machining

Lecture 78 - Introduction to Finishing Process

Lecture 79 - Electrochemical Machining Processes (ECM)

Lecture 80 - Material Removal Rate of ECM

Lecture 81 - Electrode Double Layer

Lecture 82 - Material removal rate of an alloy in ECM

Lecture 83 - Kinematics and Dynamics of ECM

Lecture 84 - Temperature and Pressure rise during ECM

Lecture 85 - Determination of Electrolyte flow velocity in ECM

Lecture 86 - Theoretical determination of Tool shape

Lecture 87 - Design for Electrolyte flow in ECM

Lecture 88 - Mechanics of Electron Beam Machining Process

Lecture 89 - Functional Characteristics of EBM Process Edit Lesson

Lecture 90 - Introduction of Laser Beam Machining Process

Lecture 91 - Material removal rate of LBM

Lecture 92 - Heat conduction and Temperature rise during LBM

Lecture 93 - Modelling of LBM processes

Lecture 94 - Introduction of Additive Techniques

Lecture 95 - Additive Manufacturing Processes

Lecture 96 - Fused Deposition Modeling Process

NPTEL : NOC:Nature and Property of Materials (Mechanical Engineering)

Co-ordinators : Prof. Bishakh Bhattacharya

Lecture 1 - History and Evolution of Materials

Lecture 2 - Classification of Materials

Lecture 3 - Advanced and Exotic Materials

Lecture 4 - Mechanical Properties of Materials - I

Lecture 5 - Mechanical Properties of Materials - II

Lecture 6 - Mechanical Properties of Materials - III

Lecture 7 - Bonding between atoms

Lecture 8 - The Role of Crystal Structure - I

Lecture 9 - The Role of Crystal Structure - II

Lecture 10 - The Role of Crystal Structure - III

Lecture 11 - Metals - I (Ferrous alloys)

Lecture 12 - Metals - II (Non-Ferrous alloys)

Lecture 13 - Metals - III (Strengthening and Degradation)

Lecture 14 - Ceramics - I

Lecture 15 - Ceramics - II

Lecture 16 - Polymers : Introduction and Classification

Lecture 17 - Polymeric Structure

Lecture 18 - Effects of Glass transition temperature

Lecture 19 - Polymer Mechanical properties

Lecture 20 - Composites - I

Lecture 21 - Composites - II

Lecture 22 - Composites - III

Lecture 23 - Smart Materials - I (Introduction)

Lecture 24 - Smart Materials - II (Piezoelectricity)

Lecture 25 - Smart Materials - III (Magnetostriction)

Lecture 26 - Smart Materials - IV (Smart Polymers)

Lecture 27 - Smart Materials - V (SMA)

Lecture 28 - Materials Selection in Engineering Design

Lecture 29 - Numerical: Cantilever beam (High stiffness and light weight)

Lecture 30 - Numerical: Cantilever beam (High strength and light weight)

Lecture 31 - Numerical: Connecting rod

Lecture 32 - Numerical: Probe for scanning probe microscope

Lecture 33 - Optical Properties

Lecture 34 - Optical Fiber

Lecture 35 - Thermal Properties

Lecture 36 - Numerical: Material selection for Heat exchanger

Lecture 37 - Electric Properties - I

Lecture 38 - Electric Properties - II

Lecture 39 - Magnetic Properties

Lecture 40 - Laboratory demonstration

NPTEL : NOC:Manufacturing Process Technology - Part II (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Introduction to Advanced Machining Processes

Lecture 2 - Classification of Machining Processes

Lecture 3 - Silicon growth and Crystallography

Lecture 4 - Micro Fabrication Technology

Lecture 5 - Photolithography

Lecture 6 - Soft Lithography

Lecture 7 - Introduction to Wet Etching Techniques

Lecture 8 - Introduction to Dry Etching Techniques

Lecture 9 - Introduction of Additive Techniques

Lecture 10 - Introduction to Abrasive Jet Machining Process

Lecture 11 - Ultrasonic Machining Process

Lecture 12 - Determination of MRR of Ultrasonic Machining Process

Lecture 13 - Mechanics of Ultrasonic Machining (USM)

Lecture 14 - Effect of Process parameters of USM

Lecture 15 - Ultrasonic Machining Unit

Lecture 16 - Electrochemical Machining Processes (ECM)

Lecture 17 - Material Removal Rate of ECM

Lecture 18 - Electrode Double Layer

Lecture 19 - Material removal rate of an alloy in ECM

Lecture 20 - Kinematics and Dynamics of ECM

Lecture 21 - Temperature and Pressure rise during ECM

Lecture 22 - Determination of Electrolyte flow velocity in ECM

Lecture 23 - Effect of heat and Hydrogen bubble generation during ECM Process

Lecture 24 - Theoretical determination of Tool shape

Lecture 25 - Design for Electrolyte flow in ECM

Lecture 26 - Introductions of Electro-chemical Drilling Process

Lecture 27 - Introduction to Finishing Process

Lecture 28 - Electric Discharge Machining Process

Lecture 29 - EDM part-2

Lecture 30 - Effect of various process parameters on EDM process

Lecture 31 - Analysis of RC circuit for EDM

Lecture 32 - Electrodischarge machining sytem

Lecture 33 - Effect of various parameters on EDM Process

Lecture 34 - Tool Electrodes and Dielectric fluids and Electron Beam Machining

Lecture 35 - Mechanics of Electron Beam Machining Process

Lecture 36 - Functional Characteristics of EBM Process Edit Lesson

Lecture 37 - Introduction of Laser Beam Machining Process

Lecture 38 - Material removal rate of LBM

Lecture 39 - Heat conduction and Temperature rise during LBM

Lecture 40 - Modelling of LBM processes

Lecture 41 - Metal forming Processes Edit Lesson

Lecture 42 - Yield Criterion used in Metal Forming Processes Edit Lesson

Lecture 43 - Concept of Principal stress, strain

Lecture 44 - Trescas' Yield criteria and Rolling Process

Lecture 45 - Rolling Processes - Part 1

Lecture 46 - Rolling Processes - Part 2

Lecture 47 - Additive Manufacturing Processes

Lecture 48 - Fused Deposition Modeling Process

NPTEL : NOC:Basics of Finite Element Analysis - II (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Overview of the Course

Lecture 2 - Fundamental principles

Lecture 3 - Steps followed in FEA

Lecture 4 - Weak Formulation

Lecture 5 - Weak Formulation : Example Problem

Lecture 6 - Assembling element level equations

Lecture 7 - Errors in FEA Solution

Lecture 8 - Measures of Errors in FEA Solution

Lecture 9 - Convergence and Accuracy of Solution - Part I

Lecture 10 - Convergence and Accuracy of Solution - Part II

Lecture 11 - Convergence - Part I

Lecture 12 - Convergence - Part II

Lecture 13 - Numerical Integration Schemes - Part I

Lecture 14 - Numerical Integration Schemes - Part II

Lecture 15 - Approximations - Part I

Lecture 16 - Approximations - Part II

Lecture 17 - Approximations - Part III

Lecture 18 - Gauss Quadrature

Lecture 19 - Gaussian Quadrature review

Lecture 20 - Gaussian Quadrature - Part II

Lecture 21 - Gaussian Quadrature - Part III

Lecture 22 - Newton-Cotes Quadrature

Lecture 23 - Two dimensional FEM problem

Lecture 24 - Two dimensional one variable FEM problem

Lecture 25 - 2D Finite element problems with single variable (Model equation)

Lecture 26 - 2D Finite element problems with single variable (Weak formulation)

Lecture 27 - Elemental level 2D finite element equations

Lecture 28 - Interpolation functions for 2D finite element problems

Lecture 29 - Interpolation functions for linear triangular elements - Part I

Lecture 30 - Interpolation functions for linear triangular elements - Part II

Lecture 31 - Interpolation functions for Triangular and Rectangular elements

Lecture 32 - Evaluation of Stiffness and Force matrices

Lecture 33 - Stiffness and Force matrices for Triangular element

Lecture 34 - Stiffness and Force matrices for Rectangular element

Lecture 35 - Boundary elements for Finite element Equations

Lecture 36 - Boundary integrals for Triangular element

Lecture 37 - Assembly of 2-D finite elements - Part I

Lecture 38 - Assembly of 2-D finite elements - Part II

Lecture 39 - 2-D Heat transfer problems - Part I

Lecture 40 - 2-D Heat transfer problems - Part II

Lecture 41 - Numerical integration schemes for 2-D problems

Lecture 42 - Jacobian and transformation matrix for 2-D problems

Lecture 43 - Numerical Integration Schemes for 2-D Problems : Closure

Lecture 44 - Post-processing

Lecture 45 - Plane Elasticity Problems

Lecture 46 - Plane Elasticity Problems : Development of Weak form

Lecture 47 - Plane Elasticity Problems : Element level equations

Lecture 48 - Plane Elasticity Problems : Closure

NPTEL : NOC:Principles of Vibration Control (Mechanical Engineering)

Co-ordinators : Prof. Bishakh Bhattacharya

Lecture 1 - Introduction to Vibration control

Lecture 2 - Strategies and Steps in Vibration Control

Lecture 3 - Strategies, Active control, Detuning and Decoupling

Lecture 4 - Viscous damping model

Lecture 5 - Coulomb and Hysteretic damping model

Lecture 6 - Energy Dissipation in Structural Materials

Lecture 7 - Material Selection Criterion against Damping

Lecture 8 - Design for Enhanced Material Damping

Lecture 9 - Linear Viscoelastic Materials and Models

Lecture 10 - Maxwell and 3-Parameter Models

Lecture 11 - Complex modulus and Applications of VEM

Lecture 12 - Basics of Dynamic Vibration Absorber

Lecture 13 - Modelling of Dynamic Vibration Absorber

Lecture 14 - Proof mass Actuator

Lecture 15 - Springs for Vibration Isolation

Lecture 16 - Introduction to Active Vibration Control

Lecture 17 - Basics of Classical Control System

Lecture 18 - Basics of State Space Control

Lecture 19 - Controllability and Observability of System

Lecture 20 - Full State Feedback Control

Lecture 21 - SMSS Laboratory Demonstration

NPTEL : NOC:Fundamentals of Acoustics (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Lesson 1 - Course Overview

Lecture 2 - Lesson 2 - Introduction

Lecture 3 - Lesson 3 - Nature Of Sound

Lecture 4 - Lesson 4 - The Decibel scale

Lecture 5 - Lesson 5 - Key Terms In Acoustics

Lecture 6 - Lesson 6 - Adding Decibels

Lecture 7 - Lesson 1 - Important Mathematical Concepts-Complex Algebra

Lecture 8 - Lesson 2 - Important Mathematical Concepts-Complex Time Signals

Lecture 9 - Lesson 3 - Important Mathematical Concepts-Transfer Function

Lecture 10 - Lesson 4 - Important Mathematical Concepts-Pole Zero Plot

Lecture 11 - Lesson 5 - Important Mathematical Concepts - Bode Plot For Simple Pole

Lecture 12 - Lesson 6 - Important Mathematical Concepts - Bode Plot For Simple Zero

Lecture 13 - Lesson 1 - Bode Plots (Magnitude) for Complex Transfer Functions

Lecture 14 - Lesson 2 - Momentum Equation for 1-D Sound Propagation

Lecture 15 - Lesson 3 - Continuity Equation for 1-D Sound Propagation

Lecture 16 - Lesson 4 - Gas Law for 1-D Sound Propagation

Lecture 17 - Lesson 5 - 1-D Wave Equation

Lecture 18 - Lesson 6 - Solution for 1-D Wave Equation

Lecture 19 - Lesson 1 - Waveguide

Lecture 20 - Lesson 2 - Transmission Line Equations - Part I

Lecture 21 - Lesson 3 - Transmission Line Equations - Part II

Lecture 22 - Lesson 4 - Transmission Line Equations - Part III

Lecture 23 - Lesson 5 - Transmission Line Equations - Part IV

Lecture 24 - Lesson 6 - Transmission Line Equations - Part V

Lecture 25 - Lesson 1 - Instantaneous Power

Lecture 26 - Lesson 2 - Instantaneous Power in a L-R Circuit

Lecture 27 - Lesson 3 - Power Factor, and Acoustic Power

Lecture 28 - Lesson 4 - Power Flow into an Infinitely Long Tube

Lecture 29 - Lesson 5 - Point Sources of Sound

Lecture 30 - Lesson 6 - Relations for Outward Travelling Spherical Acoustic Wave

Lecture 31 - Lesson 1 - Specific Acoustic Impedance for a Closed Tube

Lecture 32 - Lesson 2 - Specific Acoustic Impedance for an Open Tube and an Infinitely Long Tube

Lecture 33 - Lesson 3 - Specific Acoustic Impedance for a Tube with Imperfect Termination

Lecture 34 - Lesson 4 - KundtÂ's Tube

Lecture 35 - Lesson 5 - Volume Velocity

Lecture 36 - Lesson 6 - Comparison of Impedances for a Radially Propagating Wave and a Planar Wave

Lecture 37 - Lesson 1 - Interference of sound sources - Part I

Lecture 38 - Lesson 2 - Interference of sound sources - Part II

Lecture 39 - Lesson 3 - Interference of sound sources - Part III

Lecture 40 - Lesson 4 - Interference of sound sources - Part IV

Lecture 41 - Lesson 5 - Directivity

Lecture 42 - Lesson 6 - Complex power, pressure and velocity for a spherical source

Lecture 43 - Lesson 1 - Noise reduction - Mass Attenuation Method

Lecture 44 - Lesson 2 - Noise Reduction - Pressure Ratio

Lecture 45 - Lesson 3 - Noise Reduction - Velocity of Wall

Lecture 46 - Lesson 4 - 3 Media Problem - Introduction

Lecture 47 - Lesson 5 - 3 Media Problem - Apply Boundary Conditions

Lecture 48 - Lesson 6 - 3 Media Problem - Special cases

Lecture 49 - Lesson 1 - Mufflers

Lecture 50 - Lesson 2 - Designing of Reactive Mufflers

Lecture 51 - Lesson 3 - Designing of Dissipative Mufflers

Lecture 52 - Lesson 4 - Time and Frequency Domain Representation of a Signal

Lecture 53 - Lesson 5 - Fourier Series

Lecture 54 - Lesson 6 - Fourier Series

Lecture 55 - Lesson 1 - Fourier Transform

Lecture 56 - Lesson 2 - Fourier Transform

Lecture 57 - Lesson 3 - Fourier Transform

Lecture 58 - Lesson 4 - Discrete Fourier Transform (DFT)

Lecture 59 - Lesson 5 - Discrete Fourier Transform (DFT)

Lecture 60 - Lesson 6 - Discrete Fourier Transform (DFT)

Lecture 61 - Lesson 1 - Measuring Sound Signals

Lecture 62 - Lesson 2 - Microphones

Lecture 63 - Lesson 3 - Microphones

Lecture 64 - Lesson 4 - Weighting

Lecture 65 - Lesson 5 - Loudness

Lecture 66 - Lesson 6 - Loudness

Lecture 67 - Lesson 1 - Octave Band Analysis - Part I

Lecture 68 - Lesson 2 - Octave Band Analysis Â– Part II

Lecture 69 - Lesson 3 - Octave Band Analysis Â– Part III

Lecture 70 - Lesson 4 - Reverberation Time

Lecture 71 - Lesson 5 - Calculation of Reverberation Time and Sound Transmission Class (STC)

Lecture 72 - Lesson 6 - Noise Reduction Coefficient (NRC)

NPTEL : NOC:Heat Treatment and Surface Hardening - II (Mechanical Engineering)

Co-ordinators : Dr. Kallol Mondal

Lecture 1 - Recap - I

Lecture 2 - Recap - II

Lecture 3 - Recap - III

Lecture 4 - Determination of Phase Diagram (Experimentally) - I

Lecture 5 - Determination of Phase Diagram (Experimentally) - II

Lecture 6 - Determination of Phase Diagram (Thermodynamically)

Lecture 7 - Effect of pressure on phase transformation temperature and concept of equilibrium between condensed and vapor phase

Lecture 8 - Effect of different parameters on heat treatment and concept of saturation vapor pressure with examples

Lecture 9 - Title: Formation of ideal solid or liquid solution and (G-X) diagrams for ideal solutions (Part-I)

Lecture 10 - G-X diagrams (Part- II) and concept of chemical potential (Micro Sign) from G-X diagrams.

Lecture 11 - Concept of common tangent for equilibrium between two phases

Lecture 12 - Expressions for equilibrium of two phases - I

Lecture 13 - Expressions for equilibrium of two phases - II

Lecture 14 - Expressions for equilibrium of two phases - III

Lecture 15 - Determining nucleation of phases using G-X plot

Lecture 16 - Î”G for nucleation and overall transformation, concepts of solid state transformation including precipitation and Quasi-Chemical Model (QCM)

Lecture 17 - Introduction to real solutions and expression of Î”Hmix based on the Quasi-Chemical Model (QCM)

Lecture 18 - Expression for Î”Hmix as a function of interaction energy and mole fraction, based on the QCM - Part I

Lecture 19 - Expression for Î”Hmix as a function of interaction energy and mole fraction, based on the QCM - Part II

Lecture 20 - Graphical representation of Î”Gmix, Î”Hmix, and -TÎ”Smix for real solutions and evolution of eutectic phase diagram from the G-X plots

Lecture 21 - Effect of Î”Hmix on determination of phase diagrams (same crystal structure)

Lecture 22 - Effect of Î”Hmix on determination of phase diagrams (Continued...)

Lecture 23 - Importance of phase diagrams

Lecture 24 - Effect of heat treatment on microstructure evolution in steel - I

Lecture 25 - Effect of heat treatment on microstructure evolution in steel - II

Lecture 26 - Recap of homogeneous and heterogeneous nucleation for solid to solid transformation

Lecture 27 - Nucleation rate and its dependence on T (temp. of interest), Î”T, Î”G v and Î”G* and, introduction to growth kinetics

Lecture 28 - Growth kinetics (Continued...)

Lecture 29 - Growth rate variation with undercooling and kinetics of overall phase transformation

Lecture 30 - Implication of Avramiâ€™s equation with example on excel spreadsheet

Lecture 31 - Experimental verification of Avrami Equation

Lecture 32 - Linear regression (least squares) method to find the value of n and k in Avrami equation

Lecture 33 - In this lecture, method to determine the goodness of fit has been explained. Procedure to estimate the values of n and k from experimental data have also been discussed.

Lecture 34 - Stereology and quantitative metallography - I

Lecture 35 - Stereology and quantitative metallography - II

Lecture 36 - Grain size measurements methods

Lecture 37 - Statistical tools for analysis and reporting of obtained data with examples

Lecture 38 - Evolution of TTT and CCT diagram from f vs. t plots

Lecture 39 - TTT, CCT continue and hardenability of steel

Lecture 40 - Importance of heat treatment practices in real life (with examples)

NPTEL : NOC:Phase Transformation in Materials (Mechanical Engineering)

Co-ordinators : Dr. Krishanu Biswas

Lecture 1 - Brief Introduction

Lecture 2 - Define Phase, Equilibrium

Lecture 3 - Free Energy, Stability of Phases

Lecture 4 - Gibbs Free Energy of Binary Solution

Lecture 5 - Ideal Solution and Chemical Potential

Lecture 6 - Thermodynamics of solid solutions

Lecture 7 - G vs X curves

Lecture 8 - Solid solutions: Types

Lecture 9 - Heterogeneous phase equilibria

Lecture 10 - G vs X curves for eutectic system

Lecture 11 - G-X plot for peritectic system

Lecture 12 - Effect of temperature of solid solubility, Influence of interfaces on Equilibrium

Lecture 13 - Introduction of Diffusion

Lecture 14 - Mechanism of Diffusion, Fick's I law

Lecture 15 - Fick's II law

Lecture 16 - Fick's II law (Continued...), Diffusion and Temperature

Lecture 17 - Interfacial Free Energy,Solid/Vapor Interface

Lecture 18 - Boundaries in single phase solids

Lecture 19 - High angle grain boundaries, Equilibrium in poly-crystalline materials, Interphase interfaces in solids

Lecture 20 - Interphase interfaces in solids (Continued...)

Lecture 21 - CSL Boundaries

Lecture 22 - Types of Nucleations

Lecture 23 - Homogeneous Nucleation

Lecture 24 - Homogeneous Nucleation (Continued...)

Lecture 25 - Heterogeneous Nucleation

Lecture 26 - Heterogeneous nucleation (Continued...)

Lecture 27 - Growth

Lecture 28 - Atomic mechanism of growth

Lecture 29 - Dendritic Solidification

Lecture 30 - Growth rate for dendrite formation

Lecture 31 - Alloy solidification

Lecture 32 - Alloy solidification (Continued...)

Lecture 33 - Eutectic: Solidification

Lecture 34 - Eutectic: solidification (Continued...)

Lecture 35 - Solidification of casting / ingot

Lecture 36 - Precipitation hardenable alloy

Lecture 37 - Precipitation age- hardening alloy (Continued...)

Lecture 38 - Age hardening alloy

Lecture 39 - Eutectoid transformation

Lecture 40 - Eutectoid transformation (Continued....)

Lecture 41 - Eutectoid transformation in steel (Continued...)

Lecture 42 - Martensite

Lecture 43 - Martensite (Continued...)

Lecture 44 - Martensite (Continued...) and TTT curves

Lecture 45 - TTT diagram

Lecture 46 - Recovery, Recrystallization and Grain growth

Lecture 47 - Recovery

Lecture 48 - Recrystallization

Lecture 49 - Recrystallization (Continued...)

Lecture 50 - Introduction to spinodal decomposition

NPTEL : NOC:Manufacturing of Composites (Mechanical Engineering)

Co-ordinators : Prof. J. Ramkumar

Lecture 1 - Introduction to Composites

Lecture 2 - Matrices

Lecture 3 - Fiber reinforcements

Lecture 4 - Fiber reinforcements (Continued...)

Lecture 5 - Composites properties

Lecture 6 - Composites testing

Lecture 7 - Selection of material

Lecture 8 - Selection of material (Continued...)

Lecture 9 - Design for Manufacturing

Lecture 10 - Design for Manufacturing (Continued...)

Lecture 11 - Composite Manufacturing Processes

Lecture 12 - Filament winding Processes

Lecture 13 - Resin transfer moulding

Lecture 14 - Pultrusion

Lecture 15 - Compression Moulding Process

Lecture 16 - Vacuum Impregnation Methods

Lecture 17 - Stacking of Composites

Lecture 18 - Thermoplastic Composites Manufacturing Processes - Part 1

Lecture 19 - Thermoplastic Composites Manufacturing Processes - Part 2 (Continued...)

Lecture 20 - Non-destructive testing methods for composite materials

Lecture 21 - Metal Matrix Composites

Lecture 22 - Metal Matrix Composites applications (Continued...)

Lecture 23 - Processing of Metal Matrix Composites - Part 1

Lecture 24 - Processing of Metal Matrix Composites - Part 2

Lecture 25 - Ceramic Matrix Composites

Lecture 26 - Fabrication of Ceramic Matrix Composites (CMCs)

Lecture 27 - Carbon - Carbon Composites

Lecture 28 - Polymer Matrix and Nano Composites

Lecture 29 - Machining of Composites

Lecture 30 - Repair of Composites

Lecture 31 - Manufacturing Processes: Selection and Considerations

NPTEL : NOC:Applied Ergonomics (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30 - Work Systems

Lecture 31 - Measures of Productivity

Lecture 32 - Productivity Measurement

Lecture 33 - Work Study

Lecture 34 - Motion and time study

Lecture 35 - Motion Study

Lecture 36 - Flow Diagram

Lecture 37 - Time Study

Lecture 38 - Manual Work System

Lecture 39 - Worker Machine Systems

Lecture 40 - Industrial accidents

Lecture 41 - Human Errors

Lecture 42 - Workers compensation laws

Lecture 43 - Organisation Ergonomics - Part 1

Lecture 44 - Organisation Ergonomics - Part 2

Lecture 45 - Job Satisfaction

Lecture 46 - Worker behavior

Lecture 47 - Job ranking Techniques

Lecture 48 - Waging System

Lecture 49 - Biomechanics - 1

Lecture 50 - Biomechanics - 2

Lecture 51 - Applications of Biomechanics

Lecture 52 - Problem solving - 1

Lecture 53 - Problem solving - 2

Lecture 54 - Problem solving - 3

NPTEL : NOC:Sustainability through Green Manufacturing Systems - An Applied Approach (Mechanical Engineering)

Co-ordinators : Dr. Deepu Philip, Dr. Amandeep Singh

Lecture 1 - Basics of Production

Lecture 2 - Basics of Production (Continued...)

Lecture 3 - Sustainability and Manufacturing

Lecture 4 - Introduction to Simulation

Lecture 5 - Introduction to Simulation (Continued...)

Lecture 6 - Basic Statistical Concepts for Sustainable Manufacturing Analysis

Lecture 7 - Basic Statistical Concepts for Sustainable Manufacturing Analysis (Continued...)

Lecture 8 - Life Cycle Assessment

Lecture 9 - Life Cycle Assessment Elements

Lecture 10 - Life Cycle Assessment Procedure

Lecture 11 - Life Cycle Assessment (Continued...)

Lecture 12 - Sustainability Framework

Lecture 13 - Basic Modeling Concepts for Factory Simulation

Lecture 14 - Basic Modeling Concepts for Factory Simulation (Continued...)

Lecture 15 - Green Manufacturing Modelling: Metrics for Green Manufacturing

Lecture 16 - Green Manufacturing Modelling (Continued...) Indices for Green Manufacturing

Lecture 17 - Green Manufacturing Modelling (Continued...) Developing Green Manufacturing System

Lecture 18 - Productivity and Sustainability

Lecture 19 - Productivity and Sustainability (Continued...)

Lecture 20 - Green Manufacturing Techniques

Lecture 21 - Green Manufacturing Techniques (Continued...)

Lecture 22 - Renewable Sources of Energy

Lecture 23 - Renewable Sources of Energy (Continued...)

Lecture 24 - Renewable energy in India and Industrial Symbiosis

Lecture 25 - Demonstration of Various Instruments Used for Green Machining

Lecture 26 - Laboratory demonstration

Lecture 27 - Developing a Smart Factory

Lecture 28 - Demonstration on PLM Software

Lecture 29 - Developing a Smart Factory (Continued...)

Lecture 30 - Sustainability and Green Manufacturing System

NPTEL : NOC:Noise Management and Control (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Course Overview

Lecture 2 - Introduction

Lecture 3 - Nature Of Sound

Lecture 4 - Beats

Lecture 5 - The Decibel Scale

Lecture 6 - Key Terms in Acoustics

Lecture 7 - Decibel Scale - Part 1

Lecture 8 - Decibel Scale - Part 2

Lecture 9 - Decibel Scale - Part 3

Lecture 10 - Complex Numbers

Lecture 11 - Complex Time Function

Lecture 12 - Linear Systems

Lecture 13 - Transfer Functions

Lecture 14 - Introduction to One Dimensional Wave Equation

Lecture 15 - The Momentum Equation

Lecture 16 - The Continuity Equation and The Gas Law

Lecture 17 - One Dimensional Wave Equation

Lecture 18 - Solution for One Dimensional Wave Equation

Lecture 19 - Transmission Line Equations

Lecture 20 - One Dimensional Example Problems

Lecture 21 - Impedance

Lecture 22 - Pressure Wave Travels in a Closed Tube

Lecture 23 - Standing Wave Formation in a Closed Tube With Rigid Termination

Lecture 24 - Pressure Wave Travels in an Open Tube

Lecture 25 - 1-D sound wave propagation: Kundtâ€™s tube - I

Lecture 26 - 1-D sound wave propagation: Kundtâ€™s tube - II

Lecture 27 - Radially propagating sound waves in spherical coordinate system - I

Lecture 28 - Radially propagating sound waves in spherical coordinate system - II

Lecture 29 - Complex impedance for radially propagating sound waves in spherical coordinate system

Lecture 30 - Volume velocity - I

Lecture 31 - Interference of 1-D spherically propagating sound waves - I

Lecture 32 - Interference of 1-D spherically propagating sound waves - II

Lecture 33 - Noise sources and introduction to microphones

Lecture 34 - Classification of microphones - I

Lecture 35 - Classification of microphones - II

Lecture 36 - Classification of microphones - III

Lecture 37 - Microphone Parameters

Lecture 38 - Understanding microphone specifications

Lecture 39 - Noise Source: Terminology

Lecture 40 - Noise Source: Sound Attenuation

Lecture 41 - Noise Source: Sound Pressure Level due to a noise source located outdoors

Lecture 42 - Noise Source: Role of reflecting surfaces

Lecture 43 - Noise Source: Sound Pressure Level due to a noise source located indoors - Part I

Lecture 44 - Noise Source: Sound Pressure Level due to a noise source located indoors - Part II

Lecture 45 - Measuring Sound Power Level - Understanding standard octave bands

Lecture 46 - Measuring Sound Power Level - Fan noise - Part I

Lecture 47 - Measuring Sound Power Level - Fan noise - Part II

Lecture 48 - Measuring Sound Power Level - Fan noise - Part III

Lecture 49 - Weighting

Lecture 50 - Noise coming from Motors

Lecture 51 - Noise coming from Motors and Pumps

Lecture 52 - Noise coming from Pump and Motor Working Simultaneously

Lecture 53 - Noise coming from Compressors

Lecture 54 - Example problems regarding Noise coming from Compressor

Lecture 55 - Noise Spread Mechanisms

Lecture 56 - Reverberation time

Lecture 57 - Reverberation time example problem

Lecture 58 - Noise from Adjacent Room

Lecture 59 - Acoustic Enclosures

Lecture 60 - Acoustic Enclosures - Example Problems

Lecture 61 - Large acoustical enclosures - I

Lecture 62 - Large acoustical enclosures - II

Lecture 63 - Acoustic barriers - I

Lecture 64 - Acoustic barriers - II

Lecture 65 - Acoustic barriers - III

Lecture 66 - Helmholtz resonator - I

Lecture 67 - Silencers

Lecture 68 - Side Branched Mufflers - I

Lecture 69 - Side Branched Mufflers - II

Lecture 70 - Side Branched Mufflers - III

Lecture 71 - Expansion Chamber Muffler

Lecture 72 - Single Expansion Chamber Muffler

NPTEL : NOC:Design Practice (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Brief introduction of Design systems

Lecture 2 - Product Developement

Lecture 3 - Basic protocols of industrial design

Lecture 4 - Design thinking and innovation

Lecture 5 - Brain Storming

Lecture 6 - Design prototyping

Lecture 7 - Generic Phases of the Design

Lecture 8 - Configurational Design Aspects

Lecture 9 - Concurrent Engineering

Lecture 10 - Concurrent Engineering - 2

Lecture 11 - Concurrent Engineering Approaches

Lecture 12 - Concurrent Engineering Approaches - 2

Lecture 13 - Benefits of concurrent engineering

Lecture 14 - Concurrent engineering environment influencing dimensions

Lecture 15 - Concurrent engineering environment influencing dimensions - 2

Lecture 16 - Program and product Interface dimensions in Concurrent engineering

Lecture 17 - Product Developement Methodology

Lecture 18 - Elements of concurrent engineering: Optimization in product development

Lecture 19 - Business relationships in concurrent engineering

Lecture 20 - Organizational elements in concurrent engineering

Lecture 21 - Techniques for the Implementation of concurrent engineering environment

Lecture 22 - Average quality loss

Lecture 23 - Robustness in Design

Lecture 24 - Robustness in Design - 2

Lecture 25 - Material selection in Engineering design

Lecture 26 - Material selection in Engineering Design.

Lecture 27 - Basic steps in Material Selection Process

Lecture 28 - Design of Work Systems

Lecture 29 - Motion Study

Lecture 30 - Axiomatic Design

Lecture 31 - Introduction to group technology

Lecture 32 - Failure Mode Effect Analysis

NPTEL : NOC:Introduction to Composites (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Definition of the composite materials

Lecture 2 - Composite materials and its applications

Lecture 3 - Classification of the composite materials

Lecture 4 - What Makes fiber so strong?

Lecture 5 - Advantages and limitations of composite materials

Lecture 6 - Properties of the composite materials.

Lecture 7 - Different Types of Fiber

Lecture 8 - Production process and different types of Glass Fiber

Lecture 9 - Graphite Fibers

Lecture 10 - Aramid and Boron Fibers

Lecture 11 - Ceramic Fibers

Lecture 12 - Matrix - Properties and classifications

Lecture 13 - Polymers as matrix material and its classification

Lecture 14 - Thermosets and thermoplastics

Lecture 15 - Properties of thermosets and thermoplastics

Lecture 16 - Thermoset materials and its production methods

Lecture 17 - Thermoplastics and metals as matrix materials

Lecture 18 - Ceramic and carbon matrices

Lecture 19 - What is a good fabrication process of a composite?

Lecture 20 - Fabrication of Thermoset Composites

Lecture 21 - Hand Lay-Up Process

Lecture 22 - Bag Molding Process

Lecture 23 - Resin Transfer Molding Process

Lecture 24 - Fabrication of Thermoplastic, Metal and Ceramic Matrix based Composites

Lecture 25 - Terminologies and basic concepts

Lecture 26 - Orthotropic material

Lecture 27 - Modeling of unidirectional composites

Lecture 28 - Composite density as a function of mass fraction and volume fraction

Lecture 29 - Calculation of longitudinal modulus for unidirectional composites

Lecture 30 - Failure modes of unidirectional composite

Lecture 31 - Failure of Unidirectional Lamina

Lecture 32 - Minimum Volume Fraction and Critical Volume Fraction

Lecture 33 - Example based on Failure of Composite Material

Lecture 34 - Example based on Minimum and Critical Volume Fraction

Lecture 35 - Transverse Modulus of Unidirectional Composite

Lecture 36 - Halpin-Tsai Relation for Transverse Modulus

Lecture 37 - Transverse modulus of unidirectional composites

Lecture 38 - Transverse strength of unidirectional composites

Lecture 39 - Poissonâ€™s ratio of unidirectional composites

Lecture 40 - Failure modes of composite materials

Lecture 41 - Failure modes of composite materials

Lecture 42 - Other properties

Lecture 43 - Concept of Tensor

Lecture 44 - Stress Transformation (Two Dimensional)

Lecture 45 - Analysis of Specially Orthotropic Lamina

Lecture 46 - Analysis of Generally Orthotropic Lamina

Lecture 47 - Transformation of Engineering Constants - Part I

Lecture 48 - Transformation of Engineering Constants - Part II

Lecture 49 - Variation of elastic constants with respect to fiber orientation for generally orthotropic lamina

Lecture 50 - Generally orthotropic lamina

Lecture 51 - Generalized Hookeâ€™s law for anisotropic materials

Lecture 52 - Generalized Hookeâ€™s law for anisotropic materials

Lecture 53 - Elastic constants for Specially orthotropic materials

Lecture 54 - Elastic constants for Specially orthotropic materials in plane stress

Lecture 55 - Relation Betweeen Engineering Constants and Elements of Stiffness and Compliance Matrices - Part I

Lecture 56 - Relation Betweeen Engineering Constants and Elements of Stiffness and Compliance Matrices - Part II

Lecture 57 - Stress Strain Relations for A Lamina With Arbitrary Orientation - Part I

Lecture 58 - Stress- Strain Relation for A Lamina With Arbitrary Orientation - Part II

Lecture 59 - Strength of An Orthotropic Lamina

Lecture 60 - Importance of Sign of Shear Stress in context of Strength of A Unidirectional Lamina

Lecture 61 - Strain displacement relations for a laminate

Lecture 62 - Stress-strain relations for individual layers of a laminate

Lecture 63 - Resultant forces and moments

Lecture 64 - Relations between force and moment resultants and mid-plane strains and curvatures

Lecture 65 - Physical significance of extensional stiffness matrix [A], coupling matrix [B] and bending stiffness matrix [D] matrices

Lecture 66 - Lamination sequence (standard laminate code)

Lecture 67 - Calculation of A, B and D Matrices.

Lecture 68 - Simplification of Stiffness Matrices - Part I

Lecture 69 - Simplification of Stiffness Matrices - Part II

Lecture 70 - Quasi-Isotropic Laminates - Part I

Lecture 71 - Quasi-Isotropic Laminates - Part II

Lecture 72 - Failure of Composite Laminates

NPTEL : NOC:Product Design and Manufacturing (Mechanical Engineering)

Co-ordinators : Dr. Amandeep Singh, Prof. J. Ramkumar

Lecture 1 - Introduction to product design and Manufacturing

Lecture 2 - Introduction to product design and Manufacturing (Continued...)

Lecture 3 - Fundamentals of Manufacturing towards Product Development

Lecture 4 - Fundamentals of Manufacturing towards Product Development (Continued...)

Lecture 5 - Engineering Design Process

Lecture 6 - Product design morphology

Lecture 7 - Product characteristics

Lecture 8 - Elements of Visual Design - Part 1

Lecture 9 - Elements of Visual Design - Part 2

Lecture 10 - Elements of Visual Design - Part 3

Lecture 11 - Translating Customer Needs

Lecture 12 - Translating Customer Needs

Lecture 13 - Value Engineering, an introduction

Lecture 14 - Value Engineering Methodology - Part 1

Lecture 15 - Value Engineering Methodology - Part 2, FAST diagramming

Lecture 16 - Value Engineering Methodology - Part 3

Lecture 17 - Value Engineering, case study

Lecture 18 - Materials Selection - Part 1

Lecture 19 - Materials Selection - Part 2

Lecture 20 - Manufacturing Process Selection - Part 1

Lecture 21 - Manufacturing Process Selection - Part 2

Lecture 22 - Product Costing

Lecture 23 - Design for Manufacturing

Lecture 24 - Design for Assembly

Lecture 25 - Design for Maintenance

Lecture 26 - Design for Environment - Part 1

Lecture 27 - Design for Environment - Part 2

Lecture 28 - Quality Control

Lecture 29 - Quality Assurance

Lecture 30 - Patent - Part 1

Lecture 31 - Patent - Part 2

Lecture 32 - Creativity techniques - Part 1

Lecture 33 - Creativity techniques - Part 2

Lecture 34 - Frugal Innovation

Lecture 35 - Rapid Prototyping, an introduction

Lecture 36 - Rapid Prototyping Modelling

Lecture 37 - Rapid Prototyping Processes - Part 1

Lecture 38 - Rapid Prototyping Processes - Part 2

Lecture 39 - Laboratory demonstration; 3D printing - Part 1

Lecture 40 - Laboratory demonstration; 3D printing - Part 2

Lecture 41 - Laboratory demonstration; 3D printing - Part 3

Lecture 42 - Plant Layout Planning - Part 1

Lecture 43 - Plant Layout Planning - Part 2

Lecture 44 - Laboratory demonstration; Plant Simulation - Part 1

Lecture 45 - Laboratory demonstration; Plant Simulation - Part 2

Lecture 46 - Laboratory demonstration; Plant Simulation - Part 3

Lecture 47 - Computer Integrated Manufacturing - Part 1

Lecture 48 - Computer Integrated Manufacturing - Part 2

Lecture 49 - Reverse Engineering

Lecture 50 - Managing Competitiveness

NPTEL : NOC:Phase Equilibria in Materials - Nature and Properties of Materials-II (Mechanical Engineering)

Co-ordinators : Dr. Ashish Garg

Lecture 1 - Basic Thermodynamics: System, phase and components

Lecture 2 - Basic Thermodynamics: Gibbs Free Energy

Lecture 3 - Phase Stability in Materials

Lecture 4 - Effects of Temperature and Pressure on Single Components System

Lecture 5 - Clausisus-Clapeyron Equation and Binary Solution

Lecture 6 - Calculation of Configurational Entropy

Lecture 7 - Chemical Potential

Lecture 8 - Phase Stability in Binary Solution

Lecture 9 - Activity and Thermodynamics of Regular Solution

Lecture 10 - Thermodynamic of Real Solution

Lecture 11 - Free Energy Curves and Various Systems

Lecture 12 - Solubility Limits 2-phase Co-existence

Lecture 13 - Phase Diagram Formation: Binary Solution

Lecture 14 - Phase Diagram Construction: Partial Soluble Phases

Lecture 15 - Phase Diagram Construction: Eutectic Phase

Lecture 16 - Intermetallics and Phase Diagrams

Lecture 17 - Phase Rule

Lecture 18 - Gibb's Phase Rule: Unary and Binary System

Lecture 19 - Gibb's Phase Rule: Eutectic Point and Lever Rule

Lecture 20 - Phase Fraction Calculation in a Phase Diagram

Lecture 21 - Microstructure evolution in Cu-Ni binary system

Lecture 22 - Microstructure evolution (Continued...)

Lecture 23 - Phase evolution in hypoeutectic region

Lecture 24 - Phase evolution at Eutectic point

Lecture 25 - Phase Diagrams of Cu-Ni and Al-Si

Lecture 26 - Phase Diagrams of Pb-Sn and Fe-C

Lecture 27 - Phase Diagram of Fe-C (Continued...)

Lecture 28 - Fe-C Phase Diagram (Continued...)

Lecture 29 - Fe-C Phase Diagram (Continued...)

Lecture 30 - Phase Diagrams for non-Ferrous Alloys

Lecture 31 - Method of measuring Phase diagram

Lecture 32 - Methods of measuring phase diagram (Continued...)

Lecture 33 - Methods of measuring phase diagram: PbMg2

Lecture 34 - Ternary Phase Diagram

Lecture 35 - Ternay Phase Diagram (Continued...)

Lecture 36 - Ternary system with two phases

Lecture 37 - Ternary system with three phases

Lecture 38 - Ternary phase diagram with 4 phases

Lecture 39 - Application of Phases diagrams

Lecture 40 - Summary of Course

NPTEL : NOC:Advanced Composites (Mechanical Engineering)

Co-ordinators : Prof. Nachiketa Tiwari

Lecture 1 - Basics of composite materials

Lecture 2 - Different type of Fibers

Lecture 3 - Properties of single layer continuous fiber composites

Lecture 4 - Properties of single layer continuous fiber composites

Lecture 5 - Strength of single layer continuous fiber composites

Lecture 6 - Strength of single layer continuous fiber composites

Lecture 7 - Concept of Tensor

Lecture 8 - General Anisotropic Material

Lecture 9 - Specially Orthotropic Material

Lecture 10 - Specially Orthotropic Material Under Plane Stress

Lecture 11 - Stress and Strain Transformation

Lecture 12 - Transformation of Stiffness and Compliance Matrices

Lecture 13 - Strain - Displacement relations

Lecture 14 - Relations for stress and strain along thickness of laminate

Lecture 15 - Stress - Strain variation along Laminate thickness

Lecture 16 - Force and Moment resultant - Part 1

Lecture 17 - Force and Moment resultant - Part 2

Lecture 18 - Important observation related to [A], [B] and [D] matrices

Lecture 19 - Quasi-Isotropic Laminates

Lecture 20 - Maximum Stress Theory

Lecture 21 - Maximum Strain Theory

Lecture 22 - Importance of Sign of Shear Stress.

Lecture 23 - Failure Initiation in Composite Laminate.

Lecture 24 - Progressive Failure of Laminae in A Laminate

Lecture 25 - Governing equations for composite plates

Lecture 26 - Force equilibrium in Z-direction

Lecture 27 - Moment equilibrium equations

Lecture 28 - Equilibrium equations for composite plates

Lecture 29 - Boundary conditions associated with different edges of composite plate - Part 1

Lecture 30 - Boundary conditions associated with different edges of composite plate - Part 2

Lecture 31 - Generalized Solution for Semi-Infinite Plate - Part I

Lecture 32 - Generalized Solution for Semi-Infinite Plate - Part II

Lecture 33 - Particular Solution for Semi-Infinite Plate: Case A

Lecture 34 - Particular Solution for Semi-Infinite Plate: Case B

Lecture 35 - Particular Solution for Semi-Infinite Plate: Case C

Lecture 36 - Particular Solution for Semi-Infinite Plate: Case D

Lecture 37 - Solution for governing equation related to semi-infinite composite plate

Lecture 38 - Nature of displacement u0(x) and how it gets influence by important parameters of lamination sequence

Lecture 39 - Semi-infinite plate loaded in the x-direction - Part 1

Lecture 40 - Semi-infinite plate loaded in the x-direction - Part 2

Lecture 41 - Thermal effects in composite laminates - Part 1

Lecture 42 - Thermal effects in composite laminates - Part 2

Lecture 43 - Thermal effects in composite laminates - Part 3

Lecture 44 - Finite Rectangular Plate

Lecture 45 - Different Boundary Conditions in Finite Rectangular Plate

Lecture 46 - Example Based On a Finite Rectangular Plate: Part-I

Lecture 47 - Example Based On a Finite Rectangular Plate: Part-II

Lecture 48 - Example Based On a Finite Rectangular Plate: Part-III

Lecture 49 - Anticlastic curvature

Lecture 50 - Principle of virtual work

Lecture 51 - Virtual work method: apply to beam problem

Lecture 52 - Virtual work method: apply to simply supported plate

Lecture 53 - Beam (two term solution)

Lecture 54 - 3rd Interpretation of special Galerkin method

Lecture 55 - Role of D16 and D26 Terms On Laminated Plate Response: Part-I

Lecture 56 - Role of D16 and D26 Terms On Laminated Plate Response: Part-II

Lecture 57 - Role of D16 and D26 Terms On Laminated Plate Response: Part-III

Lecture 58 - Role of D16 and D26 Terms On Laminated Plate Response: Part-IV

Lecture 59 - Free Vibration in Composite Plate: Part-I

Lecture 60 - Free Vibration in Composite Plate: Part-II

Lecture 61 - Buckling of composite plates

Lecture 62 - Force equilibrium in z-direction for buckling of composite plates

Lecture 63 - Moment equilibrium around x, y and z-directions for buckling of composite plates

Lecture 64 - Buckling of an infinitely long composite plate

Lecture 65 - Buckling of a simply supported finite plate

Lecture 66 - Composite plate under bidirectional compression

Lecture 67 - Shear Bucking in Rectangular Composite Plate: Part-I

Lecture 68 - Shear Bucking in Rectangular Composite Plate: Part-II

Lecture 69 - Introduction to Short-Fiber Composites

Lecture 70 - Theories of Stress Transfer: Part-I

Lecture 71 - Theories of Stress Transfer: Part-II

Lecture 72 - Modulus of Short-Fiber Composites and Closure

NPTEL : NOC:Engineering Metrology (Mechanical Engineering)

Co-ordinators : Dr. Amandeep Singh, Prof. J. Ramkumar

Lecture 1 - Introduction to measurements and metrology

Lecture 2 - Instruments in measurement systems

Lecture 3 - Instruments in measurement systems

Lecture 4 - General concepts and definitions in metrology

Lecture 5 - Standards of measurement

Lecture 6 - Limits, Fits, and Tolerances - Part 1

Lecture 7 - Limits, Fits, and Tolerances - Part 2

Lecture 8 - Limits, Fits, and Tolerances - Part 3

Lecture 9 - Limits, Fits, and Tolerances - Part 4

Lecture 10 - Linear Measurements - Part 1

Lecture 11 - Linear Measurements - Part 2

Lecture 12 - Laboratory demonstration, Vernier Caliper

Lecture 13 - Laboratory demonstration, Dial gauge and vernier, micrometer, surface plate, feeler gauge

Lecture 14 - Angular Measurements - Part 1

Lecture 15 - Angular Measurements - Part 2

Lecture 16 - Laboratory demonstration, Vernier height gauge

Lecture 17 - Laboratory demonstration, Thread gauge, spirit level

Lecture 18 - Laboratory demonstration, Combination set, slip gauges, sine bar

Lecture 19 - Comparators - Part 1

Lecture 20 - Comparators - Part 2

Lecture 21 - Transducers - Part 1

Lecture 22 - Transducers - Part 2

Lecture 23 - Screw thread metrology

Lecture 24 - Gears metrology - Part 1

Lecture 25 - Gears metrology - Part 2

Lecture 26 - Laboratory demonstration, Gear Vernier

Lecture 27 - Surface metrology

Lecture 28 - Temperature measurements

Lecture 29 - Pressure measurements - Part 1

Lecture 30 - Pressure measurements - Part 2

Lecture 31 - Strain measurements - Part 1

Lecture 32 - Strain measurements - Part 2

Lecture 33 - Optical measurements and Nanometrology - Part 1

Lecture 34 - Optical measurements and Nanometrology - Part 2

Lecture 35 - Optical measurements and Nanometrology - Part 3

Lecture 36 - Statistics in Metrology, an intoduction - Part 1

Lecture 37 - Statistics in Metrology, an intoduction - Part 2

Lecture 38 - Data and scales in measurements

Lecture 39 - Discrete and continuous data

Lecture 40 - Statistics for metrology, fundamental concepts - Part 1

Lecture 41 - Statistics for metrology, fundamental concepts - Part 2

Lecture 42 - Statistics for metrology, fundamental concepts - Part 3

Lecture 43 - Probability distributions for estimating measurement

Lecture 44 - Normal distribution

Lecture 45 - Statistics for proportions

Lecture 46 - Chi square distribution, and Data outlier detection

Lecture 47 - Quality Control, introduction

Lecture 48 - Quality Control, control charts for variables

Lecture 49 - Quality Control, control charts for attributes

Lecture 50 - Quality Control, critical aspects

Lecture 51 - 3D measurements, Coordinate Measuring Machine (CMM)

Lecture 52 - Laboratory demonstration, Coordinate Measuring Machine (CMM))

NPTEL : NOC:Smart Materials and Intelligent System Design (Mechanical Engineering)

Co-ordinators : Prof. Bisakh Bhattacharya

Lecture 1 - Introduction to Smart Materials

Lecture 2 - Piezoelectric Material

Lecture 3 - Magnetostrictive Material

Lecture 4 - Active Smart Polymer

Lecture 5 - Shape Memory Alloys

Lecture 6 - Introduction to composites

Lecture 7 - Classification of Composites

Lecture 8 - Micromechanics and Macromechanics of Composites

Lecture 9 - Classical Laminated Plate Theory

Lecture 10 - ABD Matrices

Lecture 11 - Modelling of piezoelectric material 1

Lecture 12 - Modelling of piezoelectric material 2

Lecture 13 - Modelling of Magnetostrictive material

Lecture 14 - Modelling of Shape memory Alloys

Lecture 15 - Smart Actuators

Lecture 16 - Smart Materials based MEMS

Lecture 17 - Smart MEMS Applications

Lecture 18 - Energy Harvesting

Lecture 19 - Concept of Self Healing

NPTEL : NOC:Design Practice-II (Mechanical Engineering)

Co-ordinators : Dr. Shantanu Bhattacharya

Lecture 1 - Design concepts

Lecture 2 - Computer Aided Design (CAD)

Lecture 3 - Geometrical transformation

Lecture 4 - Composition of geometrical transformation

Lecture 5 - Geometric modeling

Lecture 6 - Representation of curves

Lecture 7 - Parametric representation of synthetic curves

Lecture 8 - Curve fitting problem (Hermite case)

Lecture 9 - Problem solving (based on Bezier curve)

Lecture 10 - Representation of Surfaces

Lecture 11 - Introduction to Micro-Elctro mechanical Systems (MEMS)

Lecture 12 - Lab-on-Chip

Lecture 13 - Introduction to Sensors

Lecture 14 - Introduction to Transducers

Lecture 15 - Introduction to device fabrications

Lecture 16 - Introduction to Silicon as a MEMS material

Lecture 17 - Etching processes

Lecture 18 - Types of Photolithography

Lecture 19 - Introduction to actuators

Lecture 20 - Designing of the Micro-Valve

Lecture 21 - Electrochemical valves

Lecture 22 - Micropumps

Lecture 23 - Designing of peristaltic pumps

Lecture 24 - Different types of pumps and sensors

Lecture 25 - Gas Sensors

Lecture 26 - Computer Numerical Control

Lecture 27 - Numerical Control Programming

Lecture 28 - NC Part Programming

Lecture 29 - Canned Cycles

Lecture 30 - Introduction to Rapid Prototyping

Lecture 31 - Different Types of Rapid Prototyping Technologies

Lecture 32 - LAB Demonstration of FDM Process

Lecture 33 & 34

Lecture 35

Lecture 36

Lecture 37, 38 & 39

Lecture 40

NPTEL : NOC:Rapid Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. J. Ramkumar

Lecture 1 - Introduction to Rapid Manufacturing - Part 1

Lecture 2 - Introduction to Rapid Manufacturing - Part 2

Lecture 3 - Introduction to Rapid Manufacturing - Part 3

Lecture 4 - Product Development Process - Part 1

Lecture 5 - Product Development Process - Part 2

Lecture 6 - Product Development Process - Part 3

Lecture 7 - Design for Modularity (Manufacturing)

Lecture 8 - Design for Modularity (Assembly; Part 1)

Lecture 9 - Design for Modularity (Assembly; Part 2)

Lecture 10 - Design for Modularity

Lecture 11 - Subtractive versus Rapid Manufacturing

Lecture 12 - Reverse Engineering - Part 1

Lecture 13 - Reverse Engineering - Part 2

Lecture 14 - Laboratory Demonstration, Co-ordinate Measuring Machine - Part 1

Lecture 15 - Laboratory Demonstration, Co-ordinate Measuring Machine - Part 2

Lecture 16 - Laboratory Demonstration, 3D scanners - Part 1

Lecture 17 - Laboratory Demonstration, 3D scanners - Part 2

Lecture 18 - Polymerization Processes - Part 1

Lecture 19 - Polymerization Processes - Part 2

Lecture 20 - Powder based processes - Part 1

Lecture 21 - Powder based processes - Part 2

Lecture 22 - Powder based processes - Part 3

Lecture 23 - Extrusion based processes - Part 1

Lecture 24 - Extrusion based processes - Part 2

Lecture 25 - Sheet Stacking processes

Lecture 26 - 3D printing processes

Lecture 27 - Laboratory Demonstration, 3D printing - Part 1

Lecture 28 - Laboratory Demonstration, 3D printing - Part 2

Lecture 29 - Laboratory Demonstration, 3D printing - Part 3

Lecture 30 - Beam Deposition processes

Lecture 31 - Materials in Rapid Manufacturing - Part 1

Lecture 32 - Materials in Rapid Manufacturing - Part 2

Lecture 33 - Post-processing concerns - Part 1

Lecture 34 - Post-processing concerns - Part 2

Lecture 35 - Product costing for Rapid Manufacturing - Part 1

Lecture 36 - Product costing for Rapid Manufacturing - Part 2

Lecture 37 - Rapid Product Development, CAD/CAM - Part 1

Lecture 38 - Rapid Product Development, CAD/CAM - Part 2

Lecture 39 - Rapid Product Development, CAD/CAM - Part 3

Lecture 40 - Rapid Product Development, CAE and CIM

Lecture 41 - Rapid Product Development, Technomatix, Plant Simulation 10 - Part 1

Lecture 42 - Rapid Product Development, Technomatix, Plant Simulation 10 - Part 2

Lecture 43 - Rapid Product Development, Technomatix, Plant Simulation 10 - Part 3

Lecture 44 - Rapid Manufactiuring, case studies

NPTEL : NOC:Turbulent Combustion: Theory and Modelling (Mechanical Engineering)

Co-ordinators : Prof. Ashoke De

Lecture 1 - Introduction to Combustion

Lecture 2 - Introduction to Combustion (Continued...)

Lecture 3 - Introduction to Combustion (Continued...)

Lecture 4 - Introduction to Combustion (Continued...) + Combustion and Thermochemistry

Lecture 5 - Combustion and Thermochemistry

Lecture 6 - Combustion and Thermochemistry (Continued...)

Lecture 7 - Combustion and Thermochemistry (Continued...) + Chemical Kinetics

Lecture 8 - Chemical Kinetics (Continued...)

Lecture 9 - Chemical Kinetics (Continued...)

Lecture 10 - Chemical Kinetics (Continued...) + Combustion Chemistry

Lecture 11 - Combustion Chemistry (Continued...)

Lecture 12 - Heat and Mass Transfer

Lecture 13 - Heat and Mass Transfer + Coupling of Chemical Kinetics and Thermodynamics

Lecture 14 - Coupling of Chemical Kinetics and Thermodynamics (Continued...)

Lecture 15 - Coupling of Chemical Kinetics and Thermodynamics + Laminar Premixed Flames

Lecture 16 - Laminar Premixed Flames (Continued...)

Lecture 17 - Laminar Premixed Flames (Continued...)

Lecture 18 - Laminar Premixed Flames (Continued...) + Laminar Non-Premixed Flames

Lecture 19 - Laminar Non-Premixed Flames (Continued...)

Lecture 20 - Laminar Non-Premixed Flames (Continued...)

Lecture 21 - Laminar Non-Premixed Flames

Lecture 22 - Laminar Non-Premixed Flames (Continued...)

Lecture 23 - Laminar Non-Premixed Flames (Continued...)

Lecture 24 - Laminar Non-Premixed Flames (Continued...)

Lecture 25 - Laminar Non-Premixed Flames (Continued...)

Lecture 26 - Laminar Non-Premixed Flames + Turbulence

Lecture 27 - Turbulence : Introduction

Lecture 28 - Turbulence : Introduction (Continued...)

Lecture 29 - Turbulence : Flow Stability analysis

Lecture 30 - Turbulence : Flow Stability analysis (Continued...)

Lecture 31 - Turbulence : Stability and Burger's Equation

Lecture 32 - Turbulence : Energy cascade, length scales and Statistical description

Lecture 33 - Turbulence : Statistical analysis and free shear flows

Lecture 34 - Turbulence : Free shear and wall bounded shear flows

Lecture 35 - Turbulence : Turbulent boundary layer

Lecture 36 - Turbulence

Lecture 37 - Turbulence : Temperature effects and Modelling

Lecture 38 - Turbulence : Modelling and statistics

Lecture 39 - Turbulence : Modelling (Continued...)

Lecture 40 - Turbulence : Modelling (Continued...)

Lecture 41 - Turbulence : Chemistry Interaction

Lecture 42 - Turbulence : Chemistry Interaction (Continued...)

Lecture 43 - Turbulence : Chemistry Interaction (Continued...)

Lecture 44 - Turbulence : Chemistry Interaction (Continued...)

Lecture 45 - Turbulence : Chemistry Interaction (Continued...)

Lecture 46 - Turbulent Combustion : Stochastic method of solution

Lecture 47 - Turbulent Combustion : Transported scalar PDF model

Lecture 48 - Turbulent Combustion : Transported joint velocity - scalar PDF model

Lecture 49 - Turbulent Combustion : Modelling Turbulent Premixed Combustion

Lecture 50 - Turbulent Combustion : Modelling Turbulent Premixed Combustion (Continued...)

Lecture 51 - Turbulent Combustion : Modelling Turbulent Premixed Combustion (Continued...)

Lecture 52 - Turbulent Combustion : Modelling Turbulent Premixed Combustion (Continued...)

Lecture 53 - Turbulent Combustion : Modelling Turbulent Non-Premixed Combustion

Lecture 54 - Turbulent Combustion : Modelling Turbulent Non-Premixed Combustion (Continued...)

Lecture 55 - Turbulent Combustion : Modelling Turbulent Non-Premixed Combustion (Continued...)

Lecture 56 - Turbulent Combustion : Modelling Turbulent Non-Premixed Combustion

Lecture 57 - Turbulent Combustion : Modelling Turbulent Non-Premixed Combustion (Continued...)

Lecture 58 - Multiphase Combustion : Introduction + Droplet Evaporation

Lecture 59 - Multiphase Combustion : Droplet Combustion

Lecture 60 - Multiphase Combustion : Spray Combustion

NPTEL : NOC:Manufacturing Automation (Mechanical Engineering)

Co-ordinators : Prof. Sounak Kumar Choudhury

Lecture 1 - Introduction to Manufacturing Automation

Lecture 2 - Various Aspects of Manufacturing Automation

Lecture 3 - Part Transfer Mechanisms

Lecture 4 - Automated Flow Lines

Lecture 5 - Analysis of Automated Flow Lines

Lecture 6 - Vibratory Bowl Feeder

Lecture 7 - Analysis of Vibratory Bowl Feeder

Lecture 8 - Reciprocating Tube Hopper Feeder

Lecture 9 - Centreboard Hopper Feeder and its analysis

Lecture 10 - Reciprocating fork and External Gate Hopper Feeders

Lecture 11 - Rotary Disc Feeder and Centrifugal Hopper Feeder

Lecture 12 - Bladed Wheel and Tumbling Barrel Hopper Feeders

Lecture 13 - Rotary Centreboard and Magnetic Feeders

Lecture 14 - Part Orienting Devices

Lecture 15 - Feed Tracks and their analysis

Lecture 16 - Powered Feed Track and Escapements

Lecture 17 - Various Escapements and Part Placing Mechanisms

Lecture 18 - Design for Automatic Assembly

Lecture 19 - Performance and Economics of Assembly Systems

Lecture 20 - Performance of Indexing and Free Transfer Machines

NPTEL : NOC:Computer Integrated Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. J. Ramkumar, Prof. Amandeep Singh

Lecture 1 - Introduction to CIM - Part 1

Lecture 2 - Introduction to CIM - Part 2

Lecture 3 - Computers and Manufacturing Systems - Part 1

Lecture 4 - Computers and Manufacturing Systems - Part 2

Lecture 5 - Computers and Manufacturing Systems - Part 3

Lecture 6 - Computer Graphics - Part 1

Lecture 7 - Computer Graphics - Part 2

Lecture 8 - Computer Graphics - Part 3

Lecture 9 - Computer Graphics - Part 4

Lecture 10 - Geometric Modelling - Part 1

Lecture 11 - Geometric Modelling - Part 2

Lecture 12 - Computer Numerical Control - Part 1

Lecture 13 - Computer Numerical Control - Part 2

Lecture 14 - Computer Numerical Control - Part 3

Lecture 15 - Computer Numerical Control - Part 4

Lecture 16 - CNC Machining - Part 1

Lecture 17 - CNC Machining - Part 2

Lecture 18 - CNC Tooling

Lecture 19 - CNC Part Programming - Part 1

Lecture 20 - CNC Part Programming - Part 2

Lecture 21 - CNC Part Programming - Part 3

Lecture 22 - CNC Part Programming - Part 4

Lecture 23 - Laboratory Demonstration, Computer Aided Design - Part 1

Lecture 24 - Laboratory Demonstration, Computer Aided Design - Part 2

Lecture 25 - CAM softwares

Lecture 26 - Laboratory Demonstration, Computer Aided Manufacturing - Part 1

Lecture 27 - Laboratory Demonstration, Computer Aided Manufacturing - Part 2

Lecture 28 - Group Technology

Lecture 29 - Computer Aided Process Planning - Part 1

Lecture 30 - Computer Aided Process Planning - Part 2

Lecture 31 - Flexible Manufacturing System

Lecture 32 - Robotics

Lecture 33 - Programmable Logic Controller

Lecture 34 - Automatic Identification and Data Capture

Lecture 35 - Computer Aided Quality Control - Part 1

Lecture 36 - Computer Aided Quality Control - Part 2

Lecture 37 - Laboratory Demonstration, Coordinate Measuring Machine

Lecture 38 - Rapid Manufacturing - Part 1

Lecture 39 - Rapid Manufacturing - Part 2

Lecture 40 - Laboratory demonstration, Rapid Manufacturing - Part 1

Lecture 41 - Laboratory demonstration, Rapid Manufacturing - Part 2

Lecture 42 - Laboratory Demonstration, CAD using Fusion 360, an introduction

Lecture 43 - Laboratory Demonstration, CAD using Fusion 360, Rendering and 3D printing

Lecture 44 - Material Handling

Lecture 45 - Laboratory Demonstration, Plant Simulation software - Part 1

Lecture 46 - Laboratory Demonstration, Plant Simulation software - Part 2

Lecture 47 - Laboratory Demonstration, Plant Simulation software - Part 3

Lecture 48 - Computers in Manufacturing Industry, current scenario - Part 1

Lecture 49 - Computers in Manufacturing Industry, current scenario - Part 2

Lecture 50 - Computers in Manufacturing Industry, current scenario - Part 3

NPTEL : NOC:Machining Science (Mechanical Engineering)

Co-ordinators : Prof. Sounak Kumar Choudhury

Lecture 1 - Introduction to Machining

Lecture 2 - Mechanism of plastic deformation

Lecture 3 - Basic machining parameters, Cutting Tools and Types of Machining

Lecture 4 - Types of Chips, Tool nomenclature and tool angles

Lecture 5 - Tool Nomenclature in Normal Rake System and conversion of angles

Lecture 6 - Selection of Tool angles

Lecture 7 - Forces in machining, Merchantâ€™s Circle Diagram

Lecture 8 - Stress, Strain and Strain Rate and Shear Plane Angle

Lecture 9 - Numerical Examples; Lee and Shafferâ€™s model

Lecture 10 - Friction in metal cutting: Zorevâ€™s Friction Model

Lecture 11 - Practical Machining Operations

Lecture 12 - Slab Milling; Measurement of Cutting Forces

Lecture 13 - Dynamometers; Tool Wear and Tool Life

Lecture 14 - Factors affecting tool life; Abrasive Machining Processes

Lecture 15 - Mechanics of Grinding Process

Lecture 16 - Chip length and specific energy in Grinding

Lecture 17 - Grinding wheel wear; Oblique Cutting

Lecture 18 - Rake angles in oblique cutting; Economics of Machining

Lecture 19 - Economics of Machining (Continued...); Thermal aspects of machining

Lecture 20 - Surface finish

NPTEL : NOC:Foundations of Cognitive Robotics (Mechanical Engineering)

Co-ordinators : Prof. Bishakh Bhattacharya

Lecture 1 - Introduction to Cognitive Robotics (Private)

Lecture 2 - Smart Materials - I (Private)

Lecture 3 - Smart Materials - II (Private)

Lecture 4 - Smart Materials - III (Private)

Lecture 5 - Architecture of the Brain

Lecture 6 - Architecture of the Brain (Continued...)

Lecture 7 - Nerve Cells

Lecture 8 - Introduction to Synchronisation Models

Lecture 9 - Synchronisation models (Continued...)

Lecture 10 - Introduction to EEG

Lecture 11 - Theories of Intelligence - I

Lecture 12 - Theories of Intelligence - II

Lecture 13 - Kuramoto Model

Lecture 14 - Child Robot Interaction

NPTEL : NOC:Introduction to Robotics (Mechanical Engineering)

Co-ordinators : Prof. Ashish Dutta

Lecture 1 - Introduction to Robotics

Lecture 2 - Robot Joints and Work Volume

Lecture 3 - Spatial transformations

Lecture 4 - Homogenous Transformtions

Lecture 5 - Practice Problems with MATLAB in Rotation matrices

Lecture 6 - Kinematics: Derivation of Link Transformations

Lecture 7 - Problem Solving DH Parameters

Lecture 8 - Forward Kinematics

Lecture 9 - Inverse Kinematics

Lecture 10 - Problems in Kinematics

Lecture 11 - Inverse Kinematics of PUMA Robot

Lecture 12 - Jacobian and Singularity

Lecture 13 - Velocity and Static Forces

Lecture 14 - Dynamics - Lagrangian Euler

Lecture 15 - Newton Euler Dynamics

Lecture 16 - Trajectory Planning

Lecture 17 - Inverse Dynamics using MATLAB

Lecture 18 - Sensors

Lecture 19 - Actuators and Basic Control System

Lecture 20 - Block Diagram Reduction and Position Regulator

Lecture 21 - Control of a single joint

Lecture 22 - Non Linear Control of Manipulators

Lecture 23 - Force Control

Lecture 24 - Manipulator Mechanism Design

Lecture 25 - Industrial Robots and Applications

Lecture 26 - Specifications and Programming

Lecture 27 - VAL programming

Lecture 28 - Experiment With PUMA Robot Using VAL- II

NPTEL : NOC:Muffler Acoustics - Application to Automotive Exhaust Noise Control (Mechanical Engineering)

Co-ordinators : Prof. Akhilesh Mimani

Lecture 1 - Introduction to Acoustic Wave Propagation

Lecture 2 - D'Alemberts's solution and 1-D Continuity equation

Lecture 3 - Muffler Acoustics-Application to Automotive Exhaust Noise Control

Lecture 4 - Linearization of governing equations, and Development of 1-D Acoustic wave and Helmholtz equation

Lecture 5 - Solution of 1-D Helmholtz equation: Propagation in 1-D ducts/pipes

Lecture 6 - 1-D Acoustic Wave Equation in Ducts Carrying Uniform Mean Flow: Derivation

Lecture 7 - 1-D Acoustic Wave Equation in Ducts Carrying Uniform Mean Flow: Solution

Lecture 8 - 3-D Acoustic Wave Equation in Rectangular and Circular Waveguides: Derivation, Modal Solution and Concept of Cut-on Frequency

Lecture 9 - Sound Pressure Level, Intensity Level and Sound Power Level

Lecture 10 - Acoustic Impedance and Reflection Coefficient

Lecture 11 - Lumped System Analysis: Inertance and Compliance

Lecture 12 - Lumped Analysis of a Uniform Pipe Closed/Open at an End, Concept of End Correction

Lecture 13 - Helmholtz Resonator, Electro-Acoustic Analogy and Layout of a typical engine exhaust system

Lecture 14 - Muffler Performance Measures: Insertion Loss

Lecture 15 - Muffler Performance Measures: Transmission Loss and Level Difference

Lecture 16 - Lumpted Analysis of a Tube, Simple Area Discontinuity and Transfer Matrices

Lecture 17 - Sudden area Discontinuity (Continued...)

Lecture 18 - Simple Expansion Chamber Analysis Using Transfer Matrix Method

Lecture 19 - Transmission Loss (TL) Graph for a Simple Expansion Muffler (MATLAB)

Lecture 20 - Extended-Inlet and Extended-Outlet Muffler Analysis

Lecture 21 - Extended-Inlet and Extended-Outlet Muffler Analysis (Continued...)

Lecture 22 - TL Analysis of Extended-Inlet and Extended-Outlet Muffler (MATLAB)

Lecture 23 - TL Analysis of Side-Inlet and Side-Outlet Muffler Using Transfer Matrix Method

Lecture 24 - Wave Propagation in Gradually Varying Area Ducts: Websterâ€™s Horn Equation

Lecture 25 - Websterâ€™s Horn Equation (Continued...) and Exponential Ducts

Lecture 26 - Solution of Websterâ€™s Horn Equation for Conical Ducts

Lecture 27 - TL analysis for Conical Muffler Configurations (MATLAB)

Lecture 28 - Segmentation Approach for Analysing Gradually Varying Area Ducts (MATLAB)

Lecture 29 - Acoustic Intensity (Energy Flux) in a Pipe with Mean Flow, and Transmission Loss Expression

Lecture 30 - Aeroacoustic State Variables Transfer Matrix for a Tubular Element (Uniform Pipe)

Lecture 31 - Transfer Matrix for Extended-Inlet and Outlet Element and Use of Perforated Elements in Commercial Mufflers

Lecture 32 - Two-interacting Duct Configurations: Development of Equations and Concentric Tube Resonators

Lecture 33 - Concentric Tube Resonator: Partially Perforated Pipe or Airway (MATLAB)

Lecture 34 - Review of Perforate Impedance Expressions

Lecture 35 - MATLAB Demonstration for Fully and Partially Perforated CTR

Lecture 36 - Cross-Flow elements: Setting-up the Equations

Lecture 37 - Cross-Flow elements: MATLAB Demonstration for Simple Configurations

Lecture 38 - Plug Mufflers, Three-pass Perforated Element Muffler (Commercial Configurations) - MATLAB

Lecture 39 - Multiply-Connected Mufflers: HQ Tubes

Lecture 40 - TL Analysis of HQ Tubes (MATLAB): Network Analysis and Analytical Formula

Lecture 41 - Transmission Loss in terms of Scattering and Impedance Matrix Parameters

Lecture 42 - Rectangular Chamber Muffler: Characterization and TL Analysis using 3-D Piston-driven Model

Lecture 43 - Circular Chambers: Characterization and TL Analysis Using 3-D Piston-driven Model

Lecture 44 - Analytical Mode-Matching for Extended-Inlet and Outlet Muffler: Setting-up of the Equations

Lecture 45 - MATLAB Demonstration for Transmission Loss Calculations

Lecture 46 - Dissipative Mufflers (Lined Circular duct) - A Brief Discussion

Lecture 47 - Summary of the Topics Covered in This Course, Topics to be Covered in a Future Course

NPTEL : NOC:Elements of Solar Energy Conversion (Mechanical Engineering)

Co-ordinators : Prof. Jishnu Bhattacharya

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

NPTEL : NOC:Manufacturing Processes - Casting and Joining (Mechanical Engineering)

Co-ordinators : Prof. Sounak Kumar Choudhury

Lecture 1 - Casting: Introduction to Casting

Lecture 2 - Various aspects of Casting

Lecture 3 - Patterns and Moulds

Lecture 4 - Sand Mould and Gating System

Lecture 5 - Gating System Design

Lecture 6 - Aspiration Effects and Riser Design

Lecture 7 - Solidification of Metals and Alloys

Lecture 8 - Stress, Strain and Strain Rate and Shear Plane Angle

Lecture 9 - Steps in Sand Casting Processes

Lecture 10 - Expendable Mould Casting Processes

Lecture 11 - Permanent Mould Casting

Lecture 12 - Various Casting Processes and Cost Analysis

Lecture 13 - Cost analysis, Casting Defects and Product Design

Lecture 14 - Introduction to Joining Processes

Lecture 15 - Characteristic Features of Welding Processes

Lecture 16 - Various Welding Processes

Lecture 17 - Advanced Welding Processes

Lecture 18 - Characteristic Features of Arc Welding

Lecture 19 - Shielded metal arc welding, MIG and TIG Welding

Lecture 20 - Gas Welding, Brazing and Soldering, Welding Defects

NPTEL : NOC:Computational Fluid Dynamics and Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. Gautam Biswas

Lecture 1 - Historical Perspectives and Introduction to the Course

Lecture 2 - Finite Difference Method - Basic Idea of Discretization

Lecture 3 - Explicit and Implicit Formulations, Stability Analysis - Part 1

Lecture 4 - Stability Analysis - Part 2

Lecture 5 - Important Aspects of Flow Modelling - Part 1

Lecture 6 - Important Aspects of Flow Modelling - Part 2

Lecture 7 - Important Aspects of Flow Modelling - Part 3

Lecture 8 - Applications of Our Knowledge to a Problem of Practical Interest and Setting up an Algorithm

Lecture 9 - Finite Volume Method - Part 1

Lecture 10 - Finite Volume Method - Part 2

Lecture 11 - Finite Volume Method - Part 3

Lecture 12 - Introduction to Finite Element Method (Preliminary Concepts)

Lecture 13 - Introduction to Finite Elelment Method (Galerkin Weighted Residual Method)

Lecture 14 - Introduction to Finite element Method (Elemental contributions and formation of Global Matrix)

Lecture 15 - Vorticity Stream Function Approach (Formulation and Algorithm)

Lecture 16 - Vorticity-Stream Function Approach For Solving Navier-Stokes Equations

Lecture 17 - Solving Navier-Stokes Equations For Incompressible Flows using SIMPLE Algorithm - Part 1

Lecture 18 - Solving Navier-Stokes Equations For Incompressible Flows using SIMPLE Algorithm - Part 2

Lecture 19 - Solving Navier-Stokes Equations For Incompressible Flows using MAC Algorithm - Part 2

Lecture 20 - MAC Algorithm (Pressure - Velocity Iteration and the Solution)

Lecture 21 - MAC Algorithm (Solution of Energy Equation)

Lecture 22 - A Finite Volume Method to solve NS Equations in 3D Complex Geometry - Part 1

Lecture 23 - A Finite Volume Method to solve NS Equations in 3D Complex Geometry - Part 2

Lecture 24 - A Finite Volume Method to solve NS Equations in 3D Complex Geometry - Part 3

Lecture 25 - Mathematical Approaches to Turbulent Flows (Preliminaries and Modeling Framework)

Lecture 26 - Mathematical Approaches to Turbulent Flows (Modeling on the basis of RANS)

NPTEL : NOC:Production Technology: Theory and Practice (Mechanical Engineering)

Co-ordinators : Prof. Sounak Kumar Choudhury

Lecture 1 - Engineering Materials and Their Properties - 1

Lecture 2 - Engineering Materials and Their Properties - 2

Lecture 3 - Engineering Materials and Their Properties - 3

Lecture 4 - Metal Machining-1: Introduction to Machining

Lecture 5 - Metal Machining-2: Mechanism of plastic deformation

Lecture 6 - Metal Machining-3: Types of Chips, Tool nomenclature and tool angles

Lecture 7 - Metal Machining-4: Selection of Tool angles, Forces in machining

Lecture 8 - Metal Machining-5: Merchantâ€™s Circle Diagram

Lecture 9 - Metal Machining-6: Friction in Metal Cutting

Lecture 10 - Metal Machining-7: Practical Machining Operations; Force Measurement

Lecture 11 - Metal Machining-8: Force Measurement

Lecture 12 - Metal Machining-9: Tool Wear and Tool Life

Lecture 13 - Metal Machining-10: Factors affecting Tool Life

Lecture 14 - Metal Machining-11: Abrasive Machining Processes

Lecture 15 - Metal Machining-12: Abrasive Machining Processes

Lecture 16 - Metal Machining-13: Grinding; Economics of Machining

Lecture 17 - Machining-14: Economics of Machining

Lecture 18 - Non-Traditional Machining-1: Introduction; Classification

Lecture 19 - Non-Traditional Machining-2: Various Non-Traditional Machining Processes

Lecture 20 - Non-Traditional Machining-3, Computer Numerical Control (CNC) -1

Lecture 21 - Computer Numerical Control (CNC) - 2

Lecture 22 - Computer Numerical Control (CNC) - 3

Lecture 23 - Engineering Metrology

Lecture 24 - Laboratory Demonstration/Hands-On Practice - 1

Lecture 25 - Laboratory Demonstration/Hands-On Practice - 2

Lecture 26 - Laboratory Demonstration/Hands-On Practice - 3

Lecture 27 - Laboratory Demonstration/Hands-On Practice - 4

Lecture 28 - Laboratory Demonstration/Hands-On Practice - 5

Lecture 29 - Laboratory Demonstration/Hands-On Practice - 6

Lecture 30 - Laboratory Demonstration/Hands-On Practice - 7

Lecture 31 - Laboratory Demonstration/Hands-On Practice - 8

Lecture 32 - Laboratory Demonstration/Hands-On Practice - 9

Lecture 33 - Laboratory Demonstration/Hands-On Practice - 10

NPTEL : NOC:Introduction to Turbomachinery (Mechanical Engineering)

Co-ordinators : Prof. Subrata Sarkar

Lecture 1 - Introduction and Classification

Lecture 2 - Introduction and Classification (Continued...)

Lecture 3 - Review of the Fundamental Laws

Lecture 4 - Equation of Motion in Rotating Frame

Lecture 5 - Euler Equation for Turbomachinery

Lecture 6 - Euler Equation for Turbomachinery: Illustration

Lecture 7 - Problem Session - Chapter-1: Applications of Euler Equation

Lecture 8 - Similarity Analysis - I

Lecture 9 - Similarity Analysis - II

Lecture 10 - Similarity Analysis - III

Lecture 11 - Problem Session - II

Lecture 12 - Cassade Analysis - I

Lecture 13 - Cassade Analysis - II

Lecture 14 - Cassade Analysis - III

Lecture 15 - Cassade Analysis - IV

Lecture 16 - Cassade Analysis (Problem Session)

Lecture 17 - Gas Turbine Cycle Analysis - I

Lecture 18 - Gas Turbine Cycle Analysis - II

Lecture 19 - Gas Turbine Cycle Analysis - III

Lecture 20 - Gas Turbine Cycle Analysis - IV

Lecture 21 - Gas Turbine Cycle Analysis - V

Lecture 22 - Illustrative Examples Gas Turbine Cycle

Lecture 23 - Illustrative Examples Jet Propulsion

Lecture 24 - Axial Flow Compressor - I

Lecture 25 - Axial Flow Compressor - II

Lecture 26 - Axial Flow Compressor - III

Lecture 27 - Axial Flow Compressor - IV

Lecture 28 - Illustrative Examples Axial Flow Compressor

Lecture 29 - Centrifugal Compressor - I

Lecture 30 - Centrifugal Compressor - II

Lecture 31 - Centrifugal Compressor - III

Lecture 32 - Axial Flow Turbine - I

Lecture 33 - Axial Flow Turbine - II

Lecture 34 - Axial Flow Turbine - III

Lecture 35 - Axial Flow Turbine - IV

Lecture 36 - Axial Flow Turbine - V

Lecture 37 - Axial Flow Steam Turbine - I

Lecture 38 - Axial Flow Steam Turbine - II

Lecture 39 - Axial Flow Steam Turbine - III

Lecture 40 - Axial Flow Steam Turbine - IV

Lecture 41 - Axial Flow Steam Turbine - V

Lecture 42 - Axial Flow Steam Turbine - VI

Lecture 43 - Hydraulic Turbines - I (Pelton Wheel)

Lecture 44 - Hydraulic Turbines - II (Illustrations on Pelton Wheel)

Lecture 45 - Hydraulic Turbines - III (Reaction Turbine)

Lecture 46 - Hydraulic Turbines - IV (Cavitation)

Lecture 47 - Hydraulic Turbines - V (Illustrations on Reaction Turbine)

Lecture 48 - CFD and Turbomachinery - I

Lecture 49 - CFD and Turbomachinery - II

Lecture 50 - CFD and Turbomachinery - III

NPTEL : NOC:Robot Motion Planning (Mechanical Engineering)

Co-ordinators : Prof. Ashish Dutta

Lecture 1 - Introduction

Lecture 2 - Joints and Degrees of Freedom

Lecture 3 - Work Volume and Rotation Transformation

Lecture 4 - Transformations

Lecture 5 - Kinematics

Lecture 6 - Bug Algorithms

Lecture 7 - Configuration Space

Lecture 8 - C Obstacle

Lecture 9 - Topology of C Space

Lecture 10 - Road Map Methods

Lecture 11 - Cell Decomposition Methods

Lecture 12 - Sampling Based Planning

Lecture 13 - Potential Field Methods - I

Lecture 14 - Navigation Function and Potential Field in 3D

Lecture 15 - Basic Search Algorithms

Lecture 16 - Motion Planning with Kinematic Constraints

Lecture 17 - Controllability

Lecture 18 - Kinematic Constraints and Multifinger Robot

Lecture 19 - Multifinger Robot Hands

Lecture 20 - Optimization in Motion Planning

NPTEL : NOC:Metal Additive Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. Amandeep Singh Oberoi, Prof. Janakranjan Ramkumar

Lecture 1 - Introduction to Metal Additive Manufacturing

Lecture 2 - Additive Manufacturing Processes: Classification and Challenges

Lecture 3 - Additive Manufacturing Processes: Applications and Challenges

Lecture 4 - Metal Additive Manufacturing, Glossary - Part 1

Lecture 5 - Metal Additive Manufacturing, Glossary - Part 2

Lecture 6 - CAD for Additive Manufacturing

Lecture 7 - Basic Processes - Part 1

Lecture 8 - Basic Processes - Part 2

Lecture 9 - Laser Based Processes - Part 1

Lecture 10 - Laser Based Processes - Part 2

Lecture 11 - Electron Beam Process

Lecture 12 - Powder/Wire Fed Systems

Lecture 13 - Solidification of Parts - Part 1

Lecture 14 - Solidification of Parts - Part 2

Lecture 15 - Solidification of Parts - Part 3

Lecture 16 - Process Parameters

Lecture 17 - MAM Printed Parts: Mechanical Properties, Hardness

Lecture 18 - MAM Printed Parts: Mechanical Properties, Strength

Lecture 19 - Common Defects and Post Processing

Lecture 20 - Design for Additive Manufacturing (DFAM) - Part 1

Lecture 21 - Design for Additive Manufacturing (DFAM) - Part 2

Lecture 22 - Topology Optimization Techniques

Lecture 23 - On-Machine Sensing in MAM - Part 1

Lecture 24 - On-Machine Sensing in MAM - Part 2

Lecture 25 - In-situ Control Systems

Lecture 26 - Additive Manufacturing of Metal Matrix Composites - Part 1

Lecture 27 - Additive Manufacturing of Metal Matrix Composites - Part 2

Lecture 28 - Additive Manufacturing of Metal Matrix Composites - Part 3

Lecture 29 - Additive Manufacturing of Metal Matrix Composites - Part 4

Lecture 30 - Reverse Engineering in MAM - Part 1

Lecture 31 - Reverse Engineering in MAM - Part 2

Lecture 32 - Reverse Engineering in MAM - Laboratory Demonstration - I

Lecture 33 - Reverse Engineering in MAM - Laboratory Demonstration - II

Lecture 34 - CAD and Topology Optimization Laboratory Demonstration - I

Lecture 35 - CAD and Topology Optimization Laboratory Demonstration - II

Lecture 36 - Non-Destructive Testing - Part 1

Lecture 37 - Non-Destructive Testing - Part 2

Lecture 38 - Sustainability in MAM - Part 1

Lecture 39 - Sustainability in MAM - Part 2

Lecture 40 - Sustainability in MAM - Part 3

Lecture 41 - Metal 3D Printing Laboratory Demonstration - I

Lecture 42 - Metal 3D Printing Laboratory Demonstration - II

Lecture 43 - Safety in MAM

Lecture 44 - Costing in MAM - Part 1

Lecture 45 - Costing in MAM - Part 2

Lecture 46 - Costing in MAM - Part 3

Lecture 47 - Industry 4.0 and MAM

NPTEL : NOC:Conduction and Convection: Fundamentals and Applications (Mechanical Engineering)

Co-ordinators : Prof. Gautam Biswas

Lecture 1

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NPTEL : NOC:Advanced Robotics (Mechanical Engineering)

Co-ordinators : Prof. Ashish Dutta

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Lecture 30

NPTEL : NOC:Applied Numerical Methods (Mechanical Engineering)

Co-ordinators : Prof. Malay K. Das

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Lecture 122

Lecture 123

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Lecture 127

NPTEL : NOC:Social Innovation in Industry 4.0 (Mechanical Engineering)

Co-ordinators : Prof. Janakranjan Ramkumar, Prof. Amandeep Singh Oberoi

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Lecture 52

NPTEL : NOC:Engineering Thermodynamics in Hindi (Mechanical Engineering)

Co-ordinators : Prof. Jayant K. Singh

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NPTEL : NOC:Advanced Machining Processes (2024) (Mechanical Engineering)

Co-ordinators : Prof. Shantanu Bhattacharya

Lecture 1 - Introduction to Advanced Manufacturing Processes

Lecture 2 - Ultrasonic Machining

Lecture 3

Lecture 4

Lecture 5 - Abrasive Jet Machining

Lecture 6 - Adrasive Jet Micro-Machining and Mask Materials for AJMM

Lecture 7 - Electro-Chemical Machining

Lecture 8 - Electrochemical Machining - I

Lecture 9 - Electrochemical Machining - II

Lecture 10 - Electrochemical Machining - III

Lecture 11 - Electrochemical Machining - IV

Lecture 12 - Electrochemical Machining - V

Lecture 13 - Electrochemical Machining - VI

Lecture 14 - Electrochemical Machining - VII

Lecture 15 - Electrochemical Machining - VIII

Lecture 16 - Machining Applications

Lecture 17 - Electric Discharge Machining - I

Lecture 18 - Electric Discharge Machining - II

Lecture 19 - Electric Discharge Machining - III

Lecture 20 - Electric Discharge Machining - IV

Lecture 21 - Electric Discharge Machining - IV and Electron Beam Machining - I

Lecture 22 - Electron Beam Machining - II

Lecture 23 - Laser Beam Machining - I

Lecture 24 - Laser Beam Machining - II

Lecture 25 - Silicon and Processing of Silicon - I

Lecture 26 - Silicon and Processing of Silicon - II

Lecture 27 - Polymer Processing

Lecture 28 - Advanced Finishing Processes

Lecture 29 - Lab Session-I: Water Abrasive Jet Machining Process

Lecture 30 - Lab Session-II: Electro-discharge Machining Process - I

Lecture 31 - Lab Session-III: Electro-discharge Machining Process - II

Lecture 32 - Lab Session-IV: Laser Beam Machining

Lecture 33 - Lab Session-V: Photolithiography

NPTEL : NOC:Basics of Mechanical Engineering - 1 (Mechanical Engineering)

Co-ordinators : Prof. Janakranjan Ramkumar, Prof. Amandeep Singh Oberoi

Lecture 1 - Units, Dimensions, and Dimensional Analysis - Part 1

Lecture 2 - Units, Dimensions, and Dimensional Analysis - Part 2

Lecture 3 - Laws of Motion, Inertia and Momentum

Lecture 4 - Scalars and Vectors, Vector Algebra

Lecture 5 - Statics, Kinetics and Kinematics

Lecture 6 - Friction and Lubrication

Lecture 7 - Moment of Inertia and Gravity

Lecture 8 - Mechanical Properties - Stress Strain and Residual Stress

Lecture 9 - Stress Strain Curve, Elasticity and Poission's Ratio

Lecture 10 - Principal Stress and Castigliano's Theorem

Lecture 11 - Hardness, Toughness, Impact and Creep

Lecture 12 - Homogeneous Materials, Isotropic and Anisotropic Materials

Lecture 13 - Static and Fatigue Loading, Critical Loads - Part 1

Lecture 14 - Static and Fatigue Loading, Critical Loads - Part 2

Lecture 15 - Tutorial-1 - Part 1

Lecture 16 - Tutorial-1 - Part 2

Lecture 17 - Tutorial-2 - Part 1

Lecture 18 - Tutorial-2 - Part 2

Lecture 19 - Stress in Cylinders and Spheres - Part 1

Lecture 20 - Stress in Cylinders and Spheres - Part 2

Lecture 21 - Buckling of columns

Lecture 22 - Materials, Metals and Composites - Part 1

Lecture 23 - Materials, Metals and Composites - Part 2

Lecture 24 - Mohr's circle

Lecture 25 - Shear Force and Bending Moment Diagram - Part 1

Lecture 26 - Shear Force and Bending Moment Diagram - Part 2

Lecture 27 - Shear Force and Bending Moment Diagram - Part 3

Lecture 28 - Factor of Safety, Degree of Freedom, Endurance Limit

Lecture 29 - Tutorial-3 - Part 1

Lecture 30 - Tutorial-3 - Part 2

Lecture 31 - Linkages and Mechanisms

Lecture 32 - Stress Concentration and Notch Sensitivity - Part 1

Lecture 33 - Stress Concentration and Notch Sensitivity - Part 2

Lecture 34 - Brittleness and ductility

Lecture 35 - Testing for Tension

Lecture 36 - Testing for Compression

Lecture 37 - Testing for bending

Lecture 38 - Testing for impact loads

Lecture 39 - Testing for hardness, and fracture

Lecture 40 - Spring-Mass Systems - Part 1

Lecture 41 - Spring-Mass Systems - Part 2

Lecture 42 - Gears: Basic Concepts

Lecture 43 - Cam and Follower Design

Lecture 44 - Couplings and Shafts

Lecture 45 - Keys, Nuts, Bolts, Screws and Fasteners

Lecture 46 - Chains, Pulleys, and Belts

Lecture 47 - Clutches, Brakes and Flywheels

Lecture 48 - Permanent Joints

Lecture 49 - Vibration and Acoustics

Lecture 50 - Introduction to Engineering Statistics

NPTEL : Computational Fluid Dynamics (Prof. S. Chakraborty) (Mechanical Engineering)

Co-ordinators : Prof. S. Chakraborty

Lecture 1 - Introduction to Computational Fluid Dynamics and Principles of Conservation

Lecture 2 - Conservation of Mass and Momentum: Continuity and Navier Stokes Equation

Lecture 3 - Navier Stokes Equation (Continued.)

Lecture 4 - Energy Equation and General Structure of Conservation Equations

Lecture 5 - Classification of Partial Differential Equations and Physical Behaviour

Lecture 6 - Classification of Partial Differential Equations and Physical Behaviour (Continued.)

Lecture 7 - Approximate Solutions of Differential Equations: Error Minimization Principles

Lecture 8 - Approximate Solutions of Differential Equations: Variational Principles and Weighted Residual Approach

Lecture 9 - Weighted Residual Approach and Introduction to Discretization

Lecture 10 - Fundamentals of Discretization: Finite Element Method

Lecture 11 - Fundamentals of Discretization: Finite Difference and Finite Volume Method

Lecture 12 - Fundamentals of Discretization: Finite Volume Method (Continued.)

Lecture 13 - Finite Volume Method: Some Conceptual Basics and Illustrations through 1-D Steady State Diffusion Problems

Lecture 14 - Finite Volume Method: Boundary Condition Implementation and Discretization of Unsteady State Problems

Lecture 15 - Finite Volume Method: Discretization of Unsteady State Problems

Lecture 16 - Important Consequences of Discretization of Unsteady State Problems

Lecture 17 - Important Consequences of Discretization of Time Dependent Diffusion Type Problems (Continued.) and Stability Analysis

Lecture 18 - Discretization of Hyperbolic Equations: Stability Analysis

Lecture 19 - PART 1 : Stability of Second Order Hyperbolic Equations PART 2 : Mid-Semester Assessment Review (Questions and Answers)

Lecture 20 - PART 1: Mid-Semester Assessment Review (Questions and Answers) (Continued.) PART 2: Finite Volume Discretization of 2-D Unsteady State Diffusion Type

Lecture 21 - Solution of Systems of Linear Algebraic Equations

Lecture 22 - Solution of Systems of Linear Algebraic Equations: Elimination Methods

Lecture 23 - Solution of Systems of Linear Algebraic Equations: Elimination Methods (Continued.)

Lecture 24 - Elimination Methods: Error Analysis

Lecture 25 - Iterative Methods for Numerical Solution of Systems of Linear Algebraic Equations

Lecture 26 - Iterative Methods for Numerical Solution of Systems of Linear Algebraic Equations (Continued.)

Lecture 27 - Iterative Methods: Further Examples

Lecture 28 - PART 1: Combination of Iteration & Elimination Techniques PART 2: Introduction to Gradient Search Methods

Lecture 29 - Gradient Search Methods (Continued.)

Lecture 30 - Discretization of Convection-Diffusion Equations: A Finite Volume Approach

Lecture 31 - Discretization of Convection-Diffusion Equations: A Finite Volume Approach (Continued.)

Lecture 32 - Discretization of Convection- Diffusion Equations: A Finite Volume Approach (Continued.)

Lecture 33 - Discretization of Convection -Diffusion Equations: A Finite Volume Approach (Continued.)

Lecture 34 - Discretization of Convection-Diffusion Equations: A Finite Volume Approach (Continued.)

Lecture 35 - Discretization of Navier Stokes Equations

Lecture 36 - Discretization of Navier Stokes Equations (Continued.)

Lecture 37 - Discretization of Navier Stokes Equations (Continued.)

Lecture 38 - PART 1 : Discretization of Navier Stokes Equations (Continued.) PART 2 : Fundamentals of Unstructured Grid Formulation

Lecture 39 - Unstructured Grid Formulation (Continued.)

Lecture 40 - What is there in implementing a CFD Code

Lecture 41 - Introduction to Turbulence Modeling

Lecture 42 - Introduction to Turbulence Modeling (Continued.)

Lecture 43 - End Semester Questions Review

NPTEL : Fundamentals of Industrial Oil Hydraulics and Pneumatics (Mechanical Engineering)

Co-ordinators : Prof. R.N. Maiti

Lecture 1 - What is Hydraulic and Pneumatic System

Lecture 2 - Basic Components, Symbols and Circuits

Lecture 3 - Incompressible Fluids - Some Fundamental Properties

Lecture 4 - Incompressible Fluid Flow related to Fluid Drive

Lecture 5 - Capillary Fluid (incompressible) Flow and Hydrodynamic Lubrication

Lecture 6 - Basis for Calculating Hydraulic Systems

Lecture 7 - Different types of Valves - Features and Operations - I

Lecture 8 - Hydraulic Valves (General) Different types of Valves - Features and Operations - II

Lecture 9 - Hydraulic Circuits and Valves

Lecture 10 - Hydraulic Servomechanism and Servo and Proportional Control Valves

Lecture 11 - Basic Spool Valve Design Analysis

Lecture 12 - General Control Valve Analysis

Lecture 13 - Critical Centre Spool Valve Analysis

Lecture 14 - Critical Centre Spool Valve Analysis - Stroking Forces

Lecture 15 - Proportional Solenoid Pilot Operated Two Stage Pressure Relief Valve

Lecture 16 - Proportional Solenoid Pilot Operated Two Stage Pressure Relief Valve (Continued...)

Lecture 17 - Introduction to Positive Displacement Hydrostatic Units (Hydraulic Pumps and Motors)

Lecture 18 - Basic features of some Hydraulic Pumps and Motors

Lecture 19 - Analysis of an axial - Piston Swash Plate type Hydrostatic Pump (Discharge Flow Characteristics)

Lecture 20 - Analysis of an axial - Piston Swash Plate type Hydrostatic Pump (Estimation of Torque on Drive Shaft and Swash Plate)

Lecture 21 - Analysis of an Axial - Piston Swash Plate type Hydrostatic unit (Pressure Ripple and Swash Plate Torque)

Lecture 22 - Design Analysis of Gear Pumps - I

Lecture 23 - Design Analysis of Gear Pumps - II

Lecture 24 - Basic Concept of Hydrostatic Transmission (HST) System

Lecture 25 - Selection of HST units and components

Lecture 26 - Regenerative Circuits

Lecture 27 - Introduction to Fluid Logic

Lecture 28 - Basic Devices, Symbols and Circuits

Lecture 29 - Logic Circuits

Lecture 30 - Design Analysis of ORBIT Motor - I : Basic Design and Feature

Lecture 31 - Design Analysis of ORBIT Motor - II : Geometric Volume Displacement

Lecture 32 - Design Analysis of ORBIT Motor - III : Output torque and stress, Deformation, Gap at Contacts

Lecture 33 - Application and Selection of Accumulators - Part I

Lecture 34 - Application and Selection of Accumulators - Part II

Lecture 35 - Hydraulic Circuits in Industrial Applications

Lecture 36 - Air preparation - Compressor and Accessories

Lecture 37 - Pneumatic Circuits

Lecture 38 - Analysis of Three - Way (Spool and Flapper Nozzle Valve)

Lecture 39 - Analysis of Flapper Nozzle Valves

Lecture 40 - Flow Force Compensation and Spool Design (Electro - hydraulic valves)

Lecture 41 - Premier and Guide to Oil - hydraulic fluids ; and Introduction to Fluid Power Symbols

Lecture 42 - Symbols in Oil Hydraulics

Lecture 43 - Appendices Tutorial on Basic Calculation on HST System and Hydraulic Fluids

NPTEL : Machinery fault diagnosis and signal processing (Mechanical Engineering)

Co-ordinators : Prof. A.R. Mohanty

Lecture 1 - Introduction

Lecture 2 - Principles of Maintenance

Lecture 3 - Failure Modes Effects and Criticality Analysis

Lecture 4 - Fault Diagnostics and Prognostics

Lecture 5 - Basics of Machinery Vibration

Lecture 6 - Engineering Applications of Vibration

Lecture 7 - Rotordynamics

Lecture 8 - Time Domain Signal Analysis

Lecture 9 - Frequency Domain Signal Analysis

Lecture 10 - Computer Aided Data Acquisition

Lecture 11 - FFT Analysis

Lecture 12 - Modulation and Sidebands

Lecture 13 - Envelope Analysis

Lecture 14 - Cepstrum Analysis

Lecture 15 - Order Analysis

Lecture 16 - Basics of Instrumentation

Lecture 17 - Sensors and Transducers

Lecture 18 - Data Recording and Transmission

Lecture 19 - Vibration Transducers

Lecture 20 - Vibration Monitoring

Lecture 21 - Basics of Noise and Noise Monitoring

Lecture 22 - Numericals in Noise Vibration and Data Acquisition

Lecture 23 - Unbalance Detection

Lecture 24 - Field Balancing

Lecture 25 - Misalignment Detection

Lecture 26 - Cracked Shaft Detection

Lecture 27 - Looseness and Rub Detection

Lecture 28 - Ball and Journal Bearings

Lecture 29 - Gear Fault Detection

Lecture 30 - Fans, Blowers and Compressors

Lecture 31 - Pumps and Turbines

Lecture 32 - Contaminant Analysis

Lecture 33 - Oil Analysis

Lecture 34 - Fault Detection in Motors and Transformers

Lecture 35 - Motor Current Signature Analysis

Lecture 36 - Thermography

Lecture 37 - Ultrasonics

Lecture 38 - Acoustic Emission and Eddy Current Testing

Lecture 39 - Radiography,Dye Penetrant Test and Visual Inspection

Lecture 40 - Case Studies

NPTEL : Solar Energy Technology (Mechanical Engineering)

Co-ordinators : Prof. V.V. Satyamurty

Lecture 1 - Energy and Dependence on External Sources and Sun, Physical Descriptions and Reactions

Lecture 2 - Sun - Earth Geometry

Lecture 3 - Terminology Extra - Terrestrial Radiation Terrestria Radiation

Lecture 4 - Measuring Instruments

Lecture 5 - Estimation of Solar Radiation or Details

Lecture 6 - Radiation Processing - Long Term

Lecture 7 - Evaluation of the Apparent Sunrise and Sunset Angles

Lecture 8 - Estimation of Daily/Monthly Average daily Tilt Factor Under Terrestrial Conditions

Lecture 9 - Solar Colector Basics

Lecture 10 - Transmission - Absorptance Product

Lecture 11 - Daily (Or Monthly Average Daily) Transmittance - Absorptance Product Analytical Evaluation

Lecture 12 - Theory of Flat Plate Collectors - Liquid Based (A)

Lecture 13 - Theory of Flat Plate Collectors - Liquid Based (B)

Lecture 14 - Theory of Flat Plate Collectors - Liquid Based (C)

Lecture 15 - Mean temperature and Heat Capacity Effects

Lecture 16 - Theory of Air Based Solar Flat Plate Collectors

Lecture 17 - Theory of Air Based Solar Flat Plate Collectors (Continued.)

Lecture 18 - Other Collector Geometries

Lecture 19 - Concentrating Collectors

Lecture 20 - Concentrating Collectors (Continued.)

Lecture 21 - Concentrating Collectors (Continued.)

Lecture 22 - Compound Parabolic Collectors

Lecture 23 - Exercise - I

Lecture 24 - Exercise - I (Continued.)

Lecture 25 - Device and System Performance

Lecture 26 - Long Term Solar Energy System Performance

Lecture 27 - Exercise - I (Continued.)

Lecture 28 - Long Term Solar Energy System Performance Simplified Design Methods

Lecture 29 - Long Term Solar Energy System Performance Simplified Design Methods (Continued.)

Lecture 30 - Monthly Average Daily Utilizability

Lecture 31 - The phi(bar) - f chart method (Continued.)

Lecture 32 - The phi(bar) - f chart method Tank Losses and Finite Heat Exchanger

Lecture 33 - Exercise - 2

Lecture 34 - Exercise - 2 (Continued.)

Lecture 35 - Exercise - 2 (Continued.)

Lecture 36 - Economic Analysis

Lecture 37 - Life Cycle Savings : The P1 and P2 Method

Lecture 38 - Passive Devices

Lecture 39 - Passive Architecture, Overhangs and Wing Walls

Lecture 40 - Passive Architecture, Overhangs and Wing Walls (Continued.)

Lecture 41 - Summary

Lecture 42 - Summary (Continued.)

Lecture 43 - Summary (Continued.)

NPTEL : Technology of Surface Coating (Mechanical Engineering)

Co-ordinators : Prof. A.K. Chattopadhyay

Lecture 1 - Introduction

Lecture 2 - CVD Reaction

Lecture 3 - Adhesion of Surface Coating

Lecture 4 - CVD System

Lecture 5 - CDV of Tic

Lecture 6 - Chemical Vapour Deposition of Nitride Coating

Lecture 7 - Chemical Vapour Deposition of Carbo-Nitride Coating

Lecture 8 - Chemical Vapour Deposition of Cromium

Lecture 9 - Chemical Vapour Deposition of Aluminium Oxide

Lecture 10 - Chemical Vapour Deposition of Diamond

Lecture 11 - Vacuum Evaporation Deposition

Lecture 12 - Reactive Evaporation Deposition

Lecture 13 - Cathodic Arc Evaporation Deposition

Lecture 14 - Sputtering

Lecture 15 - Magnetron Sputtering

Lecture 16 - Unbalanced Magnetron Sputtering

Lecture 17 - Radio frequency and pulsed DC sputtering

Lecture 18 - Sputter Deposition of Nitride Coating

Lecture 19 - Sputter Deposition of Molybdenum Di Sulphide Coating

Lecture 20 - Influence of Architecture of Sputter Deposited Molybdenum Di Sulphide Coating

Lecture 21 - Electro Plating,Anodizing and Electro-Less Plating

Lecture 22 - Coating of Monolayer Abrasive Grain by Electro Plating

Lecture 23 - Mechansim of Wetting

Lecture 24 - Coating on Ceramics by Wetting

Lecture 25 - Coating of Monolayer Abrasive Grain by Wetting

Lecture 26 - Coating on Abrasive Grain

Lecture 27 - Combustion Spray Process

Lecture 28 - Plasma Spray Process

Lecture 29 - Mechanical, Chemical and Ion-Assisted Method

Lecture 30 - Combustion Spray Process

Lecture 31 - Production of Low Vacuum

Lecture 32 - Production of High Vacuum

Lecture 33 - Measurement of Low Pressure and Gas Flow in Coating Deposition System

Lecture 34 - Physical Characterization

Lecture 35 - Assessment of Coating Hardness

Lecture 36 - Assessment of Friction and Wear of Coating

Lecture 37 - Assessment of Surface Roughness and Thickness of Coating

Lecture 38 - Assessment of Adhesion of Coating

Lecture 39 - Performance Evaluation of TiN Coated Tool

Lecture 40 - Performance Evaluation of HFCVD Diamond Coated Tool

NPTEL : Vibration of Structures (Mechanical Engineering)

Co-ordinators : Prof. A. Dasgupta

Lecture 1 - Transverse Vibrations of Strings - I

Lecture 2 - Transverse Vibrations of Strings - II

Lecture 3 - Axial and Torsional Vibrations of Bars

Lecture 4 - Variational Formulation - I

Lecture 5 - Variational Formulation - II

Lecture 6 - Modal Analysis - I

Lecture 7 - Modal Analysis - II

Lecture 8 - Properties of the Eigenvalue Problem

Lecture 9 - Modal Analysis: Approximate Methods - I

Lecture 10 - Modal Analysis: Approximate Methods - II

Lecture 11 - The Initial Value Problem

Lecture 12 - Forced Vibration Analysis - I

Lecture 13 - Forced Vibration Analysis - II

Lecture 14 - Forced Vibration Analysis - III

Lecture 15 - Damping in Structures

Lecture 16 - Axially Translating Strings

Lecture 17 - d' Alembert's Solution - I

Lecture 18 - d' Alembert's Solution - II

Lecture 19 - Harmonic Waves and Energetics of Wave Motion

Lecture 20 - Scattering of Waves

Lecture 21 - Applications of Wave Solution - I

Lecture 22 - Applications of Wave Solution - II

Lecture 23 - Beam Models - I

Lecture 24 - Beam Models - II

Lecture 25 - Modal Analysis of Beams

Lecture 26 - Applications of Modal Solution

Lecture 27 - Approximate Methods

Lecture 28 - Topic in Beam Vibration - I

Lecture 29 - Topic in Beam Vibration - II

Lecture 30 - Wave Propagation in Beams

Lecture 31 - Dynamics of Curved Beams

Lecture 32 - Vibrations of Rings and Arches

Lecture 33 - Dynamics of Membranes

Lecture 34 - Vibrations of Rectangular Membrane

Lecture 35 - Vibrations of Circular Membrane

Lecture 36 - Special Problems in Membrane Vibrations

Lecture 37 - Dynamics of Plates

Lecture 38 - Vibrations of Rectangular Plates

Lecture 39 - Vibrations of Circular Plates

Lecture 40 - Special Problems in Plate Vibrations

NPTEL : Basic Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. S.K. Som

Lecture 1 - Introduction and Fundamental Concepts

Lecture 2 - Zeroth Law and Fundamental Concepts

Lecture 3 - Different Kind of Energy and First Low - I

Lecture 4 - First Low - II

Lecture 5 - First Low - III

Lecture 6 - Second Law and Its Corollaries - I

Lecture 7 - Second Law and Its Corollaries - II

Lecture 8 - Second Law and Its Corollaries - III

Lecture 9 - Second Law and Its Corollaries - IV

Lecture 10 - Second Law and Available Energy - I

Lecture 11 - Second Law and Available Energy - II

Lecture 12 - Second Law and Available Energy - III

Lecture 13 - Thermodynamic Property Relations - I

Lecture 14 - Thermodynamic Property Relations - II

Lecture 15 - Joule-Kelvin Expansion: Properties of Pure Substances

Lecture 16 - Properties of Pure Substances - I

Lecture 17 - Properties of Pure Substances - II

Lecture 18 - Properties of Pure Substances: Ideal Gases

Lecture 19 - Properties of Ideal Gases

Lecture 20 - Vapors Power Cycle - I

Lecture 21 - Vapor Power Cycle - II

Lecture 22 - Vapor Power Cycle - III

Lecture 23 - Vapor Power Cycle - IV

Lecture 24 - Gas Power Cycle - I

Lecture 25 - Gas Power Cycle - II

Lecture 26 - Gas Power Cycle - III

Lecture 27 - Thermodynamics of Reacting System - I

Lecture 28 - Thermodynamics of Reacting System - II

Lecture 29 - Thermodynamics of Reacting System - III

Lecture 30 - Thermodynamics of Multi Component System - I

Lecture 31 - Thermodynamics of Multi Component System - II

Lecture 32 - Thermodynamics of Multi Component System - III

NPTEL : Design of Machine Elements I (Mechanical Engineering)

Co-ordinators : Prof. G. Chakraborty, Prof. B. Maiti, Prof. S.K. Roychowdhury

Lecture 1 - Design Philosophy

Lecture 2 - Design And Manufacturing

Lecture 3 - Engineering Materials

Lecture 4 - Engineering Materials

Lecture 5 - Simple Stresses In Machine Elements

Lecture 6 - Simple Stresses In Machine Elements

Lecture 7 - Compound Stresses In Machine Elements

Lecture 8 - Design For Strength

Lecture 9 - Design for Strength

Lecture 10 - Design For Strength

Lecture 11 - Design for Strength

Lecture 12 - Design for Strength

Lecture 13 - Design of Fasteners - I

Lecture 14 - Design of Fasteners - II

Lecture 15 - Design Of Keys and Splines

Lecture 16 - Threaded Fasteners

Lecture 17 - Design Of Threaded Fasteners

Lecture 18 - Power Screws

Lecture 19 - Design Of Power Screws

Lecture 20 - Shaft Coupling - I

Lecture 21 - Shaft Coupling - II

Lecture 22 - Rivet Joints

Lecture 23 - Design of Welded Joints - I

Lecture 24 - Design of Welded Joints - II

Lecture 25 - Design of Joints With Eccentric Loading

Lecture 26 - Design of Joints With Variable Loading

Lecture 27 - Design of Springs

Lecture 28 - Design Of Springs

Lecture 29 - Design Of Springs

Lecture 30 - Belt Drives

Lecture 31 - Belt Drives

Lecture 32 - Belt Drives

Lecture 33 - Design for Strength

Lecture 34 - Design of Shafts

Lecture 35 - Design of Machine Elements - I (V & W)

Lecture 36 - Design of Machine Elements - II (V & W)

Lecture 37 - Design of Cylinders & Pressure Vessels - II

Lecture 38 - Design of Cylinders & Pressure Vessels - III

Lecture 39 - Design of Brakes - I

Lecture 40 - Design of Brakes - II

NPTEL : Manufacturing Processes II (Mechanical Engineering)

Co-ordinators : Prof. S. Paul, Prof. A.B. Chattopadhyay, Prof. A.K. Chattopadhyay

Lecture 1 - Instructional Objectives - I (Manufacturing Process II)

Lecture 2 - Instructional Objectives - II

Lecture 3 - On Tool Geometry

Lecture 4 - Interrelations Among The Tool Angles

Lecture 5 - Mechanism of Chip Formation

Lecture 6 - Orthogonal and Oblique Cutting

Lecture 7 - Use of Chip Breaker in Machining

Lecture 8 - Machining Forces

Lecture 9 - Analytical and Experimental

Lecture 10 - Dynamometers for Measuring Cutting Forces

Lecture 11 - CTCEAC

Lecture 12 - CCTCFA

Lecture 13 - Concept of Machinability and its Improvement

Lecture 14 - Tool Life

Lecture 15 - Conventional Cutting Tool Maths

Lecture 16 - Advanced Tool Materials

Lecture 17 - Kinematics System of Centre Lathe

Lecture 18 - General Purpose Machine Tool Drills

Lecture 19 - Kinematic Systems and Operations

Lecture 20 - Configuration and Kinematic System

Lecture 21 - Mounting of jobs and Cutting Tools in Machine

Lecture 22 - Mounting of jobs and Cutting Tools in Machine

Lecture 23 - Construction, Operation and Tool Layout

Lecture 24 - Use of Attachments In Machine Tools

Lecture 25 - Forces Developing and Acting In Machine Tools

Lecture 26 - Estimation of Machining Time

Lecture 27 - Broaching - Principle Systems and Applications

Lecture 28 - Grinding Principle and Application

Lecture 29 - Abrasive Processes

Lecture 30 - Abrasive Processes (Grinding)

Lecture 31 - Super finishing Processes

Lecture 32 - Production of Screw Threads

Lecture 33 - Gear Manufacturing

Lecture 34 - Jigs and Fixtures For Machine Shops

Lecture 35 - Design and Applications of Jigs and Fixtures

Lecture 36 - Non Traditional Manufacturing

Lecture 37 - Ultrasonic Machining

Lecture 38 - Water Jet Machining and Abrasive Water Jet

Lecture 39 - Electro - Chemical Machining

Lecture 40 - Electro - Discharge Machining

Lecture 41 - EBM and LBM

NPTEL : Refrigeration and Air Conditioning (Mechanical Engineering)

Co-ordinators : Prof. M. Ramgopal, Prof. R.C. Arora

Lecture 1 - History of Refrigeration

Lecture 2 - Refrigerant Compressors & Development

Lecture 3 - Applications of RTAC

Lecture 4 - Review of Fundamentals Thermodynamics - I

Lecture 5 - Review of Fundamentals

Lecture 6 - Fundamentals of Fluid Flow

Lecture 7 - Fundamentals of Heat Transfer

Lecture 8 - Methods of Producing low Temperatures

Lecture 9 - Air Cycle Refrigeration Systems

Lecture 10 - Vapour Compression Refrigeration Systems

Lecture 11 - Vapour Compression Refrigeration Systems (Continued...)

Lecture 12 - Vapour Compression Refrigeration Systems (Continued...)

Lecture 13 - Vapour Compression Refrigeration Systems (Continued...)

Lecture 14 - Vapour Absorption Refrigeration Systems

Lecture 15 - Vapour Absorption Refrigeration System

Lecture 16 - Vapour Absorption Refrigeration Systems (Continued...)

Lecture 17 - Vapour Absorption Refrigeration Systems (Continued...)

Lecture 18 - Worked Out Examples - I

Lecture 19 - Worked Out Examples - II

Lecture 20 - Refrigeration System Components : Compressor

Lecture 21 - Refrigeration System Components : Compressor (Continued...)

Lecture 22 - Refrigeration System Components : Compressor (Continued...)

Lecture 23 - Refrigeration System Components : Compressor (Continued...)

Lecture 24 - Refrigeration System Components : Compressor (Continued...)

Lecture 25 - Refrigeration System Components : Compressor (Continued...)

Lecture 26 - Refrigeration System Components : Condensers

Lecture 27 - Refrigeration System Components : Condensers (Continued...)

Lecture 28 - Refrigeration System Components : Evaporators

Lecture 29 - Refrigeration System Components : Evaporators

Lecture 30 - Refrigeration System Components : Expansion Devices

Lecture 31 - Refrigeration System Components : Expansion Devices

Lecture 32 - Analysis of Complete Vapour Compression System

Lecture 33 - Refrigerants

Lecture 34 - Psychrometry

Lecture 35 - Psychrometric Processes

Lecture 36 - Inside Design Condition Thermal Comfort

Lecture 37 - Psychrometry of Air Conditioning Systems

Lecture 38 - Air Conditioning Systems

Lecture 39 - Cooling and Heating Load Calculation : Solar Radiation

Lecture 40 - Cooling and Heating Load Calculations

Lecture 41 - Cooling and Heating Load Calculations (Continued...)

Lecture 42 - Cooling and Heating Load Calculations (Continued...)

Lecture 43 - Selection of Air Conditioning Systems

Lecture 44 - Transmission and Distribution of Air

Lecture 45 - Transmission and Distribution of Air (Continued..)

Lecture 46 - Space Air Distribution

NPTEL : Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. S.K. Som

Lecture 1 - Introduction and Fundamental Concepts - Part I

Lecture 2 - Introduction and Fundamental Concepts - Part II

Lecture 3 - Introduction and Fundamental Concepts - Part III

Lecture 4 - Fluid Statics - Part I

Lecture 5 - Fluid Statics - Part II

Lecture 6 - Fluid Statics - Part III

Lecture 7 - Fluid Statics - Part IV

Lecture 8 - Fluid Statics - Part V

Lecture 9 - Fluid Statics - Part VI

Lecture 10 - Kinematics of Fluid - Part I

Lecture 11 - Kinematics of Fluid - Part II

Lecture 12 - Kinematics of Fluid - Part III

Lecture 13 - Conservation Equations in Fluid Flow - Part I

Lecture 14 - Conservation Equations in Fluid Flow - Part II

Lecture 15 - Conservation Equations in Fluid Flow - Part III

Lecture 16 - Conservation Equations in Fluid Flow - Part IV

Lecture 17 - Conservation Equations in Fluid Flow - Part V

Lecture 18 - Conservation Equations in Fluid Flow - Part VI

Lecture 19 - Conservation Equations in Fluid Flow - Part VII

Lecture 20 - Conservation Equations in Fluid Flow - Part VIII

Lecture 21 - Conservation Equations in Fluid Flow - Part IX

Lecture 22 - Fluid Flow Applications - Part I

Lecture 23 - Fluid Flow Applications - Part II

Lecture 24 - Fluid Flow Applications - Part III

Lecture 25 - Fluid Flow Applications - Part IV

Lecture 26 - Fluid Flow Applications - Part V

Lecture 27 - Fluid Flow Applications - Part VI

Lecture 28 - Fluid Flow Applications - Part VII

Lecture 29 - Incompressible Viscous Flows - Part I

Lecture 30 - Incompressible Viscous Flows - Part II

Lecture 31 - Incompressible Viscous Flows - Part III

Lecture 32 - Incompressible Viscous Flows - Part IV

Lecture 33 - Application of ViscousFlow Through Pipes - Part I

Lecture 34 - Application of ViscousFlow Through Pipes - Part II

Lecture 35 - Application of ViscousFlow Through Pipes - Part III

Lecture 36 - Principles of Similarity - Part I

Lecture 37 - Principles of Similarity - Part II

Lecture 38 - Principles of Similarity - Part III

Lecture 39 - Flow of Ideal Fluids - Part I

Lecture 40 - Flow of Ideal Fluids - Part II

Lecture 41 - Flows with a Free Surface - Part I

Lecture 42 - Flows with a Free Surface - Part II

Lecture 43 - Flows with a Free Surface - Part III

Lecture 44 - A Few Unsteady Flow Phenomena in Practice - Part I

Lecture 45 - A Few Unsteady Flow Phenomena in Practice - Part II

Lecture 46 - Introduction to Laminar Boundary Layer - Part I

Lecture 47 - Introduction to Laminar Boundary Layer - Part II

Lecture 48 - Introduction to Turbulent Flow - Part I

Lecture 49 - Introduction to Turbulent Flow - Part II

NPTEL : Introduction to Fluid Machines and Compressible Flow (Mechanical Engineering)

Co-ordinators : Prof. S.K. Som

Lecture 1 - Introduction to Fluid Machines 1

Lecture 2 - Energy Transfer in Fluid Machines Part - I

Lecture 3 - Energy Transfer in Fluid Machines Part - II

Lecture 4 - Energy Transfer - impulse and Reaction Machines, efficiencies of Fluid Machines

Lecture 5 - Principles of Similarity in Fluid Machines

Lecture 6 - Concept of specific speed and introduction to Impulse Hydraulic Turbine

Lecture 7 - Analysis of force on the Bucket of Pelton wheel and Power Generation

Lecture 8 - Specific speed, Governing and Limitation of a Pelton Turbine

Lecture 9 - Introduction to reaction Type of Hydraulic Turbine - A Francis Turbine

Lecture 10 - Analysis of Force on Francis Runner and Power Generation

Lecture 11 - Axial Flow Machine and Draft Tube

Lecture 12 - Governing of Reaction Turbine

Lecture 13 - Introduction to Rotodynamic Pumps

Lecture 14 - Flow and Energy Transfer in a Centrifugal Pump

Lecture 15 - Characteristics of a Centrifugal Pump

Lecture 16 - Matching of Pump and System Characteristics

Lecture 17 - Diffuser and Cavitation

Lecture 18 - Axial Flow Pump

Lecture 19 - Reciprocating Pump - Part I

Lecture 20 - Reciprocating Pump - Part II

Lecture 21 - Centrifugal Compressor - Part I

Lecture 22 - Centrifugal Compressor - Part II

Lecture 23 - Centrifugal Compressor - Part III

Lecture 24 - Axial Flow Compressor - Part I

Lecture 25 - Axial Flow Compressor - Part II

Lecture 26 - Introduction to Compressible Flow - Part I

Lecture 27 - Introduction to Compressible Flow - Part II

Lecture 28 - Thermodynamic Relations and Speed of Sound

Lecture 29 - Disturbance propagation, Stagnation and Sonic Properties

Lecture 30 - Effects of Area Variation on Properties in an Isentropic Flow

Lecture 31 - Choking in a Converging Nozzle

Lecture 32 - Isentropic Flow through Convergent - Divergent Duct

Lecture 33 - Normal Shock - Part I

Lecture 34 - Normal Shock - Part II

Lecture 35 - Normal Shock - Part III

Lecture 36 - Normal Shock - Part IV

Lecture 37 - Normal Shock - Part V

Lecture 38 - Oblique Shock - Part I

Lecture 39 - Oblique Shock - Part II

Lecture 40 - Introduction to Expansion Wave and Prandtl Meyer Flow

NPTEL : Introduction to Fluid Mechanics and Fluid Engineering (Mechanical Engineering)

Co-ordinators : Prof. S. Chakraborty

Lecture 1 - Introductory Concepts

Lecture 2 - Introductory Concepts (Continued...)

Lecture 3 - Introductory Concepts (Continued...)

Lecture 4 - Viscosity

Lecture 5 - Viscosity (Continued...)

Lecture 6 - Viscosity (Continued...) and Surface Tension

Lecture 7 - Surface Tension (Continued...) and Fluid Statics

Lecture 8 - Fluid Statics (Continued...)

Lecture 9 - Fluid Statics (Continued...)

Lecture 10 - Fluid Statics (Continued...) and Fluid Under Rigid Body Motion

Lecture 11 - Fluid Kinematics

Lecture 12 - Fluid Kinematics (Continued...)

Lecture 13 - Fluid Kinematics (Continued...)

Lecture 14 - Fluid Kinematics (Continued...)

Lecture 15 - Fluid Kinematics (Continued...)

Lecture 16 - Dynamics of Inviscid Flows

Lecture 17 - Dynamics of Inviscid Flows (Continued...)

Lecture 18 - Dynamics of Inviscid Flows (Continued...)

Lecture 19 - Dynamics of Inviscid Flows (Continued...)

Lecture 20 - Dynamics of Inviscid Flows (Continued...)

Lecture 21 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem)

Lecture 22 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 23 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 24 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 25 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 26 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 27 - Integral Forms of Control Volume Conservation Equations (Reynolds Transport Theorem) (Continued...)

Lecture 28 - Dynamics of Viscous Flows : Navier Stokes Equation

Lecture 29 - Dynamics of Viscous Flows : Navier Stokes Equation (Continued...)

Lecture 30 - Some Exact Solutions of Navier Stokes Equation

Lecture 31 - Some Exact Solutions of Navier Stokes Equation (Continued...)

Lecture 32 - Some Exact Solutions of Navier Stokes Equation (Continued...)

Lecture 33 - Introduction to Turbulence

Lecture 34 - Introduction to Turbulence (Continued...)

Lecture 35 - Introduction to Turbulence (Continued...)

Lecture 36 - Introduction to Turbulence (Continued...)

Lecture 37 - Boundary Layer Theory

Lecture 38 - Boundary Layer Theory (Continued...)

Lecture 39 - Boundary Layer Theory (Continued...)

Lecture 40 - Boundary Layer Theory (Continued...) and Flow Past Immersed Bodies

Lecture 41 - Flow past Immersed Bodies (Continued...)

Lecture 42 - Potential Flow Past Immersed Bodies

Lecture 43 - Potential Flow (Continued...) and Flow Past Immersed Bodies of Special Shapes

Lecture 44 - Flow Past Immersed Bodies (Continued...) and Sports Ball Aerodynamics

Lecture 45 - Pipe Flow

Lecture 46 - Pipe Flow (Continued...)

Lecture 47 - Pipe Flow (Continued...)

Lecture 48 - Principles of Similarity and Dimensional Analysis

Lecture 49 - Introduction to Fluid Machines

Lecture 50 - Introduction to Fluid Machines (Continued...)

Lecture 51 - Introduction to Fluid Machines (Continued...)

Lecture 52 - Introduction to Fluid Machines (Continued...)

Lecture 53 - Introduction to Fluid Machines (Continued...)

Lecture 54 - Compressible Flows

Lecture 55 - Compressible Flows (Continued...)

Lecture 56 - Compressible Flows (Continued...)

Lecture 57 - Compressible Flows (Continued...)

Lecture 58 - Compressible Flows (Continued...)

NPTEL : Micro fluidics (Mechanical Engineering)

Co-ordinators : Prof. S. Chakraborty

Lecture 1 - Introduction to Microfluidics

Lecture 2 - Microfluidics: Some Application Examples

Lecture 3 - Microfluidics: Some More Application Examples

Lecture 4 - Equations of Conservation

Lecture 5 - Navier Stokes Equation

Lecture 6 - Navier Stokes Equation (Continued...)

Lecture 7 - Energy Equation

Lecture 8 - Energy Equation (Continued...) and Species Conservation Equation

Lecture 9 - Pressure-driven Microflows

Lecture 10 - Pressure-driven Microflows (Continued...)

Lecture 11 - Pressure-driven Microflows (Continued...)

Lecture 12 - Pressure-driven Microflows (Continued...)

Lecture 13 - Pressure -driven Microflows (Continued...)

Lecture 14 - Some Examples of Unsteady Flows

Lecture 15 - Some Examples of Unsteady Flows (Continued...)

Lecture 16 - Some Examples of Unsteady Flows (Continued...)

Lecture 17 - Stokes Drag on a Sphere

Lecture 18 - Stokes Drag on a Sphere (Continued...) and Introduction to Lubrication Theory

Lecture 19 - Lubircation Theory (Continued...)

Lecture 20 - Lubrication Theory (Continued...)

Lecture 21 - Boundary Condition in Fluid Mechanics: Slip or No-slip?

Lecture 22 - Boundary Condition in Fluid Mechanics: Slip or No-slip? (Continued...)

Lecture 23 - Surface Tension Driven Flows

Lecture 24 - Surface Tension Driven Flows (Continued...)

Lecture 25 - Surface Tension Driven Flows (Continued...)

Lecture 26 - Surface Tension Driven Flows (Continued...)

Lecture 27 - Surface Tension Driven Flows (Continued...) and Modulating Surface Tension

Lecture 28 - Modulating Surface Tension (Continued...)

Lecture 29 - Thin Film Dynamics

Lecture 30 - Thin Film Dynamics (Continued...)

Lecture 31 - Thin Film Dynamics (Continued...)

Lecture 32 - Thin Film Dynamics (Continued...)

Lecture 33 - Lab on a CD

Lecture 34 - Lab on a CD (Continued...)

Lecture 35 - Introduction to Microfabrication

Lecture 36 - Electrokinetics

Lecture 37 - Electrokinetics (Continued...)

Lecture 38 - Electrokinetics (Continued...)

Lecture 39 - Electrokinetics (Continued...)

Lecture 40 - Electrokinetics (Continued...)

Lecture 41 - Electrokinetics (Continued...)

Lecture 42 - Dispersion

Lecture 43 - Introduction to Nanofluidics

Lecture 44 - Introduction to Nanofluidics (Continued...) and Molecular Dynamics Simulations

Lecture 45 - Introduction to Molecular Dynamics Simulations (Continued...)

Lecture 46 - Biomicrofluidics

Lecture 47 - Biomicrofluidics (Continued...)

Lecture 48 - Nanofluidic Energy Conversion

NPTEL : NOC:Conduction and Convection Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. S.K. Som, Prof. S. Chakraborty

Lecture 1 - Introduction and Fundamental Concepts - I

Lecture 2 - Introduction and Fundamental Concepts - II

Lecture 3 - Heat Conduction Equation

Lecture 4 - Heat Conduction Equation and Different Types of Boundary Conditions

Lecture 5 - 1D Steady State Heat Conduction In Plane Wall Without Generation of Thermal Energy

Lecture 6 - 1D Steady State Heat Conduction In Plane Wall With Generation of Thermal Energy

Lecture 7 - Problems on 1D Steady State Heat Conduction In Plane Wall

Lecture 8 - 1D Steady State Heat Conduction In Cylindrical Geometry

Lecture 9 - 1D Steady State Heat Conduction In Cylindrical Geometry (Continued...)

Lecture 10 - 1D Steady State Heat Conduction in Spherical Geometry

Lecture 11 - Hear Transfer from Extended Surfaces (Fins)

Lecture 12 - Hear Transfer from Extended Surfaces (Continued...)

Lecture 13 - Two-dimensional Steady State Heat Conduction

Lecture 14 - Unsteady State Heat Conduction

Lecture 15 - Unsteady State Heat Conduction (Continued...)

Lecture 16 - One Dimensional Unsteady State Heat Conduction - I

Lecture 17 - One Dimensional Unsteady State Heat Conduction - II

Lecture 18 - Introduction to Convection

Lecture 19 - Convection - I

Lecture 20 - Review of Fluid Mechanics - I

Lecture 21 - Review of Fluid Mechanics - II

Lecture 22 - Review of Fluid Mechanics - III

Lecture 23 - Review of Fluid Mechanics - IV

Lecture 24 - Review of Fluid Mechanics - V

Lecture 25 - Review of Fluid Mechanics - VI

Lecture 26 - Review of Fluid Mechanics - VIII

Lecture 27 - Energy Equation - I

Lecture 28 - Energy Equation - II and Thermal Boundary Layer - I

Lecture 29 - Thermal Boundary Layer - II

Lecture 30 - Integral Method for Thermal BL Analysis

Lecture 31 - Internal Forced Convection - I

Lecture 32 - Internal Forced Convection - II

Lecture 33 - Internal Forced Convection - III

Lecture 34 - Internal Forced Convection - IV

Lecture 35 - Free Convection - I (Natural Convection)

Lecture 36 - Free Convection - II (Natural Convection)

Lecture 37 - Boiling and Condensation - I

Lecture 38 - Boiling and Condensation - II

Lecture 39 - Heat Exchanger - I

Lecture 40 - Heat Exchanger - II

Lecture 41 - Heat Exchanger - II (Continued...)

NPTEL : NOC:Vibrations of Structures (Mechanical Engineering)

Co-ordinators : Prof. A. Dasgupta

Lecture 1 - Transverse Vibrations of Strings - I

Lecture 2 - Transverse Vibrations of Strings - II

Lecture 3 - Axial and Torsional Vibrations of Bars

Lecture 4 - Variational Formulation - I

Lecture 5 - Variational Formulation - II

Lecture 6 - Modal Analysis - I

Lecture 7 - Modal Analysis - II

Lecture 8 - Properties of the Eigenvalue Problem

Lecture 9 - Modal Analysis: Approximate Methods - I

Lecture 10 - Modal Analysis: Approximate Methods - II

Lecture 11 - The Initial Value Problem

Lecture 12 - Forced Vibration Analysis - I

Lecture 13 - Forced Vibration Analysis - II

Lecture 14 - Forced Vibration Analysis - III

Lecture 15 - Dumping in Structures - I

Lecture 16 - Damping in Structures - II

Lecture 17 - Beam Models - I

Lecture 18 - Beam Models - II

Lecture 19 - Modal Analysis of Beams

Lecture 20 - Application of Modal Solution

Lecture 21 - Approximate Methods

Lecture 22 - Topics in Beam Vibrations - I

Lecture 23 - Topics in Beam Vibrations - II

Lecture 24 - Dynamics of Curved Beams

Lecture 25 - Vibrations of Rings and Arches - I

Lecture 26 - Vibrations of Rings and Arches - II

Lecture 27 - Dynamics of Membranes

Lecture 28 - Vibrations of Rectangular Membranes

Lecture 29 - Vibrations of Circular Membranes - I

Lecture 30 - Vibrations of Circular Membranes - II

Lecture 31 - Dynamics of Plates

Lecture 32 - Vibrations of Rectangular Plates

Lecture 33 - Vibrations of Circular Plates

Lecture 34 - Special Problems in Plate Vibrations - I

Lecture 35 - Special Problems in Plate Vibrations - II

NPTEL : NOC:Fluid Machines (Mechanical Engineering)

Co-ordinators : Prof. S.K. Som

Lecture 1 - Definition of Fluid Machines and Energy Transfer in Fluid Machines - Part I

Lecture 2 - Energy Transfer in Fluid Machines - Part II

Lecture 3 - Impulse and Reaction Machines: Introductory Concepts

Lecture 4 - Principles of Similarity in Fluid Machine

Lecture 5 - Concept of Specific Speed

Lecture 6 - Basic Principles, Analysis of Force and Power Generation - Part I

Lecture 7 - Basic Principles, Analysis of Force and Power Generation - Part II

Lecture 8 - Specific Speed Governing and Limitations of Impulse Turbine

Lecture 9 - Tutorial - I

Lecture 10 - Tutorial - II

Lecture 11 - Introduction and Analysis of Force on Francis Turbine (Radial Flow) - Part I

Lecture 12 - Analysis of Force (Part-II) and Power Generation

Lecture 13 - Draft Tube

Lecture 14 - Tutorial - III

Lecture 15 - Tutorial - IV

Lecture 16 - Axial Flow Turbine

Lecture 17 - Governing of Reaction Turbine

Lecture 18 - Introduction to Rotodynamic Pumps

Lecture 19 - Flow and Energy Transfer to Centrifugal Pumps

Lecture 20 - Tutorial - V

Lecture 21 - Characteristics of a Centrifugal Pump

Lecture 22 - Matching of Pump and System Characteristics

Lecture 23 - Diffuser and Cavitation

Lecture 24 - Tutorial - VI

Lecture 25 - Tutorial - VIII

Lecture 26 - Axial Flow Pump

Lecture 27 - Reciprocating Pump - Part I

Lecture 28 - Reciprocating Pump - Part II

Lecture 29 - Tutorial - VIII

Lecture 30 - Basic Principles and Energy Transfer in Centrifugal Compressor - Part I

Lecture 31 - Basic Principles and Energy Transfer in Centrifugal Compressor - Part II

Lecture 32 - Basic Principles and Energy Transfer in Centrifugal Compressor - Part III

Lecture 33 - Basic Principles and Energy Transfer in Centrifugal Compressor - Part IV and Losses in Centrifugal Compressors

Lecture 34 - Performance Characteristics of Centrifugal Compressors - Part I

Lecture 35 - Performance Characteristics of Centrifugal Compressors - Part II

Lecture 36 - Basic Principles and Energy Transfer in Axial Flow Compressor - Part I

Lecture 37 - Basic Principles and Energy Transfer in Axial Flow Compressor - Part II

Lecture 38 - Fans and Blowers - Part I

Lecture 39 - Fans and Blowers - Part II

NPTEL : NOC:Computer numerical control (CNC) of machine tools and processes (Mechanical Engineering)

Co-ordinators : Prof. Asimava Roy Choudhury

Lecture 1 - Introduction to computer control Â– role of computers in automation

Lecture 2 - Introduction (Continued...) - binary logic and logic gates

Lecture 3 - Classification of Computer numerical control (CNC) Â– Point to point and continuous control

Lecture 4 - Classification (Continued...) - Closed loop and open loop control

Lecture 5 - Tutorial involving simple calculations on different aspects of CNC controls

Lecture 6 - Questions, MCQ Discussions on Motors, Encoders, Decoders and Programming Practice

Lecture 7 - Stepper motors, Permanent magnet DC motors

Lecture 8 - Binary circuits and decoders

Lecture 9 - Tachogenerator, printed circuit motors, Encoders

Lecture 10 - Programming Practice - I

Lecture 11 - Programming Practice - II

Lecture 12 - Computer Aided Offline Programming

Lecture 13 - Interpolators - Linear

Lecture 14 - Interpolators - Curvilinear

Lecture 15 - Questions on Programming and Interpolation

Lecture 16 - 3-D Machining - Basic Concepts

Lecture 17 - Curved Surface Geometry

Lecture 18 - Cutter Path Generation for Curved Surfaces

Lecture 19 - Cutter Path Generation (Concluding Part) and Current Status - CNC Machining and Related Processes

Lecture 20 - Questions and Discussions on Curved Surface Machining

NPTEL : NOC:Non Traditional Abrasive Machining Processes - Ultrasonic, Abrasive Jet and Abrasive Water Jet Machining (Mechanical Engineering)

Co-ordinators : Prof. Asimava Roy Choudhury

Lecture 1 - Non-traditonal abrasive machining : Ultrasonic, Abrasive jet and abrasive water jet machining

Lecture 2 - Ultrasonic Machining

Lecture 3 - Ultrasonic Machining (Continued...)

Lecture 4 - Utrrasonic Machining - Free Impacts and Problem Solving

Lecture 5 - Ultrasonic Machining - Problems and MCQs

Lecture 6 - USM - Horn Design

Lecture 7 - USM - Horn Design (Continued...)

Lecture 8 - Ultrasonic Machining - Feed Mechanism, Head design and other aspects

Lecture 9 - Ultrasonic Machining - Effects of Various Inputs on the Output

Lecture 10 - Ultrasonic Machining - Numerical and MCQs

Lecture 11 - A JM (Abrasive jet machining)

Lecture 12

Lecture 13 - A JM - Numerical problems

Lecture 14 - A JM - Process Parameters and Response Characteristics take - home assignment discussing

Lecture 15 - A JM - MCQs

Lecture 16

Lecture 17 - AWJM - Equipment

Lecture 18 - AWJM - Numerical Problems

Lecture 19 - AWJM - Application Equipment Details

Lecture 20 - AWJM - MCQs

NPTEL : NOC:Introduction to Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Dr. Suman Chakraborty

Lecture 1 - Lagrangian and Eulerian Approach, Types of fluid flow

Lecture 2 - Streamlines, Streakline and Pathline

Lecture 3 - Acceleration of fluid flow

Lecture 4 - Deformation and Conservation of mass of fluid a element

Lecture 5 - Angular deformation of a fluid element, vorticity and streamfunction and velocity potential

Lecture 6 - Eulerâ€™s equation

Lecture 7 - Bernoulli's Equation - Part I

Lecture 8 - Bernoulli's Equation - Part II

Lecture 9 - Reynolds Transport Theorem (RTT)

Lecture 10 - Application of Conservation of Mass

Lecture 11 - Application of RTT: Conservation of Linear Momentum

Lecture 12 - Application of RTT in Accelerating Reference Frames

Lecture 13 - Navier's Equation of Motion

Lecture 14 - Derivation of Navier-Stokes Equation

Lecture 15 - Derivation of Navier-Stokes Equation (Continued...)

Lecture 16 - Derivation of Navier-Stokes Equation (Continued...)

Lecture 17 - Fully developed flow between two parallel plates

Lecture 18 - Force on a surface immersed in fluid - Part III, Stability of solid bodies in fluid - Part I

Lecture 19 - Couette flow

Lecture 20 - Flow with interfaces

Lecture 21 - Thin film flow on an inclined plane and Hagen-Poiseuille flow

Lecture 22 - Hagen-Poiseuille flow (Continued...)

Lecture 23 - Flow between two rotating cylinders

Lecture 24 - Stokes 1st problem

Lecture 25 - Stokes 2nd problem

Lecture 26 - Introduction to turbulence: basic concepts

Lecture 27 - Eddies

Lecture 28 - Eddies (Continued...) and Vortex shredding

Lecture 29 - Statistical description of turbulent flows

Lecture 30 - Reynolds stress

Lecture 31 - Reynolds averaged Navier Stokes equation (RANS)

Lecture 32 - Bernoulliâ€™s equation - Part I

Lecture 33 - Bernoulliâ€™s equation - Part II

Lecture 34 - Bernoulliâ€™s equation - Part III

Lecture 35 - Eulerâ€™s equation in streamline coordinates

Lecture 36 - Flow over a fat plate: Blasius equation

Lecture 37 - Momentum integral method for boundary layer analysis

Lecture 38 - Approximate solution of the momentum integral equation

Lecture 39 - Displacement and Momentum thickness

Lecture 40 - Illustrative examples

Lecture 41 - Boundary layer separation

Lecture 42 - Resultant force on a body immersed in a fluid under motion

Lecture 43 - Potential flow

Lecture 44 - Examples of Potential flow

Lecture 45 - Some more examples of Potential flows, Lift and Drag force

Lecture 46 - Applications of lift and drag force

Lecture 47 - Some examples of flow past immersed bodies

Lecture 48 - Sports Ball aerodynamics

Lecture 49 - Introduction to compressible flows

Lecture 50 - Significance of Mach number

Lecture 51 - Navier-Stokes equation - Part I

Lecture 52 - Navier-Stokes equation - Part II

Lecture 53 - Navier-Stokes equation - Part III

Lecture 54 - Navier-Stokes equation - Part IV

Lecture 55 - Pipe Flow - Part I

Lecture 56 - Pipe Flow - Part II

Lecture 57 - Pipe Flow - Part III

Lecture 58 - Pipe Flow - Part IV

Lecture 59 - Principle of Similarity and Dynamical Analysis - Part I

Lecture 60 - Principle of Similarity and Dynamical Analysis - Part II

NPTEL : NOC:Spur and Helical Gear Cutting (Mechanical Engineering)

Co-ordinators : Prof. Asimava Roy Choudhury

Lecture 1 - Introduction

Lecture 2 - Simple Gear Calculations

Lecture 3 - Gear Geometry

Lecture 4 - Helical Gear Problems

Lecture 5 - Numerical Problem MCQ

Lecture 6 - Numerical Problem Milling of Helical Gears

Lecture 7 - Simple and Compound Indexing

Lecture 8 - Differential Indexing

Lecture 9 - Helical Gear Cutting on Milling Machine

Lecture 10 - Numerical Problems on Gear Milling

Lecture 11 - Gear Shaping - I

Lecture 12 - Gear Shaping - II

Lecture 13 - Gear Shaping - III

Lecture 14 - Gear Shaping - IV

Lecture 15 - Gear Hobbing - I

Lecture 16 - Gear Hobbing - II

Lecture 17 - Gear Hobbing - III

Lecture 18 - Gear Hobbing - IV

Lecture 19 - Gear Hobbing - V

Lecture 20 - Gear Hobbing - VI

NPTEL : NOC:Laws of Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. Suman Chakraborty, Prof. S.K. Som

Lecture 1 - Introduction, Definition of System, Properties and State of a System

Lecture 2 - Properties of pure substances

Lecture 3 - Properties of pure substances (Continued...)

Lecture 4 - Heat and Work

Lecture 5 - Tutorial 1: Properties of pure substances, heat and work

Lecture 6 - Zeroth Law of Thermodynamics

Lecture 7 - First law of thermodynamics for closed systems - Part I

Lecture 8 - First law of thermodynamics for closed systems - Part II, some examples

Lecture 9 - Tutorial 2: First law of thermodynamics for closed systems

Lecture 10 - First law of thermodynamics for open systems

Lecture 11 - Tutorial 3: First law of thermodynamics for open systems

Lecture 12 - Second law and its corollaries - Part I

Lecture 13 - Second law and its corollaries - Part II

Lecture 14 - Second law and its corollaries - Part III

Lecture 15 - Definition of entropy and entropy change in closed systems

Lecture 16 - Entropy change in closed systems (Continued...)

Lecture 17 - Tutorial 4: Entropy

Lecture 18 - Entropy and its transport

Lecture 19 - Tutorial 5: Entropy and its transport

Lecture 20 - Introduction to Third Law

Lecture 21 - Review of learning concepts

NPTEL : NOC:Energy Conservation and Waste Heat Recovery (Mechanical Engineering)

Co-ordinators : Prof. PK Das

Lecture 1 - Introduction to waste heat recovery

Lecture 2 - Introduction to waste heat recovery (Continued...)

Lecture 3 - Introduction to waste heat recovery (Continued...)

Lecture 4 - Introduction to waste heat recovery (Continued...)

Lecture 5 - Thermodynamic principles of waste heat recovery

Lecture 6 - Thermodynamic principles of waste heat recovery (Continued...)

Lecture 7 - Thermodynamic principles of waste heat recovery (Continued...)

Lecture 8 - Thermodynamic principles of waste heat recovery (Continued...)

Lecture 9 - Reversible Cycles

Lecture 10 - Reversible Cycles (Continued...)

Lecture 11 - Entropy

Lecture 12 - Entropy (Continued...)

Lecture 13 - Entropy (Continued...), Exergy

Lecture 14 - Exergy, Second Law efficiency

Lecture 15 - Second Law efficiency (Continued...)

Lecture 16 - Recapitulation of common power cycles

Lecture 17 - Recapitulation of common power cycles (Continued...)

Lecture 18 - Recapitulation of common power cycles (Continued...)

Lecture 19 - Recapitulation of common power cycles (Continued...)

Lecture 20 - Recapitulation of common power cycles (Continued...)

Lecture 21 - Recapitulation of common power cycles (Continued...)

Lecture 22 - Gas Turbine cycle

Lecture 23 - Combined cycle

Lecture 24 - Combined cycle (Continued...)

Lecture 25 - Combined Cycle (Continued...)

Lecture 26 - Heat recovery steam generator

Lecture 27 - Thermodynamic cycles for low temperature application

Lecture 28 - Thermodynamic cycles for low temperature application (Continued...), Cogeneration

Lecture 29 - Heat Exchanger

Lecture 30 - Heat Exchanger (Continued...)

Lecture 31 - Heat Exchanger (Continued...)

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37 - Heat Pipe - Part I

Lecture 38 - Heat Pipe - Part II

Lecture 39 - Heat Pipe - Part III

Lecture 40 - Direct Conversion - Introduction to TEG

Lecture 41 - Thermoelectric Generators - Functioning and Applications

Lecture 42 - TEG - performance analysis

Lecture 43 - TEG - performance optimization

Lecture 44 - Direct Conversion - Magneto Hydro dynamics (MHD)

Lecture 45 - Direct Conversion - Thermo-Ionic generation

Lecture 46 - Direct Conversion - Thermo Photo Voltaic generation (TPV)

Lecture 47 - Heat Pumps - I

Lecture 48 - Heat Pumps - II

Lecture 49 - Heat Pumps - III

Lecture 50 - Waste Heat Recovery from Incinerator Plants

Lecture 51 - Energy Storage Systems - I

Lecture 52 - Energy Storage Systems - II

Lecture 53 - Energy Storage Systems - III

Lecture 54 - Energy Storage Systems - IV

Lecture 55 - Energy Storage Systems - V

Lecture 56 - Energy Storage Systems - VI

Lecture 57

Lecture 58

Lecture 59

Lecture 60

Lecture 61

Lecture 62

Lecture 63

Lecture 64

Lecture 65

Lecture 66

Lecture 67

Lecture 68 - Corrigendum

NPTEL : NOC:Introduction to Mechanical Micro Machining (Mechanical Engineering)

Co-ordinators : Prof. Ajay M Sidpara

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Introduction (Continued...)

Lecture 7 - Scaling Laws

Lecture 8 - Scaling laws (Continued...)

Lecture 9 - Scaling laws (Continued...)

Lecture 10 - Difference between macro and micro machining

Lecture 11 - Difference between macro and micro machining (Continued...)

Lecture 12 - Difference between micro and macro machining (Continued...)

Lecture 13 - Difference between micro and macro machining (Continued...)

Lecture 14 - Difference between macro and micro machining (Continued...)

Lecture 15 - Difference between macro and micro machining (Continued...)

Lecture 16 - Difference between macro and micro machining (Continued...)

Lecture 17 - Difference between macro and micro machining (Continued...)

Lecture 18 - Difference between macro and micro machining (Continued...)

Lecture 19 - Difference between macro and micro machining (Continued...)

Lecture 20 - Difference between macro and micro machining (Continued...)

Lecture 21 - Difference between macro and micro machining (Continued...)

Lecture 22 - Component of the machine tool

Lecture 23 - Components of the machine tool (Continued...)

Lecture 24 - Components of the machine tool (Continued...)

Lecture 25 - Components of the machine tool (Continued...)

Lecture 26 - Components of the machine tool (Continued...)

Lecture 27 - Errors in machine tool (Continued...)

Lecture 28 - Errors in machine tool (Continued...)

Lecture 29 - Errors in machine tool (Continued...)

Lecture 30 - Errors in machine tool (Continued...)

Lecture 31 - Components of machine tool

Lecture 32 - Components of machine tool (Continued...)

Lecture 33 - Components of machine tool (Continued...)

Lecture 34 - Components of machine tool (Continued...)

Lecture 35 - Components of machine tool (Continued...)

Lecture 36 - Components of machine tool (Continued...)

Lecture 37 - Components of machine tool (Continued...)

Lecture 38 - Components of machine tool (Continued...)

Lecture 39 - Components of machine tool (Continued...)

Lecture 40 - Components of machine tool (Continued...)

Lecture 41 - Components of machine tool (Continued...)

Lecture 42 - Components of machine tool (Continued...)

Lecture 43 - Components of machine tool (Continued...)

Lecture 44 - Components of machine tool (Continued...)

Lecture 45 - Components of machine tool (Continued...)

Lecture 46 - Components of machine tool (Continued...)

Lecture 47 - Components of machine tool (Continued...)

Lecture 48 - Components of machine tool (Continued...)

Lecture 49 - Micro tools

Lecture 50 - Micro tools (Continued...)

Lecture 51 - Micro tools (Continued...)

Lecture 52 - Fabrication of micro tool by EDM process

Lecture 53 - Micro tools (Continued...)

Lecture 54 - Micro machines

Lecture 55 - Micro machines (Continued...)

Lecture 56 - Diamond turning

Lecture 57 - Diamond turning (Continued...)

Lecture 58 - Diamond turning (Continued...)

Lecture 59 - Diamond turning (Continued...)

Lecture 60 - Sensors and metrology for micro machining

Lecture 61 - Sensors and metrology for micro machining (Continued...)

Lecture 62 - Sensors and metrology for micro machining (Continued...)

Lecture 63 - 3D surface measurement using interferometer

NPTEL : NOC:Machinery Fault Diagnosis and Signal Processing (Mechanical Engineering)

Co-ordinators : Prof. Amiya Ranjan Mohanty

Lecture 1 - Introduction

Lecture 2 - Maintenance Principles

Lecture 3 - FMECA

Lecture 4 - Fault Diagnostics and Prognostics

Lecture 5 - Machine Learning in CBM

Lecture 6 - Basics of Vibration

Lecture 7 - Free and Forced Response

Lecture 8 - Vibration and Shock Isolation

Lecture 9 - Rotordynamics

Lecture 10 - Practical Examples of Vibration

Lecture 11 - Time Domain Analysis

Lecture 12 - Frequency Domain Analysis

Lecture 13 - Non Stationary Signal Analysis

Lecture 14 - Modulation and Beats

Lecture 15 - Orbit and Order Analysis

Lecture 16 - Computer aided data acquisition

Lecture 17 - Orbit and Order Analysis

Lecture 18 - Data Recording

Lecture 19 - Cepstrum Analysis

Lecture 20 - Hilbert Transform in Condition Monitoring

Lecture 21 - Introduction to MATLAB

Lecture 22 - Signal Processing using MATLAB

Lecture 23 - Numericals in Signal Processing and Data Acquisition

Lecture 24 - Signal Hetrodyning

Lecture 25 - Practical Signals

Lecture 26 - Basics Of Instrumentation

Lecture 27 - Signal Conditioning And Filtering

Lecture 28 - Errors In Measurements

Lecture 29 - Dynamic Range And Frequency Response

Lecture 30 - Overview Of Transducers For Cbm

Lecture 31 - Accelerometers

Lecture 32 - Vibration Monitoring

Lecture 33 - Rotational Speed Measurements

Lecture 34 - Basics of Noise

Lecture 35 - Noise Monitoring

Lecture 36 - Introduction to Faults in Rotating Machines

Lecture 37 - Unbalance Detection

Lecture 38 - Field Balancing

Lecture 39 - Misalignment

Lecture 40 - Crack and Looseness

Lecture 41 - Journal and Anti-Friction Bearings

Lecture 42 - Gears

Lecture 43 - Pumps and Cavitation

Lecture 44 - IC Engines

Lecture 45 - Machinery Diagnostic Chart

Lecture 46 - Principles of Motor Current Signature Analysis

Lecture 47 - Faults in Electrical Machines

Lecture 48 - Thermography

Lecture 49 - Wear Debris Analysis

Lecture 50 - Oil Analysis

Lecture 51 - Ultrasonics

Lecture 52 - Eddy Current and Acoustic Emission

Lecture 53 - Radiography, Dye Penetrant Tests

Lecture 54 - Tool Condition Monitoring

Lecture 55 - Experimental Modal Analysis

Lecture 56 - Introduction to Failure Analysis

Lecture 57 - Railway Locomotive Noise and Vibration Monitoring

Lecture 58 - Paper Mill Vibration Monitoring

Lecture 59 - Overview of CBM facilities at IIT Kharagpur

Lecture 60 - Future of Condition based Monitoring

NPTEL : NOC:Metal Cutting and Machine Tools (Mechanical Engineering)

Co-ordinators : Prof. Asimava Roy Choudhury

Lecture 1 - Introduction

Lecture 2 - Geometry of single point turning tools - 1

Lecture 3 - Geometry of turning tools - 2

Lecture 4 - Geometry of single point turning tools - 3

Lecture 5 - Geometry of cutting tools and numerical problems

Lecture 6 - Different types of tools and mcq

Lecture 7 - Mechanism of chip formation

Lecture 8 - Mechanics of material removal

Lecture 9 - Measurement of Cutting Forces

Lecture 10 - Numerical problems and MCQ

Lecture 11 - Tool wear and Tool life

Lecture 12 - Wear and life of cutting tools - 2

Lecture 13 - The lathe

Lecture 14 - Calculations on mechanisms in machine tools

Lecture 15 - Numerical problems on lathe

Lecture 16 - Milling machines

Lecture 17 - Milling machine - indexing

Lecture 18 - Gear cutting CNC and non traditional machining

Lecture 19 - CNC and non-traditional machining methods

Lecture 20 - Numerical problems for week 4

Lecture 21 - Live Session

NPTEL : NOC:Gear and Gear Unit Design - Theory and Practice (Mechanical Engineering)

Co-ordinators : Prof. Rathindranath Maiti

Lecture 1 - Introduction - Motivation and Theme of the Course

Lecture 2 - Laws of Gearing, Kinematics and Geometry - Part I

Lecture 3 - Laws of Gearing, Kinematics and Geometry - Part II

Lecture 4 - Involute Toothed Gear- Properties and Terminology

Lecture 5 - Tutorial

Lecture 6 - Involute Straight Tooth Spur Gear

Lecture 7 - Helical Tooth Spur Gear and Loads on Gear Shaft

Lecture 8 - Design of Bevel Gear

Lecture 9 - Crossed Helical Gear - I

Lecture 10 - Crossed Helical Gear - II and Worm Gear

Lecture 11 - Gear Unit Design - Selection of Stage Ratios, Pinion and Gear Teeth Numbers

Lecture 12 - Gear Unit Design - First Stage Pinion and Gear Design- I (Module on Beam Strength Basis)

Lecture 13 - Gear Unit Design - Failure of Gear Tooth (Probable Dynamic Load and Wear Load Capacity)

Lecture 14 - Gear Unit Design - 1st. Stage Pinion and Gear Design-II (Probable Dynamic Load and Wear Load Capacity and Finalizing 1st. Stage Pinion and Gear set)

Lecture 15 - Gear Unit Design - 1st. Layout (After Gear Design)

Lecture 16 - Bearing Arrangement - Gear Box Shafts

Lecture 17 - Bearing Load Calculation - Intermediate Shaft

Lecture 18 - Bearing Selection and Introduction to Shaft Design Verification

Lecture 19 - Design Verification of Gear Box Shafts

Lecture 20 - Development (Layout) of Intermediate Shaft

Lecture 21 - Development (Layout) of Input Shaft and Integral Pinion

Lecture 22 - Development (Layout) of Output Shaft and 2nd. Stage (Output) Gear

Lecture 23 - Development (Layout) of Output Shaft (Continued...), Loads on Shaft and Bearings

Lecture 24 - Output Shaft-Bearing Lives

Lecture 25 - Design Verification of Output Shaft

Lecture 26 - Design Verification of Input Shaft (including Bearing Life Estimation)

Lecture 27 - Finalizing Design including the Sizes of the Keys

Lecture 28 - Development of Plan and Elevation of Gear Reduction Unit - I

Lecture 29 - Development of Plan and Elevation of Gear Reduction Unit - II

Lecture 30 - Development of Plan and Elevation of Gear Reduction Unit - III

Lecture 31

Lecture 32

Lecture 33 - Involute Spur Gear Tooth Correction : Part I

Lecture 34 - Involute Spur Gear Tooth Correction : Part II

Lecture 35 - Involute Spur Gear Tooth Correction : Part III

Lecture 36 - Involute Spur Gear Tooth Correction : Tutorial (Workout Example)

Lecture 37 - Involute Spur Gear Tooth Correction : Tutorial (Workout Example-2)

Lecture 38 - Tooth Tip Interference, Avoidance and Contact Ratio in Involute Internal Gearing

Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45 - Live Session

NPTEL : NOC:Traditional and Non-Traditional Optimization Tools (Mechanical Engineering)

Co-ordinators : Prof. Dilip Kumar Pratihar

Lecture 1 - Principle of Optimization

Lecture 2 - Traditional Methods of Optimization

Lecture 3 - Traditional Methods of Optimization (Continued...)

Lecture 4 - Binary-Coded Genetic Algorithm (BCGA)

Lecture 5 - Binary-Coded Genetic Algorithm (BCGA) (Continued...)

Lecture 6 - Binary-Coded Genetic Algorithm (BCGA) (Continued...)

Lecture 7 - Binary-Coded Genetic Algorithm (BCGA) (Continued...)

Lecture 8 - Binary-Coded Genetic Algorithm (BCGA) (Continued...)

Lecture 9 - Schema Theorem of BCGA

Lecture 10 - Schema Theorem of BCGA (Continued...)

Lecture 11 - Constraint Handling

Lecture 12 - Real-Coded GA

Lecture 13 - Faster Genetic Algorithms

Lecture 14 - Faster Genetic Algorithms (Continued...)

Lecture 15 - Faster Genetic Algorithms (Continued...)

Lecture 16 - Faster Genetic Algorithms (Continued...)

Lecture 17 - Scheduling GA

Lecture 18 - Scheduling GA (Continued...)

Lecture 19 - Scheduling GA (Continued...)

Lecture 20 - Simmulated Annealing

Lecture 21 - Particle Swarm Optimization

Lecture 22 - Multi-Objective Optimization

Lecture 23 - Multi-Objective Optimization (Continued...)

Lecture 24 - Multi-Objective Optimization (Continued...)

Lecture 25 - Multi-Objective Optimization (Continued...)

Lecture 26 - Multi-Objective Optimization (Continued...)

Lecture 27 - Intelligent Optimization Toolture

Lecture 28 - A Practical Optimization Problem

Lecture 29 - A Practical Optimization Problem (Continued...)

Lecture 30 - A Practical Optimization Problem (Continued...)

Lecture 31 - A Practical Optimization Problem (Continued...)

Lecture 32 - A Practical Optimization Problem (Continued...)

Lecture 33 - A Practical Optimization Problem (Continued...)

Lecture 34 - A Practical Optimization Problem (Continued...)

Lecture 35 - A Practical Optimization Problem (Continued...)

Lecture 36 - A Practical Optimization Problem (Continued...)

Lecture 37 - Genetic Algorithm as Evolution Tool

Lecture 38 - Genetic Algorithm as Evolution Tool (Continued...)

Lecture 39 - Genetic Algorithm as Evolution Tool (Continued...)

Lecture 40 - Genetic Algorithm as Evolution Tool (Continued...)

Lecture 41 - Genetic Algorithm as Evolution Tool (Continued...)

Lecture 42 - Genetic Algorithm as Evolution Tool (Continued...)

Lecture 43 - Summary 1

Lecture 44 - Summary 2

Lecture 45 - Summary 3

NPTEL : NOC:Mechanism and Robot Kinematics (Mechanical Engineering)

Co-ordinators : Dr. Anirvan Das Gupta

Lecture 1 - Introduction

Lecture 2 - Nomenclature

Lecture 3 - Kinematic Diagram

Lecture 4 - Degree of Freedom - I

Lecture 5 - Degree of Freedom - II

Lecture 6 - Degree of Freedom - Failure

Lecture 7 - Grashof Criteria - I

Lecture 8 - Grashof Criteria - II

Lecture 9 - Geometry and Representation of Vectors

Lecture 10 - Displacement Analysis: constrained mechanism - I

Lecture 11 - Displacement Analysis: constrained mechanism - II

Lecture 12 - Displacement Analysis: constrained mechanism - III

Lecture 13 - Displacement Analysis: constrained mechanism - IV

Lecture 14 - Displacement Analysis: open chain robot - I

Lecture 15 - Displacement Analysis: open chain robot - II

Lecture 16 - Displacement Analysis: open chain robot - III

Lecture 17 - Displacement Analysis: open chain robot - IV

Lecture 18 - Displacement Analysis: closed chain robot - I

Lecture 19 - Displacement Analysis: closed chain robot - II

Lecture 20 - Velocity Analysis: geometric concepts - I

Lecture 21 - Velocity Analysis: geometric concepts - II

Lecture 22 - Velocity Analysis: geometric concepts - III

Lecture 23 - Velocity Analysis: application of geometric concepts - I

Lecture 24 - Velocity Analysis: application of geometric concepts - II

Lecture 25 - Velocity Analysis: application of geometric concepts - III

Lecture 26 - Velocity Analysis: analytical approach - I

Lecture 27 - Velocity Analysis: analytical approach - II

Lecture 28 - Velocity Analysis: analytical approach - III

Lecture 29 - Serial Manipulator Velocity Analysis - I

Lecture 30 - Serial Manipulator Velocity Analysis - II

Lecture 31 - Serial Manipulator Velocity Analysis - III

Lecture 32 - Parallel Manipulator Velocity Analysis

Lecture 33 - Path Generation Problem

Lecture 34 - Acceleration Analysis - I

Lecture 35 - Acceleration Analysis - II

Lecture 36 - Force Analysis - I

Lecture 37 - Force Analysis - II

Lecture 38 - Coordinate transformation - I

Lecture 39 - Coordinate transformation - II

Lecture 40 - Coordinate transformation - III

NPTEL : NOC:Heat Exchangers: Fundamentals and Design Analysis (Mechanical Engineering)

Co-ordinators : Prof. Prasanta Kr Das, Prof. Somnath Roy

Lecture 1 - Introduction

Lecture 2 - Applications of Heat Exchangers

Lecture 3 - Classification of Heat Exchangers

Lecture 4 - Classification of Heat Exchangers (Continued...)

Lecture 5 - Design and Simulation of Heat Exchangers

Lecture 6 - Design and Simulation

Lecture 7 - Design and Simulation of Heat Exchangers - Numerical Problem

Lecture 8 - Design and Simulation of Heat Exchangers - Numerical Problem (Continued...)

Lecture 9 - Design and Simulation of Heat Exchangers - Numerical Problem (Continued...)

Lecture 10 - Tubular Heat Exchanger Types

Lecture 11 - Tubular Heat Exchanger Types : Heat Transfer Co-efficient

Lecture 12 - Tubular Heat Exchanger : Double Pipe

Lecture 13 - Tubular Heat Exchanger : Shell - and - Tube

Lecture 14 - Tubular Heat Exchanger : Shell - and - Tube Design

Lecture 15 - Tubular Heat Exchanger : Shell - and - Tube Design (Continued...)

Lecture 16 - Enhancement of Heat Transfer compact Heat Exchangers

Lecture 17 - Extended Surface Heat Transfer

Lecture 18 - Extended Surface Heat Transfer: Some Example

Lecture 19 - Extended Surface Heat Exchangers: Some Example

Lecture 20 - Analysis of fin plates of finned tube heat exchanger

Lecture 21 - Finned tube heat exchanger

Lecture 22 - Finned tube heat exchanger (Continued...)

Lecture 23 - Finned tube heat exchanger (Continued...)

Lecture 24 - Plate fin heat exchanger

Lecture 25 - Plate fin heat exchanger (Continued...)

Lecture 26 - Plate fin heat exchanger (Continued...)

Lecture 27 - Plate fin heat exchanger : Analysis

Lecture 28 - Plate fin heat exchanger : Pressure drop

Lecture 29 - Plate fin heat exchanger : Numerical

Lecture 30 - Plate fin heat exchanger : Numerical (Continued...)

Lecture 31 - Plate fin heat exchanger : Numerical (Continued...)

Lecture 32 - Plate fin heat exchanger : Multistream

Lecture 33 - Plate fin heat exchanger : Multistream (Continued...)

Lecture 34 - Plate fin heat exchanger : Multistream Analysis

Lecture 35 - Plate fin heat exchanger : Layer Stacking

Lecture 36 - Phase change heat exchangers

Lecture 37 - Phase change heat exchangers (Continued...)

Lecture 38 - Surface Condenser

Lecture 39 - Surface Condenser (Continued...)

Lecture 40 - Surface Condenser (Continued...)

Lecture 41 - Surface Condenser (Continued...)

Lecture 42 - In tube condensation

Lecture 43 - Heat pipes and Heat pipe heat exchangers

Lecture 44 - Heat pipes and Heat pipe heat exchangers (Continued...)

Lecture 45 - Heat pipes and Heat exchangers

Lecture 46 - Heat pipes and Heat exchangers (Continued...)

Lecture 47 - Micro Heat Exchanger Introduction

Lecture 48 - Micro scale Heat Transfer

Lecture 49 - Micro scale Heat Transfer (Continued...)

Lecture 50 - Micro Channel

Lecture 51 - Micro Heat Exchanger

Lecture 52 - Regenerators

Lecture 53 - Fixed Bed Regenerator Analysis

Lecture 54 - Design and Simulation of Regenerator (Fixed Bed)

Lecture 55 - Fixed Bed Regenerator (Numerical)

Lecture 56 - Fixed Bed Regenerator (Numerical) (Continued...)

Lecture 57 - Fouling in Heat Exchangers

Lecture 58 - Fouling in Heat Exchangers (Continued...)

Lecture 59 - Fouling in Heat Exchangers (Continued...)

Lecture 60 - Direct Contact heat exchanger

Lecture 61 - Direct Contact heat exchanger (Continued...)

Lecture 62 - Heat exchanger network synthesis

Lecture 63 - Heat exchanger network

Lecture 64 - Heat exchanger network (Continued...)

Lecture 65 - Heat Exchanger Testing

Lecture 66 - Heat Exchanger Testing (Continued...)

NPTEL : NOC:Robotics (Mechanical Engineering)

Co-ordinators : Prof. Dilip Kumar Pratihar

Lecture 1 - Introduction to Robots and Robotics

Lecture 2 - Introduction to Robots and Robotics (Continued...)

Lecture 3 - Introduction to Robots and Robotics (Continued...)

Lecture 4 - Introduction to Robots and Robotics (Continued...)

Lecture 5 - Introduction to Robots and Robotics (Continued...)

Lecture 6 - Introduction to Robots and Robotics (Continued...)

Lecture 7 - Introduction to Robots and Robotics (Continued...)

Lecture 8 - Introduction to Robots and Robotics (Continued...)

Lecture 9 - Introduction to Robots and Robotics (Continued...)

Lecture 10 - Introduction to Robots and Robotics (Continued...)

Lecture 11 - Robot Kinematics

Lecture 12 - Robot Kinematics (Continued...)

Lecture 13 - Robot Kinematics (Continued...)

Lecture 14 - Robot Kinematics (Continued...)

Lecture 15 - Robot Kinematics (Continued...)

Lecture 16 - Robot Kinematics (Continued...)

Lecture 17 - Robot Kinematics (Continued...)

Lecture 18 - Robot Kinematics (Continued...)

Lecture 19 - Robot Kinematics (Continued...)

Lecture 20 - Robot Kinematics (Continued...)

Lecture 21 - Trajectory Planning

Lecture 22 - Trajectory Planning (Continued...)

Lecture 23 - Singularity Checking

Lecture 24 - Robot Dynamics

Lecture 25 - Robot Dynamics (Continued...)

Lecture 26 - Robot Dynamics (Continued...)

Lecture 27 - Robot Dynamics (Continued...)

Lecture 28 - Robot Dynamics (Continued...)

Lecture 29 - Robot Dynamics (Continued...)

Lecture 30 - Control Scheme

Lecture 31 - Sensors

Lecture 32 - Sensors (Continued...)

Lecture 33 - Sensors (Continued...)

Lecture 34 - Robot Vision

Lecture 35 - Robot Vision (Continued...)

Lecture 36 - Robot Vision (Continued...)

Lecture 37 - Robot Motion Planning

Lecture 38 - Robot Motion Planning (Continued...)

Lecture 39 - Robot Motion Planning (Continued...)

Lecture 40 - Robot Motion Planning (Continued...)

Lecture 41 - Intelligent Robot

Lecture 42 - Biped Walking

Lecture 43 - Biped Walking (Continued...)

Lecture 44 - Summary

Lecture 45 - Summary (Continued...)

NPTEL : NOC:Computational Fluid Dynamics (Mechanical Engineering)

Co-ordinators : Prof. S. Chakraborty

Lecture 1 - Intoduction to CFD

Lecture 2 - Classification of partial differential equations

Lecture 3 - Examples of partial differential equations

Lecture 4 - Examples of partial differential equations (Continued...)

Lecture 5 - Nature of the characteristics of partial differential equation

Lecture 6 - Euler-Lagrangian equation

Lecture 7 - Approximate Solutions of Differential Equations

Lecture 8 - Variational formulation

Lecture 9 - Example of variational formulation and introduction to weighted residual method

Lecture 10 - Weighted residual method (Continued...)

Lecture 11 - Point Collocation method, the Galerkin's method and the 'M' form

Lecture 12 - Finite element method (FEM) of discretization

Lecture 13 - Finite element method of discretization (Continued...)

Lecture 14 - Finite difference method (FDM) of discretization

Lecture 15 - Well posed boundary value problem

Lecture 16 - Finite volume method (FVM) of discretization

Lecture 17 - Illustrative examples of finite volume method

Lecture 18 - Illustrative examples of finite volume method (Continued...)

Lecture 19 - Basic rules of finite volume discretization

Lecture 20 - Implementation of boundary conditions in FVM

Lecture 21 - Implementation of boundary conditions in FVM (Continued...)

Lecture 22 - 1-D Unsteady state diffusion problem

Lecture 23 - 1-D Unsteady state diffusion problem (Continued...)

Lecture 24 - Consequences of Discretization of Unsteady State Problems

Lecture 25 - FTCS scheme

Lecture 26 - CTCS scheme (Leap frog scheme) and Dufort-Frankel scheme

Lecture 27 - Part 1: FV Discretization of 2-D Unsteady State Diffusion Type problems; Part 2: Solution to linear algebraic equations

Lecture 28 - Solution to linear algebraic equations (Continued...)

Lecture 29 - Elemination methods

Lecture 30 - Gaussian elemination and LU Decomposition methods

Lecture 31 - Illustrative example of elemination method

Lecture 32 - Tri-Diagonal Matrix Algorithm (TDMA)

Lecture 33 - Elimination Methods: Error Analysis

Lecture 34 - Elimination Methods: Error Analysis (Continued...)

Lecture 35 - Iteration methods

Lecture 36 - Generalized analysis of Iteration method

Lecture 37 - Further discussion on Iterative methods

Lecture 38 - Illustrative examples of Iterative methods

Lecture 39 - Gradient Search based methods

Lecture 40 - Steepest descent method (Continued...)

Lecture 41 - Conjugate gradient method

Lecture 42 - Convection diffusion equation

Lecture 43 - Central difference scheme applied to convection-diffusion equation

Lecture 44 - Upwind scheme

Lecture 45 - Illustrative examples

Lecture 46 - Exact solution of 1-D steady state convection diffusion equation (Continued...)

Lecture 47 - Exponential scheme

Lecture 48 - Generalized convection diffusion formulation

Lecture 49 - 2-D convection diffusion problem

Lecture 50 - False (numerical) diffusion scheme and the QUICK scheme

Lecture 51 - Discretization of Navier Stokes equation

Lecture 52 - Discretization of Navier Stokes equation (Continued...)

Lecture 53 - Concept of staggered grid

Lecture 54 - SIMPLE algorithm

Lecture 55 - Salient features of SIMPLE algorithm

Lecture 56 - Illustrative examples on the use of SIMPLE algorithm

Lecture 57 - SIMPLER algorithm

Lecture 58 - Illustrative examples of SIMPLER algorithm

Lecture 59 - What is there in implementing a CFD Code

Lecture 60 - Some representative case studies

NPTEL : NOC:Concepts of Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. Aditya Bandopadhyay, Prof. Suman Chakraborty

Lecture 1 - Introductory Concepts

Lecture 2 - Properties of Pure Substances

Lecture 3 - Properties of Pure Substances (Continued...)

Lecture 4 - Introduction to Property Tables

Lecture 5 - Properties of Pure Substances: Example problems (Continued...)

Lecture 6 - Properties of Pure Substances: Example problems (Continued...)

Lecture 7 - Use of Computer as Means of Learning Thermodynamics

Lecture 8 - Properties of Pure Substances (Continued...)

Lecture 9 - Properties of Pure Substances Spring - Piston Problem

Lecture 10 - Heat and Work

Lecture 11 - Heat and Work : Representative Problems

Lecture 12 - Heat and Work : Representative Problems (Continued...)

Lecture 13 - Heat and Work : Representative Problems (Continued...)

Lecture 14 - First Law of Thermodynamics for a Control Mass System

Lecture 15 - Enthalpy and Specific Heats

Lecture 16 - First Law for a Control Mass System : Representative Examples

Lecture 17 - First Law for a Control Mass System : Representative Examples (Continued...)

Lecture 18 - First Law for a Control Mass System : Representative Examples (Continued...)

Lecture 19 - Control Volume Conservation Reynolds Transport Theorem

Lecture 20 - Control Volume Mass and Energy Balance

Lecture 21 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 22 - First Law for Steady State Steady Flow (SSSF) Process

Lecture 23 - First Law for SSSF Process : Example Problem

Lecture 24 - First Law for SSSF Process : Example Problem (Continued...)

Lecture 25 - First Law for SSSF Process : Example Problem (Continued...)

Lecture 26 - First Law for SSSF Process : Example Problem (Continued...)

Lecture 27 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 28 - First Law of Thermodynamics for Unsteady Processes in a Control Volume

Lecture 29 - First Law for Unsteady Problems - Examples

Lecture 30 - First Law for Unsteady Problems - Examples (Continued...)

Lecture 31 - First Law for Unsteady Problems - Examples (Continued...)

Lecture 32 - Supplementary Lecture : Problem Solving with the Aid of a Computer

Lecture 33 - Introduction to Second Law of Thermodynamics

Lecture 34 - Statements of the Second Law of Thermodynamics

Lecture 35 - Perpetual Motion Machines; Reversible and Irreversible Processes

Lecture 36 - Factors for Irreversibility and Introduction to Reversible Cycles

Lecture 37 - Carnot Theorem and Absolute Temperature Scale

Lecture 38 - Second Law: Illustrative Problems

Lecture 39 - Clausius Inequality and Introduction to Entropy

Lecture 40 - Thermodynamic Property Relationships; Entropy change for Solids, Liquids and Ideal gases

Lecture 41 - Entropy balance for Reversible and Irreversible Processes

Lecture 42 - What is Entropy ?

Lecture 43 - Entropy Change in closed system: Examples

Lecture 44 - Entropy Change in closed system: Examples

Lecture 45 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 46 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 47 - Entropy Transport for a flow process

Lecture 48 - Entropy Transport for flow process: Examples

Lecture 49 - Entropy Transport for flow process: Examples

Lecture 50 - Entropy Transport for flow process: Examples

Lecture 51 - Entropy Transport for flow process: Examples

Lecture 52 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 53 - Exergy (Availability)

Lecture 54 - Exergy (Availability) (Continued...)

Lecture 55 - Exergy Analysis : Examples

Lecture 56 - Exergy Analysis : Examples (Continued...)

Lecture 57 - Thermodynamic Relationships

Lecture 58 - Thermodynamic Relationships (Continued...)

Lecture 59 - Otto Cycle

Lecture 60 - Diesel Cycle

Lecture 61 - Example Problems : Otto Cycle and Diesel Cycle

Lecture 62 - Brayton Cycle

Lecture 63 - Carnot Cycle and Rankine Cycle

Lecture 64 - Carnot Cycle and Rankine Cycle (Continued...)

Lecture 65 - Vapour Compression Refrigeration Cycle

Lecture 66 - Review of Learning Concepts

Lecture 67 - Supplementary Lecture: Problem solving with the aid of a computer

Lecture 68 - Supplementary Lecture: Problem solving with the aid of a computer

NPTEL : NOC:Electronic Packaging and Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. A Bhattacharya

Lecture 1 - Introduction - 1

Lecture 2 - Introduction - 2

Lecture 3 - Introduction - 3

Lecture 4 - Semiconductors and Components - 1

Lecture 5 - Semiconductors and Components - 2

Lecture 6 - 1st Level Packaging - I

Lecture 7 - 1st Level Packaging - II

Lecture 8 - Area Array Packages - I

Lecture 9 - Area Array Packages - II

Lecture 10 - Area Array Packages - III

Lecture 11 - Flip Chip Technology

Lecture 12 - 1st Level Interconnections - I

Lecture 13 - 1st Level Interconnections - II

Lecture 14 - 1st Level Interconnections - III

Lecture 15 - Advanced Packaging

Lecture 16 - 2nd Level Packaging: PCB - I

Lecture 17 - 2nd Level Packaging: PCB - II

Lecture 18 - 2nd Level Packaging: PCB - III

Lecture 19 - 2nd Level Packaging: PCB - IV

Lecture 20 - 2nd Level Packaging: PCB - V

Lecture 21 - System Integration

Lecture 22 - Thermal Management 1: Introduction

Lecture 23 - Thermal Management 2: Concepts

Lecture 24 - Thermal Management 3: Thermal Resistance

Lecture 25 - Thermal Management 4: Heat Sink

Lecture 26 - Thermal Management 5: Heat Sink Characterization

Lecture 27 - Thermal Management 6: Heat Transfer Correlations

Lecture 28 - Thermal Management 7: Practice Problems

Lecture 29 - Thermal Management 8: Thermal Technologies

Lecture 30 - Thermal Management 9: Novel Cooling Technologies

Lecture 31 - Shock and Vibration - 1

Lecture 32 - Shock and Vibration - 2

Lecture 33 - Shock and Vibration - 3

Lecture 34 - Shock and Vibration - 4

Lecture 35 - Electronic Packaging Reliability - 1

Lecture 36 - Electronic Packaging Reliability - 2

Lecture 37 - Electronic Packaging Reliability - 3

Lecture 38 - Electronic Packaging Reliability - 4

Lecture 39 - Power Electronics Packaging

Lecture 40 - Special Topics

NPTEL : NOC:Kinematics of Mechanisms and Machines (Mechanical Engineering)

Co-ordinators : Prof. A. Dasgupta

Lecture 1 - Introduction and Motivation

Lecture 2 - Nomenclature and Classification

Lecture 3 - Kinematic Diagram

Lecture 4 - Degree of Freedom

Lecture 5 - Constrained and Robotic Mechanisms

Lecture 6 - Failure of DOF Calculation

Lecture 7 - Grashof Criterion - I

Lecture 8 - Grashof Criterion - II

Lecture 9 - Grashof Criterion - Problems

Lecture 10 - Displacement Analysis - I

Lecture 11 - Displacement Analysis - II

Lecture 12 - Displacement Analysis Example - I

Lecture 13 - Displacement Analysis Example - II

Lecture 14 - Steering Mechanisms

Lecture 15 - Displacement Analysis of Robots - I

Lecture 16 - Displacement Analysis of Robots - II

Lecture 17 - Displacement Analysis of Robots - III

Lecture 18 - Geometric Velocity Analysis - I

Lecture 19 - Geometric Velocity Analysis - II

Lecture 20 - Geometric Velocity Analysis - III

Lecture 21 - Velocity Analysis: Method of IC - I

Lecture 22 - Velocity Analysis: Method of IC - II

Lecture 23 - Velocity Analysis: Method of IC - III

Lecture 24 - Analytical Velocity Analysis - I

Lecture 25 - Analytical Velocity Analysis - II

Lecture 26 - Analytical Velocity Analysis - III

Lecture 27 - Velocity Analysis Examples

Lecture 28 - Robot Velocity Analysis - I

Lecture 29 - Robot Velocity Analysis - II

Lecture 30 - Robot Velocity Analysis - III

Lecture 31 - Robot Path Generation

Lecture 32 - Acceleration Analysis - I

Lecture 33 - Acceleration Analysis - II

Lecture 34 - Force Analysis - I

Lecture 35 - Force Analysis - II

Lecture 36 - Force Analysis Examples

Lecture 37 - Gear Kinematics

Lecture 38 - Gear trains - I

Lecture 39 - Gear trains - II

Lecture 40 - Gear trains - III

NPTEL : NOC:Introduction to Fluid Mechanics (2019) (Mechanical Engineering)

Co-ordinators : Prof. Suman Chakraborty

Lecture 1 - Motivations of studying fluid mechanics

Lecture 2 - Macroscopic and microscopic point of views

Lecture 3 - Concept of traction vector

Lecture 4 - Cauchy's theorem

Lecture 5 - Concept of pressure in a fluid

Lecture 6 - Density, Bulk Modulus, Viscosity

Lecture 7 - Viscosity, Newtonian fluid

Lecture 8 - Kinematic viscosity, Reynolds number

Lecture 9 - Non-Newtonian fluids

Lecture 10 - Some illustrative examples solved

Lecture 11 - Problems and Solutions

Lecture 12 - Surface Tension - Part I

Lecture 13 - Surface Tension - Part II

Lecture 14 - Governing equation of fluid statics

Lecture 15 - Manometers

Lecture 16 - Force on a surface immersed in fluid - Part I

Lecture 17 - Force on a surface immersed in fluid - Part II

Lecture 18 - Force on a surface immersed in fluid - Part III, Stability of solid bodies in fluid - Part I

Lecture 19 - Stability of solid bodies in fluid - Part II

Lecture 20 - Fluid under rigid body motion

Lecture 21 - Lagrangian and Eulerian approaches

Lecture 22 - Concept of different flow lines

Lecture 23 - Acceleration of fluid flow

Lecture 24 - Deformation of fluid elements - Part I

Lecture 25 - Derivation of continuity equation

Lecture 26 - Problems and Solutions

Lecture 27 - Deformation of fluid elements - Part II

Lecture 28 - Deformation of fluid elements - Part III

Lecture 29 - Stream Function

Lecture 30 - Circulation, Velocity Potential

Lecture 31 - Euler's equation

Lecture 32 - Bernoulliâ€™s equation - Part I

Lecture 33 - Bernoulliâ€™s equation - Part II

Lecture 34 - Bernoulli's equation - Part III

Lecture 35 - Eulerâ€™s equation in streamline coordinates

Lecture 36 - Problems and Solutions

Lecture 37 - Problems and Solutions

Lecture 38 - Application of Bernoulli's equation - Part I

Lecture 39 - Application of Bernoulli's equation - Part II

Lecture 40 - Application of Bernoulli's equation - Part III

Lecture 41 - Reynolds Transport Theorem (RTT)

Lecture 42 - Application of RTT: Conservation of mass

Lecture 43 - Problems and Solutions

Lecture 44 - Problems and Solutions

Lecture 45 - Application of RTT: Conservation of linear momentum

Lecture 46 - Problems and Solutions

Lecture 47 - Problems and Solutions

Lecture 48 - Problems and Solutions

Lecture 49 - Application of RTT: Conservation of angular momentum

Lecture 50 - Problems and Solutions

Lecture 51 - Navier-Stokes equation - Part I

Lecture 52 - Navier-Stokes equation - Part II

Lecture 53 - Navier-Stokes equation - Part III

Lecture 54 - Navier-Stokes equation - Part IV

Lecture 55 - Pipe Flow - Part I

Lecture 56 - Pipe Flow - Part II

Lecture 57 - Pipe Flow - Part III

Lecture 58 - Pipe Flow - Part IV

Lecture 59 - Principle of Similarity and Dynamical Analysis - Part I

Lecture 60 - Principle of Similarity and Dynamical Analysis - Part II

NPTEL : NOC:Conduction and Convection Heat Transfer (Prof. S. Chakraborty) (Mechanical Engineering)

Co-ordinators : Prof. S. Chakraborty

Lecture 1 - Introduction To Conduction

Lecture 2 - 1-D Steady State Conduction

Lecture 3 - Introduction To Convection

Lecture 4 - Conduction Equation:Internal Energy Form

Lecture 5 - Conduction Equation:C-P Form

Lecture 6 - Conduction Equation:Boundary Conditions And Problems

Lecture 7 - 1-D Steady State Conduction

Lecture 8 - Concept Of Thermal Resistance

Lecture 9 - 1-D Steady State Conduction - II

Lecture 10 - 1-D Steady State Conduction - II (Continued...)

Lecture 11 - Problems On 1-D Steady State Conduction - I

Lecture 12 - Problems On 1-D Steady State Conduction - I (Continued....)

Lecture 13 - Problems On 1-D Steady State Conduction - II

Lecture 14 - Conduction In Cylindrical Geometry

Lecture 15 - Critical Insulation Thickness

Lecture 16 - Critical Insulation Thickness (Continued...)

Lecture 17 - Problems On Conduction In Cylindrical Geomerty - I

Lecture 18 - Problems On Conduction In Cylindrical Geometry - I (Continued...)

Lecture 19 - Problems On Conduction In Cylindrical Geometry - II and Conduction in Spherical Geometry

Lecture 20 - Heat Transfer From Extended surfaces

Lecture 21 - Boundary Conditions at the FIN tip

Lecture 22 - Boundary Conditions at the FIN tip

Lecture 23 - Problems on Heat Transfer from Extended Surfaces

Lecture 24 - 2D Steady State Conduction

Lecture 25 - Separation of Variables Method for 2-D Steady State Conduction

Lecture 26 - Superposition Method for 2-D Steady State Conduction

Lecture 27 - Transient Conduction: Lumped Parameter Approach

Lecture 28 - Problems on Lumped Parameter Approach

Lecture 29 - Transient Conduction: Infinite Slab

Lecture 30 - Transient Conduction: Semi - Infinite Slab - I

Lecture 31 - Transient Conduction: Semi - Infinite Slab - II

Lecture 32 - Introduction to Convection

Lecture 33 - Review of Fluid Mechanics - I

Lecture 34 - Review of Fluid Mechanics - II

Lecture 35 - Review of Fluid Mechanics - III

Lecture 36 - Review of Fluid Mechanics - IV

Lecture 37 - Review of Fluid Mechanics - V

Lecture 38 - Energy Conservation Equation - I

Lecture 39 - Energy Conservation Equation - II

Lecture 40 - Energy Conservation Equation - III

Lecture 41 - Thermal Boundary Layer - I

Lecture 42 - Thermal Boundary Layer - II

Lecture 43 - Energy Integral Equation - I

Lecture 44 - Energy Integral Equation - II

Lecture 45 - Internal Forced Convection - 1

Lecture 46 - Internal Forced Convection - 2

Lecture 47 - Internal Forced Convection - 3

Lecture 48 - Internal Forced Convection - 4

Lecture 49 - Internal Forced Convection - 5

Lecture 50 - Internal Forced Convection - 6

Lecture 51 - Viscous Dissipation - 1

Lecture 52 - Viscous Dissipation - 2

Lecture 53 - Natural Convection - 1

Lecture 54 - Natural Convection - 2

Lecture 55 - Natural Convection - 3

Lecture 56 - Natural Convection - 4

Lecture 57 - Condensation - I

Lecture 58 - Condensation - II

Lecture 59 - Boiling

Lecture 60 - Heat Exchangers - I

Lecture 61 - Heat Exchangers - II

Lecture 62 - Heat Exchangers - III

Lecture 63 - Heat Exchangers - IV

Lecture 64 - Heat Exchangers - V

Lecture 65 - Problems on Heat Exchangers

NPTEL : NOC:Advanced Concepts in Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Aditya Bandopadhyay

Lecture 1 - Eulerian and Lagrangian Description of Fluid Motion

Lecture 2 - Lines of Flow Visualization and Acceleration of Flow

Lecture 3 - Angular Deformation of Fluid Elements

Lecture 4 - Linear and Volumetric Deformation; Perspectives from Mass Conservation

Lecture 5 - Continuity Education in Integral Form : Stream Function and Velocity Potential

Lecture 6 - Euler Equation for Inviscid Flow

Lecture 7 - Bernoulli's Equation

Lecture 8 - Examples of Bernoulli's Equation

Lecture 9 - Reynolds Transport Equation

Lecture 10 - Reynolds Transport Theorem : Mass and Linear Momentum Conservation

Lecture 11 - Reynolds transport theorem : arbitrarily moving control volume

Lecture 12 - Reynolds transport theorem : angular momentum conservation

Lecture 13 - Introduction to traction vector and stress tensor

Lecture 14 - Cauchy/Navier equation

Lecture 15 - Navier Stokes equation

Lecture 16 - Navier Stokes equation (Continued...)

Lecture 17 - Some exact solutions of the Navier Stokes equation

Lecture 18 - Interfacial boundary conditions and example of thin film flows

Lecture 19 - Exact solutions of the Navier Stokes equations in cylindrical polar coordinates

Lecture 20 - Exact solutions of the Navier Stokes equation for some unsteady flows

Lecture 21 - Confined oscillatory flows

Lecture 22 - Introduction to Turbulence

Lecture 23 - Statistical Treatment of Turbulence and Near - Wall Velocity Profiles

Lecture 24 - Introduction to Boundary Layer Theory

Lecture 25 - Similarity Solution of Boundary Layer Equation

Lecture 26 - Momentum Integral Method

Lecture 27 - Application of Momentum Integral Method and Boundary Layer Separation

Lecture 28 - Potential Flow

Lecture 29 - Potential Flow (Continued...)

Lecture 30 - Potential Flow (Continued...)

Lecture 31 - Potential Flow (Continued...)

Lecture 32 - Potential Flow (Continued...)

Lecture 33 - Potential Flow (Continued...)

Lecture 34 - Stokes Flow past a Sphere

Lecture 35 - Stokes Flow past a Sphere (Continued...)

Lecture 36 - Stokes Flow past a Sphere (Continued...)

Lecture 37 - Lubrication Theory

Lecture 38 - Lubrication Theory (Continued...)

Lecture 39 - Lubrication Theory (Continued...)

Lecture 40 - Thin Film Dynamics

Lecture 41 - Thin Film Dynamics (Continued...)

Lecture 42 - Thin Film Dynamics (Continued...)

Lecture 43 - Thin Film Dynamics (Continued...)

Lecture 44 - Thin Film Dynamics (Continued...)

Lecture 45 - Thin Film Dynamics (Continued...)

Lecture 46 - Thin Film Dynamics (Continued...)

Lecture 47 - Thin Film Dynamics (Continued...)

Lecture 48 - Compressible Flows

Lecture 49 - Compressible Flows (Continued...)

Lecture 50 - Compressible Flows (Stagnation Properties)

Lecture 51 - Compressible Flows (Stagnation Properties, Variable Area)

Lecture 52 - Compressible Flows (Variable Area)

Lecture 53 - Compressible Flows (Variable Area)

Lecture 54 - Compressible Flows (Normal Shock)

Lecture 55 - Compressible Flows (Normal Shock) (Continued...)

Lecture 56 - Compressible Flows (Converging Nozzle)

Lecture 57 - Compressible Flows (Converging Diverging Nozzle)

Lecture 58 - Compressible Flows (Converging Diverging Nozzle) (Continued...)

Lecture 59 - Compressible Flows with Friction

NPTEL : NOC:High Performance Computing for Scientists and Engineers (Mechanical Engineering)

Co-ordinators : Prof. Somnath Roy

Lecture 1 - Introduction to High Performance Computing

Lecture 2 - Architecture for Parallel Computing

Lecture 3 - Architecture for Parallel Computing (Continued...)

Lecture 4 - Architecture for Parallel Computing (Continued...)

Lecture 5 - Shared Memory and Distributed Memory in Parallel Computing

Lecture 6 - Shared Memory and Distributed Memory in Parallel Computing (Continued...)

Lecture 7 - Parallel Algorithms

Lecture 8 - Parallel Algorithms (Continued...)

Lecture 9 - Parallel Algorithms (Continued...)

Lecture 10 - Performance Metrics of Parallel Systems

Lecture 11 - Performance Metrics of Parallel Systems (Continued...)

Lecture 12 - Introduction to OpenMP

Lecture 13 - Introduction to OpenMP (Continued...)

Lecture 14 - Introduction to OpenMP (Continued...)

Lecture 15 - Essentials of OpenMP Programming

Lecture 16 - Essentials of OpenMP Programming (Continued...)

Lecture 17 - Data sharing and synchronization

Lecture 18 - Efficient OpenMP programming for matrix computing

Lecture 19 - Introduction to MPI and Distributed Memory Parallel Programming

Lecture 20 - Introduction to MPI and Distributed Memory Parallel Programming (Continued...)

Lecture 21 - Communication using MPI

Lecture 22 - Communication using MPI (Continued...)

Lecture 23 - Communication using MPI (Continued...)

Lecture 24 - Matrix Representation of Physical Systems - Matrix Solvers

Lecture 25 - Domain Decomposition Technique

Lecture 26 - Domain decomposition based parallelization of matrix solvers

Lecture 27 - Domain decomposition based parallelization of matrix solvers (Continued...)

Lecture 28 - Domain decomposition based parallelization of matrix solvers (Continued...)

Lecture 29 - MPI routines for parallel matrix solvers

Lecture 30 - Introduction to GPGPU and CUDA

Lecture 31 - Introduction to GPGPU and CUDA (Continued...)

Lecture 32 - Introduction to GPGPU and CUDA (Continued...)

Lecture 33 - Introduction to GPGPU and CUDA (Continued...)

Lecture 34 - Introduction to CUDA programming

Lecture 35 - Introduction to CUDA programming (Continued...)

Lecture 36 - Thread execution in CUDA program - scheduling and memory access

Lecture 37 - Thread execution in CUDA program (Continued...)

Lecture 38 - Matrix multiplications in CUDA

Lecture 39 - OpenACC programming for GPU-s

Lecture 40 - Hybrid parallelization and exascale computing

NPTEL : NOC:Engineering Drawing and Computer Graphics (Mechanical Engineering)

Co-ordinators : Prof. Rajaram Lakkaraju

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Introduction - III

Lecture 4 - Introduction - IV

Lecture 5 - Introduction - V

Lecture 6 - Introduction - VI

Lecture 7 - Conic Sections - I

Lecture 8 - Conic Sections - II

Lecture 9 - Practice - I

Lecture 10 - Practice - II

Lecture 11 - Conic Sections - III

Lecture 12 - Conic Sections - IV

Lecture 13 - Conic Sections - V

Lecture 14 - Conic Sections - VI

Lecture 15 - Conic Sections - VII

Lecture 16 - Conic Sections - VIII

Lecture 17 - Conic Sections - IX

Lecture 18 - Conic Sections - X

Lecture 19 - Conic Sections - XI

Lecture 20 - Conic Sections - XII

Lecture 21 - Orthographic Projections I - Part 1

Lecture 22 - Orthographic Projections I - Part 2

Lecture 23 - Orthographic Projections I - Part 3

Lecture 24 - Orthographic Projections I - Part 4

Lecture 25 - Orthographic Projections I - Part 5

Lecture 26 - Orthographic Projections I - Part 6

Lecture 27 - Orthographic Projections I - Part 7

Lecture 28 - Orthographic Projections I - Part 8

Lecture 29 - Orthographic Projections I - Part 9

Lecture 30 - Orthographic Projections I - Part 10

Lecture 31 - Orthographic Projections II - Part 1

Lecture 32 - Orthographic Projections II - Part 2

Lecture 33 - Orthographic Projections II - Part 3

Lecture 34 - Orthographic Projections II - Part 4

Lecture 35 - Orthographic Projections II - Part 5

Lecture 36 - Orthographic Projections II - Part 6

Lecture 37 - Orthographic Projections II - Part 7

Lecture 38 - Orthographic Projections II - Part 8

Lecture 39 - Orthographic Projections II - Part 9

Lecture 40 - Orthographic Projections II - Part 10

Lecture 41 - Orthographic Projections II - Part 11

Lecture 42 - Projection of Solids - I

Lecture 43 - Projection of Solids - II

Lecture 44 - Projection of Solids - III

Lecture 45 - Sections and Sectional Views

Lecture 46 - Sections and Sectional Views (Continued...)

Lecture 47 - Sections and Sectional Views (Continued...)

Lecture 48 - Isometric Projections

Lecture 49 - Isometric Projections (Continued...)

Lecture 50 - Isometric Projections (Continued...)

Lecture 51 - Overview of Computer Graphics - I

Lecture 52 - Overview of Computer Graphics - II

Lecture 53 - Overview of Computer Graphics - III

Lecture 54 - Overview of Computer Graphics - IV

Lecture 55 - Solidworks

Lecture 56 - Solidworks (Continued...)

Lecture 57 - Solidworks (Continued...)

Lecture 58 - Solidworks (Continued...)

Lecture 59 - Solidworks (Continued...)

Lecture 60 - Solidworks (Continued...)

Lecture 61 - Assembly Drawing

Lecture 62 - Assembly Drawing (Continued...)

Lecture 63 - Assembly Drawing (Continued...)

Lecture 64 - Assembly Drawing (Continued...)

Lecture 65 - Assembly Drawing (Continued...)

NPTEL : NOC:Tools in Scientific Computing (Mechanical Engineering)

Co-ordinators : Prof. Aditya Bandopadhyay

Lecture 1 - Preliminaries and Data types

Lecture 2 - Loops and Conditionals Implementation of bubble sort

Lecture 3 - Commonly used Functions

Lecture 4 - Matrix Manipulations Mohr's circle

Lecture 5 - Nonlinear algebraic equations - Visualizing convergence

Lecture 6 - Nonlinear algebraic equations - system of equation and Newton's basin of attraction

Lecture 7 - Overview of Jupyterlab, Octave GUI, Spyder GUI

Lecture 8 - Interactivity with Python - Ipywidgets

Lecture 9 - Geometric Interpretations of ODEs

Lecture 10 - Bifurcation: Saddle node bifurcation

Lecture 11 - Bifurcation: Transcritical bifurcation

Lecture 12 - Bifurcation: Pitchfork bifurcation

Lecture 13 - Imperfect bifurcations and catastrophies

Lecture 14 - 2D flows - linear systems

Lecture 15 - 2D flows - Trajectories: spirals, star and degeneracy

Lecture 16 - Phase portraits - nonlinear systems

Lecture 17 - 2D phase portraits - limit cycles

Lecture 18 - Bifurcations and 3D flows

Lecture 19 - 1D Maps

Lecture 20 - Probability density functions and sampling

Lecture 21 - Monte-carlo simulations: Darts and Buffon's needle

Lecture 22 - 1D Random walks

Lecture 23 - 2D Random walks

Lecture 24 - Boundary Value Problems - Part 1

Lecture 25 - Boundary Value Problems - Part 2

Lecture 26 - Regular Perturbation for ODE

Lecture 27 - Singular Perturbation for ODE

Lecture 28 - 2D Boundary Values Problems

Lecture 29 - PETSc and MPI basics

Lecture 30 - PETSc - Creating Vectors and Matrices

Lecture 31 - KSP object and solving a system

Lecture 32 - Poisson equation in PETSc

Lecture 33 - Nonlinear Solver of PETSc

Lecture 34 - Nonlinear solver with Jacobian in PETSc

Lecture 35 - Reaction-diffusion system in PETSc

Lecture 36 - Time stepping in PETSc

Lecture 37 - Heat transport using PETSc

Lecture 38 - Solving nonlinear PDE on a periodic domain yielding different patterns

Lecture 39 - Audio analysis - Determine motor RPM

Lecture 40 - Spectrogram and Doppler shift

Lecture 41 - Image processing - Preliminaries

Lecture 42 - Balloon problem and viscous fingers

Lecture 43 - Analyzing data files and 2D interpolation

NPTEL : NOC:Advanced Dynamics (Mechanical Engineering)

Co-ordinators : Prof. Anirvan DasGupta

Lecture 1 - Coordinate Systems - I

Lecture 2 - Coordinate Systems - II

Lecture 3 - Relative Motion - I

Lecture 4 - Relative Motion - II

Lecture 5 - Relative Motion - III

Lecture 6 - Particle kinetics - I

Lecture 7 - Particle kinetics - II

Lecture 8 - Particle kinetics - III

Lecture 9 - Particle kinetics - IV

Lecture 10 - Particle kinetics - V

Lecture 11 - Work-energy relation - I

Lecture 12 - Work-energy relation - II

Lecture 13 - Impulse-momentum relation - I

Lecture 14 - Impulse-momentum relation - II

Lecture 15 - Particle impact - I

Lecture 16 - Particle impact - II

Lecture 17 - Central force motion - I

Lecture 18 - Central force motion - II

Lecture 19 - Central force motion - III

Lecture 20 - Central force motion - IV

Lecture 21 - Systems with Mass Flow - I

Lecture 22 - Systems with Mass Flow - II

Lecture 23 - Kinetics of a System of Particles - I

Lecture 24 - Kinetics of a System of Particles - II

Lecture 25 - Kinetics of a System of Particles - III

Lecture 26 - Kinetics of a System of Particles: Extension to Rigid Bodies

Lecture 27 - Planar Kinetics of Rigid Bodies - I

Lecture 28 - Planar Kinetics of Rigid Bodies - II

Lecture 29 - Planar Kinetics: Work-Energy Relations - I

Lecture 30 - Planar Kinetics: Work-Energy Relations - II

Lecture 31 - Planar kinetics: impulse-momentum relations - I

Lecture 32 - Planar kinetics: impulse-momentum relations - II

Lecture 33 - Spatial kinematics of rigid bodies - I

Lecture 34 - Spatial kinematics of rigid bodies - II

Lecture 35 - Spatial kinetics of rigid bodies - I

Lecture 36 - Spatial kinetics of rigid bodies - II

Lecture 37 - Spatial kinetics of rigid bodies - III

Lecture 38 - Gyroscopic motion - I

Lecture 39 - Gyroscopic motion - II

Lecture 40 - Gyroscopic motion - III

Lecture 41 - Kinematics of rotation - I

Lecture 42 - Kinematics of rotation - II

Lecture 43 - Kinematics of rotation - III

Lecture 44 - Kinematics of rotation - IV

Lecture 45 - Kinematics of rotation - V

Lecture 46 - Introduction to Analytical Dynamics: generalized coordinates - I

Lecture 47 - Introduction to Analytical Dynamics: generalized coordinates - II

Lecture 48 - Hamilton's principle and Lagrange's equation of motion - I

Lecture 49 - Hamilton's principle and Lagrange's equation of motion - II

Lecture 50 - Hamilton's principle and Lagrange's equation of motion - III

Lecture 51 - Hamilton's principle and Lagrange's equation of motion - IV

Lecture 52 - Systems with constraints - I

Lecture 53 - Systems with constraints - II

Lecture 54 - Systems with constraints - III

Lecture 55 - Systems with constraints - IV

Lecture 56 - Symmetries and conservation laws - I

Lecture 57 - Symmetries and conservation laws - II

Lecture 58 - Symmetries and conservation laws - III

Lecture 59 - Symmetries and conservation laws - IV

Lecture 60 - Intermediate axis theorem

NPTEL : NOC:Biomechanics of Joints and Orthopaedic Implants (Mechanical Engineering)

Co-ordinators : Prof. Sanjay Gupta

Lecture 1 - General Introduction to the Course

Lecture 2 - Musculoskeletal System

Lecture 3 - Synovial Joints

Lecture 4 - The Hip Joint

Lecture 5 - The Knee Joint

Lecture 6 - The Shoulder and Elbow Joints

Lecture 7 - The Spine

Lecture 8 - Biomechanics of the Hip Joint

Lecture 9 - Biomechanics of the Knee Joint

Lecture 10 - Biomechanics of the Shoulder Joint

Lecture 11 - Biomechanics of the Elbow Joint - Part I

Lecture 12 - Biomechanics of the Elbow Joint - Part II

Lecture 13 - Biomechanics of the Spine

Lecture 14 - Gait Cycle

Lecture 15 - Gait Analysis and Abnormalities

Lecture 16 - Measurement Techniques of Gait Analysis - Part I

Lecture 17 - Measurement Techniques of Gait Analysis - Part II

Lecture 18 - Motion Capture System

Lecture 19 - Fundamentals of Joint Kinematics

Lecture 20 - Joint Kinematics and Kinetics

Lecture 21 - Introduction to Musculoskeletal Modelling

Lecture 22 - Inverse Dynamics in Musculoskeletal Modelling

Lecture 23 - Muscle Force Estimation Using Static Optimization

Lecture 24 - Concepts of Stress and Strain

Lecture 25 - Stress Transformation

Lecture 26 - Bone Structure and Mechanical Behaviour

Lecture 27 - Bone Adaptation and Viscoelastic Behaviour

Lecture 28 - Anisotropic Nature of Bone

Lecture 29 - Implant Classification and Failure Mechanisms

Lecture 30 - Introduction to Finite Element Modelling of Bone and Implant

Lecture 31 - Finite Element Modelling and Analysis of Hip and Shoulder

Lecture 32 - Modelling and Analysis of Intact and Implanted Lumbar Spine

Lecture 33 - Experimental Validation of Pre-Clinical Analysis

Lecture 34 - Adaptive Bone Remodelling

Lecture 35 - Bone Remodelling Around Resurfaced Femur and Pelvic Bone

Lecture 36 - Design Optimization of HIP Implant

Lecture 37 - Orthotropic Bone Remodelling

Lecture 38 - Biomaterials and Design of Orthopaedic Implants

Lecture 39 - Bone Fracture Healing

Lecture 40 - Bone Ingrowth and Mechanoregulatory Principles

Lecture 41 - Mathematical Modelling of Tissue Differentiation

Lecture 42 - Bone Ingrowth around Porous Coated Femoral Implant

Lecture 43 - Tissue Differentiation around Porous Coated Acetabular Implant

Lecture 44 - Concluding Remarks

NPTEL : NOC:Elements of Metal Cutting, Machine tools, Gear Cutting and CNC Machining (Mechanical Engineering)

Co-ordinators : Prof. Asimava Roy Choudhury

Lecture 1 - Introduction

Lecture 2 - Geometry of single point turning tools - 1

Lecture 3 - Geometry of turning tools - 2

Lecture 4 - Geometry of single point turning tools -3

Lecture 5 - Geometry of cutting tools and numerical problems

Lecture 6 - Different types of tools and mcq

Lecture 7 - Mechanism of chip formation

Lecture 8 - Mechanics of material removal

Lecture 9 - Measurement Of Cutting Forces

Lecture 10 - Numerical problems and MCQ

Lecture 11 - Tool wear and Tool life

Lecture 12 - Wear and life of cutting tools - 2

Lecture 13 - The lathe

Lecture 14 - Calculations on mechanisms in machine tools

Lecture 15 - Numerical problems on lathe

Lecture 16 - milling machines

Lecture 17 - Milling machine - indexing

Lecture 18 - Gear cutting CNC and non traditional machining

Lecture 19 - CNC and non-traditional machining methods

Lecture 20 - Numerical problems for week 4

Lecture 21 - Introduction

Lecture 22 - Simple Gear Calculations

Lecture 23 - Gear Geometry

Lecture 24 - Helical Gear Problems

Lecture 25 - Numerical Problem MCQ

Lecture 26 - Numerical Problem Milling of Helical Gears

Lecture 27 - Simple and Compound Indexing

Lecture 28 - Differential Indexing

Lecture 29 - Helical Gear Cutting on Milling Machine

Lecture 30 - Numerical Problems on Gear Milling

Lecture 31 - Gear Shaping - I

Lecture 32 - Gear Shaping - II

Lecture 33 - Gear Shaping - III

Lecture 34 - Gear Shaping - IV

Lecture 35 - Gear Hobbing - I

Lecture 36 - Gear Hobbing - II

Lecture 37 - Gear Hobbing - III

Lecture 38 - Gear Hobbing - IV

Lecture 39 - Gear Hobbing - V

Lecture 40 - Gear Hobbing - VI

Lecture 41 - Introduction to computer control role of computers in automation

Lecture 42 - Introduction (Continued...) binary logic and logic gates

Lecture 43 - Classification of Computer numerical control (CNC) Point to point and continuous control

Lecture 44 - Classification (Continued...) : Closed loop and open loop control

Lecture 45 - Tutorial involving simple calculations on different aspects of CNC controls

Lecture 46 - Questions, MCQ Discussions on Motors, Encoders, Decoders and Programming Practice

Lecture 47 - Stepper motors, Permanent magnet DC motors

Lecture 48 - Binary circuits and decoders

Lecture 49 - Tachogenerator, printed circuit motors, Encoders

Lecture 50 - Programming Practice - I

Lecture 51 - Programming Practice - 1I

Lecture 52 - Computer Aided Offline Programming

Lecture 53 - Interpolators - Linear

Lecture 54 - Interpolators - Curvilinear

Lecture 55 - Questions on Programming and Interpolation

Lecture 56 - 3-D Machining - Basic Concepts

Lecture 57 - Curved Surface Geometry

Lecture 58 - Cutter Path Generation for Curved Surfaces

Lecture 59 - Cutter Path Generation (Concluding Part) and Current Status - CNC Machining and Related Processes

Lecture 60 - Questions and Discussions on Curved Surface Machining

NPTEL : NOC:Finite Element Method (Mechanical Engineering)

Co-ordinators : Prof. Biswanath Banerjee, Prof. Amit Shaw

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Elements of Calculation of Variations - I

Lecture 7 - Elements of Calculation of Variations - II

Lecture 8 - Elements of Calculation of Variations - III

Lecture 9 - Strong Form and Weak Form

Lecture 10 - Rayleigh - Ritz Method - I

Lecture 11 - Rayleigh - Ritz Method - II

Lecture 12 - Weighted Residual Method

Lecture 13 - Weighted Residual Method - Example

Lecture 14 - Concepts of Element and Axial Bar Problem

Lecture 15 - Axial Bar Problem

Lecture 16 - Axial Bar - II

Lecture 17 - Beam Formulation

Lecture 18 - Beam Stiffness Matrix

Lecture 19 - Problems

Lecture 20 - Beam Column

Lecture 21 - Problem

Lecture 22 - Share Deformable Beam Theory

Lecture 23 - Weak Form and Discretization

Lecture 24 - Reduced Integration Based Stiffness Matrix

Lecture 25 - Problem

Lecture 26 - Problem (Continued...)

Lecture 27 - Element of Formulation

Lecture 28 - Analysis of Plane Truss

Lecture 29 - Analysis of Plane Truss (Computer Implementation)

Lecture 30 - Analysis of Euler-Bernoulli Beam (Computer Implementation)

Lecture 31 - Analysis of Plane Frame (Computer Implementation)

Lecture 32 - Introduction to FEM in 2D

Lecture 33 - Continuity and Completeness

Lecture 34 - Shape Functions

Lecture 35 - Numerical Integration (Gaussian Quadrature)

Lecture 36 - Gaussian Quadrature in two dimension

Lecture 37 - Weak Form

Lecture 38 - Example

Lecture 39 - Iso-Parametric Formulation

Lecture 40 - Example with Quadrilateral Element

Lecture 41 - Computer Implementation

Lecture 42 - 2D Elasticity and Weak Form

Lecture 43 - Weak Form and Matrix Formulation

Lecture 44 - Weak Form to Matrix Form

Lecture 45 - Problems

Lecture 46 - Thermoelastic Problem

Lecture 47 - Torsion

Lecture 48 - Triangular Elements

Lecture 49 - Triangular Elements (Continued...)

Lecture 50 - Examples and Computer Implementation

Lecture 51 - Examples and Computer Implementation (Continued...)

Lecture 52 - Shear Locking

Lecture 53 - Selective reduced Integration and Modes of Q4 Element

Lecture 54 - Incompatible Elements

Lecture 55 - Nearly Incompressible Material

Lecture 56

Lecture 57 - B-Bar Method

Lecture 58 - Different Elements

Lecture 59 - Iso-parametric Formulation and Guass Quadrature

Lecture 60 - Closure

NPTEL : NOC:Product Engineering and Design Thinking (Mechanical Engineering)

Co-ordinators : Prof. Pranab K Dan, Prof. Prabir Sarkar

Lecture 1 - Introduction to product engineering

Lecture 2 - Introduction to Product design

Lecture 3 - Introduction to Design Thinking

Lecture 4 - Conceptual Design

Lecture 5 - Design Planning and Innovation Engineering

Lecture 6 - FFE Interface with HLD and DT

Lecture 7 - High Level Design in the Context of Front End Innovation

Lecture 8 - Functional and Physical Decomposition and QFD

Lecture 9 - Product Design Specification

Lecture 10 - FAST in Functional Design

Lecture 11 - Design Thinking and Product Conceptualization and Development

Lecture 12 - Product specification and related methods

Lecture 13 - Conceptual design stemmed from Idea generation

Lecture 14 - Conceptual design: tools and techniques

Lecture 15 - Quality Function Deployment (QFD): Example

Lecture 16 - Kano Model and Analysis

Lecture 17 - Concept Generation methods

Lecture 18 - Concept evaluation methods

Lecture 19 - Concept testing methods

Lecture 20 - Morphological Design Concept

Lecture 21 - Embodiment, Architectural, Configuration, and Parametric Design

Lecture 22 - Pugh Method (Concept Selection leading to Embodiment Design)

Lecture 23 - Introduction to Sustainability

Lecture 24 - Sustainability and Eco-design

Lecture 25 - LCA and design thinking on LCA

Lecture 26 - Introduction to Additive Manufacturing

Lecture 27 - Design for Rapid prototyping, DFAM

Lecture 28 - Introduction to Design for Manufacturing (DFM) and Assembly (DFA)

Lecture 29 - Rapid: Digital Prototyping

Lecture 30 - A Primer on Design for Quality: Robust and Reliability Engineering

Lecture 31 - Tolerance Design: Taguchi Robust Engineering

Lecture 32 - Complexity Mitigation in Multidisciplinary, System: Concurrent Engineering Precepts

Lecture 33 - Design Thinking steps

Lecture 34 - Design Thinking Methodologies and Tools

Lecture 35 - Frugal Engineering-A Disruptive Innovation Paradigm in Product Design and Development

Lecture 36 - Design-Driven Innovation

Lecture 37 - User interface and Experience (UI/UX) Design in Product Engineering

Lecture 38 - Industrial Design: Aesthetics and Ergonomics

Lecture 39 - Design Thinking in Industrial Design - Case Studies

Lecture 40 - Product Engineering'- Led Technology Entrepreneurship

NPTEL : NOC:Microfluidics and Nanofluidics (Mechanical Engineering)

Co-ordinators : Prof. Suman Chakraborty

Lecture 1 - Introduction to Microfluidics

Lecture 2 - Introduction to Microfluidics (Continued...)

Lecture 3 - Introduction to Microfluidics (Continued...)

Lecture 4 - Introduction to Microfluidics (Continued...)

Lecture 5 - Introduction to Microfluidics (Continued...)

Lecture 6 - Introduction to Microfluidics (Continued...)

Lecture 7 - Introduction to Microfluidics (Continued...)

Lecture 8 - Introduction to Microfluidics (Continued...)

Lecture 9 - Introduction to Microfluidics (Continued...)

Lecture 10 - Introduction to Microfluidics (Continued...)

Lecture 11 - Introduction to Microfluidics (Continued...)

Lecture 12 - Foundations of Fluid Dynamics

Lecture 13 - Foundations of Fluid Dynamics (Continued...)

Lecture 14 - Foundations of Fluid Dynamics (Continued...)

Lecture 15 - Foundations of Fluid Dynamics (Continued...)

Lecture 16 - Foundations of Fluid Dynamics (Continued...)

Lecture 17 - Foundations of Fluid Dynamics (Continued...)

Lecture 18 - Foundations of Fluid Dynamics (Continued...)

Lecture 19 - Foundations of Fluid Dynamics (Continued...)

Lecture 20 - Foundations of Fluid Dynamics (Continued...)

Lecture 21 - Foundations of Fluid Dynamics (Continued...)

Lecture 22 - Pressure-driven Microchannel Flows

Lecture 23 - Pressure-driven Microchannel Flows (Continued...)

Lecture 24 - Pressure-driven Microchannel Flows (Continued...)

Lecture 25 - Pressure-driven Microchannel Flows (Continued...)

Lecture 26 - Pressure-driven Microchannel Flows (Continued...)

Lecture 27 - Insights on Inertia-free Flows

Lecture 28 - Inertia-free Flow in Circular Capillaries and Generalizing the Force balance

Lecture 29 - Inertia-free flows for general fluids - Concepts for Microelectric Materials

Lecture 30 - Microelectric Fluid Flow through Microchannel

Lecture 31 - Fluid Flow through Deformable Microchanels

Lecture 32 - Fluid Flow through Deformable Microchanels (Continued...)

Lecture 33 - Lubrication Theory

Lecture 34 - Lubrication Theory (Continued...)

Lecture 35 - Lubrication Theory (Continued...)

Lecture 36 - Lubrication Theory (Continued...)

Lecture 37 - Lubrication Theory (Continued...)

Lecture 38 - Lubrication Theory - 2 Dimensional Problems

Lecture 39 - Unsteady Flows

Lecture 40 - Unsteady Flows (Continued...)

Lecture 41 - Unsteady Flows: Stoke's 1st problem (Continued...)

Lecture 42 - Unsteady Flows: Stoke's 1st problem (Continued...)

Lecture 43 - Unsteady Flows: Stoke's 2nd Problem

Lecture 44 - Unsteady Flows: Stoke's 2nd Problem (Continued...)

Lecture 45 - Unsteady Flows: Stoke's 2nd Problem (Continued...)

Lecture 46 - Stokes Flow Past a Sphere

Lecture 47 - Stokes Flow Past a Sphere

Lecture 48 - Stokes Flow Past a Sphere - The Drag Force

Lecture 49 - Surface Tension and Its Implications in Mircrofluidics

Lecture 50 - Equilibrium of a Droplet

Lecture 51 - Equilibrium of a Droplet (Continued...)

Lecture 52 - Capillary Rise

Lecture 53 - Capillary Filling Dynamics

Lecture 54 - Capillary Filling Dynamics (Continued...)

Lecture 55 - Capillary Filling Dynamics (Continued...)

Lecture 56 - Capillary Filling Dynamics (Continued...)

Lecture 57 - Factors affecting Capillary and Wetting

Lecture 58 - Electrowetting

Lecture 59 - Slip Boundary Condition

Lecture 60 - Apparent Slip

Lecture 61 - Thin Film Flows

Lecture 62 - Thin Film Flows (Continued...)

Lecture 63 - Electrokinetics and Electric Double Layer

Lecture 64 - Equilibrium within Electrical Double Layer Poisson Boltzmann model

Lecture 65 - Poisson - Nernst - Plank Model

Lecture 66 - Maxwell Stress and Electroosmosis

Lecture 67 - Electroosmosis

Lecture 68 - Electrophoresis and Streaming Potential

NPTEL : NOC:Industrial Robotics: Theories for Implementation (Mechanical Engineering)

Co-ordinators : Dr. Arun Dayal Udai

Lecture 1 - Introduction to and Industrial Robots

Lecture 2 - Anatomy of an Industrial Robot

Lecture 3 - Technical Specifications of an Industrial Robot

Lecture 4 - Classification of Robots

Lecture 5 - Fixed Installation Robots - Serial and Parallel Robots

Lecture 6 - Introduction to Industrial Controllers, Drives and Systems

Lecture 7 - DC Motors/Actuators and Drives

Lecture 8 - Stepper Motors

Lecture 9 - Brushless DC Motors/Actuators

Lecture 10 - AC Servo Motors

Lecture 11 - Introduction to Sensor and Transducers, Position Sensors

Lecture 12 - Position Sensors: Potentiometers, and Hall-effect. Velocity Sensors

Lecture 13 - Acceleration Sensors, AC Sensors (Resolvers and Synchros)

Lecture 14 - Non-contact (Inductive and Capacitive), Force/Torque Sensors

Lecture 15 - Limit Switches, Classification and Characteristics of Sensors

Lecture 16 - Degrees of Freedom and Kinematic Transformations : Translation

Lecture 17 - Pure Rotation, Arbitrary Axis Rotations, Euler Angles

Lecture 18 - Link and Joint Parameters (DH Notations), 2 and 3 DoF Robots

Lecture 19 - 3 DoF Cylindrical Robot (Spatial), SphericalWrist, Cylindrical Robot with Wrist

Lecture 20 - Forward Kinematics of 6-DoF Industrial Robot

Lecture 21 - Inverse Kinematics: 2 and 3 DoF Planar Manipulator

Lecture 22 - Spatial Robots - 3R, Cylindrical (RPP), 4-DoF SCARA Robot

Lecture 23 - Inverse Kinematics of a 6-DoF Industrial Robot

Lecture 24 - Differential Motion Analysis, Velocity, and Robot Jacobian

Lecture 25 - Jacobian (2R), Jacobian Inverse, Singularity, and Acceleration Analysis

Lecture 26 - Installing the Mechanical Arm and Test Run

Lecture 27 - Mastering an Industrial Robot

Lecture 28 - TCP Calibration using 4-Point method and External reference method

Lecture 29 - TCP Orientation Calibration using World Frame and Two-Point method

Lecture 30 - Worksurface Calibration

Lecture 31 - Fixed Tool Calibration: External TCP and Workpiece Calibration

Lecture 32 - Base Linear Track and External Turn-Table Calibration

Lecture 33 - Link Forces and Moments

Lecture 34 - Gravity Compensation and External Forces/Torques

Lecture 35 - Kinetostatic Measures for Robot Design

Lecture 36 - Introduction to Dynamics, LE Approach, Dynamics of 1DoF System

Lecture 37 - Equation of Motion (EoM) for a Two-Link Manipulator using LE

Lecture 38 - Newton-Euler (NE) Approach

Lecture 39 - Equation of motion of a Two-Link manipulator using NE Approach

Lecture 40 - Payload and Supplementary Load Calibration

Lecture 41 - Identification Experiments

Lecture 42 - Repeatability Tests and ISO 9283:1998

Lecture 43 - Introduction to Control, Linear Control, Second Order System

Lecture 44 - Response of a Second Order Linear System

Lecture 45 - Transfer Function and State-space representation, ODE

Lecture 46 - A Robot Joint : DC Motor Model

Lecture 47 - Feedback control of a robot arm, PID Control, Gain Tuning

Lecture 48 - Workspace and Operator Safety

Lecture 49 - Industrial Robot Programming

Lecture 50 - Course Conclusion and Suggestions

NPTEL : NOC:Cryogenic Hydrogen Technology (Mechanical Engineering)

Co-ordinators : Prof. Indranil Ghosh

Lecture 1 - Introduction

Lecture 2 - Hydrogen Properties

Lecture 3 - Slush Hydrogen, Ortho-Para H2

Lecture 4 - Ortho-Para H2 Conversion

Lecture 5 - Deuterium Production

Lecture 6 - Hydrogen Production - 1

Lecture 7 - Hydrogen Production - 2

Lecture 8 - Hydrogen Production - 3

Lecture 9 - Hydrogen Production

Lecture 10 - Hydrogen Production

Lecture 11 - Hydrogen Production (Electrolysis)

Lecture 12 - Electrolytic Hydrogen

Lecture 13 - Electrolytic Hydrogen

Lecture 14 - SPE Water Electrolyser

Lecture 15 - Thermochemical Process

Lecture 16 - Hydrogen Storage: Overview

Lecture 17 - Compressed Hydrogen Storage

Lecture 18 - Compressed Hydrogen Storage

Lecture 19 - Overview on Hydrogen Storage

Lecture 20 - Adsorption Storage of Hydrogen

Lecture 21 - Basics of Cryogenic Liquefaction

Lecture 22 - Coefficient of Expansion

Lecture 23 - Cryogenic Liquefaction Cycles

Lecture 24 - Cryogenic Liquefaction (Continued...)

Lecture 25 - Hydrogen Liquefaction

Lecture 26 - Cryogenic Liquefaction (Continued...)

Lecture 27 - Cryogenic Liquefaction - Numerical

Lecture 28 - Cryogenic Liquefaction - Numerical

Lecture 29 - Cryogenic Liquefaction (Continued...)

Lecture 30 - Cryogenic Liquefaction (Continued...)

Lecture 31 - Cryo Hydrogen Storage

Lecture 32 - Cryo Hydrogen Storage

Lecture 33 - Cryo Hydrogen Storage

Lecture 34 - Cryogenic Liquid Level Measurement

Lecture 35 - Flow Rate/Fluid Quality Measurement

Lecture 36 - Temperature Measurement

Lecture 37 - Application: Fuel Cell

Lecture 38 - Fuel Cell (Continued...)

Lecture 39 - Cryogenic Rocket Propulsion

Lecture 40 - Hydrogen Safety

NPTEL : NOC:Industrial Hydraulics and Automation (Mechanical Engineering)

Co-ordinators : Prof. Niranjan Kumar, Prof. Ajit Kumar

Lecture 1 - Introduction to power hydraulics

Lecture 2 - Fundamental theory of power hydraulics

Lecture 3 - Fundamental theory of power hydraulics (Continued...)

Lecture 4 - Hydraulic fluids

Lecture 5 - Hydraulic fluids (Continued...)

Lecture 6 - Introduction to hydraulic pumps

Lecture 7 - Introduction to hydraulic pumps (Continued...)

Lecture 8 - Construction, operation and application of hydraulic pumps

Lecture 9 - Construction, operation and application of hydraulic pumps (Continued...)

Lecture 10 - Construction, operation and application of hydraulic pumps (Continued...)

Lecture 11 - Performance characteristics of hydraulic pumps

Lecture 12 - Performance characteristics of hydraulic pumps (Continued...)

Lecture 13 - Performance characteristics of hydraulic pumps (Continued...)

Lecture 14 - Performance characteristics of hydraulic pumps (Continued...)

Lecture 15 - Performance characteristics of hydraulic pumps (Continued...)

Lecture 16 - Introduction to hydraulic actuators

Lecture 17 - Introduction to hydraulic actuators (Continued...)

Lecture 18 - Rotary actuators

Lecture 19 - Rotary actuators (Continued...)

Lecture 20 - Rotary actuators (Continued...)

Lecture 21 - Linear actuators

Lecture 22 - Linear actuators (Continued...)

Lecture 23 - Performance characteristics of hydraulic actuators

Lecture 24 - Performance characteristics of hydraulic actuators (Continued...)

Lecture 25 - Performance characteristics of hydraulic actuators (Continued...)

Lecture 26 - Introduction to hydraulic valves

Lecture 27 - Theory of control valves - I

Lecture 28 - Theory of control valves - I (Continued...)

Lecture 29 - Theory of control valves - II

Lecture 30 - Theory of control valves - III

Lecture 31 - Theory of control valves - IV

Lecture 32 - Theory of control valves - IV (Continued...)

Lecture 33 - Theory of proportional valves

Lecture 34 - Theory of servo valves

Lecture 35 - Numerical on operation of control valves

Lecture 36 - Introduction to hydraulic accessories

Lecture 37 - Hydraulic accumulator

Lecture 38 - Hydraulic reservoirs

Lecture 39 - Hoses, Filters and Coolers

Lecture 40 - Performance analysis of hydraulic accumulators and hydraulic reservoirs

Lecture 41 - Hydrostatic Transmission System (HST)

Lecture 42 - Hydraulic system for industrial equipment - I

Lecture 43 - Hydraulic system for industrial equipment - I (Continued...)

Lecture 44 - Hydraulic system for industrial equipment - I (Continued...)

Lecture 45 - Hydraulic system for industrial equipment - I (Continued...)

Lecture 46 - Hydraulic system for industrial equipment - II

Lecture 47 - Hydraulic system for industrial equipment - II (Continued...)

Lecture 48 - Hydraulic system for industrial equipment - II (Continued...)

Lecture 49 - Performance evaluation of hydraulic systems

Lecture 50 - Performance evaluation of hydraulic systems (Continued...)

Lecture 51 - Introduction to control system

Lecture 52 - Introduction to control system (Continued...)

Lecture 53 - Control system analysis - I

Lecture 54 - Control system analysis - I (Continued...)

Lecture 55 - Control system analysis - I (Continued...)

Lecture 56 - Control system analysis - II

Lecture 57 - Control system analysis - II (Continued...)

Lecture 58 - Control system analysis - II (Continued...)

Lecture 59 - Digital hydraulics

Lecture 60 - Digital hydraulics (Continued...)

NPTEL : Advanced Gas Dynamics (Mechanical Engineering)

Co-ordinators : Dr. Rinku Mukherjee

Lecture 1 - Introduction to Gas Dynamics & Review of Basic Thermodynamics

Lecture 2 - Review of Basic Thermodynamics Continued

Lecture 3 - An introduction to Normal Shocks

Lecture 4 - The Mach Number and Compressible Flow

Lecture 5 - The relation of physical properties across a normal shock

Lecture 6 - Normal Shock in a duct: Throat and Reservoir conditions

Lecture 7 - Example Problems in Normal Shocks

Lecture 8 - An introduction to Oblique Shocks

Lecture 9 - The relation of physical properties across an oblique shock

Lecture 10 - Example Problems in Oblique Shocks

Lecture 11 - Pressure - Deflection relationship of Shocks

Lecture 12 - An introduction to Expansion waves

Lecture 13 - Area - Mach Relationship

Lecture 14 - Unsteady Shock Waves: The Shock Tube

Lecture 15 - The Shock Tube: Propagating Normal Shock and its reflection from end wall

Lecture 16 - A review of wave propagation

Lecture 17 - Wave propagation: Small Perturbation Theory

Lecture 18 - Finite Wave Theory: An introduction to the Method of Characteristics

Lecture 19 - The Shock Tube: Propagating Expansion Fan

Lecture 20 - The Method of Characteristics

Lecture 21 - Application of The Method of Characteristics: Design of a minimum length nozzle

Lecture 22 - Application of The Method of Characteristics: Flow through a diverging channel

Lecture 23 - Flow over a Wavy wall: Formulation using Perturbation Theory

Lecture 24 - Subsonic Flow over a Wavy wall

Lecture 25 - Supersonic Flow over a Wavy wall

Lecture 26 - Supersonic Flow past a 3D Cone: Axisymmetric/Quasi 2D Flow

Lecture 27 - Quasi 2D Flow - I

Lecture 28 - Quasi 2D Flow - II

Lecture 29 - Similarity Rules and Transformed Coordinate System

Lecture 30 - Critical Mach Number and Thin Airfoil Theory

Lecture 31 - Example Problem using Thin Airfoil Theory

Lecture 32 - Example Problems - 1

Lecture 33 - Example Problems - 2

Lecture 34 - Example Problems - 3

Lecture 35 - Supersonic Flow past a 3D Cone at an angle of attack

Lecture 36 - Supersonic Flow past a 3D Cone at an angle of attack: Flow Visualization - I

Lecture 37 - Supersonic Flow past a 3D Cone at an angle of attack: Flow Visualization - II

Lecture 38 - Supersonic Flow past a 3D Cone at an angle of attack: Governing Equations

Lecture 39 - Supersonic Flow past a 3D Cone at an angle of attack: Numerical Procedure

Lecture 40 - Supersonic Flow past a 3D Bluff Body at an angle of attack

NPTEL : Design and Optimization of Energy systems (Mechanical Engineering)

Co-ordinators : Prof. C. Balaji

Lecture 1 - Introduction to Optimization

Lecture 2 - System Design and Analysis

Lecture 3 - Workable system

Lecture 4 - System simulation

Lecture 5 - Information flow diagrams

Lecture 6 - Successive substitution method

Lecture 7 - Successive substitution method (Continued.)

Lecture 8 - Successive substitution method and Newton-Raphson method

Lecture 9 - Newton-Raphson method (Continued.)

Lecture 10 - Convergence characteristics of Newton-Raphson method

Lecture 11 - Newton-Raphson method for multiple variables

Lecture 12 - Solution of system of linear equations

Lecture 13 - Introduction to Curve fitting

Lecture 14 - Example for Lagrange interpolation

Lecture 15 - Lagrange interpolation (Continued.)

Lecture 16 - Best fit

Lecture 17 - Least Square Regression

Lecture 18 - Least Square Regression (Continued.)

Lecture 19 - Least Square Regression (Continued.)

Lecture 20 - Non-linear Regression (Gauss - Newton Algorithm)

Lecture 21 - Optimization- Basic ideas

Lecture 22 - Properties of objective function and cardinal ideas in optimization

Lecture 23 - Unconstrained optimization

Lecture 24 - Constrained optimization problems

Lecture 25 - Mathematical proof of the Lagrange multiplier method

Lecture 26 - Test for Maxima / Minima

Lecture 27 - Handling in-equality constraints

Lecture 28 - Kuhn-Tucker conditions (Continued.)

Lecture 29 - Uni-modal function and search methods

Lecture 30 - Dichotomous search

Lecture 31 - Fibonacci search method

Lecture 32 - Reduction ratio of Fibonacci search method

Lecture 33 - Introduction to multi-variable optimization

Lecture 34 - The Conjugate gradient method

Lecture 35 - The Conjugate gradient method (Continued.)

Lecture 36 - Linear programming

Lecture 37 - Dynamic programming

Lecture 38 - Genetic Algorithms

Lecture 39 - Genetic Algorithms (Continued.)

Lecture 40 - Simulated Annealing and Summary

NPTEL : Engineering Fracture Mechanics (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - EFM Course Outline

Lecture 2 - Spectacular Failures

Lecture 3 - Lessons from Spectacular Failures

Lecture 4 - LEFM and EPFM

Lecture 5 - Fracture Mechanics is Holistic

Lecture 6 - Fatigue Crack Growth Model

Lecture 7 - Crack Growth and Fracture Mechanisms

Lecture 8 - Elastic Strain Energy

Lecture 9 - Fracture Strength by Griffith

Lecture 10 - Energy Release Rate

Lecture 11 - Utility of Energy Release Rate

Lecture 12 - Pop-in Phenomenon

Lecture 13 - Displacement and Stress Formulations

Lecture 14 - Forms of Stress Functions

Lecture 15 - Airyâ€™s Stress Function for Mode-I

Lecture 16 - Westergaard Solution of Stress Field for Mode-I

Lecture 17 - Displacement Field for Mode-I

Lecture 18 - Relation between KI and GI

Lecture 19 - Stress Field in Mode-II

Lecture 20 - Generalised Westergaard Approach

Lecture 21 - Williamâ€™s Eigen Function Approach

Lecture 22 - Multi-parameter Stress Field Equations

Lecture 23 - Validation of Multi-parameter Field Equations

Lecture 24 - Discussion Session - I

Lecture 25 - Evaluation of SIF for Various Geometries

Lecture 26 - SIF for Embedded Cracks

Lecture 27 - SIF for Surface Cracks

Lecture 28 - Modeling of Plastic Deformation

Lecture 29 - Irwinâ€™s Model

Lecture 30 - Dugdale Model

Lecture 31 - Fracture Toughness Testing

Lecture 32 - Plane Strain Fracture Toughness Testing

Lecture 33 - Plane Stress Fracture Toughness Testing

Lecture 34 - Paris Law and Sigmoidal Curve

Lecture 35 - Crack Closure

Lecture 36 - Crack Growth Models

Lecture 37 - J-Integral

Lecture 38 - HRR Field and CTOD

Lecture 39 - FAD and Mixed Mode Fracture

Lecture 40 - Crack Arrest and Repair Methodologies

Lecture 41 - Discussion Session - II

NPTEL : Experimental Stress Analysis (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - Overview of Experimental Stress Analysis

Lecture 2 - Optical Methods Work as Optical Computers

Lecture 3 - Stress, Strain and Displacement Fields

Lecture 4 - Physical Principle of Strain Gauges, Photoelasticity and MoirÃ©

Lecture 5 - Introduction to MoirÃ©, Brittle Coatings and Holography

Lecture 6 - Hologram Interferometry, Speckle Methods

Lecture 7 - Introduction to Shearography, TSA, DIC and Caustics

Lecture 8 - Fringe Patterns â€“ Richness of Qualitative Information

Lecture 9 - Multi-Scale Analysis in Experimental Mechanics

Lecture 10 - Selection of an Experimental Technique

Lecture 11 - Introduction to Transmission Photoelasticity

Lecture 12 - Ordinary and Extraordinary Rays

Lecture 13 - Light Ellipse, Passage of Light Through a Crystal Plate

Lecture 14 - Retardation Plates, Stress-optic Law

Lecture 15 - Plane Polariscope

Lecture 16 - Jones Calculus

Lecture 17 - Circular Polariscope

Lecture 18 - Determination of Photoelastic Parameters at an Arbitrary Point

Lecture 19 - Tardyâ€™s Method of Compensation

Lecture 20 - Calibration of Photo elastic Materials

Lecture 21 - Fringe Thinning Methodologies

Lecture 22 - Fringe Ordering in Photoelasticity

Lecture 23 - Miscellaneous Topics in Transmission Photoelasticity

Lecture 24 - Three Dimensional Photoelasticity

Lecture 25 - Overview of Digital Photoelasticity

Lecture 26 - Introduction to Photoelastic Coatings

Lecture 27 - Correction Factors for Photoelastic Coatings

Lecture 28 - Coating Materials, Selection of Coating Thickness, Industrial Application of Photoelastic Coatings

Lecture 29 - Calibration of Photoelastic Coatings, Introduction to Brittle Coatings

Lecture 30 - Analysis of Brittle Coatings

Lecture 31 - Introduction to Strain Gauges

Lecture 32 - Strain Sensitivity of a Strain Gauge, Bridge Sensitivity, Rosettes

Lecture 33 - Strain Gauge Alloys, Carriers and Adhesives

Lecture 34 - Performance of Strain Gauge System

Lecture 35 - Temperature Compensation, Two-wire and Three-wire Circuits

Lecture 36 - Strain Gauge Selection

Lecture 37 - Bonding of a Strain Gauge

Lecture 38 - Soldering, Accounting for Transverse Sensitivity Effects

Lecture 39 - Correction Factors for Special Applications

Lecture 40 - Special Gauges

Lecture 41 - Questions and Answers

NPTEL : Rocket Propulsion (Mechanical Engineering)

Co-ordinators : Prof. K. Ramamurthi

Lecture 1 - Introduction

Lecture 2 - Motion in Space

Lecture 3 - Rotational Frame of Reference and Orbital Velocities

Lecture 4 - Velocity Requirements

Lecture 5 - Theory of Rocket Propulsion

Lecture 6 - Rocket Equation and Staging of Rockets

Lecture 7 - Review of Rocket Principles; Propulsion Efficiency

Lecture 8 - Examples Illustrating Theory of Rocket Propulsion and Introduction to Nozzles

Lecture 9 - Theory of Nozzles

Lecture 10 - Nozzle Shape

Lecture 11 - Area Ratio of Nozzles; Under-expansion and Over-expansion

Lecture 12 - Characteristic Velocity and Thrust Coefficient

Lecture 13 - Divergence Loss in Conical Nozzles and the Bell Nozzle

Lecture 14 - Unconventional Nozzles and Problems in Nozzles

Lecture 15 - Criterion for Choice of Chemical Propellants

Lecture 16 - Choice of Fuel-Rich Propellants

Lecture 17 - Performance Prediction Analysis

Lecture 18 - Dissociation of Products of Combustion

Lecture 19 - Shifting Equilibrium and Frozen Flow in Nozzles

Lecture 20 - Factors Influencing Choice of Chemical Propellants

Lecture 21 - Low Energy Liquid Propellants and Hybrid Propellants

Lecture 22 - Introduction to Solid Propellant Rockets

Lecture 23 - Burn Rate of Solid Propellants and Equilibrium Pressure in Solid Propellant Rockets

Lecture 24 - Design Aspects of Solid Propellant Rockets

Lecture 25 - Burning Surface Area of Solid Propellant Grains

Lecture 26 - Ignition of Solid Propellant Rockets

Lecture 27 - Review of Solid Propellant Rockets

Lecture 28 - Feed Systems for Liquid Propellant Rockets

Lecture 29 - Feed System Cycles for Pump Fed Liquid Propellant Rockets

Lecture 30 - Analysis of Gas Generator and Staged Combustion Cycles and Introduction to Injectors

Lecture 31 - Injectors, Cooling of Chamber and Mixture Ratio Distribution

Lecture 32 - Efficiencies due to Mixture Ratio Distribution and Incomplete Vaporization

Lecture 33 - Pumps and Turbines; Propellant Feed System at Zero â€œgâ€ Conditions

Lecture 34 - Review of Liquid Bi-propellant Rockets and Introduction to Mono-propellant Rockets

Lecture 35 - Introduction to Hybrid Rockets and a Simple Illustration of Combustion Instability in Liquid Propellant Rockets

Lecture 36 - Combustion Instability in Solid Propellant and Liquid Propellant Rockets â€“ Bulk and Wave Modes

Lecture 37 - Wave modes of Oscillation

Lecture 38 - Mechanisms Causing Instabilities and Strategies for Avoiding Combustion Instability

Lecture 39 - Electric and Magnetic Fields and the Electrostatic Thruster

Lecture 40 - Electrical Thrusters

Lecture 41 - Advances in Rocket Propulsion

NPTEL : Advanced Finite Elements Analysis (Mechanical Engineering)

Co-ordinators : Dr. R. Krishnakumar

Lecture 1 - Advanced Finite Elements Analysis

Lecture 2 - Advanced Finite Elements Analysis

Lecture 3 - Advanced Finite Elements Analysis

Lecture 4 - Advanced Finite Elements Analysis

Lecture 5 - Advanced Finite Elements Analysis

Lecture 6 - Advanced Finite Elements Analysis

Lecture 7 - Advanced Finite Elements Analysis

Lecture 8 - Advanced Finite Elements Analysis

Lecture 9 - Advanced Finite Elements Analysis

Lecture 10 - Advanced Finite Elements Analysis

Lecture 11 - Advanced Finite Elements Analysis

Lecture 12 - Advanced Finite Elements Analysis

Lecture 13 - Advanced Finite Elements Analysis

Lecture 14 - Advanced Finite Elements Analysis

Lecture 15 - Advanced Finite Elements Analysis

Lecture 16 - Advanced Finite Elements Analysis

Lecture 17 - Advanced Finite Elements Analysis

Lecture 18 - Advanced Finite Elements Analysis

Lecture 19 - Advanced Finite Elements Analysis

Lecture 20 - Advanced Finite Elements Analysis

Lecture 21 - Advanced Finite Elements Analysis

Lecture 22 - Advanced Finite Elements Analysis

Lecture 23 - Advanced Finite Elements Analysis

Lecture 24 - Advanced Finite Elements Analysis

Lecture 25 - Advanced Finite Elements Analysis

Lecture 26 - Advanced Finite Elements Analysis

Lecture 27 - Advanced Finite Elements Analysis

Lecture 28 - Advanced Finite Elements Analysis

Lecture 29 - Advanced Finite Elements Analysis

Lecture 30 - Advanced Finite Elements Analysis

NPTEL : Advanced Operations Research (Mechanical Engineering)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Introduction and Linear Programming

Lecture 2 - Revised Simplex Algorithm

Lecture 3 - Simplex Method for Bounded Variables

Lecture 4 - One Dimensional Cutting Stock Problem

Lecture 5 - One Dimensional Cutting Stock Problem (Continued.)

Lecture 6 - Dantzig-Wolfe Decomposition Algorithm

Lecture 7 - Dantzig-Wolfe Decomposition Algorithm Primal-Dual Algorithm

Lecture 8 - Primal-Dual Algorithm

Lecture 9 - Goal Programming-Formulations

Lecture 10 - Goal Programming Solutions Complexity of Simplex Algorithm

Lecture 11 - Complexity of Simplex Algorithm (Continued.) Integer Programming

Lecture 12 - Integer Programming-Formulations

Lecture 13 - Solving Zero-One Problems

Lecture 14 - Solving Zero-One Problems (Continued.)

Lecture 15 - Branch And Bond Algorithm For Integer Programming

Lecture 16 - Cutting Plane Algorithm

Lecture 17 - All Integer Primal Algorithm

Lecture 18 - All Integer Dual Algorithm

Lecture 19 - Network Models

Lecture 20 - Shortest Path Problem

Lecture 21 - Successive Shortest Path Problem

Lecture 22 - Maximum Flow Problem

Lecture 23 - Minimum Cost Flow Problem

Lecture 24 - Traveling Salesman Problem (TSP)

Lecture 25 - Branch and Bound Algorithms for TSP

Lecture 26 - Heuristics for TSP

Lecture 27 - Heuristics for TSP (Continued.)

Lecture 28 - Chinese Postman Problem

Lecture 29 - Vehicle Routeing Problem

Lecture 30 - Queueing Models

Lecture 31 - Single Server Queueing Models

Lecture 32 - Multiple Server Queueing Models

Lecture 33 - Game Theory

Lecture 34 - Critical Path Method

Lecture 35 - Quadratic Programming

Lecture 36 - Integer Programming (Continued.)

Lecture 37 - All Integer Dual Algorithm

Lecture 38 - Mixed Integer Linear Programming

Lecture 39 - Benders Partitioning Algorithm

NPTEL : Fundamentals of Operations Research (Mechanical Engineering)

Co-ordinators : Prof. G. Srinivasan

Lecture 1 - Introduction to Linear Programming Formulations

Lecture 2 - Linear Programming Formulations (Continued...)

Lecture 3 - Linear Programming Solutions- Graphical Methods

Lecture 4 - Linear Programming Solutions - Simplex Algorithm

Lecture 5 - Simplex Algorithm-Minimization Problems

Lecture 6 - Simplex Algorithm - Initialization and Iteration

Lecture 7 - Simplex Algorithm - Termination

Lecture 8 - Introduction to Duality

Lecture 9 - Primal Dual Relationships, Duality Theorems

Lecture 10 - Dual Variables and the Simplex Tables

Lecture 11 - Simplex Algorithm in Matrix Form Introduction to Sensitivity Analysis

Lecture 12 - Sensitivity Analysis Transportation Problem (Introduction)

Lecture 13 - Transportation Problem, Methods for Initial Basic Feasible Solutions

Lecture 14 - Transportation Problem-Optimal Solutions

Lecture 15 - Transportation Problem - Other Issues

Lecture 16 - Assignment Problem - Hungarian Algorithm

Lecture 17 - Assignment Problem - Other Issues Introduction to Dynamic Programming

Lecture 18 - Dynamic Programming - Examples Involving Discrete Variables

Lecture 19 - Dynamic Programming - Continuous Variables

Lecture 20 - Dynamic Programming - Examples to Solve Linear & Integer Programming Problems

Lecture 21 - Inventory Models - Deterministic Models

Lecture 22 - Inventory Models - Discount Models, Constrained Inventory Problems, Lagrangean Multipliers, Conclusions

NPTEL : Introduction to Finite Element Method (Mechanical Engineering)

Co-ordinators : Dr. R. Krishnakumar

Lecture 1 - Introduction to Finite Element Method

Lecture 2 - Introduction to Finite Element Method

Lecture 3 - Introduction to Finite Element Method

Lecture 4 - Introduction to Finite Element Method

Lecture 5 - Introduction to Finite Element Method

Lecture 6 - Introduction to Finite Element Method

Lecture 7 - Introduction to Finite Element Method

Lecture 8 - Introduction to Finite Element Method

Lecture 9 - Introduction to Finite Element Method

Lecture 10 - Introduction to Finite Element Method

Lecture 11 - Introduction to Finite Element Method

Lecture 12 - Introduction to Finite Element Method

Lecture 13 - Introduction to Finite Element Method

Lecture 14 - Introduction to Finite Element Method

Lecture 15 - Introduction to Finite Element Method

Lecture 16 - Introduction to Finite Element Method

Lecture 17 - Introduction to Finite Element Method

Lecture 18 - Introduction to Finite Element Method

Lecture 19 - Introduction to Finite Element Method

Lecture 20 - Introduction to Finite Element Method

Lecture 21 - Introduction to Finite Element Method

Lecture 22 - Introduction to Finite Element Method

Lecture 23 - Introduction to Finite Element Method

Lecture 24 - Introduction to Finite Element Method

Lecture 25 - Introduction to Finite Element Method

Lecture 26 - Introduction to Finite Element Method

Lecture 27 - Introduction to Finite Element Method

Lecture 28 - Introduction to Finite Element Method

Lecture 29 - Introduction to Finite Element Method

Lecture 30 - Introduction to Finite Element Method

Lecture 31 - Introduction to Finite Element Method

Lecture 32 - Introduction to Finite Element Method

Lecture 33 - Introduction to Finite Element Method

NPTEL : Mechanical Measurements and Metrology (Mechanical Engineering)

Co-ordinators : Prof. Shunmugam M. S, Prof. S.P. Venkateshan

Lecture 1 - Introduction to the Study of Mechanical Measurement

Lecture 2 - Errors in Measurement

Lecture 3 - Errors in Measurement (Continued...)

Lecture 4 - Propagation of Errors

Lecture 5 - Regression Analysis

Lecture 6 - Regression Analysis (Continued...)

Lecture 7 - Design of Experiments

Lecture 8 - Design of Experiments (Continued...)

Lecture 9 - Temperature Measurement

Lecture 10 - Overview of Thermometry

Lecture 11 - Thermoelectric Thermometry

Lecture 12 - Thermoelectric Thermometry (Continued...)

Lecture 13 - Measurement of Temperature Under Various Conditions

Lecture 14 - Errors in Temperature Measurement

Lecture 15 - Measurement of Transient Temperature and Resistance Thermometry

Lecture 16 - Resistance Thermometry (Continued...)

Lecture 17 - Resistance Thermometry (Continued...) and pyrometry

Lecture 18 - pyrometry (Continued...)

Lecture 19 - pyrometry (Continued...)

Lecture 20 - Pressure Measurement (Continued...)

Lecture 21 - Pressure Measurement (Continued...)

Lecture 22 - Pressure Measurement (Continued...)

Lecture 23 - Pressure Measurement (Continued...)

Lecture 24 - Transient Response of Pressure Transducers

Lecture 25 - Transient Response of Pressure Transducers

Lecture 26 - Measurement of High Vacuum

Lecture 27 - Measurement of Fluid Velocity

Lecture 28 - Hot Wire Anemometry and Laser Doppler Velocimetry

Lecture 29 - Laser Doppler Velocimetry and Ultrasonic Methods

Lecture 30 - Measurement of Heat Flux

Lecture 31 - Measurement of Heat Flux (Continued...)

Lecture 32 - Transient Method of Heat Flux Measurement

Lecture 33 - Measurement of Volume and Mass Flow Rate of Fluid

Lecture 34 - Flow Measuring Devices

Lecture 35 - Measurement of Stagnation and Bulk Mean Temperature

Lecture 36 - Measurement of Thermo-Physical Properties

Lecture 37 - Measurement of Thermal Conductivity

Lecture 38 - Measurement of Heat Capacity and Heating Value

Lecture 39 - Measurement of Viscosity

Lecture 40 - Measurement of Viscosity (Continued...)

Lecture 41 - Integrating Sphere and Measurement of Emissivity

Lecture 42 - Measurements of Gas Composition

Lecture 43 - Measurements of Gas Composition (Continued...)

Lecture 44 - Measurements of Gas Composition and Smoke

Lecture 45 - Measurement of Force

Lecture 46 - Force Measurement

Lecture 47 - Vibration and Acceleration Measurement

Lecture 48 - Laser Doppler Accelerometer,Speed,Torque

Lecture 49 - General Issues in Mechanical Measurement

Lecture 50 - Case Studies

NPTEL : Principles of Mechanical Measurements (Mechanical Engineering)

Co-ordinators : Prof. R. Raman

Lecture 1 - Principles Of Mechanical Measurements

Lecture 2 - Principles Of Mechanical Measurements

Lecture 3 - Principles Of Mechanical Measurements

Lecture 4 - Principles Of Mechanical Measurements

Lecture 5 - Principles Of Mechanical Measurements

Lecture 6 - Principles Of Mechanical Measurements

Lecture 7 - Principles Of Mechanical Measurements

Lecture 8 - Principles Of Mechanical Measurements

Lecture 9 - Principles Of Mechanical Measurements

Lecture 10 - Principles of Mechanical Measurements

Lecture 11 - Principles Of Mechanical Measurements

Lecture 12 - Principles Of Mechanical Measurements

Lecture 13 - Principles Of Mechanical Measurements

Lecture 14 - Principles Of Mechanical Measurements

Lecture 15 - Principles Of Mechanical Measurements

Lecture 16 - Principles Of Mechanical Measurements

Lecture 17 - Principles Of Mechanical Measurements

Lecture 18 - Principles Of Mechanical Measurements

Lecture 19 - Principles Of Mechanical Measurements

Lecture 20 - Principles Of Mechanical Measurements

Lecture 21 - Principles Of Mechanical Measurements

Lecture 22 - Principles Of Mechanical Measurements

Lecture 23 - Principles Of Mechanical Measurements

Lecture 24 - Principles Of Mechanical Measurements

Lecture 25 - Principles Of Mechanical Measurements

Lecture 26 - Principles Of Mechanical Measurements

NPTEL : Spray Theory and Applications (Mechanical Engineering)

Co-ordinators : Prof. Mahesh Panchagnula, Dr. Paul E. Sojka

Lecture 1 - Introduction to sprays and their applications

Lecture 2 - Spatial versus Temporal Sampling

Lecture 3 - Spatial Vs Temporal Sampling example problem

Lecture 4 - Steady vs unsteady spray

Lecture 5 - Statistical measures on spray

Lecture 6 - Discussion on pdf and moments

Lecture 7 - Size velocity correlation

Lecture 8 - Discussion on Interfacial tension

Lecture 9 - Introduction to Atomizers and their design - 1

Lecture 10 - Introduction to Atomizers and their design - 2

Lecture 11 - Simple measurement techniques

Lecture 12 - Selection of atomizers

Lecture 13 - Spray measurement characteristics

Lecture 14 - Spray measurements techniques

Lecture 15 - Non-intrusive spray measurements techniques

Lecture 16 - Non-intrusive spray measurements techniques

Lecture 17 - Linear stability analysis â€“ Introduction

Lecture 18 - Linear stability analysis- Kelvin-Helmhotz instability - 1

Lecture 19 - Linear stability analysis- Kelvin-Helmhotz instability - 2

Lecture 20 - Linear stability analysis- Kelvin-Helmhotz instability - 3

Lecture 21 - Linear stability analysis procedure

Lecture 22 - Linear stability analysis - Cylindrial jet instability - 1

Lecture 23 - Linear stability analysis - Cylindrial jet instability - 2

Lecture 24 - Linear stability analysis - Planar Liquid Sheet instability - 1

Lecture 25 - Linear stability analysis - Planar Liquid Sheet instability - 2

Lecture 26 - Design of pressure swirl atomizer - 1

Lecture 27 - Design of pressure swirl atomizer - 2

Lecture 28 - Design of pressure swirl atomizer - 3

Lecture 29 - Design of pressure swirl atomizer - 4

Lecture 30 - Secondary atomization-Dimensionless parameters

Lecture 31 - Secondary atomization-Modes of breakup - 1

Lecture 32 - Secondary atomization-Modes of breakup - 2

Lecture 33 - Multiphase modelling

Lecture 34 - Multiphase modelling

Lecture 35 - Multiphase flow modelling basics

Lecture 36 - Multiphase modelling â€“ Selection of model - 1

Lecture 37 - Multiphase modelling â€“ Selection of model - 2

Lecture 38 - Multiphase modelling - Governing equations

Lecture 39 - Droplet evaporation

Lecture 40 - Droplet combustion

Lecture 41 - Spray combustion

NPTEL : Conduction And Radiation (Mechanical Engineering)

Co-ordinators : Prof. C. Balaji

Lecture 1 - Importance of Thermal Radiation

Lecture 2 - Blackbody definition

Lecture 3 - Solid angle, spectral radiation intensity

Lecture 4 - Radiation pressure and radiation energy density

Lecture 5 - Relationship between â€œIâ€ and â€œTâ€ and Candidate blackbody distribution functions

Lecture 6 - Candidate blackbody distribution functions (Continued...)

Lecture 7 - Planck's blackbody radiation distribution function

Lecture 8 - Planck's distribution and Wien's displacement law

Lecture 9 - Universal blackbody function

Lecture 10 - Emissivity

Lecture 11 - Emissivity (Continued...)

Lecture 12 - Emissivity (Continued...)

Lecture 13 - Kirchoff law, Absorptivity

Lecture 14 - Kirchoff law, Absorptivity (Continued...)

Lecture 15 - Problems on emissivity, absorptivity

Lecture 16 - Reflectivity

Lecture 17 - Transmissivity

Lecture 18 - Problems on reflectivity and transmissivity

Lecture 19 - Radiation heat transfer between surfaces

Lecture 20 - View factor

Lecture 21 - View factor (Continued...)

Lecture 22 - View factor (Continued...)

Lecture 23 - Enclosure analysis

Lecture 24 - Enclosure analysis (Continued...)

Lecture 25 - Enclosure analysis - Gray surface

Lecture 26 - Enclosure analysis - Non gray surfaces

Lecture 27 - Radiation in participating media

Lecture 28 - Solution to the RTE

Lecture 29 - Concept of mean beam length

Lecture 30 - Enclosure analysis in the presence of absorbing / emitting gas

Lecture 31 - Emissivities and absorptivities of Gas mixtures

Lecture 32 - Conduction - Introduction

Lecture 33 - Conduction - Energy equation

Lecture 34 - Conduction - 1D, steady state

Lecture 35 - Conduction - 1D, heat generation

Lecture 36 - Fin heat transfer - I

Lecture 37 - Fin heat transfer - II

Lecture 38 - Conduction - Cylindrical and Spherical geometries

Lecture 39 - Transient conduction

Lecture 40 - Transient conduction (Continued...)

Lecture 41 - Two dimensional steady state conduction

Lecture 42 - Analytical solution for Laplace equation

Lecture 43 - Numerical methods in conduction

Lecture 44 - Numerical methods in conduction (Continued...)

Lecture 45 - Conduction with change of phase

Lecture 46 - Conduction with change of phase (Continued...)

NPTEL : Gas Dynamics and Propulsion (Mechanical Engineering)

Co-ordinators : Prof. V. Babu

Lecture 1 - Introduction

Lecture 2 - Introduction / Fundamental Ideas

Lecture 3 - Fundamental Ideas

Lecture 4 - Fundamental Ideas

Lecture 5 - Fundamental Ideas / Normal Shock Waves

Lecture 6 - Normal Shock Waves

Lecture 7 - Normal Shock Waves / Rayleigh Flow

Lecture 8 - Rayleigh Flow

Lecture 9 - Rayleigh Flow

Lecture 10 - Rayleigh Flow / Fanno Flow

Lecture 11 - Fanno Flow

Lecture 12 - Fanno Flow

Lecture 13 - Fanno Flow / Quasi One Dimensional Flows

Lecture 14 - Quasi One Dimensional Flows

Lecture 15 - Quasi One Dimensional Flows

Lecture 16 - Quasi One Dimensional Flows

Lecture 17 - Quasi One Dimensional Flows

Lecture 18 - Quasi One Dimensional Flows

Lecture 19 - Quasi One Dimensional Flows

Lecture 20 - Oblique Shock Waves

Lecture 21 - Oblique Shock Waves

Lecture 22 - Oblique Shock Waves

Lecture 23 - Oblique Shock Waves / Prandtl Meyer Waves

Lecture 24 - Prandtl Meyer Waves

Lecture 25 - Prandtl Meyer Waves

Lecture 26 - Propulsion - an Introduction

Lecture 27 - Components of the Gas Turbine Engine

Lecture 28 - Components of the Gas Turbine Engine

Lecture 29 - Components of the Gas Turbine Engine

Lecture 30 - Components of the Gas Turbine Engine

Lecture 31 - Components of the Gas Turbine Engine / Thermodynamic Analysis of the Engine

Lecture 32 - Thermodynamic Analysis of the Engine

Lecture 33 - Thermodynamic Analysis of the Engine

Lecture 34 - Calculations for Thrust and Fuel Consumption

Lecture 35 - Calculations for Thrust and Fuel Consumption

Lecture 36 - Calculations for Thrust and Fuel Consumption / Emerging Trends

Lecture 37 - Emerging Trends / Ramjets

Lecture 38 - Ramjets

Lecture 39 - Ramjets / Scramjets

Lecture 40 - Scramjets

NPTEL : Microfluidics (Mechanical Engineering)

Co-ordinators : Dr. Ashis Kumar Sen

Lecture 1 - Introduction and Scaling

Lecture 2 - Scaling

Lecture 3 - Micro-scale fluid mechanics

Lecture 4 - Micro-scale fluid mechanics (Continued...)

Lecture 5 - Micro-scale fluid mechanics (Continued...)

Lecture 6 - Micro-scale fluid mechanics (Continued...)

Lecture 7 - Micro-scale fluid mechanics (Continued...)

Lecture 8 - Micro-scale fluid mechanics (Continued...)

Lecture 9 - Micro-scale fluid mechanics (Continued...)

Lecture 10 - Micro-scale fluid mechanics (Continued...)

Lecture 11 - Capillary Flows

Lecture 12 - Capillary Flows (Continued...)

Lecture 13 - Capillary Flows and Electrokinetics

Lecture 14 - Electrokinetics

Lecture 15 - Electrokinetics (Continued...)

Lecture 16 - Electrokinetics (Continued...)

Lecture 17 - Electrokinetics (Continued...)

Lecture 18 - Electrokinetics (Continued...)

Lecture 19 - Electrokinetics (Continued...)

Lecture 20 - Electrokinetics and Magnetophoresis

Lecture 21 - Microfabrication Techniques

Lecture 22 - Microfabrication Techniques (Continued...)

Lecture 23 - Microfabrication Techniques (Continued...)

Lecture 24 - Microfabrication Techniques (Continued...)

Lecture 25 - Microfabrication Techniques (Continued...)

Lecture 26 - Microfabrication Techniques (Continued...)

Lecture 27 - Microfabrication Techniques (Continued...)

Lecture 28 - Microfabrication Techniques (Continued...)

Lecture 29 - Micropump

Lecture 30 - Micropump (Continued...)

Lecture 31 - Microvalve

Lecture 32 - Microvalve (Continued...)

Lecture 33 - Microvalve (Continued...)

Lecture 34 - Micro Flow Sensor and Micro mixers

Lecture 35 - Micro mixers

Lecture 36 - Micro mixers (Continued...)

Lecture 37 - Micro droplets

Lecture 38 - Micro reactors (Continued...)

Lecture 39 - Micro needles and Microparticle separation

Lecture 40 - Few applications of microfluidics

Lecture 41 - Lab Demo

NPTEL : Convective Heat Transfer (Mechanical Engineering)

Co-ordinators : Dr. Arvind Pattamatta, Prof. Ajit K. Kolar

Lecture 1 - Introduction to convective heat transfer - Part 1

Lecture 2 - Introduction to convective heat transfer - Part 2

Lecture 3 - Continuity Equation

Lecture 4 - Momentum and Energy Equations

Lecture 5 - Energy Equation

Lecture 6 - Reynolds Transport Theorem

Lecture 7 - Entrophy Generation and streamfunction-vorticity formulation

Lecture 8 - Couette flow - Part 1

Lecture 9 - Couette flow - Part 2

Lecture 10 - Couette flow - Part 3

Lecture 11 - Boundary layer approximation

Lecture 12 - Laminar External flow past flat plate (Blasius Similarity Solution)

Lecture 13 - Numerical solution to the Blasius equation and similarity solution to heat transfer

Lecture 14 - Pohlhausen similarity solution and flows including pressure gradient (Falkner-Skan)

Lecture 15 - Falkner skan solutions for heat transfer

Lecture 16 - Similarity solution for flow and heat transfer with transpiration at walls

Lecture 17 - Thermal boundary layer in high speed flows

Lecture 18 - Approximate(Integral) methods for laminar external flow and heat transfer

Lecture 19 - Integral method for laminar external thermal boundary layer over isothermal surface

Lecture 20 - Integral method for flows with pressure gradient (von Karman-Pohlhausen method)

Lecture 21 - Integral method with pressure gradient: heat transfer

Lecture 22 - Heat transfer across a circular cylinder: Walz approximation

Lecture 23 - Duhamel's method for varying surface temperature

Lecture 24 - Laminar External heat transfer with non uniform surface temperature

Lecture 25 - Laminar internal forced convection - fundamentals

Lecture 26 - Hydrodynamically and thermally fully developed internal laminar flows

Lecture 27 - Fully developed laminar internal flow and heat transfer

Lecture 28 - Shooting method for fully developed heat transfer and thermal entry length problem

Lecture 29 - Thermal entry length problem with plug velocity profile: Graetz problem

Lecture 30 - Extended Graetz problem for parabolic velocity profile

Lecture 31 - Extended Graetz problem

Lecture 32 - Extended Graetz problem with wall flux boundary condition

Lecture 33 - Approximate method for laminar internal flows

Lecture 34 - Integral method for thermal entry length problem

Lecture 35 - Introduction to Natural Convection Heat Transfer

Lecture 36 - Similarity Solution in Natural Convection for Vertical isothermal Plate - Part 1

Lecture 37 - Similarity Solution in Natural Convection for Vertical isothermal Plate - Part 2

Lecture 38 - Similarity Solution in Natural Convection for Vertical isoflux Plate

Lecture 39 - Approximate Method in Natural Convection Heat Transfer

Lecture 40 - Natural Convection in Other Configurations

Lecture 41 - Turbulent Convective Heat Transfer : RANS Equations - Part 1

Lecture 42 - Turbulent Convective Heat Transfer : RANS Equations - Part 2

Lecture 43 - Analogies in Turbulent Convective Heat Transfer - Part 1

Lecture 44 - Analogies in Turbulent Convective Heat Transfer - Part 2

NPTEL : Introduction to Explosions and Explosion Safety (Mechanical Engineering)

Co-ordinators : Prof. K. Ramamurthi

Lecture 1 - Loud Bang and Disruption

Lecture 2 - Blast Wave in an Explosion: Predictions from Dimensional Considerations

Lecture 3 - Typical Examples of Explosions and Classification

Lecture 4 - Shock Hugoniot and Rayleigh Line

Lecture 5 - Properties behind a Constant Velocity Shock

Lecture 6 - Blast waves:Concentration of Mass at the Front,Snow Plow Approximation,Energy conservation ina Blast wave

Lecture 7 - Blast waves: Decay of a strong Blast wave,Explosion Length, Sach's Scaling,Over pressure,Cranz Hopkinson Scaling law of Overpressure

Lecture 8 - Blast Waves: Overpressure and Impulse in the Near and Far Field, Examples,Introduction to Impulse

Lecture 9 - Blast Waves: Non-dimensional Impulse, Cranz -Hopkinson Scaling, Missiles, Fragments and Shrapnel, Craters, Examples

Lecture 10 - Blast Waves: Interaction with Objects, Reflection and Transmission of Blast Waves, Impedance

Lecture 11 - Blast Waves: Amplification of Reflected Blast Waves; Role of Impedance, Spalling, Damage to Organs containing Air, Mushroom Cloud in an Explosion, Examples

Lecture 12 - Blast Waves: Damage from Blast Waves, Examples, Multiple Spikes in an Impulse, Iso-damage Curve on an Overpressure- Impulse Diagram, Complex Structures

Lecture 13 - Energy Release in a Chemical Reaction: Moles, Internal Chemical Energy, Standard Heats of Formation

Lecture 14 - Energy Release: Stoichiometry, Equivalence Ratio and Heat Release in Fuel Rich and Oxidizer Rich Compounds

Lecture 15 - Energy Release: Examples of Energy Release Calculations, Higher and Lower Calorific Values, Internal Energy of Formation

Lecture 16 - Rate of Energy Release: Concentration, Activation Energy, Energy Release Profile

Lecture 17 - Thermal Theory of Explosion

Lecture 18 - Thermal Theory

Lecture 19 - Role of Chain Carriers in an Explosion

Lecture 20 - Combustion - I

Lecture 21 - Combustion - II

Lecture 22 - Case Histories of Explosions involving Volatile Liquids

Lecture 23 - Detonation

Lecture 24 - Structure of Detonations

Lecture 25 - Realizable States in a Detonation

Lecture 26 - One Dimensional Model of Detonation

Lecture 27 - Case Histories of Explosions involving Detonation or Quasi-Detonation

Lecture 28 - Explosions in Confined and Unconfined Geometries

Lecture 29 - Dust Explosions - I

Lecture 30 - Dust Explosions - II

Lecture 31 - Physical Explosions

Lecture 32 - Rupture of Cryogenic Storage Vessels and Pressure Vessels

Lecture 33 - Condensed Phased Explosives Based on Hydrocarbons

Lecture 34 - Condensed Phase Explosives and their Properties

Lecture 35 - TNT Equivalence and Yield of an Explosion

Lecture 36 - Atmospheric Dispersion

Lecture 37 - Modeling Atmospheric Dispersion

Lecture 38 - Explosions Involving Atmospheric Dispersion

Lecture 39 - Quantification of Damages in an Explosion

Lecture 40 - Risk Analysis for an Explosion

NPTEL : Metrology (Mechanical Engineering)

Co-ordinators : Dr. K. Sadashivappa

Lecture 1 - Introduction to Metrology

Lecture 2 - Metrology terminologies

Lecture 3 - Measurement errors

Lecture 4 - Linear measuring instruments Â– 1 (Angle plate, steel rule, spring calipers)

Lecture 5 - Linear measuring instruments Â– 2 (Combination set, Vernier calipers)

Lecture 6 - Linear measuring instruments Â– 3 (Height gauge, Micrometers Â– 1)

Lecture 7 - Linear measuring instruments Â– 4 (Micrometers Â– 2, Bore gauge)

Lecture 8 - Linear measuring instruments Â– 5 (Dial indicators, thickness gauges, depth gauges)

Lecture 9 - Manufacturing tolerances and fits

Lecture 10 - Terminologies of limits fits and tolerances

Lecture 11 - Numerical problems on fit and tolerances

Lecture 12 - Selection of fits, Geometrical tolerances

Lecture 13 - Positional tolerances

Lecture 14 - Limit gauging - 1

Lecture 15 - Limit gauging - 2

Lecture 16 - Design of limit gauges

Lecture 17 - Measurement of straightness, flatness and squareness

Lecture 18 - Perpendicularity measurement

Lecture 19 - Basics of surface roughness

Lecture 20 - Surface finish parameters

Lecture 21 - Stylus type surface finish measuring instruments

Lecture 22 - Non-contact type surface finish measuring instruments

Lecture 23 - Screw thread production and terminology

Lecture 24 - Measurement of screw thread elements

Lecture 25 - Introduction to gears

Lecture 26 - Measurement of gear elements

Lecture 27 - Angle measurement - 1

Lecture 28 - Angle measurement - 2

Lecture 29 - Radius measurement, Contact angle measurement

Lecture 30 - Basics of interferometry

Lecture 31 - Interferometers

Lecture 32 - Introduction to comparators, Mechanical comparators

Lecture 33 - Electrical and electronic comparators, Optical comparators

Lecture 34 - Pneumatic comparators

Lecture 35 - Geometrical tests on lathe

Lecture 36 - Geometrical tests on pillar type drilling machine

Lecture 37 - Universal measuring machine (UMM) and Coordinate measuring machine (CMM)

Lecture 38 - CMM probes and CMM software

Lecture 39 - Feature measurement using CMM, Laser vision

Lecture 40 - In-process gauging and control

Lecture 41 - Stage position metrology

Lecture 42 - Micro and Nano stages, Nano technology instrumentation

Lecture 43 - Optical system design

Lecture 44 - Complex opto- mechanical assemblies, Metrology testing and certification services

NPTEL : NOC:Engineering Mechanics Statics and Dynamics (Mechanical Engineering)

Co-ordinators : Prof. Mahesh Panchagnula

Lecture 1 - Introduction to the course

Lecture 2 - Newton's laws

Lecture 3 - Equilibrium

Lecture 4 - Example 1 - Statics

Lecture 5 - Example 2 - Rigid Body Systems

Lecture 6 - Example 3 - Rigid Body Systems

Lecture 7 - Structural Systems with rigid bodies

Lecture 8 - Types of 1-D Structural Elements

Lecture 9 - Axial members

Lecture 10 - Analysis of the truss system

Lecture 11 - Stability of Structural systems

Lecture 12 - Beams - Example 1

Lecture 13 - Beams - BMD and SFD

Lecture 14 - Beams - Loading, Shear and Bending Moment Relations

Lecture 15 - Static Friction

Lecture 16 - Friction - Solving Problems

Lecture 17 - Particle Kinematics - 1

Lecture 18 - Particle Kinematics - 2 (Example)

Lecture 19 - Particle Kinematics - Curvilinear Coordinates

Lecture 20 - Rigid Body Kinematics

Lecture 21 - Rotational Motion (Example 1)

Lecture 22 - Rotational Motion (Example 2)

Lecture 23 - Dynamics (Introduction)

Lecture 24 - Dynamics - Example 1

Lecture 25 - Dynamics - Example 2

Lecture 26 - Dynamics - Example 3

Lecture 27 - Dynamics - Example 4

Lecture 28 - Center of Percussion - Example

Lecture 29 - Impulse / Momentum - Example 1

Lecture 30 - Impulse / Momentum - Example 2

Lecture 31 - Impulse / Momentum - Example 3

Lecture 32 - Impulse / Momentum - Example 4

Lecture 33 - Work Energy Methods - Example 1

Lecture 34 - Work Energy Methods - Example 2

Lecture 35 - Work Energy Methods - Example 3

NPTEL : NOC:Foundation of Computational Fluid Dynamics (Mechanical Engineering)

Co-ordinators : Dr.S.Vengadesan

Week 1 - Module-1

Week 1 - Module-2

Week 1 - Module-3

Week 1 - Module-4

Week 1 - Module-5

Week 2 - Module-1

Week 2 - Module-2

Week 2 - Module-3

Week 2 - Module-4

Week 2 - Module-5

Week 3 - Module-1

Week 3 - Module-2

Week 3 - Module-3

Week 3 - Module-4

Week 3 - Module-5

Week 4 - Module-1

Week 4 - Module-2

Week 4 - Module-3

Week 4 - Module-4

Week 4 - Module-5

Week 5 - Module-1

Week 5 - Module-2

Week 5 - Module-3

Week 5 - Module-4

Week 5 - Module-5

Week 5 - Module-6

Week 6 - Module-1

Week 6 - Module-2 - Part 1

Week 6 - Module-2 - Part 2

Week 6 - Module-3

Week 6 - Module-4

Week 6 - Module-5

Week 7 - Module-1

Week 7 - Module-2

Week 7 - Module-3

Week 7 - Module-4

Week 7 - Module-5

Week 8 - Module-1

Week 8 - Module-2

Week 8 - Module-3

Week 8 - Module-4

Week 8 - Module-5

Week 8 - Module-6

Conclusion

NPTEL : NOC:Introduction to Boundary Layers (Mechanical Engineering)

Co-ordinators : Dr. Rinku Mukherjee

Lecture 1 - Review of fundamentals of fluid mechanics - I

Lecture 2 - Review of fundamentals of fluid mechanics - II

Lecture 3 - Concept of a Boundary Layer (BL) - I

Lecture 4 - Concept of a Boundary Layer (BL) - II

Lecture 5 - Concepts of BL thickness (?)

Lecture 6 - Concepts of BL displacement thickness (?*) and BL momentum thickness (?)

Lecture 7 - Control Volume approach to derive expressions for ?* over a flat plate

Lecture 8 - Control Volume approach to derive expressions for ? over a flat plate

Lecture 9 - Concept of wall friction

Lecture 10 - Concept of friction drag

Lecture 11 - Skin Friction Coefficient - I

Lecture 12 - Skin Friction Coefficient - II

Lecture 13 - Derivation of Prandtls Laminar BL Equations - I

Lecture 14 - Derivation of Prandtls Laminar BL Equations - II

Lecture 15 - Derivation of Prandtls Laminar BL Equations - III

Lecture 16 - Derivation of Prandtls Laminar BL Equations - IV

Lecture 17 - Similarity Solutions to the BL Equations Applied to a Flat Plate - I

Lecture 18 - Similarity Solutions to the BL Equations Applied to a Flat Plate - II

Lecture 19 - Similarity Solutions to the BL Equations Applied to a Flat Plate - III

Lecture 20 - Runge-Kutta Method to Numerically Solve the BL Equations Applied to a Flat Plate

Lecture 21 - Description of the Numerical Code to Solve the BL Equations Applied to a Flat Plate

Lecture 22 - Similarity Solutions to the BL Equations (other than flat plate) - I

Lecture 23 - Similarity Solutions to the BL Equations (other than flat plate) - II

Lecture 24 - Similarity Solutions to the BL Equations (other than flat plate) - III

Lecture 25 - Similarity Solutions to the BL Equations (other than flat plate) - IV

Lecture 26 - Description of the Numerical Code to Solve the BL Equations (other than flat plate)

Lecture 27 - The Energy Equation - I

Lecture 28 - The Energy Equation - II

Lecture 29 - Similarity Solutions to Thermal BL - I

Lecture 30 - Similarity Solutions to Thermal BL - II

Lecture 31 - Similarity Solutions to Thermal BL - III

Lecture 32 - BL Separation with Pressure-Gradient - I

Lecture 33 - BL Separation with Pressure Gradient - II

Lecture 34 - Effect of Prandtl Number in Thermal BL - I

Lecture 35 - Effect of Prandtl Number in Thermal BL - II

Lecture 36 - Effect of Prandtl Number in Thermal BL - III

Lecture 37 - Effect of Dissipation in Thermal BL - I

Lecture 38 - Effect of Dissipation in Thermal BL - II

Lecture 39 - Effect of Dissipation in Thermal BL - III

Lecture 40 - Similarity Solutions to Thermal BL - An Overview

NPTEL : NOC:Fundamentals of Gas Dynamics (Mechanical Engineering)

Co-ordinators : Prof.A. Sameen

Lecture 1 - Introduction

Lecture 2 - Basics of Thermodynamics

Lecture 3 - Tutorial 1

Lecture 4 - Control Volume Approach

Lecture 5 - Conservation Equations

Lecture 6 - Tutorial 2

Lecture 7 - Energy Equation

Lecture 8 - Concept of stagnation

Lecture 9 - Discussion on stagnation

Lecture 10 - Velocity of sound

Lecture 11 - Discussion on velocity of sound and mach number

Lecture 12 - Wave propagation

Lecture 13 - Mach wave

Lecture 14 - Mach number relations

Lecture 15 - Variable Area Adiabatic flow

Lecture 16 - Variable Area Adiabatic flow (Continued...)

Lecture 17 - * reference quantities and their relations

Lecture 18 - Importance of stagnation temperature in relation to v

Lecture 19 - Discussion on variable area adiabaic flow and * reference quantities

Lecture 20 - Gas tables

Lecture 21 - Converging nozzle

Lecture 22 - Condition of choked flow and associated properties

Lecture 23 - Area ratio and pressure ratio in converging nozzles

Lecture 24 - Discussion on converging nozzles

Lecture 25 - Converging - Diverging (C-D) nozzles

Lecture 26 - More on C-D nozzles

Lecture 27 - Discussion on C-D nozzles - 1

Lecture 28 - Discussion on C-D nozzles - 2

Lecture 29 - Examples and applications of flow through C-D nozzles

Lecture 30 - Introduction to normal shocks

Lecture 31 - Normal shock relations - 1

Lecture 32 - Normal shock relations - 2

Lecture 33 - Rankine-Hugoniot equation

Lecture 34 - Discussion on Normal Shocks - 1

Lecture 35 - Discussion on Normal Shocks - 2

Lecture 36 - Normal shocks in C-D nozzles

Lecture 37 - Normal shocks in C-D nozzles (Continued...)

Lecture 38 - Moving Normal Shocks

Lecture 39 - Discussion on moving normal shocks

Lecture 40 - Oblique shocks

Lecture 41 - Oblique shock relations

Lecture 42 - Discussion on oblique shocks

Lecture 43 - Reflection of oblique shocks

Lecture 44 - Discussion on reflection of oblique shocks

Lecture 45 - Prandtl-Meyer flow

Lecture 46 - Prandtl-Meyer flow (Continued...)

Lecture 47 - Discussion on Prandtl-Meyer expansion

Lecture 48 - Shock Polar diagram and Prandtl-Meyer relation for Oblique shocks

NPTEL : NOC:Experimental Stress Analysis - An Overview (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - Introduction to Stress Analysis Â– Analytical and Numerical Approaches

Lecture 2 - Introduction to Stress Analysis - Experimental Approaches

Lecture 3 - Optical Methods Work as Optical Computers

Lecture 4 - Basic information provided by various experimental methods

Lecture 5 - Visual Appreciation of Field Information - Part 1

Lecture 6 - Visual Appreciation of Field Information - Part 2

Lecture 7 - Visual Appreciation of Field Information - Part 3

Lecture 8 - Visual Appreciation of Field Information - Part 4

Lecture 9 - Visual Appreciation of Field Information - Part 5

Lecture 10 - Completeness of a Numerical Solution

Lecture 11 - Principle of Strain Gauges

Lecture 12 - Overview of Strain Gauge Measurements

Lecture 13 - Elegance of Photoelasticity

Lecture 14 - Introduction to Photoelasticity

Lecture 15 - Different Polariscopes

Lecture 16 - Principles of MoirÃ©

Lecture 17 - Introduction to MoirÃ©

Lecture 18 - Introduction to Brittle Coatings

Lecture 19 - Introduction to Holography

Lecture 20 - Introduction to Hologram Interferometry

Lecture 21 - Introduction to Double exposure hologram interferometry

Lecture 22 - Introduction to Speckle Methods

Lecture 23 - Introduction to Speckle Interferometry Techniques

Lecture 24 - Introduction to TSA and DIC

Lecture 25 - Introduction to Caustics

Lecture 26 - Introduction to Coherent Gradient Sensor

Lecture 27 - Naming of Experimental Methods

Lecture 28 - Fringe Patterns - Richness of Qualitative Information

Lecture 29 - Key technologies that have influenced Experimental Mechanics

Lecture 30 - Multiscale analysis and trends in experimental mechanics

Lecture 31 - Selection of an experimental technique - Part 1

Lecture 32 - Selection of an experimental technique - Part 2

NPTEL : NOC:Fluid Dynamics and Turbomachines (Mechanical Engineering)

Co-ordinators : Prof. Dhiman Chatterjee, Prof. Shamit Bakshi

Lecture 1 - Introduction to Fluid Flow

Lecture 2 - Flow field, Stresses on fluid element, Newtonian fluid

Lecture 3 - Non Newtonian fluid, Classification of flow, Analysis of flow

Lecture 4 - Tutorial

Lecture 5 - Lecture 1 - Integral analysis, Control volume, Generalised conservation equation

Lecture 6 - Lecture 2 - Mass and linear momentum conservation in CV

Lecture 7 - Lecture 3 - Angular momentum conservation, Non-inertial frame of reference

Lecture 8 - Lecture 4 - Tutorial

Lecture 9 - Lecture 1 - Differential Analysis

Lecture 10 - Lecture 2 - Navier-Stokes equation for 2D incompressible flow

Lecture 11 - Lecture 3 - Vorticity, Stream function, Bernoulli's equation

Lecture 12 - Lecture 4 - Tutorial

Lecture 13 - Lecture 1 - External flows, Laminar and Turbulent Boundary Layer

Lecture 14 - Lecture 2 - Differential analysis of boundary layer, Blassius equation

Lecture 15 - Lecture 3 - Boundary Layer flow with pressure gradient, Flow separation

Lecture 16 - Lecture 4 - Internal flow, Pipe friction

Lecture 17 - Lecture 1 - Basic Thermodynamics

Lecture 18 - Lecture 2 - Turbomachines: Definition and classification

Lecture 19 - Lecture 3 - Dimensional Analysis

Lecture 20 - Lecture 4 - Tutorial

Lecture 21 - Lecture 1 - Representation of Turbomachines and Definition of velocity

Lecture 22 - Lecture 2 - Euler's energy equation

Lecture 23 - Lecture 3 - Real fluid flow and efficiency of turbomachine

Lecture 24 - Lecture 4 - Tutorial

Lecture 25 - Lecture 1 - Pumps

Lecture 26 - Lecture 2 - Pumping Systems

Lecture 27 - Lecture 3 - Hydraulic Turbines : Pelton Turbine

Lecture 28 - Lecture 4 - Hydraulic Turbines : Reaction Turbines

Lecture 29 - Lecture 5 - Cavitation in Hydroturbomachines

Lecture 30 - Lecture 6 - Tutorial

Lecture 31 - Lecture 1 - Introduction to compressible flow

Lecture 32 - Lecture 2 - Steam and Gas Turbine : Introduction and classification

Lecture 33 - Lecture 3 - Steam and Gas Turbine : h-s Plots and velocity triangle

Lecture 34 - Lecture 4 - Tutorial

NPTEL : NOC:Micro and Nano Scale Energy Transport (Mechanical Engineering)

Co-ordinators : Dr. Arvind Pattamatta

Lecture 1 - Overview to Micro/Nanoscale energy transport - Part 1

Lecture 2 - Overview to Micro/Nanoscale energy transport - Part 2

Lecture 3 - Some applications of Micro/Nanoscale energy transport

Lecture 4 - Continuum heat transfer and its limitation

Lecture 5 - Energy carriers at Micro/Nanoscale and their attributes

Lecture 6 - Microscopic contributes to Internal energy of a systems

Lecture 7 - Fundamentals of Quantum mechanics - Part 1

Lecture 8 - Fundamentals of Quantum mechanics - Part 2

Lecture 9 - Fundamentals of Quantum mechanics - Part 3

Lecture 10 - Fundamentals of Quantum mechanics - Part 4

Lecture 11 - Fundamentals of Quantum mechanics - Part 5

Lecture 12 - Fundamentals of solid state physics - Part 1

Lecture 13 - Fundamentals of solid state physics - Part 2

Lecture 14 - Fundamentals of solid state physics - Part 3

Lecture 15 - Fundamentals of solid state physics - Part 4

Lecture 16 - Fundamentals of statistical thermodynamics - Part 1

Lecture 17 - Fundamentals of statistical thermodynamics - Part 2

Lecture 18 - Fundamentals of statistical thermodynamics - Part 3

Lecture 19 - Fundamentals of statistical thermodynamics - Part 4

Lecture 20 - Kinetic theory of energy carriers - Part 1

Lecture 21 - Kinetic theory of energy carriers - Part 2

Lecture 22 - Non-equilibrium energy transport at Nanoscales: Boltzmann Transport Equation (BTE)

Lecture 23 - Boltzmann Transport Equation under the relaxation time approximation

Lecture 24 - Derivation of Continuum laws from Boltzmann Transport Equation - Part 1

Lecture 25 - Derivation of Continuum laws from Boltzmann Transport Equation - Part 2

Lecture 26 - Derivation of Continuum laws from Boltzmann Transport Equation - Part 3

Lecture 27 - Nanoscale Energy transport in a Thin Film - Part 1

Lecture 28 - Nanoscale Energy transport in a Thin Film - Part 2

Lecture 29 - Nanoscale Energy transport in a Thin Film - Part 3

Lecture 30 - Gas flow and Heat transport in Microchannels - Part 1

Lecture 31 - Gas flow and Heat transport in Microchannels - Part 2

Lecture 32 - Single phase liquid flow and Heat transport in Microchannels - Part 1

Lecture 33 - Single phase liquid flow and Heat transport in Microchannels - Part 2

Lecture 34 - Fundamentals of Electro kinetics in Microchannels Part1

Lecture 35 - Fundamentals of Electro kinetics in Microchannels Part2

Lecture 36 - Fundamentals of Electro kinetics in Microchannels Part3

Lecture 37 - Two phase Heat transfer in Microchannels - Part 1

Lecture 38 - Two phase Heat transfer in Microchannels - Part 2

Lecture 39 - Nano fluid Heat transfer - Part 1

Lecture 40 - Nano fluid Heat transfer - Part 2

Lecture 41 - Measurement techniques in Micro and Nanoscale Heat transfer - Part 1

Lecture 42 - Measurement techniques in Micro and Nanoscale Heat transfer - Part 2

NPTEL : NOC:Electron Diffraction and Imaging (Mechanical Engineering)

Co-ordinators : Prof. Sundararaman M

Lecture 1 - 1D-2D-3D lattice

Lecture 2 - Stereographic projection - 1

Lecture 3 - Stereographic Projection - 2

Lecture 4 - Symmetry in 1-D crystals

Lecture 5 - Symmetry in 2-D crystals

Lecture 6 - Symmetry in 3-D crystals

Lecture 7 - Understanding IUCr tables

Lecture 8 - Symmetry in 3-D Crystals

Lecture 9 - Reciprocal lattice

Lecture 10 - Directions Planes and zone axes

Lecture 11 - Interplanar distances and angles

Lecture 12 - Diffraction - 1

Lecture 13 - Diffraction - 2

Lecture 14 - Diffraction - Structure and Shape Factor

Lecture 15 - Transformation of Indices

Lecture 16 - Microscope - 1

Lecture 17 - Microscope - 2

Lecture 18 - Kikuchi Diffraction

Lecture 19 - Double Diffraction and CBED

Lecture 20 - CBED and Precession Electron Diffraction

Lecture 21 - Indexing Diffraction Pattern

Lecture 22 - Correlation of Diffraction Spots to Microstructure

Lecture 23 - 3-Index to 4-Index System

Lecture 24 - Kinematical and Dynamical Theory of Diffraction and Imaging

Lecture 25 - Contrast from Planar Defects

Lecture 26 - Contrast from Strain Fields

Lecture 27 - Atomic Scattering Factor

Lecture 28 - Coherence

Lecture 29 - Lens Aberrations

Lecture 30 - Phase Contrast Microscopy - 1

Lecture 31 - Phase Contrast Microscopy - 2

Lecture 32 - Phase Contrast Microscopy - 3

Lecture 33 - STEM

Lecture 34 - ELES and EDS

Lecture 35 - Recent trends

Lecture 36 - Energy dispersive Spectroscopy

Lecture 37 - Revision - 1

Lecture 38 - Revision - 2

Lecture 39 - Revision of Recent trends in Microscopy

Lecture 40 - Crystallography Revision

NPTEL : NOC:Acoustic and Noise Control (Mechanical Engineering)

Co-ordinators : Prof. Abijith Sarkar

Lecture 1 - Module 1 - Introduction - 1

Lecture 2 - Module 1 - Introduction - 2

Lecture 3 - Module 2 - Governing Equation - 1

Lecture 4 - Module 2 - Governing Equation - 2

Lecture 5 - Module 3 - Plane Wave - 1

Lecture 6 - Module 3 - Plane Wave - 2

Lecture 7 - Module 4 - Reflection Of Plane Waves - 1

Lecture 8 - Module 4 - Reflection Of Plane Waves - 2

Lecture 9 - Module 5 - Frequence Analysis - 1

Lecture 10 - Module 5 - Frequence Analysis - 2

Lecture 11 - Module 6 - Harmonic Plane Waves

Lecture 12 - Module 7 - Travelling And Standing Waves

Lecture 13 - Module 8 - Acoustic Mode Shapes, Reflection

Lecture 14 - Module 9 - Plane Waves : Reflection and Intermission

Lecture 15 - Module 10 - Flexural Waves, evanescent Waves

Lecture 16 - Module 11 - Near Field Acoustic Waves

Lecture 17 - Module 12 - cuton Waves in duct

Lecture 18 - Module 13 - Power Calculation

Lecture 19 - Module 14 - Decibel Scale

Lecture 20 - Module 15 - Db Arithmetic

Lecture 21 - Module 16 - Sound Power Level

Lecture 22 - Module 17 - Human factors in Acoustic Engineering

Lecture 23 - Module 18 - Microphone

Lecture 24 - Module 19 - Acoustic Measurements

Lecture 25 - Module 20 - Muffler Analysis

Lecture 26 - Module 21 - Transfer Matrix Method

Lecture 27 - Module 22 - Electro Mechanical Analogies - Part 1

Lecture 28 - Module 23 - Electro Mechanical Analogies Simple Example

Lecture 29 - Module 24 - Electro Mechanical Analogies Example

Lecture 30 - Module 25 - Helmholtz Resonator

Lecture 31 - Module 26 - Source Impedance

Lecture 32 - Module 27 - Insertion Loss

Lecture 33 - Module 28 - Analysis Of Industrial Mufflers

Lecture 34 - Module 29 - Spherical Waves

Lecture 35 - Module 30 - Monopole and Dipole

Lecture 36 - Module 31 - Inhomogeneous Wave Equation

Lecture 37 - Module 32 - Green's Function

Lecture 38 - Module 33 - Kirchoff Helmholtz Integral Equation

Lecture 39 - Tutorial 1

Lecture 40 - Tutorial 2

Lecture 41 - Tutorial 3

Lecture 42 - Tutorial 4

NPTEL : NOC:Steel Quality - Role of Secondary Refining and Continuous Casting (Mechanical Engineering)

Co-ordinators : Prof. Santanu Kr. Ray

Lecture 1 - Concept of Steel Quality

Lecture 2 - Control of Residuals and Impact on Quality

Lecture 3 - Non-Metallic Inclusions

Lecture 4 - Evaluation of Residuals and Inclusions

Lecture 5 - Cleanliness Requirements for Different applications

Lecture 6 - Limitation of Primary Steelmaking and Importance of secondary Refining

Lecture 7 - Deoxidation

Lecture 8 - Prevention of Slag carryover

Lecture 9 - Desulphurisation

Lecture 10 - Degassing

Lecture 11 - Secondary Refining Processes

Lecture 12 - Injection of Calcium

Lecture 13 - Different Routes and Temperature Control

Lecture 14 - Decarburisation

Lecture 15 - Cleanliness Measures in Ladle and Tundish

Lecture 16 - Cleanliness Measures in Mould

Lecture 17 - Nature and Distribution of Entrapments in Casting

Lecture 18 - Genesis of Entrapment

Lecture 19 - Effect of Vertical vis-a-vis Curved Mould

Lecture 20 - Quality of Cast Product

Lecture 21 - Role of Concast Process, Caster Design and Steel Grade

Lecture 22 - Primary Cooling in Caster Mould

Lecture 23 - Heat Transfer in Mould

Lecture 24 - Role of Mould Oscillation

Lecture 25 - Cast Structure and Dendrite Size

Lecture 26 - Role of Chemistry - Part I

Lecture 27 - Role of Chemistry - Part II

Lecture 28 - Role of Segregation - Part I

Lecture 29 - Role of Segregation - Part II

Lecture 30 - Deleterious Effect of Phosphorus

Lecture 31 - Strength of Solidifying Strand

Lecture 32 - Brittle Zone Near Solidus

Lecture 33 - Strength and Toughness of Solid Shell

Lecture 34 - Role of Chemistry on Solidification Behaviour

Lecture 35 - Sticking vis-a-vis Depression Behaviour

Lecture 36 - Role of Chemistry on Bulging or Depression Tendency - Part I

Lecture 37 - Role of Chemistry on Bulging or Depression Tendency - Part II

Lecture 38 - Effect of Cast Grain Size

Lecture 39 - Brittle Temperature Regions

Lecture 40 - Typical Cracks and Defects - Part I

Lecture 41 - Typical Cracks and Defects - Part II

Lecture 42 - Remedial Measures to Control Defects - Part I

Lecture 43 - Remedial Measures to Control Defects - Part II

Lecture 44 - Remedial Measures to Control Defects - Part III

Lecture 45 - Grade - Specific Casting Parameters - Part I

Lecture 46 - Grade - Specific Casting Parameters - Part II

Lecture 47 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part I

Lecture 48 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part II

Lecture 49 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part III

NPTEL : NOC:X-ray Crystallography and Diffraction (Mechanical Engineering)

Co-ordinators : Prof. Ranjit Kumar Ray

Lecture 1 - Geometry of Crystals

Lecture 2 - Geometry of Crystals (Continued...)

Lecture 3 - Tutorial-1

Lecture 4 - Reciprocal Lattice

Lecture 5 - Stereographic Projection

Lecture 6 - Tutorial-2

Lecture 7 - Point Groups and Space Groups

Lecture 8 - Point Groups and Space Groups (Continued...)

Lecture 9 - Tutorial-3

Lecture 10 - Point Groups and Space Groups (Continued...)

Lecture 11 - Basics of X-Rays

Lecture 12 - Production and Detection of X-Rays

Lecture 13 - Production and Detection of X-Rays (Continued...)

Lecture 14 - Principles of X-Ray Diffraction

Lecture 15 - X-Ray Diffraction Methods

Lecture 16 - Debye Sherrer Camera

Lecture 17 - Diffractometer Measurements

Lecture 18 - Tutorial-4

Lecture 19 - Intensity of Diffracted Beams

Lecture 20 - Intensity of Diffracted Beams (Continued...)

Lecture 21 - Determination of Crystal Structures

Lecture 22 - Precise Lattice Parameter Determination

Lecture 23 - XRD - Lab Demonstration

Lecture 24 - Discussion - Based on Forum Queries - 1

Lecture 25 - Phase Diagram Determination

Lecture 26 - Ordered Disordered Transformation

Lecture 27 - Ordered Disordered Transformation (Continued...)

Lecture 28 - Qualitative Phase Analysis

Lecture 29 - Quantitative Phase Analysis - 1

Lecture 30 - Precise Lattice Parameter Determination - 1

Lecture 31 - Chemical Analysis by X-Ray Flourescence

Lecture 32 - Chemical Analysis by X-Ray Absorption

Lecture 33 - Effect of Crystallite Size on Diffracted X-Ray Intensity

Lecture 34 - Texture Determination by XRD

Lecture 35 - Particle Size Determination by XRD

Lecture 36 - Effect of Crystallite Size on Diffracted X-Ray Intensity

Lecture 37 - Determination of Single Crystal Orientation by X-Rays

Lecture 38 - Stress Analysis by X-Rays

Lecture 39 - Factors Contributing to Peak Broadening

Lecture 40 - Residual Stress Measurement by X-Rays

NPTEL : NOC:Transport Phenomena in Materials (Mechanical Engineering)

Co-ordinators : Dr. G. Phanikumar

Lecture 1 - Subscript Notation - Part 1

Lecture 2 - Subscript Notation - Part 2

Lecture 3 - Coordinate Rotation

Lecture 4 - Introduction to Tensors

Lecture 5 - Symmetry of Properties

Lecture 6 - Material Derivative

Lecture 7 - Planar Flows

Lecture 8 - Reynolds Transport Theorem

Lecture 9 - Derivation of Navier-Stokes equation

Lecture 10 - Navier Stokes equations - Part 2

Lecture 11 - Flow problem statements

Lecture 12 - Simple cases in fluid flow : rectangular coordinate system

Lecture 13 - Simple cases in fluid flow : cylindrical coordinate system

Lecture 14 - Pipe flow and porous medium

Lecture 15 - Simple cases in fluid flow : spherical coordinate system

Lecture 16 - Friction factors and correlations

Lecture 17 - Energy Transport

Lecture 18 - Conduction cases - Steady state

Lecture 19 - Conduction cases - Transient state

Lecture 20 - Convective heat transfer

Lecture 21 - Mass Transfer Overview

Lecture 22 - Chemical Equilibrium

Lecture 23 - Reaction Equilibrium

Lecture 24 - Species Balance Equation

Lecture 25 - Solute Transfer Modelling - Part 1

Lecture 26 - Solute Transfer Modelling - Part 2

Lecture 27 - Solute Segregation Profile - Part 1

Lecture 28 - Solute Segregation Profile - Part 2

Lecture 29 - Problem Statements

Lecture 30 - Diffusion in Solid State

Lecture 31 - Transient Solute Diffusion in Solid State

Lecture 32 - Mass Transfer in Fluids

Lecture 33 - Similarity Across Transport Phenomena

NPTEL : NOC:Experimental Stress Analysis - An Overview (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - Overview of Experimental Stress Analysis

Lecture 2 - Optical Methods Work as Optical Computers

Lecture 3 - Stress, Strain and Displacement Fields

Lecture 4 - Completeness of a numerical solution

Lecture 5 - Fringe Patterns - Richness of Qualitative Information

Lecture 6 - Multi-Scale Analysis in Experimental Mechanics

Lecture 7 - Selection of an Experimental Technique

Lecture 8 - Introduction to Transmission Photoelasticity

Lecture 9 - Ordinary and Extraordinary Rays

Lecture 10 - Light Ellipse, Passage of Light Through a Crystal Plate

Lecture 11 - Retardation Plates, Stress-optic Law

Lecture 12 - Plane Polariscope

Lecture 13 - Jones Calculus

Lecture 14 - Circular Polariscope

Lecture 15 - Determination of Photoelastic Parameters at an Arbitrary Point

Lecture 16 - Tardyâ€™s Method of Compensation

Lecture 17 - Calibration of Photoelastic Materials

Lecture 18 - Fringe Thinning Methodologies

Lecture 19 - Fringe Ordering in Photoelasticity

Lecture 20 - Miscellaneous Topics in Transmission Photoelasticity

Lecture 21 - Three Dimensional Photoelasticity

Lecture 22 - Overview of Digital Photoelasticity

Lecture 23 - Introduction to Photoelastic Coatings

Lecture 24 - Correction Factors for Photoelastic Coatings

Lecture 25 - Coating Materials, Selection of Coating Thickness, Industrial Application of Photoelastic Coatings

Lecture 26 - Calibration of Photoelastic Coatings, Introduction to Brittle Coatings

Lecture 27 - Analysis of Brittle Coatings

Lecture 28 - Introduction to Strain Gauges

Lecture 29 - Strain Sensitivity of a Strain Gauge, Bridge Sensitivity, Rosettes

Lecture 30 - Strain Gauge Alloys, Carriers and Adhesives

Lecture 31 - Performance of Strain Gauge System

Lecture 32 - Temperature Compensation, Two-wire and Three-wire Circuits

Lecture 33 - Strain Gauge Selection

Lecture 34 - Bonding of a Strain Gauge

Lecture 35 - Soldering, Accounting for Transverse Sensitivity Effects

Lecture 36 - Correction Factors for Special Applications

Lecture 37 - Special Gauges

NPTEL : NOC:Mechanics of Human Movement (Mechanical Engineering)

Co-ordinators : Prof. Sujatha Srinivasan

Lecture 1 - Basic Terminologies

Lecture 2 - Skeletal System

Lecture 3 - Axial and Appendicular Skeleton

Lecture 4 - Bones in the Human Body

Lecture 5 - Types of Joints

Lecture 6 - Movements about Joints

Lecture 7 - Levers in the Human Body

Lecture 8 - Skeletal Muscles: Functions

Lecture 9 - Skeletal Muscles: Structure - Part I

Lecture 10 - Skeletal Muscles: Structure - Part II

Lecture 11 - Mechanics and Modeling of Muscles

Lecture 12 - Muscle Action - Part I

Lecture 13 - Muscle Action - Part II

Lecture 14 - Principles of Statics

Lecture 15 - Static Analysis of Elbow - Part I

Lecture 16 - Static Analysis of Elbow - Part II

Lecture 17 - Static Analysis of Shoulder - Part I

Lecture 18 - Static Analysis of Shoulder - Part II

Lecture 19 - Static Analysis of Spine - Part I

Lecture 20 - Static Analysis of Spine - Part II

Lecture 21 - Static Analysis of Spine - Part III

Lecture 22 - Static Analysis of Hip - Part I

Lecture 23 - Static Analysis of Hip - Part II

Lecture 24 - Static Analysis of the Knee

Lecture 25 - Static Analysis of the Knee and Ankle

Lecture 26 - Kinetics: Linear Motion - Part I

Lecture 27 - Kinetics: Linear Motion - Part II

Lecture 28 - Kinetics: Linear Motion - Part III

Lecture 29 - Kinetics: Angular Motion - Part I

Lecture 30 - Kinetics: Angular Motion - Part II

Lecture 31 - Kinetics: Angular Motion - Part III

Lecture 32 - Kinetics: Angular Motion - Part IV

Lecture 33 - Kinetics of Arm Swinging during Walking

Lecture 34 - Inverse Dynamics Analysis

Lecture 35 - Biomechanics of Balance - Part I

Lecture 36 - Biomechanics of Balance - Part II

Lecture 37 - Biomechanics of Balance - Part III

Lecture 38 - Human Gait

Lecture 39 - Human Gait Terminologies

Lecture 40 - Characteristics of Normal Gait - Part I

Lecture 41 - Characteristics of Normal Gait - Part II

Lecture 42 - Characteristics of Normal Gait - Part III

Lecture 43 - Pathological Gait - Part I

Lecture 44 - Pathological Gait - Part II

Lecture 45 - Pathological Gait - Part III

Lecture 46 - Introduction to Assistive Devices for Mobility

Lecture 47 - Design Considerations: Prosthetic Foot

Lecture 48 - Design Considerations: Prosthesis and Orthosis

Lecture 49 - Design Considerations: Prosthetic Knee

Lecture 50 - Journey of Standing Wheelchair Development

NPTEL : NOC:Design for Quality, Manufacturing and Assembly (Mechanical Engineering)

Co-ordinators : Prof. Palaniappaan Ramu

Lecture 1 - Introduction to DfX

Lecture 2 - Introduction to Quality

Lecture 3 - Introduction to Robustness

Lecture 4 - Introduction to Six Sigma Concept

Lecture 5 - Recap and clarifications of basic concepts

Lecture 6 - Review of Six Sigma and Quality Loss Function (QLF)

Lecture 7 - Types of QLF and SN Ratio

Lecture 8 - Linking Quality and Robustness

Lecture 9 - Design for Six Sigma - Stages, Design of Experiments

Lecture 10 - Introduction To Design Of Experiments

Lecture 11 - Need for DoE and basic DoE methods

Lecture 12 - Factorial Design

Lecture 13 - Orthogonal Array- L4 and L8 example

Lecture 14 - Setting up an Orthogonal Array

Lecture 15 - Confounding OA and Resolution Table

Lecture 16 - Confounding Logic and Randomization of Experiments

Lecture 17 - Paper Helicopter Case Study - Part I

Lecture 18 - Paper Helicopter Case Study - Part II

Lecture 19 - Introduction To Injection Molding Process, Materials, Terminologies Related To Plastic Parts and Design Guidelines

Lecture 20 - Estimation of Mold Cost for Injection Molding (Dixon and Poli's Method)

Lecture 21 - Estimation of Mold Cost for Injection Molding (Dixon and Poli's Method) (Continued...)

Lecture 22 - Mold Cost Estimation - Tutorial

Lecture 23 - Design for Additive Manufacturing

Lecture 24 - Demo

Lecture 25 - Introduction to Sustainable Development and Sustainability Indicators - Part 1

Lecture 26 - Introduction to Sustainable Development and Sustainability Indicators - Part 2

Lecture 27 - Introduction to design process

Lecture 28 - Accounting for manufacturability and assembly in design - An overview

Lecture 29 - DfMA in product design

Lecture 30 - General design guidelines for manual assembly

Lecture 31 - Systematic DFA methodology

Lecture 32 - Alpha symmetry, Beta symmetry

Lecture 33 - Quantification of part size and thickness

Lecture 34 - Systematic DFA Case study - controller assembly

Lecture 35 - DFA examples and discussion

Lecture 36 - Xerox Producibility Index (XPI)

Lecture 37 - High Speed and Robotic Assembly

Lecture 38 - Sheet Metal Working

Lecture 39 - Overview of DoE Workflow

Lecture 40 - DFA Software

Lecture 41 - DFM Software and Case Studies

NPTEL : NOC:Surrogates and Approximations in Engineering Design (Mechanical Engineering)

Co-ordinators : Prof. Palaniappaan Ramu

Lecture 1 - Overview and Motivation of Course

Lecture 2 - Basic Optimization Problem Formulation

Lecture 3 - Problem Formulation Example

Lecture 4 - Calculus related to Optimization

Lecture 5 - The big picture - Overview

Lecture 6 - Introduction to DOE - 1

Lecture 7 - Introduction to DOE - 2

Lecture 8 - Types of DOE - 1

Lecture 9 - Types of DOE - 2 and some examples

Lecture 10 - Introduction to surrogate modeling

Lecture 11 - Types of surrogate - Polynomial models

Lecture 12 - Radial basis function - 1

Lecture 13 - Radial basis function - 2

Lecture 14 - Kriging - 1

Lecture 15 - Kriging - 2

Lecture 16 - Metamodels for Safe and Efficient Automotive Structures

Lecture 17 - Exploration and Exploitation in Surrogates

Lecture 18 - Errors Based Exploration

Lecture 19 - Ensemble of Surrogates

NPTEL : NOC:Steel Quality: Role of Secondary Refining and Continuous Casting (Mechanical Engineering)

Co-ordinators : Prof. Santanu Kr. Ray

Lecture 1 - Concept of Steel Quality

Lecture 2 - Typical Examples of Surface Defects

Lecture 3 - Origin of Common Quality Problems

Lecture 4 - Present Scenario on Quality Demands

Lecture 5 - Control of Residuals and Impact on Quality

Lecture 6 - Non-Metallic Inclusions

Lecture 7 - Evaluation of Residuals and Inclusions

Lecture 8 - Cleanliness Requirements for Different applications

Lecture 9 - Limitation of Primary Steelmaking and Importance of secondary Refining

Lecture 10 - Deoxidation

Lecture 11 - Prevention of Slag carryover

Lecture 12 - Desulphurisation

Lecture 13 - Degassing

Lecture 14 - Secondary Refining Processes

Lecture 15 - Injection of Calcium

Lecture 16 - Decarburisation

Lecture 17 - Cleanliness Measures in Ladle and Tundish

Lecture 18 - Cleanliness Measures in Mould

Lecture 19 - Different Routes and Temperature Control

Lecture 20 - Nature and Distribution of Entrapments in Casting

Lecture 21 - Sources of Exogenous Entrapments

Lecture 22 - Effect of Vertical vis-a-vis Curved Mould

Lecture 23 - Quality of Cast Product

Lecture 24 - Role of Concast Process, Caster Design and Steel Grade

Lecture 25 - Primary Cooling in Caster Mould

Lecture 26 - Heat Transfer in Mould

Lecture 27 - Cast Structure and Dendrite Size

Lecture 28 - Role of Mould Oscillation

Lecture 29 - Role of Chemistry - Part I

Lecture 30 - Role of Chemistry - Part II

Lecture 31 - Role of Segregation - Part I

Lecture 32 - Role of Segregation - Part II

Lecture 33 - Deleterious Effect of Phosphorus

Lecture 34 - Strength of Solidifying Strand

Lecture 35 - Brittle Zone Near Solidus

Lecture 36 - Strength and Toughness of Solid Shell

Lecture 37 - Role of Chemistry on Solidification Behaviour

Lecture 38 - Sticking vis-a-vis Depression Behaviour

Lecture 39 - Role of Chemistry on Bulging or Depression Tendency - Part I

Lecture 40 - Role of Chemistry on Bulging or Depression Tendency - Part II

Lecture 41 - Effect of Cast Grain Size

Lecture 42 - Brittle Temperature Regions

Lecture 43 - Role of Secondary Cooling - Part 1

Lecture 44 - Role of Secondary Cooling - Part 2

Lecture 45 - Typical Cracks and Defects - Part I

Lecture 46 - Typical Cracks and Defects - Part II

Lecture 47 - Remedial Measures to Control Defects - Part I

Lecture 48 - Remedial Measures to Control Defects - Part II

Lecture 49 - Remedial Measures to Control Defects - Part III

Lecture 50 - Grade - Specific Casting Parameters - Part I

Lecture 51 - Grade - Specific Casting Parameters - Part II

Lecture 52 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part I

Lecture 53 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part II

Lecture 54 - Identification of Genesis of Quality Problems Through Metallographic Investigation - Part III

Lecture 55 - Some Examples of Quality Problems

NPTEL : Theory of Mechanism (Mechanical Engineering)

Co-ordinators : Prof. Sujatha Srinivasan

Lecture 1 - Review of Kinematics Fundamentals-I

Lecture 2 - Links, Pairs, Kinematic Chains; Planar Mobility Criterion

Lecture 3 - Mobility of Mechanisms, Grubler's Criterion and Applications

Lecture 4 - Inversions, Grashof Criterion, Kinematic equivalence

Lecture 5 - Linkage Synthesis Classification, 2-position Motion Generation

Lecture 6 - Driver dyad, Quick-return synthesis - I

Lecture 7 - Quick-return synthesis - II, 3-position Motion Generation

Lecture 8 - Specified fixed pivots, Path generation

Lecture 9 - Function generation

Lecture 10 - Function generation using relative poles

Lecture 11 - Structural Error, and Chebyshev Spacing

Lecture 12 - Chebyshev Spacing

Lecture 13 - Analytical Linkage Synthesis-I: Vector Loop Closure, Freudenstein's method

Lecture 14 - Analytical Linkage Synthesis-II: Bloch's method, Driver Dyad

Lecture 15 - Four-bar Position Analysis, Dyad or Standard Form Synthesis

Lecture 16 - Dyad Form Synthesis: Motion Generation

Lecture 17 - Dyad Form Synthesis: Path and Function Generation

Lecture 18 - Dyad Form Synthesis: Multi loop linakges

Lecture 19 - Dyad Form Synthesis: Four Position Motion Generation

Lecture 20 - Coupler Curves - I

Lecture 21 - Coupler Curves - II, Fixed and Moving Centrodes

Lecture 22 - Coupler Curves - III, Symmetrical Coupler Curves

Lecture 23 - Roberts-Chebyshev Theorem

Lecture 24 - Cognates

Lecture 25 - Velocity Analysis: Review of Velocity Polygons

Lecture 26 - Velocity Analysis: Velocity Polygons (Continued...) and Instant Centres

Lecture 27 - Velocity Analysis: Auxiliary Point Method

Lecture 28 - Auxiliary Point Method: (Continued...)

Lecture 29 - Velocity and Acceleration Analysis: Analytical Method

Lecture 30 - Acceleration Analysis: Analytical Method (Continued...)

Lecture 31 - Acceleration Analysis: Auxiliary Point Method

Lecture 32 - Force Analysis of Mechanisms, Mechanical Advantage

Lecture 33 - Force Analysis of Mechanisms - II

Lecture 34 - Balancing of Mechanisms using Counterweights

Lecture 35 - Balancing of Mechanisms using Springs

Lecture 36 - Spatial Mechanisms

Lecture 37 - Introduction to the Kinematics of Spatial Mechanisms

NPTEL : NOC:Engineering Mechanics (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - Introduction to Engineering Mechanics - I

Lecture 2 - Introduction to Engineering Mechanics - II

Lecture 3 - Force Systems - I

Lecture 4 - Force Systems - II

Lecture 5 - Equilibrium of Rigid bodies - I

Lecture 6 - Equilibrium of Rigid bodies - II

Lecture 7 - Trusses - I

Lecture 8 - Trusses - II

Lecture 9 - Trusses - III

Lecture 10 - Beams - I

Lecture 11 - Beams - II

Lecture 12 - Beams - III

Lecture 13 - Beams - IV

Lecture 14 - Virtual Work - I

Lecture 15 - Virtual Work - II

Lecture 16 - Energy Relations

Lecture 17 - Review Before Quiz - I

Lecture 18 - Friction - I

Lecture 19 - Friction - II

Lecture 20 - Friction - III

Lecture 21 - Particle Dynamics

Lecture 22 - Circular Motion

Lecture 23 - Absolute Motion

Lecture 24 - Relative Motion - I

Lecture 25 - Relative Motion - II

Lecture 26 - Relative Motion - III and Instantaneous Center

Lecture 27 - Rotating frame of reference I - Velocity

Lecture 28 - Rotating frame of reference II - Acceleration

Lecture 29 - Rotating frame of reference III - Choice of rotating frame of reference

Lecture 30 - RFR- IV Crank and slotted bar

Lecture 31 - RFR-V Understanding Coriolis Acceleration

Lecture 32 - Kinetics - I

Lecture 33 - Kinetics - II

Lecture 34 - Kinetics - III

Lecture 35 - 3D Kinematics - I

Lecture 36 - 3D Kinematics - II

Lecture 37 - 3D Kinematics - III

NPTEL : NOC:Foundations of Computational Materials Modelling (Mechanical Engineering)

Co-ordinators : Dr.Narasimhan Swaminathan

Lecture 1 - Introduction to the course

Lecture 2 - Some applications of MD simulations

Lecture 3 - Introduction to Bravais lattices and constructing simple crystals with MATLAB

Lecture 4 - Introduction to symmetry - 1

Lecture 5 - Symmetry Elements - 1

Lecture 6 - Symmetry elements - 2

Lecture 7 - Plane groups and their Hermann-Maugin (HM) symbols

Lecture 8 - Glide reflection; Examples of writing point group symbols; Wyckoff positions

Lecture 9 - Generating 2D crystal with MATLAB using Bilbao crystallography website

Lecture 10 - Symmetry of space groups

Lecture 11 - Hernann maugin symbols of space groups

Lecture 12 - Translational symmetry operators

Lecture 13 - The Space groups

Lecture 14 - Generation of crystals

Lecture 15 - Generation of monoclinic lattice

Lecture 16 - Introduction to Statistical Mechanica - 1

Lecture 17 - Introduction to Statistical Mechanica - 2

Lecture 18 - Introduction to Statistical Mechanics - 3

Lecture 19 - Statistical mechanics - 1

Lecture 20 - Statistical mechanics - 2

Lecture 21 - Basic introduction to mechanics

Lecture 22 - Introduction to phase space

Lecture 23 - Introduction to phase average and time average

Lecture 24 - Canonical ensemble; Partition function

Lecture 25 - Basic introduction to MD

Lecture 26 - Input script for LAMMPS - 1

Lecture 27 - Input script for LAMMPS - 2

Lecture 28 - Input script for LAMMPS - 3

Lecture 29 - Input script for LAMMPS - 4

Lecture 30 - LAMMPS exercises - 1

Lecture 31 - LAMMPS exercises - 2

Lecture 32 - LAMMPS exercises - 3

Lecture 33 - LAMMPS exercises - 4

Lecture 34 - LAMMPS exercises - 5

NPTEL : NOC:Fundamentals of Combustion for Propulsion (Mechanical Engineering)

Co-ordinators : Prof. S Varunkumar, Prof. H S Mukunda

Lecture 1 - Introduction

Lecture 2 - Combustion processes in ICE and Gas turbine engines

Lecture 3 - Combustion in solid and liquid rocket motors

Lecture 4 - Equilibrium

Lecture 5 - Chemical kinetics, Equilibrium vs rate controlled

Lecture 6 - Demonstration of NASA-CEA

Lecture 7 - Premixed and diffusion flames: principal features and differences - Part I

Lecture 8 - Premixed and diffusion flames: principal features and differences - Part II

Lecture 9 - Quenching, flammability and other limit phenomena

Lecture 10 - Conservation equations

Lecture 11 - Integral Analysis of flame

Lecture 12 - Solid propellant combustion

Lecture 13 - Erosive burning

Lecture 14 - Instability in solid rockets

Lecture 15 - Analysis of p-t traces - Part II

Lecture 16 - Statistical representation of composite propellants in HeQu1D - geometry and thermochemistry

Lecture 17 - HeQu1D model - Parameter estimation

Lecture 18 - Effects of Al - extended HeQu1D model

Lecture 19 - Instability in solid rockets - II

Lecture 20 - Tutorial

Lecture 21 - Liquid propellant rockets - Part I

Lecture 22 - Liquid propellant rockets - Part II

Lecture 23 - Combustion in liquid rockets

Lecture 24 - Instabilities in liquid rockets and gas turbine after burners

Lecture 25 - CFD modeling aspects - Fundamentals

Lecture 26 - CFD modeling aspects - Modeling appraches

Lecture 27 - Effect of turbulence on flames

Lecture 28 - Scramjets - Part I

Lecture 29 - Scramjets - Part II

Lecture 30 - Summary - Premixed flames

Lecture 31 - Summary - Non-premixed flames

Lecture 32 - Summary - Solid rocket propulsion

Lecture 33 - Additional Insights

NPTEL : NOC:Basics of Materials Engineering (Mechanical Engineering)

Co-ordinators : Prof. Ratna Kumar Annabattula

Lecture 1 - Introduction

Lecture 2 - Material Property Landscape

Lecture 3 - Crystal Structure-1 (Platonic Solids)

Lecture 4 - Crystal Structure-2 (Unit Cell, Lattice, Crystal)

Lecture 5 - Crystal Structure-3 (Bravais lattice, Symmetry in Crystals)

Lecture 6 - Crystal Structure-4 (Miller Indices for Crystallographic Points and Directions)

Lecture 7 - Crystal Structure-5 (Miller-Brvais Indices, Linear and Planar Density)

Lecture 8 - Crystal Structure-6 (Planar desnity, Close-Packed Structures, Stacking Faults)

Lecture 9 - Crystal Structure-7 (Single Crystal and Polycrystalline Materials)

Lecture 10 - Crystal Structure-8 (X-Ray Diffraction and Determination of Structure)

Lecture 11 - Defects in Crystalline Materials-1 (Types of Crystalline Defects)

Lecture 12 - Defects in Crystalline Materials-1 (Point Defects)

Lecture 13 - Defects in Crystalline Materials-1 (Equilibrium Concentration of Vacancies)

Lecture 14 - Defects in Crystalline Materials-1 (Theoretical Shear Strength)

Lecture 15 - Defects in Crystalline Materials-2 (Effect of Point Defects)

Lecture 16 - Defects in Crystalline Materials-2 (Point Defects and Solid Solutions)

Lecture 17 - Defects in Crystalline Materials-3 (Line Defects, Types of Dislocations and their Characteristics)

Lecture 18 - Defects in Crystalline Materials-4 (Slip Systems, Burger's Vector and Dislocation Motion)

Lecture 19 - Defects in Crystalline Materials-4 (Slip in Single Crystals and Resolved Shear Stress)

Lecture 20 - Defects in Crystalline Materials-5 (Different Stages of Slip in Single Crystla Materials)

Lecture 21 - Defects in Crystalline Materials-5 (Geometry and Slip, Stress Field Around a Dislocation and Deformation Twinning)

Lecture 22 - Defects in Crystalline Materials-6 (Twinning, Interfacial Defects and Volume Defects)

Lecture 23 - Defects in Crystalline Materials-6 (Strengthening Mechanisms)

Lecture 24 - Defects in Crystalline Materials-7 (Plastic deformation in polycrystalline materials, Softening Mechanisms)

Lecture 25 - Mechanical Properties of Materials (Concept of Stress Tensor)

Lecture 26 - Mechanical Properties (Tension Test-Elastic Deformation)

Lecture 27 - Mechanical Properties (Tension Test - Plastic Deformation)

Lecture 28 - Mechanical Properties (Tension Test - Plastic Deformation)

Lecture 29 - Mechanical Properties (Hardness Test)

Lecture 30 - Static Failure Theories (Introduction, Definition of Failure)

Lecture 31 - Static Failure Theories (General form of failure theory, Stress tensor, Principal stress)

Lecture 32 - Static Failure Theories (Distortion Energy Theory)

Lecture 33 - Static Failure Theories (Maximum Shear Stress Theory)

Lecture 34 - Static Failure Theories (Design Problems)

Lecture 35 - Static Failure Theories (Failure of Brittle Materials)

Lecture 36 - Static Failure Theories (Coulomb-Mohr and Modified Coulomb-Mohr)

Lecture 37 - Static Failure Theories (Notches and Stress Concentration)

Lecture 38 - Introduction to Fracture Mechanics, Griffith's Analysis of a Cracked Body

Lecture 39 - Fracture Mechanics (Energy Release Rate)

Lecture 40 - Fracture Mechanics (Crack Resistance, Stress Intensity Factor, Fracture Toughness)

Lecture 41 - Fatigue Failure of Materials (Introduction, Historical Events, S-N Diagram)

Lecture 42 - Fatigue Failure of Materials (S-N Diagram, Types of Time Varying Loads)

Lecture 43 - Fatigue Failure of Materials (High Cycle Fatigue, Low Cycle Fatigue, Stress Ratio, Amplitude Ratio)

Lecture 44 - Fatigue Failure of Materials (Rotating Beam Bending Test, Estimated S-N diagram)

Lecture 45 - Fatigue Failure Theories (Fatigue strength correction factors)

Lecture 46 - Problems on Fatigue Failure-1 (S-N diagram and Corrected endurance strength)

Lecture 47 - Fatigue Failure of Materials (Features of Fatigue Failure; Factor of Safety in Life and Stress)

Lecture 48 - Fatigue Failure of Materials (Effect of Mean Stress)

Lecture 49 - Fatigue Failure of Materials (Multiaxial Fatigue and Variable Amplitude Loading)

Lecture 50 - Fatigue Failure of Materials (Fatigue Stress Concentration Factor)

Lecture 51 - Fatigue Failure of Materials (Fatigue Crack Growth, Paris' law)

Lecture 52 - Problems on Fatigue Failure-2 (Effect of mean stress, Fatigue crack growth)

Lecture 53 - Problems on Fatigue Failure-3 (Effect of Notch, Multiaxial Loading)

Lecture 54 - Phase Diagrams (Introduction)

Lecture 55 - Phase Diagrams (Language of Phase Diagrams, Types of Binary Phase Alloys)

Lecture 56 - Phase Diagrams (Tie line, Lever Rule, Indentifcation of compositions and weight fractions in two-phase regions)

Lecture 57 - Phase Diagrams (Type 1: Isomorphous Alloys, Microstructure evolution in Equilibrium and Noon equilibrium cooling)

Lecture 58 - Phase Diagrams (Conguent Melting Alloys, Type II Alloys, Eutectic Reaction)

Lecture 59 - Phase Diagrams (Type III Alloys with Partial Solubility in Solid State)

Lecture 60 - Phase Diagrams (Conguent melting alloys, Peritectic Reaction, Monotectic Reaction)

Lecture 61 - Phase Diagrams (Allotropy, Eutectoid and Peritectoid Reactions)

Lecture 62 - Phase Diagrams (Iron-Iron Carbide Phase Diagram)

Lecture 63 - Kinetics of Phase Transformations (Homogeneous Nucleation)

Lecture 64 - Kinetics of Phase Transformations (Heterogeneous Nucleation)

Lecture 65 - Isothermal Transformation Diagram

Lecture 66 - Martensite Transformation, C-C-T Diagram

Lecture 67 - Heat Treatment of Steels (Annealing and Normalizing)

NPTEL : NOC:Computational Fluid Dynamics using Finite Volume Method (Mechanical Engineering)

Co-ordinators : Prof. Kameswararao Anupindi

Lecture 1 - Review of governing equations: Conservation of mass

Lecture 2 - Review of governing equations: Conservation of momentum

Lecture 3 - Review of governing equations: Conservation of energy

Lecture 4 - Review of governing equations: Navier-Stokes equations and energy equation

Lecture 5 - Review of governing equations: General scalar transport equation

Lecture 6 - Review of governing equations: classification of PDEs

Lecture 7 - Overview of Numerical Methods: Finite Difference Method

Lecture 8 - Overview of Numerical Methods: Finite Volume Method

Lecture 9 - Overview of Numerical Methods: Solution of linear algebraic equations

Lecture 10 - Finite Volume Method for Diffusion Equation: Discretization of 1D diffusion equation

Lecture 11 - Finite Volume Method for Diffusion Equation: Discretization of 2D diffusion equation

Lecture 12 - Finite Volume Method for Diffusion Equation: Boundary conditions for 2D diffusion equation

Lecture 13 - Finite Volume Method for Diffusion Equation: Discretization of 3D diffusion equation, mixed boundary conditions

Lecture 14 - Finite Volume Method for Diffusion Equation: Tri-Diagonal Matrix Algorithm

Lecture 15 - Finite Volume Method for Diffusion Equation: Linearization of source term, line-by-line TDMA

Lecture 16 - Finite Volume Method for Diffusion Equation: Problem solving using TDMA

Lecture 17 - Finite Volume Method for Diffusion Equation: Problem solving using line-by-line TDMA

Lecture 18 - Finite Volume Method for Diffusion Equation: Steady diffusion in polar and axisymmetric coordinates

Lecture 19 - Finite Volume Method for Diffusion Equation: Discretization of unsteady diffusion equation

Lecture 20 - Finite Volume Method for Diffusion Equation: Unsteady diffusion time-stepping schemes

Lecture 21 - Finite Volume Method for Diffusion Equation: Unsteady diffusion time-stepping schemes and Truncation errors of the FV schemes

Lecture 22 - Finite Volume Method for Diffusion Equation: Truncation errors and stability analysis

Lecture 23 - Finite Volume Method for Diffusion Equation: Stability analysis and steady diffusion in unstructured meshes.

Lecture 24 - Finite Volume Method for Diffusion Equation: Steady diffusion in unstructured meshes - Part 1

Lecture 25 - Finite Volume Method for Diffusion Equation: Steady diffusion in unstructured meshes - Part 2

Lecture 26 - Finite Volume Method for Diffusion Equation: Steady diffusion in unstructured meshes - Part 3

Lecture 27 - Finite Volume Method for Diffusion Equation: Steady diffusion in unstructured meshes - Part 4

Lecture 28 - Finite Volume Method for Diffusion Equation: Steady diffusion in unstructured meshes - Part 5

Lecture 29 - Finite Volume Method for Convection and Diffusion: Discretization of steady convection equation

Lecture 30 - Finite Volume Method for Convection and Diffusion: Discretization of steady convection equation

Lecture 31 - Finite Volume Method for Convection and Diffusion: Discretization of steady and unsteady convection equation

Lecture 32 - Finite Volume Method for Convection and Diffusion: Discretization of unsteady convection equation

Lecture 33 - Finite Volume Method for Convection and Diffusion: Discretization of convection-diffusion equation on unstructured mesh

Lecture 34 - Finite Volume Method for Convection-diffusion and fluid flow calculations

Lecture 35 - Finite Volume Method for Fluid Flow Calculations: The staggered grid approach

Lecture 36 - Finite Volume Method for Fluid Flow Calculations: SIMPLE algorithm - Part 1

Lecture 37 - Finite Volume Method for Fluid Flow Calculations: SIMPLE algorithm - Part 2

Lecture 38 - Finite Volume Method for Fluid Flow Calculations: SIMPLE algorithm - Part 3

Lecture 39 - Finite Volume Method for Fluid Flow Calculations: SIMPLE-Revised and SIMPLE-Corrected algorithm

Lecture 40 - Finite Volume Method for Fluid Flow Calculations: SIMPLE algorithm for Colocated mesh - Part 1

Lecture 41 - Finite Volume Method for Fluid Flow Calculations: SIMPLE algorithm for Colocated mesh - Part 2

Lecture 42 - Finite Volume Method for Fluid Flow Calculations: SIMPLE-Colocated algorithm for Unstructured mesh

NPTEL : NOC:Wheeled Mobile Robots (Mechanical Engineering)

Co-ordinators : Prof. Asokan Thondiyath, Prof. Santhakumar Mohan

Lecture 1 - Introduction to Mobile Robots and Manipulators

Lecture 2 - Introduction to Locomotion and Types of Locomotion

Lecture 3 - Introduction to Mobile Robot Kinematics

Lecture 4 - Degree of Maneuverability and Types of Wheels

Lecture 5 - Kinematic Simulation of a Mobile Robot (Land-based)

Lecture 6 - Kinematic Simulation and Motion Animation of a Mobile Robot (Land-based)

Lecture 7 - A Generalized Wheel (Kinematic) Model

Lecture 8 - Examples related to the Generalized Wheel (Kinematic) Model

Lecture 9 - Holonomic and Non-holonomic Mobile Robots

Lecture 10 - Kinematic Simulation of Wheeled Mobile Robots - Part 1

Lecture 11 - Kinematic Simulation of Wheeled Mobile Robots - Part 2

Lecture 12 - Kinematic Simulation of Wheeled Mobile Robots - Part 3

Lecture 13 - Mobile Robot Dynamics - Part 1

Lecture 14 - Mobile Robot Dynamics - Part 2

Lecture 15 - Equation of Motion and Dynamic Simulation of a Mobile Robot

Lecture 16 - Dynamic Models of Wheeled Mobile Robots with Wheel Configurations

Lecture 17 - Kinematic and Dynamic Models of a Mobile base with Four-Independent Steerable Power Wheels

Lecture 18 - Sensing and Perception

Lecture 19 - Sensors and Sensing

Lecture 20 - Commonly used sensors - 1

Lecture 21 - Commonly used sensors - 2

Lecture 22 - Commonly used sensors - 3

Lecture 23 - Sensor Errors and Error modelling

Lecture 24 - Mobile Robot Localisation

Lecture 25 - Map based Localisation

Lecture 26 - Markov Localisation

Lecture 27 - Kalman Filter Localisation

Lecture 28 - SLAM

Lecture 29 - Mobile Robot Navigation

Lecture 30 - Path Planning: Graph Construction

Lecture 31 - Graph Search Methods

Lecture 32 - Path Planning and Obstacle avoidance

Lecture 33 - Introduction to Motion Control of Mobile Robots - Part 1

Lecture 34 - Introduction to Motion Control of Mobile Robots - Part 2

Lecture 35 - Kinematic control of Land-based Mobile Robots

Lecture 36 - Simulation of Land-based Mobile Robots along with Kinematic Control - Part 1

Lecture 37 - Simulation of Land-based Mobile Robots along with Kinematic Control - Part 2

Lecture 38 - Simulation of Land-based Mobile Robots along with Kinematic Control - Part 3

Lecture 39 - Dynamic Control of Mobile Robots

Lecture 40 - Cascaded or Back-stepping Control of Mobile Robots

Lecture 41 - Modern Robotics and Challenges

Lecture 42 - Multiple Mobile Robotic Systems

Lecture 43 - Autonomous Mobile Robots and Mobile Manipulators

Lecture 44 - Legged and Hybrid Robots

Lecture 45 - Underwater and Aerial Robots

Lecture 46 - Healthcare Robots

NPTEL : NOC:Fundamentals of Combustion (Mechanical Engineering)

Co-ordinators : Prof. V. Raghavan

Lecture 1 - Fuel and their properties - Part 1

Lecture 2 - Fuel and their properties - Part 2 - Gaseous and Liquid fuels

Lecture 3 - Fuel and their properties - Part 3 - Liquid and Solid fuels

Lecture 4 - Review of basic thermodynamics of ideal gas mixtures - Part 1

Lecture 5 - Review of basic thermodynamics of ideal gas mixtures - Part 2

Lecture 6 - Stoichiometry - Part 1

Lecture 7 - Stoichiometry - Part 2 - Worked Examples

Lecture 8 - Stoichiometry - Part 3 - Worked Examples (Continued...)

Lecture 9 - First law and Second law of thermodynamics applied to combustion - Part 1 - Heat Calculation

Lecture 10 - First law and Second law of thermodynamics applied to combustion - Part 2 - Enthalpy Calculation

Lecture 11 - First law and Second law of thermodynamics applied to combustion - Part 3 - Calculation of flame temperature

Lecture 12 - First law and Second law of thermodynamics applied to combustion - Part 4 - Chemical equilibrium

Lecture 13 - First law and Second law of thermodynamics applied to combustion - Part 5 - Chemical equilibrium (Continued...)

Lecture 14 - First law and Second law of thermodynamics applied to combustion - Part 6 - Worked examples

Lecture 15 - First law and Second law of thermodynamics applied to combustion - Part 7 - Worked examples (Continued...)

Lecture 16 - Mass transfer basics - Part 1 - Fundamentals

Lecture 17 - Mass transfer basics - Part 2 - Calculation of diffusion velocity

Lecture 18 - Mass transfer basics - Part 3 - Steady evaporation (The Stefan Problem)

Lecture 19 - Mass transfer basics - Part 4 - Steady evaporation of liquid droplet and Worked examples

Lecture 20 - Fundamentals of combustion kinetics - Part 1 - Global and elementary reactions

Lecture 21 - Fundamentals of combustion kinetics - Part 2 - Reaction rates and equilibrium constant

Lecture 22 - Fundamentals of combustion kinetics - Part 3 - Steady state and partial equilibrium approximation

Lecture 23 - Fundamentals of combustion kinetics - Part 4 - Worked examples

Lecture 24 - Governing equations for reacting flow - Part 1 - Continuity, momentum and species conservation equations

Lecture 25 - Governing equations for reacting flow - Part 2 - The energy equation

Lecture 26 - Governing equations for reacting flow - Part 3 - Estimation of thermo-physical properties and control of combustion phenomena

Lecture 27 - Governing equations for reacting flow - Part 4 - Control of combustion phenomena and simplified chemically reacting system

Lecture 28 - Governing equations for reacting flow - Part 5 - Conserved scalars and mixture fraction approach

Lecture 29 - Characteristics of combustion flame and detonation - Part 1

Lecture 30 - Characteristics of combustion flame and detonation - Part 2

Lecture 31 - Characteristics of combustion flame and detonation - Part 3 - Rankine-Hugoniot relation

Lecture 32 - Characteristics of combustion flame and detonation - Part 4 - Estimation of detonation velocity and Worked examples

Lecture 33 - Laminar Premixed Flames - Part 1 - Laminar flame propagation

Lecture 34 - Laminar Premixed Flames - Part 2 - Laminar flame speed variation and Structure of premixed flames

Lecture 35 - Laminar Premixed Flames - Part 3 - Flammability limits and Premixed flame theory

Lecture 36 - Laminar Premixed Flames - Part 4 - Estimation of laminar flame speed

Lecture 37 - Laminar Premixed Flames - Part 5 - Ignition of premixed mixture (Semenov's Analysis)

Lecture 38 - Laminar Premixed Flames - Part 6 - Piloted ignition and Flame quenching

Lecture 39 - Laminar Premixed Flames - Part 7 - Premixed flame stability

Lecture 40 - Laminar Premixed Flames - Part 8 - Stability Maps and Worked examples

Lecture 41 - Laminar Diffusion Flames - Part 1 - Theory of gas jets

Lecture 42 - Laminar Diffusion Flames - Part 2 - Analysis of gas jets and jet diffusion flames

Lecture 43 - Laminar Diffusion Flames - Part 3 - Diffusion flame characteristics and flame structure

Lecture 44 - Laminar Diffusion Flames - Part 4 - Diffusion flame structure and Flame regimes

Lecture 45 - Laminar Diffusion Flames - Part 5 - Diffusion flame regimes and Flame height correlations

Lecture 46 - Laminar Diffusion Flames - Part 6 - Diffusion flame control

Lecture 47 - Laminar Diffusion Flames - Part 7 - Diffusion flame configurations (coflow, crossflow and opposed flow flames)

Lecture 48 - Laminar Diffusion Flames - Part 8 - Diffusion flame stability and Worked examples

Lecture 49 - Turbulent Flames - Part 1 - Characteristics of turbulence

Lecture 50 - Turbulent Flames - Part 2 - Turbulent length scales and turbulent stresses

Lecture 51 - Turbulent Flames - Part 3 - Axisymmetric turbulent jet

Lecture 52 - Turbulent Flames - Part 4 - Turbulent premixed flames and flame regimes

Lecture 53 - Turbulent Flames - Part 5 - Turbulent diffusion flames

Lecture 54 - Droplet evaporation and combustion - Part 1 - Steady evaporation of liquid droplet

Lecture 55 - Droplet evaporation and combustion - Part 2 - Equilibrium under steady evaporation of liquid droplet and droplet combustion

Lecture 56 - Droplet evaporation and combustion - Part 3 - Droplet combustion (simplified analysis)

Lecture 57 - Droplet evaporation and combustion - Part 4 - Species and temperature profiles

Lecture 58 - Droplet evaporation and combustion - Part 5 - Evaluation of mass burning rate and worked examples

Lecture 59 - Combustion of carbon particle - Part 1 - Coal combustion

Lecture 60 - Combustion of carbon particle - Part 2 - One film model

Lecture 61 - Combustion of carbon particle - Part 3 - Two film model and worked examples

NPTEL : NOC:Oil Hydraulics and Pneumatics (Mechanical Engineering)

Co-ordinators : Prof. Somashekhar S

Lecture 1 - Introduction, Learning Objectives, Course Content and References

Lecture 2 - Merits and Demerits of Fluid Power, Power Transmission Method

Lecture 3 - Brief History, Application Areas, Major Divisions of Fluid Power System

Lecture 4 - Introduction to Oil Hydraulics and its Basic Components

Lecture 5 - Introduction to Pneumatic and its Basic Components, Applications-Stationary and Mobile

Lecture 6 - Typical Application of Fluid Power System, Status and Development

Lecture 7 - Pascal's law and its application-Hydraulic jack, Hydraulic brake and Numerical

Lecture 8 - Pressure Intensifier, Numericals, Air-to-Hydraulic Booster and Bernoulli equation

Lecture 9 - Applications of Bernoulli equation-Venturi,Torricelli's theorem, Siphon, Continuity equation and flow configuration, Concept of pressures and Gas laws

Lecture 10 - Introduction to Fluid Power Symbols, Hydraulic lines and Color Coding

Lecture 11 - Symbols for Functional Units, Hydraulic Pumps, Hydraulic Motors, Cylinders, Air Compressors, Pneumatic Motors and Orifices

Lecture 12 - Symbols for Filters, Check Valves, DCVs, Spool Actuation methods, PCV, Miscellaneous, Port Configurations

Lecture 13 - Introduction to Hydraulic Pumps, Facts and Figures, Classifications

Lecture 14 - Positive Displacement pump and pumping theory

Lecture 15 - Ideal pump, pump losses, efficiency curve, Constructional features and Operations of External Gear pump

Lecture 16 - Construction features and operations of Internal Gear Pump, Gerotor Pump and Screw Pump

Lecture 17 - Numericals on Gear Pump, Tree Structure of Vane Pump

Lecture 18 - Vane Pump, Pumping theory, Construction and Operation of Unbalanced Vane Pump, Vane loading and solutions, Different Vanes

Lecture 19 - Variable Displacement Pressure Compensated Vane Pump, Balance Vane Pump, Kinematic Inversion of Vane pump and Numerical

Lecture 20 - Piston pump, Pumping theory, Constructional features and Operations of Hand Pump-Single acting, Twin single acting, Double acting, Two-stage

Lecture 21 - Axial Piston Pump- Construction and Operating principles of Bent axis and Swash plate type pump

Lecture 22 - Radial Piston Pumps- Construction and Operation, Pump failure and Cavitations, Important parameters while selecting Pump, Numerical

Lecture 23 - Pneumatic Control System-Introduction, Air preparation-Primary and Secondary Air Treatment

Lecture 24 - Pneumatic Power Source- Compressor, Classification, Air Receiver and Control Methods

Lecture 25 - Reciprocating Type Air Compressor-Single and Multi-stage Piston Pump, PV Diagram and Work Done

Lecture 26 - Construction and Operation of Two-stage Reciprocating type Air Compressor, Diaphragm Type Air Compressor, Rotary Vane Compressor, Twin Lobe Air compressor, Screw Compressor, Liquid Ring Compressor and Selection Criteria

Lecture 27 - Energy Loss and Cost Break Down in Air Preparation Process, Pressure Drop and its Effect

Lecture 28 - What causes Pressure Drop ?, Minimising Pressure Drop, Air Distribution System- Sizing of Pipes, Tubes, Materials and Fittings, Important Air Flow Parameters

Lecture 29 - Pressure drop Predictions using Various Empirical Formulae and Nomogram, Best Practices for Compressed Air Piping System and Installation Tips

Lecture 30 - Need for Air Dryer, Analysis of Moisture Removal from Air, Typical Air Drying Methods, Basic Types of Air Dryers

Lecture 31 - Construction and Operation of Refrigerated Air dyers, Absorption Dryer, Adsorption Dryer, Membrane Dryer, How to Choose the Right Air Dryer?

Lecture 32 - Directional Control Valves

Lecture 33 - Directional Control Valves

Lecture 34 - Directional Control Valves

Lecture 35 - Directional Control Valves

Lecture 36 - Directional Control Valves

Lecture 37 - Pressure Control Valves

Lecture 38 - Pressure Control Valves

Lecture 39 - Pressure Control Valves

Lecture 40 - Flow Control Valves

Lecture 41 - Flow Control Valves

Lecture 42 - Flow Control Valves

Lecture 43 - Estimation of leakage through spool and housing bore and Numericals on DCV, PCV and FCV

Lecture 44 - Estimation of leakage through spool and housing bore and Numericals on DCV, PCV and FCV

Lecture 45 - Hydraulic Motors

Lecture 46 - Hydraulic Motors

Lecture 47 - Hydraulic Motors

Lecture 48 - Hydraulic Motors

Lecture 49 - Hydraulic Motors

Lecture 50 - Hydraulic Motors

Lecture 51 - Hydraulic Cylinders

Lecture 52 - Hydraulic Cylinders

Lecture 53 - Hydraulic Cylinders

Lecture 54 - Hydraulic Cylinders

Lecture 55 - Hydraulic Cylinders

Lecture 56 - Numericals on Fluid Power Actuators

Lecture 57 - Numericals on Fluid Power Actuators

Lecture 58 - Subsystems: Hydraulic Reservoir, Coolers and Filters

Lecture 59 - Subsystems: Hydraulic Reservoir, Coolers and Filters

Lecture 60 - Subsystems: Hydraulic Reservoir, Coolers and Filters

Lecture 61 - Subsystems: Hydraulic Fluids, Conduits and Simple Numericals

Lecture 62 - Subsystems: Hydraulic Fluids, Conduits and Simple Numericals

Lecture 63 - Subsystems: Hydraulic Fluids, Conduits and Simple Numericals

Lecture 64 - Subsystems: Hydraulic accumulators, Classifications, Applications, Accumulator physics, Maintenance, Numericals

Lecture 65 - Subsystems: Hydraulic accumulators, Classifications, Applications, Accumulator physics, Maintenance, Numericals

Lecture 66 - Subsystems: Hydraulic accumulators, Classifications, Applications, Accumulator physics, Maintenance, Numericals

Lecture 67 - Oil Hydraulic Circuits: Design and Analysis

Lecture 68 - Oil Hydraulic Circuits: Design and Analysis

Lecture 69 - Oil Hydraulic Circuits: Design and Analysis

Lecture 70 - Task Based Selection and Analysis of Oil Hydraulic Circuits

Lecture 71 - Task Based Selection and Analysis of Oil Hydraulic Circuits

Lecture 72 - Task Based Selection and Analysis of Oil Hydraulic Circuits

Lecture 73 - Task Based Selection and Analysis of Oil Hydraulic Circuits

Lecture 74 - Pneumatic Circuits: Design and Analysis

Lecture 75 - Pneumatic Circuits: Design and Analysis

Lecture 76 - Pneumatic Circuits: Design and Analysis

Lecture 77 - Pneumatic Circuits: Design and Analysis of Multiple Actuators

Lecture 78 - Pneumatic Circuits: Design and Analysis of Multiple Actuators

Lecture 79 - Pneumatic Circuits: Design and Analysis of Multiple Actuators

Lecture 80 - Pump-controlled Hydraulic Systems

Lecture 81 - Pump-controlled Hydraulic Systems

Lecture 82 - Pump-controlled Hydraulic Systems

Lecture 83 - Hydrostatic Transmissions

Lecture 84 - Hydrostatic Transmissions

Lecture 85 - Hydrostatic Transmissions

Lecture 86 - Proportional Valve Technology

Lecture 87 - Proportional Valve Technology

Lecture 88 - Proportional Valve Technology

Lecture 89 - Electro Hydraulic Servo Valve (EHSV)

Lecture 90 - Electro Hydraulic Servo Valve (EHSV)

Lecture 91 - Electro Hydraulic Servo Valve (EHSV)

Lecture 92 - Electro-Hydraulic Actuator (EHA)

Lecture 93 - Electro-Hydraulic Actuator (EHA)

Lecture 94 - Modeling and Simulation in Hydraulic Components

Lecture 95 - Modeling and Simulation in Hydraulic Components

Lecture 96 - Modeling and Simulation in Hydraulic Components

NPTEL : Introduction to Turbomachines (Mechanical Engineering)

Co-ordinators : Prof. Babu Viswanathan

Lecture 1 - Introduction

Lecture 2 - Basic Theroy of Turbomachines - Part 1

Lecture 3 - Basic Theroy of Turbomachines - Part 2

Lecture 4 - Basic Theroy of Turbomachines - Part 3

Lecture 5 - Basic Theroy of Turbomachines - Part 4

Lecture 6 - Basic Theroy of Turbomachines - Part 5

Lecture 7 - Basic Theroy of Turbomachines - Part 6

Lecture 8 - Hydro Turbomachines - Centrifugal pumps - Part 1

Lecture 9 - Hydro Turbomachines - Centrifugal pumps - Part 2

Lecture 10 - Hydro Turbomachines - Centrifugal pumps - Part 3

Lecture 11 - Hydro Turbomachines - Centrifugal pumps - Part 4

Lecture 12 - Hydro Turbomachines - Francis turbine - Part 1

Lecture 13 - Hydro Turbomachines - Francis turbine - Part 2

Lecture 14 - Hydro Turbomachines - Kaplan turbine

Lecture 15 - Hydro Turbomachines - Pelton turbine

Lecture 16 - Positive Displacement Pumps - Gear pump

Lecture 17 - Thermal Turbomachines - Introduction

Lecture 18 - Thermal Turbomachines - Gas turbines

Lecture 19 - Thermal Turbomachines - Steam Turbines

Lecture 20 - Thermal Turbomachines - Part 1

Lecture 21 - Thermal Turbomachines - Part 2

NPTEL : NOC:Mechanics and Control of Robotic Manipulators (Mechanical Engineering)

Co-ordinators : Prof. Santhakumar Mohan

Lecture 1 - Introduction

Lecture 2 - Introduction to robot mechanics

Lecture 3 - Introduction to forward and inverse kinematics

Lecture 4 - Description of position and orientation

Lecture 5 - Transformation matrix

Lecture 6 - Compound rotations - Part 1

Lecture 7 - Compound rotations - Part 2

Lecture 8 - Kinematic parameters

Lecture 9 - DH parameters

Lecture 10 - DH representation

Lecture 11 - Frame arrangement and examples - Part 1

Lecture 12 - Examples related to frame arrangement

Lecture 13 - Frame arrangement and examples - Part 2

Lecture 14 - Forward and inverse kinematics of robotic manipulators

Lecture 15 - Examples related to inverse kinematics

Lecture 16 - Inverse kinematic solution based on numerical methods

Lecture 17 - Forward kinematic solution using Matlab

Lecture 18 - Inverse kinematic solution based on numerical methods using Matlab

Lecture 19 - Introduction to differential kinematics

Lecture 20 - Velocity propogation model for serial manipulators and Jacobian matrix

Lecture 21 - Velocity propogation model using Matlab

Lecture 22 - Manipulator Statics and Workspace singularities

Lecture 23 - Introduction to robot dynamics and Lagrange-Euler method

Lecture 24 - Newton-Euler method

Lecture 25 - Equation of motion in state-space form

Lecture 26 - Dynamic model derivation using Newton-Euler method in Matlab

Lecture 27 - Dynamic model derivation using Lagrange-Euler method in Matlab

Lecture 28 - Dynamic simulation of serial manipulators using Matlab

Lecture 29 - Introduction to trajectory generation

Lecture 30 - Trajectory generation using smooth functions

Lecture 31 - Trajectory generation schemes for serial manipulators

Lecture 32 - Trajectory generation using Matlab - Part 1

Lecture 33 - Trajectory generation using Matlab - Part 2

Lecture 34 - Trajectory generation for serial manipulators using matlab

Lecture 35 - Trajectory generation for serial manipulators with workspace using matlab

Lecture 36 - Introduction to robot motion control

Lecture 37 - Types of robot manipulator control and concerns

Lecture 38 - Kinematic control

Lecture 39 - Matlab simulation on kinematic control

Lecture 40 - Dynamic control

Lecture 41 - Simulations related to dynamic control schemes using Matlab - Part 1

Lecture 42 - Cascaded control design

Lecture 43 - Simulations related to dynamic control schemes using Matlab - Part 2

Lecture 44 - Simulations related to dynamic control schemes using Matlab - Part 3

Lecture 45 - Kinematic and dynamic models of a mobile robot using DH approach

NPTEL : Inverse Methods in Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. C.Balaji, Prof.S. Balaji

Lecture 1 - Introduction to inverse problems

Lecture 2 - Fermi estimation

Lecture 3 - Forward/Direct and Inverse problems

Lecture 4 - Key drivers for studying inverse methods in engineering

Lecture 5 - Formulation for inverse problems

Lecture 6 - Statistical tools for estimation

Lecture 7 - Statistical description of errors

Lecture 8 - Well-posed and ill-posed problems

Lecture 9 - Probability and Statistics Brief overview - I

Lecture 10 - Probability and Statistics Brief overview - II

Lecture 11 - Gaussian distribution

Lecture 12 - Gaussian distribution (Continued...), and Maximum Likelihood Estimation (MLE)

Lecture 13 - Linear least square regression

Lecture 14 - Linear least square regression (Continued...)

Lecture 15 - Alternatives to Linear least square

Lecture 16 - Polynomial regression

Lecture 17 - Inverse problems in transient conduction - I

Lecture 18 - Inverse problems in transient conduction - II

Lecture 19 - Non-linear regression

Lecture 20 - Gauss-Newton algorithm (GNA)

Lecture 21 - Gauss-Newton algorithm (GNA) Example

Lecture 22 - Levenberg-Marquardt algorithm (LMA)

Lecture 23 - Tikhonov regularization

Lecture 24 - Jacobian and its calculation

Lecture 25 - Bayesian methods

Lecture 26 - Bayesian methods (Continued...)

Lecture 27 - Metropolis-Hastings algorithm (MH) and Markov Chain Monte Carlo Methods (MCMC)

Lecture 28 - Introduction to machine learning in heat transfer

Lecture 29 - Overview of machine learning

Lecture 30 - Calculation in a neural network model

Lecture 31 - Gradient Descent method

Lecture 32 - Gradient Descent method (Continued...)

Lecture 33 - Back propagation

Lecture 34 - Neural network as a surrogate forward model

Lecture 35 - PINN for an inverse problem

Lecture 36 - PINN for an inverse problem (Continued...)

Lecture 37 - Inverse methods in heat transfer - Summary

NPTEL : Engineering Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. Babu Viswanathan

Lecture 1 - Course outline

Lecture 2 - Introduction - Part 1

Lecture 3 - Introduction - Part 2

Lecture 4 - Basic concepts - Part 1

Lecture 5 - Basic concepts - Part 2

Lecture 6 - Basic concepts - Part 3

Lecture 7 - Basic concepts - Part 4

Lecture 8 - Basic concepts - Part 5

Lecture 9 - Work and Heat - Part 1

Lecture 10 - Work and Heat - Part 2

Lecture 11 - Work and Heat - Part 3

Lecture 12 - First law of thermodynamics

Lecture 13 - Pure substances

Lecture 14 - Ideal gases and ideal gas mixtures

Lecture 15 - Two-phase mixtures - Part 1

Lecture 16 - Two-phase mixtures - Part 2

Lecture 17 - First law analysis of systems - Part 1

Lecture 18 - First law analysis of systems - Part 2

Lecture 19 - First law analysis of systems - Part 3

Lecture 20 - First law analysis of systems - Part 4

Lecture 21 - First law of thermodynamics for a control colume

Lecture 22 - Control volume analysis of steady flow devices - Part 1

Lecture 23 - Control volume analysis of steady flow devices - Part 2

Lecture 24 - Control volume analysis of steady flow devices - Part 3

Lecture 25 - Unsteady analysis

Lecture 26 - Second law of Thermodynamics - Part 1

Lecture 27 - Second law of Thermodynamics - Part 2

Lecture 28 - Second law of Thermodynamics - Part 3

Lecture 29 - Second law of Thermodynamics - Part 4

Lecture 30 - Second law of Thermodynamics - Part 5

Lecture 31 - Entropy - Part 1

Lecture 32 - Entropy - Part 2

Lecture 33 - Entropy - Part 3

Lecture 34 - Entropy - Part 4

Lecture 35 - Entropy - Part 5

Lecture 36 - Entropy - Part 6

Lecture 37 - Thermodynamic cycles - Part 1

Lecture 38 - Thermodynamic cycles - Part 2

NPTEL : Applied Mechanics - Fluid Mechanics Laboratory (Mechanical Engineering)

Co-ordinators : Unknown

Lecture 1 - Free and Forced Vortices - I

Lecture 2 - Free and Forced Vortices - II

Lecture 3 - Impact of Jet on hemispherical shell

Lecture 4 - Impact of Jet on horizontal flat plate

Lecture 5 - Pressure Distribution on a Circular Cylinder

Lecture 6 - Verification of Bernoullis Theorem

Lecture 7 - Visualization of potential flows

Lecture 8 - Visualization of vortex shredding

Lecture 9 - Wake Velocity Measurement for flow over a Circular Cylinder

NPTEL : NOC:Interfacial Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Harish N Dixit

Lecture 1 - Non-dimensional numbers in interfacial flows

Lecture 2 - Integral form of governing equations

Lecture 3 - Boundary (Jump) conditions at a fluid-fluid interface (no surface tension)

Lecture 4 - On surface tension and interfacial energy

Lecture 5 - Introduction to surface tension effects

Lecture 6 - Boundary (Jump) conditions at a fluid-fluid interface (with surface tension) - Part 1

Lecture 7 - Boundary (Jump) conditions at a fluid-fluid interface (with surface tension) - Part 2

Lecture 8 - Summary of equations

Lecture 9 - Capillary statics shape of meniscus - Part 1

Lecture 10 - Capillary statics shape of meniscus - Part 2

Lecture 11 - Shape of static meniscus-Energy minimisation - Part 1

Lecture 12 - Calculus of variations (a primer): Euler-Lagrange equations

Lecture 13 - Shape of static meniscus-Energy minimisation - Part 2

Lecture 14 - Method of Lagrange multipliers

Lecture 15 - On wetting and shape of a drop

Lecture 16 - The Young's Equation: Partial wetting

Lecture 17 - Variational approach to the Young-Laplace equation - Part 1

Lecture 18 - Variational approach to the Young-Laplace equation - Part 2

Lecture 19 - Shape of a puddle - large/heavy drops

Lecture 20 - Wetting on rough and textured surface - Part 1

Lecture 21 - Wetting on rough and textured surface - Part 2

Lecture 22 - Wetting on rough and textured surface - Part 3

Lecture 23 - Law of capillary rise

Lecture 24 - Dynamics of capillary rise

Lecture 25 - Dynamics of capillary rise: Analysis of regimes

Lecture 26 - Forced wetting and coating flows

Lecture 27 - More on coating and Landau-Levich equation

Lecture 28 - Lubrication approximation and thin films

Lecture 29 - Free surface flows and interface conditions

Lecture 30 - Uniform flow down an incline

Lecture 31 - Shape of a falling jet

Lecture 32 - A quick tour of stability analysis

Lecture 33 - Rayleigh-Plateau instability - Part 1

Lecture 34 - Rayleigh-Plateau instability - Part 2

Lecture 35 - Rayleigh-Plateau instability - Part 3

Lecture 36 - Rupture of thin films - Part 1

Lecture 37 - Rupture of thin films - Part 2

Lecture 38 - Rupture of thin films - Effect of van der Waals force

Lecture 39 - Rupture of thin films - Part 3

Lecture 40 - Rupture of thin films - Part 4

Lecture 41 - Benard-Marangoni Instability - Part 1

Lecture 42 - Benard-Marangoni Instability - Part 2

Lecture 43 - Benard-Marangoni Instability - Part 3

Lecture 44 - Benard-Marangoni Instability - Part 4

Lecture 45 - Kelvin helmholtz instability - Part 1

Lecture 46 - Kelvin helmholtz instability - Part 2

Lecture 47 - Kelvin helmholtz instability - Part 3

Lecture 48 - Kelvin helmholtz instability - Part 4

Lecture 49 - Contact angle hysterisis

Lecture 50 - Thin film down an incline-a contact line problem - Part 1

Lecture 51 - Thin film down an incline-a contact line problem - Part 2

Lecture 52 - Local flow near a moving contact line

Lecture 53 - Modelling of moving contact line

NPTEL : Applied Thermodynamics (Mechanical Engineering)

Co-ordinators : Dr. Babu Viswanathan

Lecture 1 - Introduction

Lecture 2 - Entropy change of a control volume - Part 1

Lecture 3 - Entropy change of a control volume - Part 2

Lecture 4 - Entropy change of a control volume - Part 3

Lecture 5 - Work interaction of internally reversible steady flow processes

Lecture 6 - Exergy - Part 1

Lecture 7 - Exergy - Part 2

Lecture 8 - Exergy - Part 3

Lecture 9 - Exergy - Part 4

Lecture 10 - Exergy - Part 5

Lecture 11 - Thermodynamic cycles - Rankine cycle - Part 1

Lecture 12 - Thermodynamic cycles - Rankine cycle - Part 2

Lecture 13 - Thermodynamic cycles - Rankine cycle - Part 3

Lecture 14 - Thermodynamic cycles - Air standard Brayton cycle - Part 1

Lecture 15 - Thermodynamic cycles - Air standard Brayton cycle - Part 2

Lecture 16 - Thermodynamic cycles - Air standard Brayton cycle - Part 3

Lecture 17 - Thermodynamic cycles - Air standard Brayton cycle - Part 4

Lecture 18 - Thermodynamic cycles - Air standard Brayton cycle - Part 5

Lecture 19 - Thermodynamic cycles - Air standard Otto cycle

Lecture 20 - Thermodynamic cycles - Air standard Diesel cycle - Part 1

Lecture 21 - Thermodynamic cycles - Air standard Diesel cycle - Part 2

Lecture 22 - Thermodynamic cycles - Vapor compression refrigeration cycle

Lecture 23 - Psychrometry - Part 1

Lecture 24 - Psychrometry - Part 2

Lecture 25 - Psychrometry - Part 3

Lecture 26 - Psychrometry - Part 4

Lecture 27 - Psychrometry - Part 5

Lecture 28 - Psychrometry - Part 6

Lecture 29 - Psychrometry - Part 7

Lecture 30 - Combustion thermodynamics - Part 1

Lecture 31 - Combustion thermodynamics - Part 2

Lecture 32 - Combustion Thermodynamics - Part 3

Lecture 33 - Combustion thermodynamics - Part 4

Lecture 34 - Compressible flow through nozzles - Part 1

Lecture 35 - Compressible flow through nozzles - Part 2

Lecture 36 - Compressible flow through nozzles - Part 3

Lecture 37 - Compressible flow through nozzles - Part 4

Lecture 38 - Compressible flow through nozzles - Part 5

Lecture 39 - Compressible flow through nozzles - Part 6

Lecture 40 - Compressible flow through nozzles - Part 7

Lecture 41 - Compressible flow through nozzles - Part 8

Lecture 42 - Compressible flow through nozzles - Part 9

Lecture 43 - Compressible flow through nozzles - Part 10

Lecture 44 - Compressible flow through nozzles - Part 11

Lecture 45 - Compressible flow through nozzles - Part 12

NPTEL : Heat Transfer (Prof .Dr.C. Balaji) (Mechanical Engineering)

Co-ordinators : Prof .Dr.C. Balaji

Lecture 1 - Introduction to Heat Transfer

Lecture 2 - Introduction to Heat Transfer - Practical examples

Lecture 3 - Introduction to Heat Transfer - Rate laws Conduction

Lecture 4 - Introduction to Heat Transfer - Rate laws Convection

Lecture 5 - Introduction to Heat Transfer - Rate laws Radiation

Lecture 6 - Radiation Heat Transfer

Lecture 7 - Radiation Laws

Lecture 8 - Universal Black Body Curve

Lecture 9 - Properties of Real Surfaces

Lecture 10 - Properties of Real Surfaces (Continued...)

Lecture 11 - Kirchoff's Law and example problems

Lecture 12 - Radiosity Irradiation Method and Viewfactors

Lecture 13 - Viewfactor Algebra

Lecture 14 - Conduction

Lecture 15 - Conduction: Steady state conduction equation

Lecture 16 - Conduction in composite wall

Lecture 17 - Conduction in cylinder

Lecture 18 - Crtical Radius of Insulation

Lecture 19 - Conduction with heat generation

Lecture 20 - Variable Thermal Conductivity and example problems

Lecture 21 - Fin heat transfer

Lecture 22 - Fin heat transfer continued

Lecture 23 - Fin heat transfer continued

Lecture 24 - Unsteady Heat Conduction

Lecture 25 - Unsteady Heat Conduction (Continued...)

Lecture 26 - Lumped capacitance Method

Lecture 27 - Unsteady Heat Conduction (Continued...)

Lecture 28 - Method of Separation of variables

Lecture 29 - Conduction Analytical solution

Lecture 30 - Conduction Numerical solution

Lecture 31 - Introduction to convection

Lecture 32 - Governing Equations for Convection

Lecture 33 - Energy equation

Lecture 34 - Convection - Boundary layer theory

Lecture 35 - Convection - Integral momentum equation

Lecture 36 - Solution to Integral Energy equation

Lecture 37 - Internal Flow - Flow inside pipes and ducts

Lecture 38 - Internal Flow - Turbulent heat transfer

Lecture 39 - Natural Convection

Lecture 40 - Heat Exchangers - 1

Lecture 41 - Heat Exchangers - 2

NPTEL : NOC:Inverse Methods in Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. Balaji Srinivasan

Lecture 1 - Introduction to the Inverse Methods in Heat Transfer Course

Lecture 2 - Inverse Problems - Definition, History and Applications

Lecture 3 - The inverse problem solving process

Lecture 4 - Review of Basic Heat Transfer for this course

Lecture 5 - Introduction to Week - 2

Lecture 6 - Introduction to Linear Regression for Inverse Problems

Lecture 7 - Example Application of Linear regression for an inverse conduction problem

Lecture 8 - Goodness of Fit and Coefficient of Determination

Lecture 9 - Linear Regression with Quadratic Model

Lecture 10 - Summary of Week - 2

Lecture 11 - Introduction to Week - 3

Lecture 12 - Introduction to Normal Equations for linear models

Lecture 13 - Normal Equations for linear models (Continued...)

Lecture 14 - Parity Plots

Lecture 15 - Programming Inverse Methods using Normal Equations

Lecture 16 - Variants on the Linear Model for inverse problems

Lecture 17 - Summary of Week - 3

Lecture 18 - The General Inverse Methods Process

Lecture 19 - Simple nonlinear inverse problem - Transient Heat transfer

Lecture 20 - Review of required calculus results

Lecture 21 - Gradient Descent Algorithm

Lecture 22 - Gradient Descent - Simple Example

Lecture 23 - Gradient Descent for Nonlinear Inverse Problem - Theory

Lecture 24 - Gradient Descent for Nonlinear Inverse Problem - Coding Example

Lecture 25 - Newton Algorithm for a System of Equations

Lecture 26 - Gauss Newton Algorithm - Derivation and Code

Lecture 27 - Overfitting and Regularization for Linear Models

Lecture 28 - Tikhonov Regularization and Levenberg-Marquardt - Theory

Lecture 29 - Tikhonov and Levenberg-Marquardt - Example Code

Lecture 30 - Introduction to Probability for Inverse Methods

Lecture 31 - Sum and Product Rules of Probability

Lecture 32 - Bayes Theorem - Simple Examples

Lecture 33 - Independence and Expectation

Lecture 34 - Variance and Covariance

Lecture 35 - Gaussian distribution and the standard normal table

Lecture 36 - Maximum Likelihood Estimate

Lecture 37 - MLE, MAP estimates

Lecture 38 - Introduction to Bayesian Methods for Inverse Problems

Lecture 39 - Offline Bayesian Estimation

Lecture 40 - Offline Bayesian Estimation - MATLAB Demo

Lecture 41 - MHMCMC for Inverse Problems

Lecture 42 - MHMCMC for Inverse Problems - MATLAB Demo

Lecture 43 - Why Machine Learning in Inverse Heat Transfer ?

Lecture 44 - Overview of AI and ML

Lecture 45 - Supervised Machine Learning as an Inverse Problem

Lecture 46 - Introduction to Week 9 - From Linear Models to Neural Networks

Lecture 47 - Gradient Descent - Batch, Stochastic and Mini Batch

Lecture 48 - Logistic Regression - The Forward Model

Lecture 49 - Logistic Regression - Binary Entropy Cost Function and Gradient

Lecture 50 - Multiclass Classification

Lecture 51 - Linear Separability and Neural Networks

Lecture 52 - Introduction to Week 10 - XOR and Deeper networks

Lecture 53 - Forward pass through a simple neural network

Lecture 54 - Backprop in a scalar chain

Lecture 55 - Backprop in a MLP

Lecture 56 - Introduction to Week 11 - ANNs as Surrogate models

Lecture 57 - Physics Informed Neural Networks - Introduction

Lecture 58 - Physics Informed Neural Networks - an intuitive explanation

Lecture 59 - Physics Informed Neural Networks - BC incorporation

Lecture 60 - PINNs for inverse problems

Lecture 61 - Introduction to Week 12 - Sensitivity Analysis

Lecture 62 - Code Examples of Logistic Regression - OR and AND gates

Lecture 63 - Code Example of shallow neural network - XOR gate

Lecture 64 - Code walkthrough for PINNs in Burgers equation

Lecture 65 - Formulation of a PINN based inverse problem in unsteady conduction

Lecture 66 - Formulation of a surrogate model based inverse solution in unsteady conduction

Lecture 67 - Summary of course

NPTEL : NOC:Sustainable Energy Technology (Mechanical Engineering)

Co-ordinators : Dr. Sayak Banerjee

Lecture 1 - Introduction and Fundamental Concepts - Part 1

Lecture 2 - Introduction and Fundamental Concepts - Part 2

Lecture 3 - Energy Scenario in Modern World - Part 1

Lecture 4 - Energy Scenario in Modern World - Part 2

Lecture 5 - Macro Trends in Energy Use - World and India - Part 1

Lecture 6 - Macro Trends in Energy Use - World and India - Part 2

Lecture 7 - Impact of Fossil fuels - Part 1

Lecture 8 - Impact of Fossil fuels - Part 2

Lecture 9 - Fossil Fuels and Climate Change - Part 1

Lecture 10 - Fossil Fuels and Climate Change - Part 2

Lecture 11 - Continual of previous lecture and Overview of Renewable energy Technology - Part 1

Lecture 12 - Continual of previous lecture and Overview of Renewable energy Technology - Part 2

Lecture 13 - Numerical examples - Part 1

Lecture 14 - Numerical examples - Part 2

Lecture 15 - Renewable Energy Contributions - Part 1

Lecture 16 - Renewable Energy Contributions - Part 2

Lecture 17 - Hydro Power - Part 1

Lecture 18 - Hydro Power - Part 2

Lecture 19 - The Fundamentals of various Turbine working principle - Part 1

Lecture 20 - The Fundamentals of various Turbine working principle - Part 2

Lecture 21 - Hydroturbine Selection Principle

Lecture 22 - Pumped Hydro Storage

Lecture 23 - Worked Out Examples of HydroPower

Lecture 24 - Introduction to Wind Energy - Part 1

Lecture 25 - Introduction to Wind Energy - Part 2

Lecture 26 - Wind Speed and Power Analysis - Part 1

Lecture 27 - Wind Speed and Power Analysis - Part 2

Lecture 28 - Design of Wind Turbine - Part 1

Lecture 29 - Design of Wind Turbine - Part 2

Lecture 30 - Wind Turbine Parts and Performance - Part 1

Lecture 31 - Wind Turbine Parts and Performance - Part 2

Lecture 32 - Wind farms, Offshore Wind Turbines and Numerical Examples in Wind Energy - Part 1

Lecture 33 - Wind farms, Offshore Wind Turbines and Numerical Examples in Wind Energy - Part 2

Lecture 34 - Introduction to Solar Energy - Part 1

Lecture 35 - Introduction to Solar Energy - Part 2

Lecture 36 - Solar Thermal Energy Systems - Part 1

Lecture 37 - Solar Thermal Energy Systems - Part 2

Lecture 38 - Solar Water Heaters - Part 1

Lecture 39 - Solar Water Heaters - Part 2

Lecture 40 - Concentrated Solar Thermal Power (CSP)

Lecture 41 - Introduction to Solar Photovoltaic Systems - Part 1

Lecture 42 - Introduction to Solar Photovoltaic Systems - Part 2

Lecture 43 - Solar Photovoltaic Technology - Part 1

Lecture 44 - Solar Photovoltaic Technology - Part 2

Lecture 45 - Doping of a Semiconductor - Part 1

Lecture 46 - Doping of a Semiconductor - Part 2

Lecture 47 - Structure of a Solar Cell and its Electrical Properties - Part 1

Lecture 48 - Structure of a Solar Cell and its Electrical Properties - Part 2

Lecture 49 - Solar Cell Efficiency - Part 1

Lecture 50 - Solar Cell Efficiency - Part 2

Lecture 51 - Types of solar cells - Part 1

Lecture 52 - Types of solar cells - Part 2

Lecture 53 - Bioenergy and Biofuels - Part 1

Lecture 54 - Bioenergy and Biofuels - Part 2

Lecture 55 - Biofuel Feedstocks

Lecture 56 - Bioenergy Technology and Sustainability - Part 1

Lecture 57 - Bioenergy Technology and Sustainability - Part 2

Lecture 58 - Production Technologies for Bioethanol, Biodiesel and Biogas

Lecture 59 - Introduction of Geothermal Energy

Lecture 60 - Different types of Geothermal power systems

Lecture 61 - Characteristics of electricity demand and the technology is developed to respond the energy demand

Lecture 62 - Continuation of Enegry demand and adaptation of renewable energies

Lecture 63 - Introduction of Energy storage system

Lecture 64 - Major parameters of energy storage technology

Lecture 65 - Mechanical Energy Storage Technologies

Lecture 66 - Compressed Air Energy Storage System

Lecture 67 - Flywheel Based Energy Storage System - Part 1

Lecture 68 - Flywheel Based Energy Storage System - Part 2

Lecture 69 - Energy Storage System Through Capacitor

Lecture 70 - Electrolytic Capacitor

Lecture 71 - Super Capacitor

Lecture 72 - Electrochemical Energy Storage Systems

Lecture 73 - Performance Characteristics of Battery

Lecture 74 - Types of Rechargeable Batteries - Part 1

Lecture 75 - Types of Rechargeable Batteries - Part 2

Lecture 76 - Thermal Energy Storage Systems - Part 1

Lecture 77 - Thermal Energy Storage Systems - Part 2

Lecture 78 - Storage of Coolness and Synoptic View of Energy Storage Technology

Lecture 79 - Storage Needs for the Grid

Lecture 80 - Energy Storage Types

Lecture 81 - Trends in Energy Storage Types and their Characteristics

Lecture 82 - Analysis of Growth in Energy Storage-focussed on Pumped Hydro Storage, Flywheels and Li-ion batteries

Lecture 83 - Fuel Cells and Hydrogen Energy Economy

Lecture 84 - Hydrogen production and storage technologies

Lecture 85 - Hydrogen storage technologies

Lecture 86 - Fuel cell technology

Lecture 87 - Fuel cell types

Lecture 88 - Carbon Capture and Storage (CCS) technologies - Part 1

Lecture 89 - Carbon Capture and Storage (CCS) technologies - Part 2

NPTEL : NOC:Strength of Materials - IITM (Mechanical Engineering)

Co-ordinators : Prof. K. Ramesh

Lecture 1 - Introduction to Strength of Materials - 1

Lecture 2 - Introduction to Strength of Materials - 2

Lecture 3 - Stress Component is Scalar

Lecture 4 - Stress Vector

Lecture 5 - Stress Tensor

Lecture 6 - Equilibrium Conditions

Lecture 7 - Mohr's Circle

Lecture 8 - Proof of Mohr's Circle

Lecture 9 - Principal Stresses

Lecture 10 - Octahedral and Deviatoric Stresses and Principal Directions

Lecture 11 - Free Surfaces

Lecture 12 - Photoelasticity

Lecture 13 - Strain

Lecture 14 - State of Strain

Lecture 15 - Strain Measurement

Lecture 16 - Tension Test

Lecture 17 - Stress Strain Relations

Lecture 18 - Interrelations between Elastic Constants

Lecture 19 - Thermal Strain

Lecture 20 - Torsion 1 - Thought and Physical Experiments

Lecture 21 - Torsion 2 - Mathematical Development

Lecture 22 - Torsion 3 - Problem solving, Hollow shaft

Lecture 23 - Bending 1 - Euler-Bernoulli Hypothesis

Lecture 24 - Bending 2 - Flexure Formula

Lecture 25 - Bending 3 - Engineering Analysis of Beams

Lecture 26 - Bending 4 - Shear Stress in Beams

Lecture 27 - Bending 5 - Composite Beams

Lecture 28 - Bending 6 - Shear in I Beams and Shear Centre

Lecture 29 - Bending 7 - Unsymmetrical Bending and Combined Loading

Lecture 30 - Review 1

Lecture 31 - Deflection 1 - Moment-Curvature and Load Deflection

Lecture 32 - Deflection 2 - Moment-Area Method

Lecture 33 - Deflection 3 - Method of Superposition and Energy Method

Lecture 34 - Deflection 4 - Fictitious Load Method

Lecture 35 - Theories of Failure 1 - Overview

Lecture 36 - Theories of Failure 2 - Yield surfaces, Mohr's Theory and Failure in Combined Loading

Lecture 37 - Stability 1 - Governing Equations, Fixed-free and Pinned-pinned

Lecture 38 - Stability 2 - Fixed-pinned, Fixed-fixed

Lecture 39 - Review 2

NPTEL : NOC:Engineering Thermodynamics (Mechanical Engineering)

Co-ordinators : Prof. V. Raghavan

Lecture 1 - Course outline

Lecture 2 - Introduction - Part 1

Lecture 3 - Introduction - Part 2

Lecture 4 - Basic concepts - Part 1

Lecture 5 - Basic concepts - Part 2

Lecture 6 - Basic concepts - Part 3

Lecture 7 - Basic concepts - Part 4

Lecture 8 - Basic concepts - Part 5

Lecture 9 - Tutorial 1 - Basic concepts, pressure and temperature measurements - Part 1

Lecture 10 - Tutorial 1 - Basic concepts, pressure and temperature measurements - Part 2

Lecture 11 - Tutorial 1 - Basic concepts, pressure and temperature measurements - Part 3

Lecture 12 - Work and Heat - Part 1

Lecture 13 - Work and Heat - Part 2

Lecture 14 - Work and Heat - Part 3

Lecture 15 - Tutorial 2 - Work and heat transfer examples - Part 1

Lecture 16 - Tutorial 2 - Work and heat transfer examples - Part 2

Lecture 17 - Tutorial 2 - Work and heat transfer examples - Part 3

Lecture 18 - First law of thermodynamics

Lecture 19 - Pure substances

Lecture 20 - Ideal gases and ideal gas mixtures

Lecture 21 - Two-phase mixtures - Part 1

Lecture 22 - Two-phase mixtures - Part 2

Lecture 23 - First law analysis of systems - Part 1

Lecture 24 - First law analysis of systems - Part 2

Lecture 25 - First law analysis of systems - Part 3

Lecture 26 - First law analysis of systems - Part 4

Lecture 27 - Tutorial 3 - First law analysis of system - Part 1

Lecture 28 - Tutorial 3 - First law analysis of system - Part 2

Lecture 29 - Tutorial 3 - First law analysis of system - Part 3

Lecture 30 - Tutorial 4 - Systems involving ideal gas mixtures - Part 1

Lecture 31 - Tutorial 4 - Systems involving ideal gas mixtures - Part 2

Lecture 32 - Tutorial 4 - Systems involving ideal gas mixtures - Part 3

Lecture 33 - Tutorial 5 - Systems involving Steam and R134a using table - Part 1

Lecture 34 - Tutorial 5 - Systems involving Steam and R134a using table - Part 2

Lecture 35 - Tutorial 5 - Systems involving Steam and R134a using table - Part 3

Lecture 36 - Tutorial 5 - Systems involving Steam and R134a using table - Part 4

Lecture 37 - Tutorial 5 - Systems involving Steam and R134a using table - Part 5

Lecture 38 - Tutorial 5 - Systems involving Steam and R134a using table - Part 6

Lecture 39 - First law of thermodynamics for a control colume

Lecture 40 - Control volume analysis of steady flow devices - Part 1

Lecture 41 - Control volume analysis of steady flow devices - Part 2

Lecture 42 - Control volume analysis of steady flow devices - Part 3

Lecture 43 - Unsteady analysis

Lecture 44 - Tutorial 6 - First law for control volumes

Lecture 45 - Second law of Thermodynamics - Part 1

Lecture 46 - Second law of Thermodynamics - Part 2

Lecture 47 - Second law of Thermodynamics - Part 3

Lecture 48 - Second law of Thermodynamics - Part 4

Lecture 49 - Second law of Thermodynamics - Part 5

Lecture 50 - Tutorial 7 - Second law of thermodynamics - Part 1

Lecture 51 - Tutorial 7 - Second law of thermodynamics - Part 2

Lecture 52 - Tutorial 7 - Second law of thermodynamics - Part 3

Lecture 53 - Tutorial 7 - Second law of thermodynamics - Part 4

Lecture 54 - Tutorial 7 - Second law of thermodynamics - Part 5

Lecture 55 - Entropy - Part 1

Lecture 56 - Entropy - Part 2

Lecture 57 - Entropy - Part 3

Lecture 58 - Entropy - Part 4

Lecture 59 - Entropy - Part 5

Lecture 60 - Entropy - Part 6

Lecture 61 - Tutorial 8 - Entropy - Part 1

Lecture 62 - Tutorial 8 - Entropy - Part 2

Lecture 63 - Tutorial 8 - Entropy - Part 3

Lecture 64 - Tutorial 8 - Entropy - Part 4

Lecture 65 - Tutorial 8 - Entropy - Part 5

Lecture 66 - Thermodynamic cycles - Part 1

Lecture 67 - Thermodynamic cycles - Part 2

Lecture 68 - Tutorial 9 - Thermodynamic cycles - Part 1

Lecture 69 - Tutorial 9 - Thermodynamic cycles - Part 2

Lecture 70 - Tutorial 9 - Thermodynamic cycles - Part 3

NPTEL : NOC:Theory of Fire Propagation (Fire Dynamics) (Mechanical Engineering)

Co-ordinators : Prof. V. Raghavan

Lecture 1 - Basics of Fire - Part 1

Lecture 2 - Basics of Fire - Part 2

Lecture 3 - Basics of Fire - Part 3

Lecture 4 - Basics of Fire - Part 4

Lecture 5 - Basics of Fire - Part 5

Lecture 6 - Basics of Fire - Part 6

Lecture 7 - Basics of Fire - Part 7

Lecture 8 - Basics of Fire - Part 8

Lecture 9 - Basics of Fire - Part 9

Lecture 10 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 1

Lecture 11 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 2

Lecture 12 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 3

Lecture 13 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 4

Lecture 14 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 5

Lecture 15 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 6

Lecture 16 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 7

Lecture 17 - Review of thermo-chemistry, chemical equilibrium and kinetics - Part 8

Lecture 18 - Review of Premixed and Diffusion Flames - Part 1

Lecture 19 - Review of Premixed and Diffusion Flames - Part 2

Lecture 20 - Review of Premixed and Diffusion Flames - Part 3

Lecture 21 - Review of Premixed and Diffusion Flames - Part 4

Lecture 22 - Review of Premixed and Diffusion Flames - Part 5

Lecture 23 - Review of Premixed and Diffusion Flames - Part 6

Lecture 24 - Review of Premixed and Diffusion Flames - Part 7

Lecture 25 - Review of Premixed and Diffusion Flames - Part 8

Lecture 26 - Burning of Liquid Fuels- Part 1

Lecture 27 - Burning of Liquid Fuels- Part 2

Lecture 28 - Burning of Liquid Fuels- Part 3

Lecture 29 - Burning of Liquid Fuels- Part 4

Lecture 30 - Burning of Liquid Fuels- Part 5

Lecture 31 - Burning of Liquid Fuels- Part 6

Lecture 32 - Burning of Liquid Fuels- Part 7

Lecture 33 - Burning of Liquid Fuels- Part 8

Lecture 34 - Burning of Solid Fuels - Part 1

Lecture 35 - Burning of Solid Fuels - Part 2

Lecture 36 - Burning of Solid Fuels - Part 3

Lecture 37 - Burning of Solid Fuels - Part 4

Lecture 38 - Burning of Solid Fuels - Part 5

Lecture 39 - Burning of Solid Fuels - Part 6

Lecture 40 - Burning of Solid Fuels - Part 7

Lecture 41 - Analysis of Fire Plumes - Part 1

Lecture 42 - Analysis of Fire Plumes - Part 2

Lecture 43 - Analysis of Fire Plumes - Part 3

Lecture 44 - Analysis of Fire Plumes - Part 4

Lecture 45 - Analysis of Fire Plumes - Part 5

Lecture 46 - Analysis of Fire Plumes - Part 6

Lecture 47 - Enclosure Fires - Part 1

Lecture 48 - Enclosure Fires - Part 2

Lecture 49 - Enclosure Fires - Part 3

Lecture 50 - Enclosure Fires - Part 4

Lecture 51 - Enclosure Fires - Part 5

Lecture 52 - Enclosure Fires - Part 6

Lecture 53 - Enclosure Fires - Part 7

Lecture 54 - Introduction to dust ignition, dust explosion and forest fires - Part 1

Lecture 55 - Introduction to dust ignition, dust explosion and forest fires - Part 2

Lecture 56 - Introduction to dust ignition, dust explosion and forest fires - Part 3

Lecture 57 - Introduction to dust ignition, dust explosion and forest fires - Part 4

Lecture 58 - Introduction to dust ignition, dust explosion and forest fires - Part 5

Lecture 59 - Fire safety aspects - Part 1

Lecture 60 - Fire safety aspects - Part 2

Lecture 61 - Fire safety aspects - Part 3

NPTEL : Data-Driven Models for Unsteady Fluid Flow (Mechanical Engineering)

Co-ordinators : Prof. Aditya G. Nair

Lecture 1 - Data-driven models for unsteady fluid flows: Course overview

Lecture 2 - Data generation techniques for fluid flows

Lecture 3 - Dimensionality reduction of fluid flows

Lecture 4 - Reduced-order modeling of fluid flows

Lecture 5 - Turbulence modeling

NPTEL : NOC:Applied Thermodynamics (2024) (Mechanical Engineering)

Co-ordinators : Prof. V. Raghavan

Lecture 1 - Introduction

Lecture 2 - Entropy change of a control volume - Part 1

Lecture 3 - Entropy change of a control volume - Part 2

Lecture 4 - Entropy change of a control volume - Part 3

Lecture 5 - Work interaction of internally reversible steady flow processes

Lecture 6 - Tutorial 1 - Entropy change of a control volume - Part 1

Lecture 7 - Tutorial 1 - Entropy change of a control volume - Part 2

Lecture 8 - Tutorial 2 - Entropy change of a control volume - Part 3

Lecture 9 - Tutorial 2 - Entropy change of a control volume - Part 4

Lecture 10 - Tutorial 2 - Entropy change of a control volume - Part 5

Lecture 11 - Tutorial 3 - Entropy change of a control volume, Work interaction of internally reversible - Part 1

Lecture 12 - Tutorial 3 - Entropy change of a control volume, Work interaction of internally reversible - Part 2

Lecture 13 - Tutorial 3 - Entropy change of a control volume, Work interaction of internally reversible - Part 3

Lecture 14 - Exergy - Part 1

Lecture 15 - Exergy - Part 2

Lecture 16 - Exergy - Part 3

Lecture 17 - Exergy - Part 4

Lecture 18 - Exergy - Part 5

Lecture 19 - Tutorial 4 - Exergy transfer and exergy change of a system - Part 1

Lecture 20 - Tutorial 4 - Exergy transfer and exergy change of a system - Part 2

Lecture 21 - Tutorial 5 - Exergy transfer and exergy change of a system - Part 3

Lecture 22 - Tutorial 5 - Exergy transfer and exergy change of a system - Part 4

Lecture 23 - Tutorial 5 - Exergy transfer and exergy change of a system - Part 5

Lecture 24 - Tutorial 6 - Exergy transfer and exergy change of a control volume - Part 1

Lecture 25 - Tutorial 6 - Exergy transfer and exergy change of a control volume - Part 2

Lecture 26 - Tutorial 6 - Exergy transfer and exergy change of a control volume - Part 3

Lecture 27 - Thermodynamic cycles - Rankine cycle - Part 1

Lecture 28 - Thermodynamic cycles - Rankine cycle - Part 2

Lecture 29 - Thermodynamic cycles - Rankine cycle - Part 3

Lecture 30 - Thermodynamic cycles - Air standard Brayton cycle - Part 1

Lecture 31 - Thermodynamic cycles - Air standard Brayton cycle - Part 2

Lecture 32 - Thermodynamic cycles - Air standard Brayton cycle - Part 3

Lecture 33 - Thermodynamic cycles - Air standard Brayton cycle - Part 4

Lecture 34 - Thermodynamic cycles - Air standard Brayton cycle - Part 5

Lecture 35 - Thermodynamic cycles - Air standard Otto cycle

Lecture 36 - Thermodynamic cycles - Air standard Diesel cycle - Part 1

Lecture 37 - Thermodynamic cycles - Air standard Diesel cycle - Part 2

Lecture 38 - Thermodynamic cycles - Vapor compression refrigeration cycle

Lecture 39 - Psychrometry - Part 1

Lecture 40 - Psychrometry - Part 2

Lecture 41 - Psychrometry - Part 3

Lecture 42 - Psychrometry - Part 4

Lecture 43 - Psychrometry - Part 5

Lecture 44 - Psychrometry - Part 6

Lecture 45 - Psychrometry - Part 7

Lecture 46 - Tutorial 7 - Psychometry and Air conditioning processes - Part 1

Lecture 47 - Tutorial 7 - Psychometry and Air conditioning processes - Part 2

Lecture 48 - Tutorial 8 - Psychometry and Air conditioning processes - Part 3

Lecture 49 - Tutorial 8 - Psychometry and Air conditioning processes - Part 4

Lecture 50 - Combustion Thermodynamics - Part 1

Lecture 51 - Combustion Thermodynamics - Part 2

Lecture 52 - Combustion Thermodynamics - Part 3

Lecture 53 - Combustion Thermodynamics - Part 4

Lecture 54 - Tutorial 9 - Stoichiometry - Part 1

Lecture 55 - Tutorial 9 - Stoichiometry - Part 2

Lecture 56 - Tutorial 10 - Heat and temperature calculations in combustion - Part 1

Lecture 57 - Tutorial 10 - Heat and temperature calculations in combustion - Part 2

Lecture 58 - Tutorial 10 - Heat and temperature calculations in combustion - Part 3

Lecture 59 - Tutorial 10 - Heat and temperature calculations in combustion - Part 4

Lecture 60 - Tutorial 10 - Heat and temperature calculations in combustion - Part 5

Lecture 61 - Compressible flow through nozzles - Part 1

Lecture 62 - Compressible flow through nozzles - Part 2

Lecture 63 - Compressible flow through nozzles - Part 3

Lecture 64 - Compressible flow through nozzles - Part 4

Lecture 65 - Compressible flow through nozzles - Part 5

Lecture 66 - Compressible flow through nozzles - Part 6

Lecture 67 - Compressible flow through nozzles - Part 7

Lecture 68 - Compressible flow through nozzles - Part 8

Lecture 69 - Compressible flow through nozzles - Part 9

Lecture 70 - Compressible flow through nozzles - Part 10

Lecture 71 - Compressible flow through nozzles - Part 11

Lecture 72 - Compressible flow through nozzles - Part 12

NPTEL : NOC:Design of Mechanical Transmission Systems (Mechanical Engineering)

Co-ordinators : Prof. Ramkumar

Lecture 1 - Course Introduction, Evaluation, and Application of Gearbox

Lecture 2 - Machine Tool Gearbox: GP, Step Ratio, Preferred Numbers, Structural Formula and Rules of Optimum Gearbox

Lecture 3 - Machine Tool Gearbox: Ray Diagram Construction

Lecture 4 - Machine Tool Gearbox: Kinematic Diagram Construction

Lecture 5 - Machine Tool Gearbox: Centre Distance and Teeth Calculation

Lecture 6 - Machine Tool Gearbox: Problem Solving

Lecture 7 - Automobile Gearbox: General Engine Operation and Transmission Types

Lecture 8 - Automobile Gearbox: Saw Tooth Diagram and Design Procedure for Gearbox

Lecture 9 - Automobile Gearbox: Problem Solving and Tyre Specification

Lecture 10 - Automobile Gearbox: Basic Transmission Types and Kinematic Diagram

Lecture 11 - Automobile Gearbox: Gear Failures and Material Selection

Lecture 12 - Automobile Gearbox: Module Calculation Concept - Part I

Lecture 13 - Automobile Gearbox: Module Calculation Concept - Part II

Lecture 14 - Automobile Gearbox: Shaft Design, Lubrication Selection and Method

Lecture 15 - Automobile Gearbox: Bearing Selection and Gearbox Losses

Lecture 16 - Brake: Introduction, Working Principle and Types

Lecture 17 - Brake: Torque Requirement for Drum Brake Systems

Lecture 18 - Brake: Problem Solving

Lecture 19 - Brake: Torque Requirement for Disc Brake Systems

Lecture 20 - Brake: Static and Dynamic Analysis

Lecture 21 - Brake: Dynamic Analysis - Brake Force Distribution and Optimum

Lecture 22 - Brake: Problem Solving

Lecture 23 - Brake: Braking Efficiency and Distance and Brake Factor

Lecture 24 - Brake: Problem Solving and Friction Materials

Lecture 25 - Brake: Thermal Analysis and Braking Conditions

Lecture 26 - Brake: Energy and Power, Braking Power Absorbed by Lining and Drum/Disc

Lecture 27 - Brake: Single Stop Braking and Repeated Braking - Temperature Analysis

Lecture 28 - Brake: Thermal Analysis Problem Solving

Lecture 29 - Clutch: Types and Working Method

Lecture 30 - Clutch: Torque Transmitting Capacity - Uniform Pressure and Wear Theories

Lecture 31 - Clutch: Multiple Discs and Cone Clutches, Problem Solving

Lecture 32 - Clutch: Centrifugal Clutch

Lecture 33 - Clutch: Dynamic Analysis

Lecture 34 - Clutch: Dynamic Analysis Problem Solving

NPTEL : NOC:Turbulence Modeling (Mechanical Engineering)

Co-ordinators : Prof. Vagesh D. Narasimhamurthy

Lecture 1 - Introduction to turbulence

Lecture 2 - Statistical Analysis: An approach of modelling turbulence - I

Lecture 3 - Statistical Analysis: An approach of modelling turbulence - II

Lecture 4 - Statistical Analysis and Cartesian tensors - I

Lecture 5 - Statistical Analysis and Cartesian tensors - II

Lecture 6 - Navier Stokes: the governing equations - 1

Lecture 7 - Navier Stokes: the governing equations - 2

Lecture 8 - RANS equations I - 1

Lecture 9 - RANS equations I - 2

Lecture 10 - RANS equations II - 1

Lecture 11 - RANS equations II - 2

Lecture 12 - Reynold's stress: governing equations - I

Lecture 13 - Reynold's stress: governing equations - II

Lecture 14 - Statistical Stationarity and Homogenity in Plane Couttee Flows - I

Lecture 15 - Statistical Stationarity and Homogenity in Plane Couttee Flows - II

Lecture 16 - Pressure-strain-rate and redistribution of turbulence in flows - I

Lecture 17 - Pressure-strain-rate and redistribution of turbulence in flows - II

Lecture 18 - Turbulence Kinetic Energy and it's dissipation rate - I

Lecture 19 - Turbulence Kinetic Energy and it's dissipation rate - II

Lecture 20 - Production rate of TKE and Mean TKE - I

Lecture 21 - Production rate of TKE and Mean TKE - II

Lecture 22 - Turbulent Boundary Layer: Order of Magnitude analysis - I

Lecture 23 - Turbulent Boundary Layer: Order of Magnitude analysis - II

Lecture 24 - Inner and Outer TBL: Order of magnitude analysis - I

Lecture 25 - Inner and Outer TBL: Order of magnitude analysis - II

Lecture 26 - Inner layer equation, constant stress layer, and inner velocity scaling - I

Lecture 27 - Inner layer equation, constant stress layer, and inner velocity scaling - II

Lecture 28 - Reynold's Averaged Navier-Stokes (RANS) models - I

Lecture 29 - Reynold's Averaged Navier-Stokes (RANS) models - II

Lecture 30 - Different approaches to solve turbulence closure problem - I

Lecture 31 - Different approaches to solve turbulence closure problem - II

Lecture 32 - Modelling of turbulent kinetic energy (k): production, destruction, and dissipation rate - I

Lecture 33 - Modelling of turbulent kinetic energy (k): production, destruction, and dissipation rate - II

Lecture 34 - Standard k-? model and the model constants - I

Lecture 35 - Standard k-? model and the model constants - II

Lecture 36 - Standard k-? model, RNG k-? model, and Prandltâ€™s one equation model - I

Lecture 37 - Standard k-? model, RNG k-? model, and Prandltâ€™s one equation model - II

Lecture 38 - New model k- ? and model constants - I

Lecture 39 - New model k- ? and model constants - II

Lecture 40 - Introduciton to wall-functions - I

Lecture 41 - Introduciton to wall-functions - II

Lecture 42 - Introduction to wall-resolved simulations - I

Lecture 43 - Introduction to wall-resolved simulations - II

Lecture 44 - Damping functions for LRN - I

Lecture 45 - Damping functions for LRN - II

Lecture 46 - Boundary and Initial conditions for RANS simulations - I

Lecture 47 - Boundary and Initial conditions for RANS simulations - II

Lecture 48 - Realizability constraints in eddy-viscoscity models - I

Lecture 49 - Realizability constraints in eddy-viscoscity models - II

Lecture 50 - Correctors for eddy-viscoscity models - I

Lecture 51 - Correctors for eddy-viscoscity models - II

Lecture 52 - Reynoldâ€™s Stress Modelling (RSM): governing equations - I

Lecture 53 - Reynoldâ€™s Stress Modelling (RSM): governing equations - II

Lecture 54 - Dissipation rate and Pressure-Strain rate modelling for RSM - I

Lecture 55 - Dissipation rate and Pressure-Strain rate modelling for RSM - II

Lecture 56 - Pressure-Strain rate modelling for RSM - I

Lecture 57 - Pressure-Strain rate modelling for RSM - II

Lecture 58 - Pressure-Strain rate modelling and wall corrections for RSM - I

Lecture 59 - Pressure-Strain rate modelling and wall corrections for RSM - II

Lecture 60 - Introduction to Eddy Resolved Models - I

Lecture 61 - Introduction to Eddy Resolved Models - II

Lecture 62 - Introduction to Direct Numerical Simulations (DNS) - I

Lecture 63 - Introduction to Direct Numerical Simulations (DNS) - II

Lecture 64 - Introduction to Large Eddy Simulations (LES) Filtering operation and SGS stresses - I

Lecture 65 - Introduction to Large Eddy Simulations (LES) Filtering operation and SGS stresses - II

Lecture 66 - Large Eddy Simulations: Filtered Navier-Stokes Equations - I

Lecture 67 - Large Eddy Simulations: Filtered Navier-Stokes Equations - II

Lecture 68 - Large Eddy Simulations: Filters and its types - I

Lecture 69 - Large Eddy Simulations: Filters and its types - II

Lecture 70 - Large Eddy Simulations: Smagorinsky model - I

Lecture 71 - Large Eddy Simulations: Smagorinsky model - II

Lecture 72 - LES: Dynamic Smagorinsky model and Scale similarity models - I

Lecture 73 - LES: Dynamic Smagorinsky model and Scale similarity models - II

Lecture 74 - Numerics in LES and Hybrid models

NPTEL : Advanced Manufacturing Processes (Mechanical Engineering)

Co-ordinators : Dr. A.K. Sharma

Lecture 1 - Manufacturing and Manufacturing Systems

Lecture 2 - Manufacturing Trends and Challenges

Lecture 3 - Manufacturing Aspects, Selection and Classification

Lecture 4 - Description and Taxonomy of the Mfg. Processes

Lecture 5 - Metal Casting basics, Gating and Risering design

Lecture 6 - Evaporative Pattern Casting Process (EPC)

Lecture 7 - Continuous, Permanent mold, Centrifugal and Pressure Die Casting

Lecture 8 - Hybrid EPC Processes and Vacuum EPC Process

Lecture 9 - Set-up of VEPC and Investment Casting Processes

Lecture 10 - Ceramic Shell Investment Casting Process

Lecture 11 - Shell Molding Process

Lecture 12 - Abrasive Flow Machining

Lecture 13 - Mechanism of Material Removal in AFM and Variant processes in AFM

Lecture 14 - Abrasive Jet Machining (AJM)

Lecture 15 - Water Jet and Abrasive Water Jet Machining

Lecture 16 - Ultrasonic Machining Process (USM)

Lecture 17 - Mechanism, Processes Variants and applications of USM

Lecture 18 - Micro USM and advances in USM

Lecture 19 - Electric Discharge Machining (EDM) Process

Lecture 20 - Die-Sinker EDM and Wire Cut Electric Discharge Machining (WEDM)

Lecture 21 - Variant Processes in EDM

Lecture 22 - Electro Chemical Discharge Machining (ECDM)

Lecture 23 - Laser Beam Machining (LBM)

Lecture 24 - Equipment and Process Parameters in LBM

Lecture 25 - Electrochemical Machining (ECM)

Lecture 26 - ECM Kinematics and Tool Design

Lecture 27 - The Subsystems in ECM, advantages and applications

Lecture 28 - Variant Processes in ECM: ECG, ECH, ECDe and STEM

Lecture 29 - Electron Beam, Plasma Beam and Ion Beam Machining

Lecture 30 - Submerged Arc Welding (SAW)

Lecture 31 - Resistance Welding Process

Lecture 32 - Solid State Welding processes

Lecture 33 - Friction Welding process

Lecture 34 - Electron Beam and Plasma Welding Processes

Lecture 35 - Laser Beam welding and Diffusion welding processes

Lecture 36 - High Energy Rate Forming Processes

Lecture 37 - Rapid Prototyping Technology (RPT)

Lecture 38 - Rapid Manufacturing, applications and advancements

Lecture 39 - Microwave Processing of Materials

Lecture 40 - Applications and new trends in Microwave Material Processing

NPTEL : Computational Fluid Dynamics (Dr. K.M. Singh) (Mechanical Engineering)

Co-ordinators : Dr. K.M. Singh

Lecture 1 - General Introduction: Historical Background and Spectrum of Applications

Lecture 2 - CFD: Simulation Process and Course Outline

Lecture 3 - Conservation Laws and Mathematical Preliminaries

Lecture 4 - Mass Conservation: Continuity Equation

Lecture 5 - Momentum Equation: Newtonâ€™s 2nd Law

Lecture 6 - Momentum Equation: Navier-Stokes Equations

Lecture 7 - Navier-Stokes Equation and its Simplified Forms

Lecture 8 - Energy and Scalar Transport Equations

Lecture 9 - Scalar Transport, Mathematical Classification and Boundary Conditions

Lecture 10 - Finite Difference Method: Methodology and Grid Notation

Lecture 11 - Finite Difference Approximation of First Order Derivatives

Lecture 12 - Finite Difference Approximation of Second Order Derivatives - 1

Lecture 13 - Finite Difference Approximation of Second Order Derivatives - 2

Lecture 14 - Approximation of Mixed Derivatives and Multi-Dimensional F.D. Formulae

Lecture 15 - Implementation of Boundary Conditions and Finite Difference Algebraic System

Lecture 16 - Applications of FDM to Scalar Transport Problems - 1

Lecture 17 - Applications of FDM to Scalar Transport Problems - 2

Lecture 18 - Application of FDM to Advection-Diffusion and Computer Implementation Aspects

Lecture 19 - Computer Implementation of FDM for Steady State Heat Diffusion Problems - 1

Lecture 20 - Computer Implementation of FDM for Steady State Heat Diffusion Problems - 2

Lecture 21 - Computer Implementation of FDM for Steady State Heat Diffusion Problems - 3

Lecture 22 - Solution of Discrete Algebraic Systems

Lecture 23 - Direct and Basic Iterative Methods for Linear Systems

Lecture 24 - Accelerated Iterative Methods for Linear Systems

Lecture 25 - Two Level and Multi-Level Methods for First Order IVPs - 1

Lecture 26 - Two Level and Multi-Level Methods for First Order IVPs - 2

Lecture 27 - Application to Unsteady Transport Problems

Lecture 28 - Introduction to Finite Volume Method

Lecture 29 - Finite Volume Interpolation Schemes

Lecture 30 - Application of FVM to Scalar Transport

Lecture 31 - Introduction to Finite Element Method

Lecture 32 - Finite Element Shape Functions and Numerical Integration - 1

Lecture 33 - Finite Element Shape Functions and Numerical Integration - 2

Lecture 34 - Application of FEM to Scalar Transport

Lecture 35 - Special Features of Navier-Stokes Equations

Lecture 36 - Time Integration Techniques for Navier-Stokes Equations

Lecture 37 - Implicit Pressure Correction Methods

Lecture 38 - SIMPLEC, SIMPLER and Fractional Step Methods

Lecture 39 - Turbulent Flows: Features and Simulation Strategies

Lecture 40 - Reynolds Averaging and RANS Simulation Models

Lecture 41 - RANS Turbulence Models and Large Eddy Simulation

Lecture 42 - Introduction to Grid Generation

Lecture 43 - Aspects of Practical CFD Analysis

NPTEL : Metal Casting (Mechanical Engineering)

Co-ordinators : Dr. D. B. Karunakar

Lecture 1 - Introduction

Lecture 2 - Overview of different casting processes - 1

Lecture 3 - Overview of different casting processes - 2

Lecture 4 - Overview of different casting processes - 3

Lecture 5 - Terminology and Tools of Sand Moulding

Lecture 6 - Moulding Sands and Design - 1

Lecture 7 - Moulding Sands and Design - 2

Lecture 8 - Moulding Sands Properties

Lecture 9 - Moulding Sand Properties Testing

Lecture 10 - Cores and Core Sands

Lecture 11 - Patterns and Allowances

Lecture 12 - Steps Involved in Making a Sand Casting

Lecture 13 - Design of Risering System - 1

Lecture 14 - Design of Risering System - 2

Lecture 15 - Design of Risering System - 3

Lecture 16 - Design of Risering System - 4

Lecture 17 - Design of Risering System - 5

Lecture 18 - Design of Gating System - 1

Lecture 19 - Design of Gating System - 2

Lecture 20 - Sand Casting Defects - 1

Lecture 21 - Sand Casting Defects - 2

Lecture 22 - Melting Furnaces and Practice

Lecture 23 - Treatment of Molten Metal

Lecture 24 - Fluidity of Molten Metal

Lecture 25 - Solidification

Lecture 26 - Cast Irons and Steels

Lecture 27 - Aluminum and Magnesium Cast Alloys

Lecture 28 - Copper, Zinc and Titanium Cast Alloys

Lecture 29 - Die Casting Process - I

Lecture 30 - Die Casting Process - II

Lecture 31 - Investment Casting Process - I

Lecture 32 - Investment Casting Process - II

Lecture 33 - Continuous Casting Process

Lecture 34 - Centrifugal Casting Process

Lecture 35 - Evaporative Pattern Casting and Plaster Moulding

Lecture 36 - Vacuum Sealed Moulding and Squeeze Casting

Lecture 37 - Shakeout, Fettling and Finishing

Lecture 38 - Inspection, Testing and Quality Control

Lecture 39 - Design Consideration and Economics

Lecture 40 - Environment, Health and Safety Aspects

NPTEL : Processing of non metals (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Engineering Materials and Processing Techniques: Introduction

Lecture 2 - Properties of Non-Metals

Lecture 3 - Glass Structure and Properties

Lecture 4 - Glass Processing - I

Lecture 5 - Glass Processing - II

Lecture 6 - Ceramics - I

Lecture 7 - Ceramics - II

Lecture 8 - Ceramic Powder Preparation

Lecture 9 - Ceramic Powder Preparation â€“ I

Lecture 10 - Processing of Ceramic Parts ? Pressing

Lecture 11 - Processing of Ceramic Parts â€“ II

Lecture 12 - Ceramics: Secondary Processing

Lecture 13 - Thermoplastics and Thermosets

Lecture 14 - Processing of Plastics

Lecture 15 - Extrusion of Plastics

Lecture 16 - Transfer Molding and Compression Molding

Lecture 17 - Injection Molding

Lecture 18 - Thermoforming

Lecture 19 - Rotational Molding and Blow Molding

Lecture 20 - Composite Materials

Lecture 21 - Composite Materials: Classification and Applications

Lecture 22 - Processing of Polymer Matrix Composites

Lecture 23 - Hand Lay-up and Spray Lay-up

Lecture 24 - Pultrusion

Lecture 25 - Compression Molding

Lecture 26 - Filament Winding

Lecture 27 - Injection Molding-1

Lecture 28 - Pre-pregging and Sheet Molding Compounds

Lecture 29 - Resin Transfer Molding and Autoclave Molding

Lecture 30 - Ceramic Matrix Composites

Lecture 31 - Ceramic Matrix Composites: Fundamentals and Properties

Lecture 32 - Powder Processing: Ceramic Matrix Composites

Lecture 33 - Chemical Vapour Infiltration

Lecture 34 - Ceramic Matrix Composites: Processing-1

Lecture 35 - Ceramic Matrix Composites: Post Processing

Lecture 36 - Drilling of Polymer Matrix Composites

Lecture 37 - Hole Making Techniques for Polymer Matrix Composites

Lecture 38 - Joining of Polymer Matrix Composites

Lecture 39 - Microwave Joining of Polymer Matrix Composites

Lecture 40 - Research Tools for Secondary Processing

NPTEL : Vibration control (Mechanical Engineering)

Co-ordinators : Dr. S. P. Harsha

Lecture 1 - Basics of Vibrations for Simple Mechanical Systems

Lecture 2 - Introduction to Damping in Free and Force Vibrations

Lecture 3 - Free and Forced Vibrations of Two Degree of Systems

Lecture 4 - Multi Degree of Freedom Systems

Lecture 5 - Reduction at source - 1

Lecture 6 - Reduction at source - 2

Lecture 7 - Reduction at source - 3

Lecture 8 - Feedback Control System - 1

Lecture 9 - Shunt Damping

Lecture 10 - Vibration Isolation - 1

Lecture 11 - Vibration Isolation - 2

Lecture 12 - Vibration Isolation - 3

Lecture 13 - Source Classification

Lecture 14 - Self Excitation Vibration

Lecture 15 - Flow Induction Vibration

Lecture 16 - Field Balancing of Rigid / Flexible Rotors

Lecture 17 - Damping: Models and Measures - I

Lecture 18 - Damping: Models and Measures - II

Lecture 19 - Numerical Problems

Lecture 20 - Design Sensitivity - I

Lecture 21 - Design Specification

Lecture 22 - Design for Enhanced Material Damping

Lecture 23 - Basics of Passive Vibration Control

Lecture 24 - Design of Absorber

Lecture 25 - Shock Absorber

Lecture 26 - Isolators with Stiffness and Damping

Lecture 27 - Basics of Active Vibration Control

Lecture 28 - Piezoelectric Material - I

Lecture 29 - Piezoelectric Material - II: Applications

Lecture 30 - Piezoelectric Accelerometers

Lecture 31 - Electro-rheological (ER) Fluids

Lecture 32 - Magneto-rheological (MR) Fluids

Lecture 33 - Magneto and Electrostrictive Materials

Lecture 34 - Shape Memory Alloy

Lecture 35 - Electro-Magnetics

Lecture 36 - Numerical Problems

Lecture 37 - Basics of Vibration Measurement System

Lecture 38 - Data Acquisition

Lecture 39 - Fourier Transformation

Lecture 40 - Filters

NPTEL : Welding Engineering (Mechanical Engineering)

Co-ordinators : Dr. D.K. Dwivedi

Lecture 1 - Introduction to Welding Engineering

Lecture 2 - Classification of Welding Processes - I

Lecture 3 - Classification of Welding Processes - II

Lecture 4 - Sources of Heat and Protection of Weld pool

Lecture 5 - Protection of Weld Pool

Lecture 6 - Introduction

Lecture 7 - Fundamentals of Arc Initiation

Lecture 8 - Arc Maintenance & Arc Characteristics

Lecture 9 - Arc Forces

Lecture 10 - Arc Efficiency

Lecture 11 - Melting Rate in Different Welding Processes

Lecture 12 - Types of power sources and their characteristics - I

Lecture 13 - Types of power sources and their characteristics - II

Lecture 14 - SMAW - I

Lecture 15 - SMAW - II

Lecture 16 - GTAW - I

Lecture 17 - GTAW - II

Lecture 18 - PAW & SAW

Lecture 19 - SAW

Lecture 20 - GMAW

Lecture 21 - Brazing, Soldering & Braze Welding

Lecture 22 - Braze welding and Electroslag welding

Lecture 23 - Weld Thermal Cycle

Lecture 24 - Effect of WTC and Cooling rate in welding

Lecture 25 - Cooling rate

Lecture 26 - Peak temperature & Solidification rate

Lecture 27 - Residual stress - I

Lecture 28 - Residual stress - II

Lecture 29 - Introduction

Lecture 30 - Type of joints and welds

Lecture 31 - Edge preparation

Lecture 32 - Design for static and fatigue loading

Lecture 33 - Fatigue fracture of weld joints - I

Lecture 34 - Fatigue fracture of weld joints - II

Lecture 35 - Introduction-

Lecture 36 - DT & NDT

Lecture 37 - Understanding Weldability

Lecture 38 - Reactions in weldment

Lecture 39 - Weldability of Al alloys

Lecture 40 - Failure analysis and prevention

NPTEL : Industrial Engineering (Mechanical Engineering)

Co-ordinators : Prof. P.K. Jain, Dr. Pradeep Kumar, Dr. Inderdeep Singh, Dr. D.K. Dwivedi

Lecture 1 - Production Planning and Control

Lecture 2 - Product Design and Development

Lecture 3 - Statistical Process Control - Part I

Lecture 4 - Statistical Process Control - Part II

Lecture 5 - Statistical Process Control - Part III

Lecture 6 - Productivity

Lecture 7 - Factors Affecting the Productivity

Lecture 8 - Improving the Productivity Introduction to Work Study

Lecture 9 - Work Study Human Component and Method Study

Lecture 10 - Recording Techniques for Method Study - Part I

Lecture 11 - Recording Techniques for Method Study - Part II

Lecture 12 - Recording Techniques Critical Examination

Lecture 13 - Principles of Motion Economy

Lecture 14 - Work Measurement Time Study - Part I

Lecture 15 - Work Measurement Time Study - Part II

Lecture 16 - Performance Rating Allowances

Lecture 17 - Work Measurement: Work Sampling

Lecture 18 - PMT System Standard Data Method

Lecture 19 - Ergonomics

Lecture 20 - Metabolism and Organization at Work

Lecture 21 - Working Conditions Lights Vibrations

Lecture 22 - Materials Management - Part I

Lecture 23 - Materials Management - Part II

Lecture 24 - Materials Requirement Planning

Lecture 25 - Sales Forecasting - Part I

Lecture 26 - Sales Forecasting - Part II

Lecture 27 - Capacity Planning - Part I

Lecture 28 - Capacity Planning - Part II

Lecture 29 - Network Analysis - Part I

Lecture 30 - Network Analysis - Part II

Lecture 31 - Facility Design Part - Part I

Lecture 32 - Facility Design Part - Part II

Lecture 33 - Facility Design Part - Part III

Lecture 34 - Facility Design Part - Part IV

Lecture 35 - Product Design Development

Lecture 36 - Materials Handling

Lecture 37 - Quality Concepts

Lecture 38 - Value Engineering

Lecture 39 - Reliability

Lecture 40 - Industrial Safety

NPTEL : Manufacturing Processes I (Mechanical Engineering)

Co-ordinators : Dr. D.B. Karunakar, Dr. Inderdeep Singh. Dr. D.K. Dwivedi

Lecture 1 - Powder Metallurgy - Part I

Lecture 2 - Powder Metallurgy - Part II

Lecture 3 - Powder Metallurgy - Part III

Lecture 4 - Metal Forming - Fundamentals

Lecture 5 - Forging

Lecture 6 - Swaging and Wire Drawing

Lecture 7 - Sheet Metal Operations - Part I

Lecture 8 - Sheet Metal Operations - Part II

Lecture 9 - Sheet Metal Operations - Part III

Lecture 10 - Sheet Metal Working - Presses

Lecture 11 - Sheet Metal Working - Equipment

Lecture 12 - High Energy Rate Forming Processes

Lecture 13 - Machining Fundamentals

Lecture 14 - Machining - Part I

Lecture 15 - Machining - Part II

Lecture 16 - Machining - Part III

Lecture 17 - Metal casting - Part I

Lecture 18 - Metal casting - Part II

Lecture 19 - Metal Casting - Part III

Lecture 20 - Metal Casting - Part IV

Lecture 21 - Metal Casting - Part V

Lecture 22 - Metal Casting - Part VI

Lecture 23 - Metal Casting - Part VII

Lecture 24 - Metal Casting - Part VIII

Lecture 25 - Metal Casting - Part IX

Lecture 26 - Metal Casting - Part X

Lecture 27 - Introduction

Lecture 28 - Welding Process Classification

Lecture 29 - Brazing Soldering Braze Welding

Lecture 30 - Arc Welding Power Source - Part I

Lecture 31 - Arc Welding Power Source - Part II

Lecture 32 - Shielded Metal Arc Welding - Part I

Lecture 33 - Shielded Metal Arc Welding - Part II

Lecture 34 - Submerged Arc Welding

Lecture 35 - Gas Metal Arc Welding - Part I

Lecture 36 - Gas Metal Arc Welding - Part II

Lecture 37 - Tungsten Inert Gas Welding - Part I

Lecture 38 - Tungsten Inert Gas Welding - Part II

Lecture 39 - Resistance Welding Process

Lecture 40 - Reaction in Weld Region Welding Defects

NPTEL : Strength of Materials (Mechanical Engineering)

Co-ordinators : Dr. S.P. Harsha

Lecture 1 - Solid Mechanics

Lecture 2 - Strength of Materials

Lecture 3 - Strength of Materials

Lecture 4 - Solid Mechanics

Lecture 5 - Strength of Materials

Lecture 6 - Strength of Materials

Lecture 7 - Strength of Materials

Lecture 8 - Strength of Materials

Lecture 9 - Strength of Materials

Lecture 10 - Strength of Materials

Lecture 11 - Strength of Materials

Lecture 12 - Strength of Materials

Lecture 13 - Strength of Materials

Lecture 14 - Strength of Materials

Lecture 15 - Strength of Materials

Lecture 16 - Strength of Materials

Lecture 17 - Strength of Materials

Lecture 18 - Strength of Materials

Lecture 19 - Strength of Materials

Lecture 20 - Strength of Materials

Lecture 21 - Strength of Materials

Lecture 22 - Strength of Materials

Lecture 23 - Strength of Materials

Lecture 24 - Strength of Materials

Lecture 25 - Strength of Materials

Lecture 26 - Strength of Materials

Lecture 27 - Strength of Materials

Lecture 28 - Strength of Materials

Lecture 29 - Strength of Materials

Lecture 30 - Strength of Materials

Lecture 31 - Strength of Materials

Lecture 32 - Strength of Materials

Lecture 33 - Strength of Materials

Lecture 34 - Strength of Materials

Lecture 35 - Strength of Materials

Lecture 36 - Strength of Materials

Lecture 37 - Strength of Materials

Lecture 38 - Strength of Materials

Lecture 39 - Strength of Materials

Lecture 40 - Strength of Materials

NPTEL : NOC:Two Phase Flow and Heat Transfer (Mechanical Engineering)

Co-ordinators : Dr. Arup Kumar Das

Lecture 1 - Introduction

Lecture 2 - Flow Regimes

Lecture 3 - Homogeneous Model

Lecture 4 - Drift Flux Model

Lecture 5 - Separated Flow Model

Lecture 6 - Dispersed Flow

Lecture 7 - Slug Flow

Lecture 8 - Annular Flow

Lecture 9 - Droplet Annular and Stratified Flow

Lecture 10 - Measurement of Void Fraction

Lecture 11 - Signal Analysis

Lecture 12 - Two Fluid and Population Balance Model

Lecture 13 - Interface Tracking

Lecture 14 - Lattice Boltzmann Method

Lecture 15 - Smoothed Particle Hydrodynamics

Lecture 16 - Molecular Perspective of Two Phase Flow

Lecture 17 - Boiling Heat Transfer

Lecture 18 - Condensation

Lecture 19 - Solid-Liquid Flow

Lecture 20 - Gas-Solid Flow

NPTEL : NOC:Refrigeration and Air-Conditioning (Mechanical Engineering)

Co-ordinators : Prof. Ravi Kumar

Lecture 1 - Recapitulation of Thermodynamics

Lecture 2 - Introduction to Refrigeration

Lecture 3 - Air Refrigeration Cycle

Lecture 4 - Aircraft Refrigeration Cycles - 1

Lecture 5 - Aircraft Refrigeration Cycles - 2

Lecture 6 - Aircraft Refrigeration Cycles - 3

Lecture 7 - Vapour Compression Cycle - 1

Lecture 8 - Vapour Compression Cycle - 2

Lecture 9 - P-h Charts

Lecture 10 - Actual Vapour Compression Cycle - 1

Lecture 11 - Actual Vapour Compression Cycle - 2

Lecture 12 - Compound Compression with Intercooling - 1

Lecture 13 - Compound Compression with Intercooling - 2

Lecture 14 - Multiple Evaporator and Cascade System

Lecture 15 - Problem Solving - 1

Lecture 16 - Refrigerants - 1

Lecture 17 - Refrigerants - 2

Lecture 18 - Vpour Absorption Systems - 1

Lecture 19 - Vpour Absorption Systems - 2

Lecture 20 - Vpour Absorption Systems - 3

Lecture 21 - Introduction to Air-conditioning

Lecture 22 - Properties of Moist Air

Lecture 23 - Psychrometric Chart

Lecture 24 - Psychrometric Processes - 1

Lecture 25 - Psychrometric Processes - 2

Lecture 26 - Psychrometric Processes - 3

Lecture 27 - Infiltration

Lecture 28 - Design Conditions

Lecture 29 - Cooling Load - 1

Lecture 30 - Cooling Load - 2

Lecture 31 - Cooling Load - 3

Lecture 32 - Air Distribution System - 1

Lecture 33 - Air Distribution System - 2

Lecture 34 - Problem Solving - 2

Lecture 35 - Air-Conditioning Systems

Lecture 36 - Human Physiology

Lecture 37 - Thermal Comfort

Lecture 38 - Indoor Environmental Health - 1

Lecture 39 - Indoor Environmental Health - 2

Lecture 40 - Problem Solving - 3

NPTEL : NOC:Engineering Economic Analysis (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Engineering Economy, Physical and Economic Environment, Phases in Engg. process

Lecture 2 - Some economic concepts, Value and utility, Interest and Interest rate, Time value of money

Lecture 3 - Interest formulas: Simple and compound interest, Cash flow diagrams

Lecture 4 - Interest formulas for discrete compounding and discrete payments: Single payment (CAF and PWF)

Lecture 5 - Interest formulas for discrete compounding and discrete payments: Equal payment series (CAF, CRF and PWF)

Lecture 6 - Problem solving on discrete compounding, discrete payment

Lecture 7 - Interest formulas for Uniform gradient series

Lecture 8 - Interest formulas for geometric gradient series

Lecture 9 - Compounding frequency of Interest: Nominal and Effective interest rates

Lecture 10 - Problem solving on frequency compounding of interest and gradient series factors

Lecture 11 - Economic equivalence: Meaning and principles of equivalence

Lecture 12 - Equivalence calculations involving cash flows

Lecture 13 - Methods of comparison of alternatives: Present worth, Annual equivalent, Future worth, Internal rate of return

Lecture 14 - comparison of alternatives: Capitalized equivalent amount, Capital recovery with return

Lecture 15 - Problem solving on equivalence and comparison of alternatives

Lecture 16 - Replacement analysis: Reason, Concept of defender and challenger

Lecture 17 - Proper treatment of sunk cost in replacement

Lecture 18 - Replacement because of improved efficiency, inadequacy, demand etc.

Lecture 19 - Problem solving on replacement analysis

Lecture 20 - Economic life of the asset

Lecture 21 - Depreciation: Definition, Reasons, Types of property, Value time function and book value

Lecture 22 - Basic depreciation methods:S-L method, Declining balance method

Lecture 23 - Depreciation: Declining balance switching to S-L, SOYD Method

Lecture 24 - Modified accelerated cost recovery system (MACRS) method of depreciation, Depletion

Lecture 25 - Depreciation: Units of production method, Depletion

Lecture 26 - Problem solving based on Depreciation and Depletion

Lecture 27 - Elements of cost: types of cost

Lecture 28 - Breakeven analysis, Effect of fixed and variable cost on BEP.

Lecture 29 - Economic order quantity

Lecture 30 - Problem solving based on Breakeven analysis and EOQ

Lecture 31 - Cost estimation: Methods of cost estimation, Adjustment of data, Learning

Lecture 32 - cost estimating relationships

Lecture 33 - Introduction to decision under risk Criteria for decision under risk

Lecture 34 - Expected value decision making under risk

Lecture 35 - Expected variance decision making under risk

Lecture 36 - Problem solving based on decision under risk

Lecture 37 - Income taxes: Principles and calculation of effective income tax rates

Lecture 38 - Effect of method of depreciation on income taxes

Lecture 39 - After tax economic analysis

Lecture 40 - Problem solving based on Income tax analysis

NPTEL : NOC:Convective Heat Transfer (Mechanical Engineering)

Co-ordinators : Dr. Arup Kumar Das

Lecture 1 - Introduction

Lecture 2 - Balance of Total Energy

Lecture 3 - Different Forms of Thermal Energy Equation

Lecture 4 - Thermal Boundary Layer

Lecture 5 - Forced Convection : Low Prandtl Number over a Flat Plate

Lecture 6 - Forced Convection : High Prandtl Number over a Flat Plate

Lecture 7 - Forced Convection over a Flat Plate : Uniform Heat Flux

Lecture 8 - Natural Convection : Uniform Wall Temperature

Lecture 9 - Natural Convection : Uniform Heat Flux

Lecture 10 - Tutorial : Convection over Flat Plate

Lecture 11 - Forced Convection in Ducts

Lecture 12 - Thermally Developed Slug Flow in a Duct

Lecture 13 - Thermally and Hydrodynamically Developed Flow : Uniform Heat Flux

Lecture 14 - Thermally and Hydrodynamically Developed Flow : Uniform Wall Temperature

Lecture 15 - Thermal Entrance Region : Uniform Wall Temperature

Lecture 16 - Thermal Entrance Region : Uniform Heat Flux

Lecture 17 - Rayleigh Benard Convection

Lecture 18 - Heat Transfer with Phase Change

Lecture 19 - Mass Transfer

Lecture 20 - Tutorial : Convection inside Duct and Mass Transfer

NPTEL : NOC:Introduction to Mechanical Vibration (Mechanical Engineering)

Co-ordinators : Prof. Anil Kumar

Lecture 1 - Lesson 1 - Introduction

Lecture 2 - Lesson 2 - Addition of two harmonic motions and beat phenomenon

Lecture 3 - Lesson 3 - Fourier series and harmonic analysis

Lecture 4 - Lesson 4 - Vibration analysis procedure

Lecture 5 - Lesson 5 - Numerical problems

Lecture 6 - Lesson 1 - Undamped free vibration

Lecture 7 - Lesson 2 - Energy method

Lecture 8 - Lesson 3 - Damped free vibration

Lecture 9 - Lesson 4 - Viscous damped systems and logarithmic decrement

Lecture 10 - Lesson 5 - Coulomb damping

Lecture 11 - Lesson 1 - Harmonic excitations

Lecture 12 - Lesson 2 - Magnification factor and frequency response curve

Lecture 13 - Lesson 3 - Rotating unbalance

Lecture 14 - Lesson 4 - Excitation of the support

Lecture 15 - Lesson 5 - Energy input and dissipation by viscous damping

Lecture 16 - Lesson 1 - Coulomb damping and equivalent viscous damping

Lecture 17 - Lesson 2 - Structural damping and equivalent viscous damping

Lecture 18 - Lesson 3 - Vibration isolation and force transmissibility

Lecture 19 - Lesson 4 - Motion transmissibility

Lecture 20 - Lesson 5 - Numerical problems

Lecture 21 - Lesson 1 - Transducers and vibration pickup

Lecture 22 - Lesson 2 - Vibrometer

Lecture 23 - Lesson 3 - Accelerometer

Lecture 24 - Lesson 4 - Velocity pickup or Velometer

Lecture 25 - Lesson 5 - Phase distortion and frequency measurement

Lecture 26 - Lesson 1 - Undamped free vibration

Lecture 27 - Lesson 2 - Principal modes of vibration

Lecture 28 - Lesson 3 - Combined rectilinear and angular modes

Lecture 29 - Lesson 4 - Damped free vibration

Lecture 30 - Lesson 5 - Undamped forced vibration with harmonic excitation

Lecture 31 - Lesson 1 - Undamped dynamic vibration absorber

Lecture 32 - Lesson 2 - Tuned absorber

Lecture 33 - Lesson 3 - Numerical problems

Lecture 34 - Lesson 4 - Damped dynamic vibration absorber

Lecture 35 - Lesson 5 - Optimally tuned vibration absorber

Lecture 36 - Lesson 1 - Undamped free vibration

Lecture 37 - Lesson 2 - Eigen values and eigen vectors

Lecture 38 - Lesson 3 - Flexibility influence coefficients

Lecture 39 - Lesson 4 - Stiffness influence coefficients

Lecture 40 - Lesson 5 - Static and dynamic coupling

NPTEL : NOC:Joining Technologies for Metals (Mechanical Engineering)

Co-ordinators : Prof. Dheerendra Kumar Dwivedi

Lecture 1 - Introduction: Manufacturing and Joining

Lecture 2 - Fundamental mechanisms of Joining

Lecture 3 - Classification of Joining Processes

Lecture 4 - Heat Generation in Welding

Lecture 5 - Protection of Weld Metal

Lecture 6 - Principle of Fusion Welding Processes: Gas Welding

Lecture 7 - Fundamentals of Welding

Lecture 8 - Physics of Welding Arc

Lecture 9 - Shielded Metal Arc Welding

Lecture 10 - Gas Tungsten Arc Welding

Lecture 11 - Newer variants of Gas tungsten arc welding

Lecture 12 - Gas metal arc welding

Lecture 13 - Submerged arc welding

Lecture 14 - Electro-slag and Electro-gas welding

Lecture 15 - Laser beam welding

Lecture 16 - Brazing

Lecture 17 - Soldering and braze welding

Lecture 18 - Fundamentals of resistance welding

Lecture 19 - Resistance welding processes: spot and seam welding

Lecture 20 - Flash butt welding

Lecture 21 - Adhesive joining

Lecture 22 - Weld bonding

Lecture 23 - Solid state joining technologies: Fundamentals

Lecture 24 - Ultrasonic welding

Lecture 25 - Diffusion welding

Lecture 26 - Explosive welding

Lecture 27 - Magnetic pulse welding

Lecture 28 - Weld thermal cycle

Lecture 29 - Heat affected zone and weld thermal cycle - I

Lecture 30 - Heat affected zone and weld thermal cycle - II

Lecture 31 - Solidification of weld metal

Lecture 32 - Metallurgical transformations in weld and heat affected zone of steels

Lecture 33 - Residual Stresses in Weld Joints

Lecture 34 - Solidification cracking and their control

Lecture 35 - Cracking of Welded Joints II - Cold Cracks

Lecture 36 - Understanding Weldability Introduction - I

Lecture 37 - Understanding Weldability Introduction - II

Lecture 38 - Metal Properties and Weldability - I

Lecture 39 - Metal Properties and Weldability - II

Lecture 40 - Weldability of Work Hardenable Metals

Lecture 41 - Weldability of Work Hardenable and Precipitation Strengthened Metals

Lecture 42 - Weldability of Precipitation Strengthened Metals

Lecture 43 - Weldability of Metals Strengthened by Grain Refinement and Transformation Hardening

Lecture 44 - Weldability of Transformation Hardening Metals

Lecture 45 - Weldability of Metals - Combination of Strengthening Mechanisms

Lecture 46 - Weldability Consideration

Lecture 47 - Weldability of Carbon and Alloy Steel - I

Lecture 48 - Weldability of Carbon and Alloy Steel - II

Lecture 49 - Weldability of Carbon and Alloy Steel - III

Lecture 50 - Weldability of Low Carbon Steel and Mild Steel

Lecture 51 - Weldability of Medium Carbon Steel and High Carbon Steel

Lecture 52 - Weldability of High Strength Low Alloy Steels

Lecture 53 - Weldability of HTLA Steel - I

Lecture 54 - Weldability of HTLA Steel - II

Lecture 55 - Weldability of Cr-Mo Steel - I

Lecture 56 - Weldability of Cr-Mo Steel - II

Lecture 57 - Weldability of Pre-coated Steel - I

Lecture 58 - Weldability of Pre-coated Steel - II

Lecture 59 - Weldability of Stainless Steel - I

Lecture 60 - Weldability of Stainless Steel - II

NPTEL : NOC:Modelling and Simulation of Dynamic Systems (Mechanical Engineering)

Co-ordinators : Prof. Pushparaj Mani Pathak

Lecture 1 - Introduction to Modelling

Lecture 2 - Examples of models

Lecture 3 - Modeling of Dynamic Systems

Lecture 4 - Introduction to Simulation

Lecture 5 - MATLAB as a Simulation tool

Lecture 6 - Bond graphs modelling

Lecture 7 - Bond graph model and causality

Lecture 8 - Generation of System Equations

Lecture 9 - Methods of Drawing bond graph models - Mechanical Systems

Lecture 10 - Methods of Drawing bond graph models - Electrical Systems

Lecture 11 - Basic System Models - Mechanical Systems

Lecture 12 - Basic System Models - Electrical Systems

Lecture 13 - Basic System Models - Hydraulic Systems

Lecture 14 - Basic System Models - Pneumatic Systems

Lecture 15 - Basic System Models - Thermal Systems

Lecture 16 - System Models : Linearity and Non Linearity in Systems

Lecture 17 - System Model of Combined Rotary and Translatory Systems

Lecture 18 - System Model of Electro Mechanical Systems

Lecture 19 - System Model of Hydro Mechanical Systems

Lecture 20 - System Models of Robots

Lecture 21 - Dynamic response of the 1st order system

Lecture 22 - Dynamic response of 2nd order system

Lecture 23 - Performance measures for 2nd order system

Lecture 24 - System Transfer functions

Lecture 25 - Transfer Function of 1st and 2nd Order System

Lecture 26 - Block Diagram Algebra

Lecture 27 - Signal Flow Graphs

Lecture 28 - State Variable Formulation

Lecture 29 - Frequency Response

Lecture 30 - Bode Plot

Lecture 31 - Simulation using SIMULINK

Lecture 32 - Simulation of simple and compound pendulums

Lecture 33 - Simulation of planar mechanisms

Lecture 34 - Simulation of wheeled mobile robots

Lecture 35 - Validation and Verification of Simulation Models

Lecture 36 - Parameter estimation methods

Lecture 37 - Parameter estimation examples

Lecture 38 - System identifications

Lecture 39 - Introduction to Optimization

Lecture 40 - Optimization with modeling of engineering problems

NPTEL : NOC:Principles of Casting Technology (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Casting Technology

Lecture 2 - Mechanism of solidification

Lecture 3 - Solidification of Pure Metals and Alloys

Lecture 4 - Freeze Wave Mechanism and Solidification Time

Lecture 5 - Problem Solving on Solidification

Lecture 6 - Technology of pattern making

Lecture 7 - Allowances in pattern making

Lecture 8 - Moulding sands and its ingredients

Lecture 9 - Testing of molding sands

Lecture 10 - Sand preparation for casting

Lecture 11 - Technology of mould making

Lecture 12 - Technology of core making

Lecture 13 - Special sand moulding process

Lecture 14 - Organic binders

Lecture 15 - Special moulding process

Lecture 16 - Introduction of gating design

Lecture 17 - Types of gate

Lecture 18 - Pouring time calculation

Lecture 19 - Aspiration effects in gating system

Lecture 20 - Problem solving on gating design

Lecture 21 - Solidification analysis

Lecture 22 - Risering methods

Lecture 23 - Shape factor

Lecture 24 - Feeding and Chills effect

Lecture 25 - Problem related to riser design

Lecture 26 - Special casting process - 1

Lecture 27 - Special casting process - 2

Lecture 28 - Special casting process - 3

Lecture 29 - Technology of melting

Lecture 30 - Melting practices

Lecture 31 - Melting and Casting of cast metal

Lecture 32 - Melting practice for gray iron

Lecture 33 - Melting practice for Malleable iron and S.G iron

Lecture 34 - Casting of steel and alloy steel

Lecture 35 - Casting practices for non-ferrous metals and alloys

Lecture 36 - Fettling of castings

Lecture 37 - Heat treatment of castings

Lecture 38 - Heat treatment practices for cast iron and non-ferrous metals and alloys

Lecture 39 - Casting defects

Lecture 40 - Diagnostics of casting defects

NPTEL : NOC:Steam and Gas Power Systems (Mechanical Engineering)

Co-ordinators : Prof. Ravi Kumar

Lecture 1 - Review of Thermodynamics

Lecture 2 - Rankine Cycle

Lecture 3 - Performance of Rankine Cycle

Lecture 4 - Binary vapour cycle and co-generation

Lecture 5 - Problem Solving (Rankine Cycle)

Lecture 6 - Steam Generators

Lecture 7 - Fire Tube Boilers

Lecture 8 - Water Tube Boilers

Lecture 9 - Boiler Mountings and Accessories

Lecture 10 - High Pressure Boilers (Part-1)

Lecture 11 - High Pressure Boilers (Part-2)

Lecture 12 - Draught

Lecture 13 - Performance of Boiler

Lecture 14 - Combustion of Fuel

Lecture 15 - Combustion of Fuel (Problem Solving)

Lecture 16 - Boiler Trial

Lecture 17 - Nozzles and Diffusers - Momentum and Continuity Equations

Lecture 18 - Nozzles and Diffusers - Efficiency and Critical Pressure

Lecture 19 - Nozzles and Diffusers - General Relationships and Supersaturated Flow

Lecture 20 - Problem Solving (Nozzles and diffusers)

Lecture 21 - Steam Turbine

Lecture 22 - Compounding of Steam Turbine

Lecture 23 - Impulse Steam Turbine

Lecture 24 - Impulse Steam Turbine Performance

Lecture 25 - Problem solving (Impulse Steam Turbine)

Lecture 26 - Impulse Reaction Steam Turbine

Lecture 27 - Impulse Reaction Steam Turbine Performance

Lecture 28 - Energy Losses in Steam Turbine

Lecture 29 - Condensers

Lecture 30 - Problem Solving (Steam Turbine)

Lecture 31 - Gas turbine cycle

Lecture 32 - Gas Turbine cycle Performance Evaluations

Lecture 33 - Gas Turbine cycle - Modifications

Lecture 34 - Problem Solving (Gas Turbine Cycle)

Lecture 35 - Centrifugal Compressors

Lecture 36 - Centrifugal Compressors Characteristics

Lecture 37 - Axial Flow Compressor

Lecture 38 - Axial Flow Compressor Characteristics

Lecture 39 - Jet Propulsion

Lecture 40 - Problem Solving

NPTEL : NOC:Product Design and Development (Mechanical Engineering)

Co-ordinators : Prof. Indradeep Singh

Lecture 1 - Introduction to product design and development

Lecture 2 - Product life-cycle

Lecture 3 - Product policy of an organization and selection of profitable products

Lecture 4 - Product design

Lecture 5 - Product design steps and product analysis

Lecture 6 - Value engineering concepts

Lecture 7 - Problem Identification and VEJP

Lecture 8 - Function analysis

Lecture 9 - Functional analysis system technique

Lecture 10 - Case study on value engineering

Lecture 11 - Quality function deployment

Lecture 12 - Computer aided design

Lecture 13 - Rubust design

Lecture 14 - Design for X

Lecture 15 - Ergonomics in product design

Lecture 16 - DFMA guidelines

Lecture 17 - Product design for manual assembly

Lecture 18 - Design guidelines for different processes

Lecture 19 - Rapid prototyping: concept, advantages

Lecture 20 - Rapid prototyping processes

NPTEL : NOC:Fundamentals of Manufacturing Processes (Mechanical Engineering)

Co-ordinators : Dr. D. K. Dwivedi

Lecture 1 - Understanding Manufacturing

Lecture 2 - Fundamental Approaches of Manufacturing

Lecture 3 - Manufacturing Process Specific Advantages and Limitations

Lecture 4 - Material and Manufacturing Processes

Lecture 5 - Classification of Manufacturing Processes

Lecture 6 - Selection of Manufacturing Processes

Lecture 7 - Applications of Manufacturing Processes

Lecture 8 - Effect of Manufacturing Processes on Mechanical Properties

Lecture 9 - Break Even Analysis in Manufacturing Processes

Lecture 10 - Casting: Introduction and Suitability

Lecture 11 - Steps of Casting Processes

Lecture 12 - Casting: Terminology

Lecture 13 - The Pattern Allowances - I

Lecture 14 - The Pattern Allowances - II

Lecture 15 - Casting: Sand Moulding - l

Lecture 16 - Sand Moulding - II

Lecture 17 - Casting: Core and Core Prints

Lecture 18 - Casting: Gating System

Lecture 19 - Casting: Yield and Riser Design

Lecture 20 - Casting: Riser Design

Lecture 21 - Casting: Cleaning of Castings

Lecture 22 - Casting: Casting Defects and their Preventions

Lecture 23 - Casting: Shell Mould Casting

Lecture 24 - Casting: Investment and Permanent Mould Casting

Lecture 25 - Metal Working Processes: Hot and Cold Working

Lecture 26 - Metal Working Processes: Rolling

Lecture 27 - Metal Working Processes: Forging

Lecture 28 - Metal Working Processes: Extrusion

Lecture 29 - Metal Working Processes: Wire Drawing

Lecture 30 - Metal Working Processes: Press

Lecture 31 - Sheet Metal Operations: Shearing

Lecture 32 - Metal Working Processes: Sheet Metal Operations - II

Lecture 33 - Metal Working Processes: Sheet Metal Operations - III

Lecture 34 - Metal Working Processes: Dies and Die sets

Lecture 35 - Material Removal Processes: Machining

Lecture 36 - Material Removal Processes: Mechanism of Metal Cutting

Lecture 37 - Material Removal Processes: Chip Formation

Lecture 38 - Material Removal Processes: Types of Chips and Power Consumption

Lecture 39 - Material Removal Processes: Heat Generation

Lecture 40 - Material Removal Processes: Tool Failure and Tool Life

Lecture 41 - Material Removal Processes: Tool materials

Lecture 42 - Material removal processes: Cutting fluids

Lecture 43 - Material removal processes: Grinding - I

Lecture 44 - Material removal Processes: Grinding - II

Lecture 45 - Material removal Processes: Grinding - III

Lecture 46 - Material removal processes: Grinding operations

Lecture 47 - Joining of metals: Fundamentals - I

Lecture 48 - Joining of metals: Fundamentals - II

Lecture 49 - Joining of metals: Welding processes - I

Lecture 50 - Brazing, soldering and weldability

Lecture 51 - Weldability and welding defects

Lecture 52 - Heat treatment: Fundamentals - I

Lecture 53 - Heat treatment: Fundamentals - II

Lecture 54 - Heat treatment: Fundamentals - III

Lecture 55 - Heat treatment: Normalizing and hardening

Lecture 56 - Heat treatment: Tempering

Lecture 57 - Improving surface properties: Introduction

Lecture 58 - Improving surface properties: Surface modification processes I

Lecture 59 - Improving surface properties: Changing chemical composition

Lecture 60 - Improving surface properties: Coating

NPTEL : NOC:Modelling and Simulation of Discrete Event System (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Simulation

Lecture 2 - Concept of System, Model and Simulation

Lecture 3 - Time advance mechanism, Components of a simulation model

Lecture 4 - Program organization and logic, Steps in a simulation study

Lecture 5 - Simulation examples

Lecture 6 - Statistical Models in Simulation

Lecture 7 - Input probability distribution functions for discrete systems

Lecture 8 - Continuous distribution functions

Lecture 9 - Continuous distribution functions and empirical distribution functions

Lecture 10 - Problem solving on statistical models in simulation

Lecture 11 - Characteristics of a queueing system

Lecture 12 - Performance measures of queueing system

Lecture 13 - Analysis of a single server queueing system

Lecture 14 - Simulation of a single server queueing system

Lecture 15 - Computer representation of simulation of single server queuing system

Lecture 16 - Generation of Random Numbers

Lecture 17 - Issues and Challenges in Congruential Generators

Lecture 18 - Testing of random numbers

Lecture 19 - Generation of Random Variates

Lecture 20 - Problem Solving on Random Number and Random Variate Generation

Lecture 21 - Input modeling: Identifying distributions with data

Lecture 22 - Input modeling: Estimation of parameters

Lecture 23 - Input modeling: Goodness-of-fit tests and assessing sample dependence

Lecture 24 - Input modeling: Multivariate input models

Lecture 25 - Problem Solving on input modeling

Lecture 26 - Output analysis of a single system: Introduction

Lecture 27 - Obtaining a specified precision

Lecture 28 - Comparison of alternative system configurations

Lecture 29 - Confidence Intervals for comparing more than two systems

Lecture 30 - Problem Solving on output analysis of single and alternative systems

Lecture 31 - Introduction to simulation of manufacturing and material handling system

Lecture 32 - Issues in material handling system

Lecture 33 - Modeling of system randomness: Machine downtime

Lecture 34 - Verification of simulation models

Lecture 35 - Model validity and credibility

Lecture 36 - Problem solving and case studies on simulation of manufacturing system

Lecture 37 - Introduction to Monte Carlo Simulation

Lecture 38 - Inventory Control Simulation using Monte Carlo Technique

Lecture 39 - In this lecture, Monte Carlo technique was used to solve inventory system problems

Lecture 40 - Problem solving on Monte Carlo Simulation

NPTEL : NOC:Processing of Polymers and Polymer Composites (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Introduction to course

Lecture 2 - Engineering materials and processing techniques

Lecture 3 - Thermoplastics and thermosets

Lecture 4 - Processing of polymers

Lecture 5 - Thermoforming processes

Lecture 6 - Extrusion - I

Lecture 7 - Extrusion - II

Lecture 8 - Compression molding

Lecture 9 - Injection molding - I

Lecture 10 - injection molding - II

Lecture 11 - Transfer molding

Lecture 12 - Rotational molding

Lecture 13 - Blow molding

Lecture 14 - Composite materials: Basic concepts

Lecture 15 - Classification of composite materials

Lecture 16 - Processing of polymer composites

Lecture 17 - Hand lay-up

Lecture 18 - Spray lay-up

Lecture 19 - Compression molding

Lecture 20 - Injection molding

Lecture 21 - Reaction injection molding

Lecture 22 - Autoclave molding

Lecture 23 - Resin transfer molding

Lecture 24 - Filament winding

Lecture 25 - Pultrusion process

Lecture 26 - Sheet molding

Lecture 27 - Pre-pregging and challenges in primary processing of composites

Lecture 28 - Secondary processing of polymer composites

Lecture 29 - Joining of polymer composites

Lecture 30 - Adhesive joining

Lecture 31 - Mechanical joining

Lecture 32 - Microwave joining

Lecture 33 - Induction and resistance welding

Lecture 34 - Drilling of polymer matrix composites - I

Lecture 35 - Drilling of polymer matrix composites - II

Lecture 36 - Methods to prevent drilling induced damage

Lecture 37 - Non-conventional drilling

Lecture 38 - Process simulation of secondary processing

Lecture 39 - Intelligent drilling of polymer matrix composites

Lecture 40 - Web based tools for polymer matrix composites

NPTEL : NOC:Operations Management (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Operations Management: Basics

Lecture 2 - Operations Management: Objectives

Lecture 3 - Operations Management: Functions and Scope

Lecture 4 - Types of Production Systems

Lecture 5 - Operations Strategy

Lecture 6 - Product Life-Cycle

Lecture 7 - Value Engineering Concepts

Lecture 8 - Design for X (DFX)

Lecture 9 - Ergonomics in Product Design

Lecture 10 - Rapid Prototyping: Concept, Advantages

Lecture 11 - Sales Forecasting

Lecture 12 - Forecasting System

Lecture 13 - Qualitative Methods of Forecasting

Lecture 14 - Quantitative Methods - I

Lecture 15 - Quantitative Methods - II

Lecture 16 - Facility Planning

Lecture 17 - Factors Affecting Plant Location

Lecture 18 - Plant Location: Case Study on Uttarakhand

Lecture 19 - Location Evaluation Methods - I

Lecture 20 - Location Evaluation Methods - II

Lecture 21 - Facility Layout and Planning - I

Lecture 22 - Facility Layout and Planning - II

Lecture 23 - Factors Influencing Plant Layout

Lecture 24 - Material Flow Patterns

Lecture 25 - Tools and Techniques used For Plant Layout Planning

Lecture 26 - Production Planning and Control

Lecture 27 - Process Planning

Lecture 28 - Aggregate Production Planning

Lecture 29 - Capacity Planning: Introduction

Lecture 30 - Capacity Planning: Examples

Lecture 31 - Project Scheduling

Lecture 32 - Network Diagrams

Lecture 33 - Critical Path Method

Lecture 34 - Critical Path Method: Problems - I

Lecture 35 - Critical Path Method: Problems - II

Lecture 36 - Program Evaluation and Review Technique (PERT)

Lecture 37 - PERT Problems - I

Lecture 38 - PERT Problems - II

Lecture 39 - Time Cost Trade Off (Crashing)

Lecture 40 - Project Network: Crashing Problems

Lecture 41 - Production Control

Lecture 42 - Sequencing

Lecture 43 - Sequencing Problems - I

Lecture 44 - Sequencing Problems - II

Lecture 45 - Master Production Scheduling (MPS)

Lecture 46 - Concept of Quality

Lecture 47 - Total Quality Management (TQM)

Lecture 48 - Total Productive Maintenance

Lecture 49 - Statistical Quality Control (SQC)

Lecture 50 - Six Sigma

Lecture 51 - Materials Management

Lecture 52 - Inventory Control

Lecture 53 - Economic Order Quantity (EOQ) Models

Lecture 54 - Economic Order Quantity (EOQ): Problems

Lecture 55 - Production Quantity Model

Lecture 56 - Just In time (JIT)

Lecture 57 - Kanban System

Lecture 58 - Materials Requirement Planning (MRP) - I

Lecture 59 - Materials Requirement Planning (MRP) - II

Lecture 60 - Enterprise Resource Planning (ERP)

NPTEL : NOC:Theory of Production Processes (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Theory and Practics of Casting

Lecture 2 - Theory of Solidification: Cooling curves

Lecture 3 - Solidification of pure metals and alloys

Lecture 4 - Factors affecting solidification process

Lecture 5 - Fluidity of liquid metals

Lecture 6 - Technology of patternmaking: Pattern materials

Lecture 7 - Patternmaking: Types of pattern and allowances

Lecture 8 - Molding sand ingredients and sand testing methods

Lecture 9 - Sand molding methods

Lecture 10 - Coremaking: Properties and types of cores

Lecture 11 - Gating system design: Types of gates

Lecture 12 - Gating system design: Pouring time calculation

Lecture 13 - Introduction to riser design

Lecture 14 - Risering methods

Lecture 15 - Problem solving on gating design and risering methods

Lecture 16 - Theory of melting: Types of furnaces

Lecture 17 - Melting and production of Iron castings

Lecture 18 - Production of steel and non-ferrous castings

Lecture 19 - Casting design considerations

Lecture 20 - Casting defects: Types, causes and remedies

Lecture 21 - Concept of stress and strain, Elastic and plastic behavior

Lecture 22 - State of stress in two and three dimensions, Mohrâ€™s circle

Lecture 23 - Description of strain at a point

Lecture 24 - Mean and deviator stresses, Elastic stress strain relationships

Lecture 25 - Theory of plasticity: True stress and true strain, Flow curve

Lecture 26 - Yield criteria for ductile materials

Lecture 27 - Flow rules, Plastic stress strain relationships

Lecture 28 - Classification of metal working processes

Lecture 29 - Mechanics of metal working

Lecture 30 - Temperature in metalworking: Hot and cold working

Lecture 31 - Rolling process: Classification, Hot and cold rolling

Lecture 32 - Analysis of rolling operation: Forces and geometrical relationships

Lecture 33 - Introduction to forging Process: Classification and equipments

Lecture 34 - Analysis of forging process

Lecture 35 - Problem solving on rolling and forging processes

Lecture 36 - Extrusion process: Classification and analysis

Lecture 37 - Drawing of rods, tubes and wires

Lecture 38 - Analysis of drawing operation

Lecture 39 - Sheet metal operations

Lecture 40 - Metal Forming Defects

Lecture 41 - Classification of joining processes

Lecture 42 - Heat flow in welding

Lecture 43 - Metallurgy of fusion welds

Lecture 44 - Heat affected zone in welding

Lecture 45 - Heat treatment processes in welding

Lecture 46 - Principle of shield arc welding processes

Lecture 47 - Principle of gas shield arc welding processes

Lecture 48 - Principle of Resistance welding

Lecture 49 - Principle of Solid State Welding Processes

Lecture 50 - Brazing, soldering and adhesive bonding

Lecture 51 - Residual stresses in welding

Lecture 52 - Methods of controlling residual stresses in welding

Lecture 53 - Welding Distortion

Lecture 54 - Control of welding distortion

Lecture 55 - Preheat and postweld heat treatment of weldments

Lecture 56 - Weldability of metals

Lecture 57 - Weldability of steels

Lecture 58 - Weldability of cast iron

Lecture 59 - Weldability of non-ferrous materials

Lecture 60 - Welding defects

NPTEL : NOC:Automatic Control (Mechanical Engineering)

Co-ordinators : Dr. Anil Kumar

Lecture 1 - Definition and Types

Lecture 2 - Performance Specifications

Lecture 3 - Design Process

Lecture 4 - Block Diagrams

Lecture 5 - Laplace Transform and Transfer Function

Lecture 6 - Translational Mechanical System

Lecture 7 - Rotational Mechanical System

Lecture 8 - Electrical System

Lecture 9 - Linearization of Nonlinear Systems

Lecture 10 - Numerical Problems

Lecture 11 - Poles and Zeros

Lecture 12 - First Order System

Lecture 13 - Second Order System

Lecture 14 - Underdamped Second Order System - I

Lecture 15 - Underdamped Second Order System - II

Lecture 16 - Definition of Stability

Lecture 17 - Routh-Hurwitz Criterion

Lecture 18 - Routh-Hurwitz Criterion- Special Cases

Lecture 19 - Steady State Errors

Lecture 20 - Static Error Constants

Lecture 21 - Define Root Locus

Lecture 22 - Sketching of Root Locus - I

Lecture 23 - Sketching of Root Locus - II

Lecture 24 - Sketching of Root Locus - III

Lecture 25 - Numerical Examples and Second Order Approximation

Lecture 26 - PI Controller Design

Lecture 27 - PD Controller Design

Lecture 28 - PID Controller Design

Lecture 29 - Lag Compensation

Lecture 30 - Lead and Lag-Lead Compensation

Lecture 31 - State Space Representation

Lecture 32 - Converting a Transfer Function to State Space

Lecture 33 - Converting From State Space to Transfer Function

Lecture 34 - Controller Design

Lecture 35 - Controller Design and Controllability

Lecture 36 - Transfer Function, Poles, Zeros, Response

Lecture 37 - Steady State Error, Root Locus

Lecture 38 - Design Via Root Locus, Compensation - I

Lecture 39 - Design Via Root Locus, Compensation - II

Lecture 40 - State Space Method

NPTEL : NOC:Failure Analysis and Prevention (Mechanical Engineering)

Co-ordinators : Dr. D. K. Dwivedi

Lecture 1 - Introduction - Need and scope of failure analysis and prevention

Lecture 2 - Introduction - Engineering disasters and understanding failures

Lecture 3 - Fundamental sources of failures - Deficient design - I

Lecture 4 - Fundamental sources of failures - Deficient design - II

Lecture 5 - Fundamental sources of failures - Deficient design - III and upgrading of a part

Lecture 6 - Fundamental sources of failures - Imperfections in base metals

Lecture 7 - Fundamental sources of failures - Improper Manufacturing - I

Lecture 8 - Fundamental sources of failures - Improper Manufacturing - II

Lecture 9 - Fundamental sources of failures - Improper Manufacturing - III

Lecture 10 - Fundamental sources of failures - Improper Manufacturing - IV and improper service conditions

Lecture 11 - Fundamental sources of failures - Poor assembly, service and maintenance

Lecture 12 - Industrial engineering tool for failure analysis - Pareto diagram

Lecture 13 - Industrial engineering tool for failure analysis - Fishbone diagram and FMEA

Lecture 14 - Industrial engineering tool for failure analysis - FMEA

Lecture 15 - Industrial engineering tool for failure analysis - Fault tree analysis

Lecture 16 - Industrial engineering tool for failure analysis - Reliability - I

Lecture 17 - Industrial engineering tool for failure analysis - Reliability - II

Lecture 18 - General procedure of failure analysis - Steps

Lecture 19 - General procedure of failure analysis - Background information collection

Lecture 20 - General procedure of failure analysis - Preliminary examination

Lecture 21 - General procedure of failure analysis - NDT for failure analysis

Lecture 22 - General procedure of failure analysis - Destructive testing

Lecture 23 - General procedure of failure analysis - DT, selection, preservation, cleaning and sectioning of samples

Lecture 24 - General procedure of failure analysis - Macroscopy of fracture surfaces - I

Lecture 25 - General procedure of failure analysis - Macroscopy of fracture surfaces - II

Lecture 26 - General procedure of failure analysis - Macroscopy of fracture surfaces - III

Lecture 27 - General procedure of failure analysis - Macroscopy of fracture surfaces - IV

Lecture 28 - General procedure of failure analysis - Microscopy of fracture surfaces

Lecture 29 - General procedure of failure analysis - Metallography of failed components

Lecture 30 - General procedure of failure analysis - Determination of type of fracture - I

Lecture 31 - General procedure of failure analysis - Determination of type of fracture - II

Lecture 32 - General procedure of failure analysis - Determination of type of fracture - III and chemical analysis

Lecture 33 - General procedure of failure analysis - Application of fracture mechanics - I

Lecture 34 - General procedure of failure analysis - Application of fracture mechanics - II

Lecture 35 - General procedure of failure analysis - Simulated test service conditions and analysis of evidences

Lecture 36 - General procedure of failure analysis - Question for analysis

Lecture 37 - General procedure of failure analysis - Reporting failure analysis and failure analysis of welded joint

Lecture 38 - General procedure of failure analysis - Failure analysis of weld joint

Lecture 39 - General procedure of failure analysis - Examples of failure analysis

Lecture 40 - General procedure of failure analysis - Embrittlement of steels

NPTEL : NOC:Mechanical Measurement System (Mechanical Engineering)

Co-ordinators : Prof. Ravi Kumar

Lecture 1 - Basic concepts of measurement

Lecture 2 - Functional elements of instruments

Lecture 3 - Classification of measuring instruments

Lecture 4 - Methods of correction for interfering and modifying inputs

Lecture 5 - Static characteristics of measuring instruments - 1

Lecture 6 - Static characteristics of measuring instruments - 2

Lecture 7 - Loading effect and Impedance matching

Lecture 8 - Statistical analysis

Lecture 9 - Chi-square test

Lecture 10 - Least square method

Lecture 11 - Uncertainty analysis

Lecture 12 - Problem solving - 1

Lecture 13 - Generalized model of a measuring system

Lecture 14 - Zero and first order system

Lecture 15 - First order system - step response

Lecture 16 - First order system - ramp response

Lecture 17 - First order system - impulse response

Lecture 18 - First order system - frequency response

Lecture 19 - Second order system - step response - 1

Lecture 20 - Second order system - step response - 2

Lecture 21 - Second order system - ramp response

Lecture 22 - Second order system - impulse and frequency response

Lecture 23 - Higher order systems

Lecture 24 - Compensation

Lecture 25 - Transducers - 1

Lecture 26 - Transducers - 2

Lecture 27 - Flow measurement - 1

Lecture 28 - Flow measurement - 2

Lecture 29 - Temperature measurement - 1

Lecture 30 - Temperature measurement - 2

Lecture 31 - Strain gauges

Lecture 32 - Piezoelectric transducers

Lecture 33 - Pressure measurement

Lecture 34 - Force and torque measurement

Lecture 35 - Displacement and acceleration measurement

Lecture 36 - Sound measurement

Lecture 37 - Thermophysical properties measurement

Lecture 38 - Flow visualization

Lecture 39 - Air pollution sampling and measurement

Lecture 40 - Problem solving - 2

NPTEL : NOC:Fundamentals of Surface Engineering: Mechanisms, Processes and Characterizations (Mechanical Engineering)

Co-ordinators : Dr. D. K. Dwivedi

Lecture 1 - Introduction and need of surface engineering

Lecture 2 - Surface/sub-surface regions and properties of importance for surface engineering

Lecture 3 - Surface properties and their modification

Lecture 4 - Classification of surface modification techniques - I

Lecture 5 - Classification of surface modification techniques - II

Lecture 6 - Comparison of surface modification techniques and scope of surface engineering

Lecture 7 - Scope of surface engineering - I

Lecture 8 - Surface properties for wear and friction resistance - I

Lecture 9 - Surface properties for wear and friction resistance - II

Lecture 10 - Surface properties for wear and friction resistance - III

Lecture 11 - Issues and application of surface modification

Lecture 12 - Surface damage: type and categories

Lecture 13 - Surface damage: Adhesive wear - I

Lecture 14 - Surface damage: Adhesive wear - II

Lecture 15 - Surface damage: Classical law of adhesive wear and abrasive wear

Lecture 16 - Surface damage: Abrasive wear - I

Lecture 17 - Surface damage: Abrasive wear - II

Lecture 18 - Surface damage: Erosive wear

Lecture 19 - Surface damage: Melting wear and corrosive wear

Lecture 20 - Surface damage: Diffusive wear and evaluation of surface damage

Lecture 21 - Properties and mode of wear

Lecture 22 - Metal systems

Lecture 23 - Thermal barrier coatings

Lecture 24 - Functionally graded materials and other materials

Lecture 25 - Surface modification techniques: Principle of controlling surface metallurgy

Lecture 26 - Surface modification techniques: Controlling surface metallurgy - I

Lecture 27 - Surface modification techniques: Controlling surface metallurgy - II

Lecture 28 - Surface modification techniques: Controlling surface metallurgy - III

Lecture 29 - Surface modification techniques: Controlling surface metallurgy - IV

Lecture 30 - Surface modification techniques: Changing surface composition

Lecture 31 - Surface modification techniques: Carburizing - I

Lecture 32 - Surface modification techniques: Carburizing - II

Lecture 33 - Surface modification techniques: Carburizing and Cyaniding

Lecture 34 - Surface modification techniques: Nitriding

Lecture 35 - Surface modification techniques: Plasma carburizing and plasma nitriding

Lecture 36 - Surface modification techniques: Vacuum based surface modification I

Lecture 37 - Surface modification techniques: Ion implantation and ion plating

Lecture 38 - Surface modification techniques: Sputtering and Ion beam assisted deposition

Lecture 39 - Surface modification techniques: Chemical vapour deposition and boronizing

Lecture 40 - Surface modification techniques: Laser alloying

Lecture 41 - Surface modification techniques: Laser nitriding and developing surface layer

Lecture 42 - Surface modification techniques: Fundamentals of surface modification by weld surfacing and thermal spraying

Lecture 43 - Surface modification techniques: Fundamentals of surface modification by weld surfacing

Lecture 44 - Surface modification techniques: Weld surfacing processes

Lecture 45 - Surface modification techniques: Weld surfacing - I

Lecture 46 - Surface modification techniques: Weld surfacing - II

Lecture 47 - Surface modification techniques: Weld surfacing - III

Lecture 48 - Surface modification techniques: Laser cladding

Lecture 49 - Surface modification techniques: Principle of thermal spraying

Lecture 50 - Surface modification techniques: Flame spraying

Lecture 51 - Surface modification techniques: Improving the performance of flame spray coating

Lecture 52 - Surface modification techniques: HVOF and Detonation spraying

Lecture 53 - Surface modification techniques: Cold spraying, arc spraying

Lecture 54 - Surface modification techniques: Plasma spraying, electroplating, electroless plating

Lecture 55 - Characterization of modified surfaces: Surface roughness and thickness - I

Lecture 56 - Characterization of modified surfaces: Surface roughness and thickness - II

Lecture 57 - Characterization of modified surfaces: Thickness and soundness

Lecture 58 - Characterization of modified surfaces: Soundness and mechanical properties

Lecture 59 - Characterization of modified surfaces: Metallography

Lecture 60 - Characterization of modified surfaces: Wear behavior

NPTEL : NOC:Work System Design (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Work System Design: Introduction

Lecture 2 - Introduction and Concept of Productivity

Lecture 3 - Measurement of Productivity

Lecture 4 - Productivity Measures

Lecture 5 - Productivity Measurement Models

Lecture 6 - Factors Influencing Productivity

Lecture 7 - Causes of Low Productivity

Lecture 8 - Productivity Improvement Technique

Lecture 9 - Numerical Problems on Productivity

Lecture 10 - Case Study on Productivity

Lecture 11 - Work Study: Basic Concept

Lecture 12 - Steps Involved in Work Study

Lecture 13 - Concept of Work Content

Lecture 14 - Techniques of Work Study

Lecture 15 - Human Aspects of Work Study

Lecture 16 - Method Study: Basic Concept

Lecture 17 - Method Study: Steps

Lecture 18 - Method Study: Recording Techniques

Lecture 19 - Operation Process Charts

Lecture 20 - Operation Process Charts: Examples

Lecture 21 - Flow Process Charts

Lecture 22 - Flow Process Charts: Examples

Lecture 23 - Two-Handed-Process Charts

Lecture 24 - Multiple Activity Charts

Lecture 25 - Flow Diagrams

Lecture 26 - String Diagrams

Lecture 27 - Principles of Motion Economy

Lecture 28 - Micro-Motion Study

Lecture 29 - Therbligs

Lecture 30 - SIMO Charts

Lecture 31 - Memo-Motion Study

Lecture 32 - Cycle Graph and Chronocycle Graph

Lecture 33 - Critical Examination Techniques

Lecture 34 - Development and Selection of New Method

Lecture 35 - Installation and Maintenance of Improved Methods

Lecture 36 - Work Measurement: Basic Concept

Lecture 37 - Techniques of Work Measurement

Lecture 38 - Steps Involved in Time Study

Lecture 39 - Steps and Equipment of Time Study

Lecture 40 - Performance Rating

Lecture 41 - Performance Rating: Examples

Lecture 42 - Allowances in Time Study

Lecture 43 - Computation of Standard Time - I

Lecture 44 - Computation of Standard Time - II

Lecture 45 - Work Measurement: Applications

Lecture 46 - Work Sampling: Basic Concept

Lecture 47 - Procedure of Work Sampling

Lecture 48 - Work Sampling: Examples

Lecture 49 - Introduction to Synthetic Data and PMTS

Lecture 50 - Introduction to MTM and MOST

Lecture 51 - Ergonomics: Basic Concept

Lecture 52 - Industrial Ergonomics

Lecture 53 - Ergonomics: Anthropometry

Lecture 54 - Man-Machine System - 1

Lecture 55 - Man-Machine System - 2

Lecture 56 - Case Study: Office Chair

Lecture 57 - Case Study: Tower Crane Cabin

Lecture 58 - Case Study: Car Seat

Lecture 59 - Case Study: Computer System

Lecture 60 - Case Study: Assembly Line

NPTEL : NOC:Principles of Metal Forming Technology (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Metal Forming Technology

Lecture 2 - Classification of Metal Working Processes

Lecture 3 - Behavior of Materials

Lecture 4 - Failure of Materials

Lecture 5 - Concept of stress and strain

Lecture 6 - Description of stress

Lecture 7 - State of stress in three dimension

Lecture 8 - Description of strain

Lecture 9 - Hydrostatic and deviator components of stress and strain

Lecture 10 - Elastic stress strain relationships

Lecture 11 - Introduction to theory of plasticity and flow curve

Lecture 12 - True stress and true strain

Lecture 13 - Yield criteria for ductile materials

Lecture 14 - Yield locus, Octahedral shear stress and strain

Lecture 15 - Plastic stress strain relationships

Lecture 16 - Measures of yielding and ductility in tensile testing

Lecture 17 - Instability in tension

Lecture 18 - Strain rate effects on flow properties

Lecture 19 - Temperature effects on flow properties

Lecture 20 - Influence of various parameters on flow properties

Lecture 21 - Classification of metal working processes

Lecture 22 - Mechanics of metalworking and analysis methods

Lecture 23 - Determination of flow stresses in metal working

Lecture 24 - Hot working and cold working

Lecture 25 - Metallurgical considerations in metal forming

Lecture 26 - Introduction and classification of forging processes

Lecture 27 - Equipments used in forging

Lecture 28 - Forging in plane strain

Lecture 29 - Introduction and classification of rolling processes

Lecture 30 - Analysis of rolling load calculations

Lecture 31 - Defects in rolled and forged products

Lecture 32 - Introduction and classification of extrusion processes

Lecture 33 - Analysis of extrusion processes

Lecture 34 - Extrusion of tubes and pipes, extrusion defect

Lecture 35 - Introduction to rod and wire drawing

Lecture 36 - Analysis of wire drawing and tube drawing processes

Lecture 37 - Sheet metal operations - I

Lecture 38 - Sheet metal operations - II

Lecture 39 - Powder metallurgy forming - I

Lecture 40 - Powder metallurgy forming - II

NPTEL : NOC:Radiative Heat Transfer (Mechanical Engineering)

Co-ordinators : Prof. Ankit Bansal

Lecture 1 - Introduction

Lecture 2 - Fundamentals of Radiation

Lecture 3 - Basic Laws of Thermal Radiation

Lecture 4 - Properties of Plane Surfaces

Lecture 5 - Radiative Properties of Materials

Lecture 6 - View Factor

Lecture 7 - Hottel Crossed String Method

Lecture 8 - Inside Sphere and Monte Carlo Method

Lecture 9 - Radiative Heat Exchange Between Black Surfaces

Lecture 10 - Radiative Heat Exchange Between Gray Diffuse Surfaces

Lecture 11 - Network Analogy

Lecture 12 - Solution Methods for Governing Integral Equations

Lecture 13 - Radiative Heat Exchange between Partially Specular Gray Surfaces

Lecture 14 - Non-Gray Surfaces

Lecture 15 - Radiative Heat Transfer in the Presence of Conduction/Convection

Lecture 16 - Radiative Transfer in Participating Media

Lecture 17 - Equation of Radiative Transfer

Lecture 18 - Solution of Radiative Transfer Equation

Lecture 19 - Radiative Heat Transfer in Cylindrical Media

Lecture 20 - Approximate Methods-I

Lecture 21 - Approximate Methods-II

Lecture 22 - The Method of Spherical Harmonics (PN Approximation) - I

Lecture 23 - The Method of Spherical Harmonics (PN Approximation) - II

Lecture 24 - Discrete Ordinate Method (DOM)

Lecture 25 - Zone Method

Lecture 26 - Exchange Areas

Lecture 27 - Monte Carlo Method for Thermal Radiation - I

Lecture 28 - Monte Carlo Method for Thermal Radiation - II

Lecture 29 - Radiative Properties of Gases

Lecture 30 - Atomic and Molecular Spectra

Lecture 31 - Line Radiation

Lecture 32 - Spectral Modelling

Lecture 33 - Wide Band Models

Lecture 34 - WSGG Model

Lecture 35 - k-Distribution Model

Lecture 36 - Radiative Properties of Particulate Media

Lecture 37 - Combustion and Flame

Lecture 38 - Solar and Atmospheric Radiation

Lecture 39 - Concentrated Solar Collector

Lecture 40 - Experimental Methods

NPTEL : NOC:Weldability of Metals (Mechanical Engineering)

Co-ordinators : Dr. D. K. Dwivedi

Lecture 1 - Understanding Weldability: Introduction - I

Lecture 2 - Understanding Weldability: Introduction - II

Lecture 3 - Metal Properties and Weldability - I

Lecture 4 - Metal Properties and Weldability - II

Lecture 5 - Weldability of Work Hardenable Metals

Lecture 6 - Weldability of Work Hardenable and Precipitation Strengthened Metals

Lecture 7 - Weldability of Precipitation Strengthened Metals

Lecture 8 - Weldability of Metals Strengthened by Grain Refinement, dispersion Hardening and Transformation Hardening

Lecture 9 - Weldability of Transformation Hardening Metals

Lecture 10 - Weldability of Metals: Combination of Strengthening Mechanisms

Lecture 11 - Weldability Consideration

Lecture 12 - Weldability of Carbon and Alloy Steel - I

Lecture 13 - Weldability of Carbon and Alloy Steel - II

Lecture 14 - Weldability of Carbon and Alloy Steel - III

Lecture 15 - Weldability of Low Carbon Steel and Mild Steel

Lecture 16 - Weldability of Medium Carbon Steel and High Carbon Steel

Lecture 17 - Weldability of Carbon and Welding Processes - I

Lecture 18 - Weldability of Carbon and Welding Processes - II

Lecture 19 - Weldability of Carbon Steel and Welding Processes - III

Lecture 20 - Weldability of Carbon Steel and Radiation Welding and Thermal Cutting

Lecture 21 - Weldability of High Strength Low Alloy Steels

Lecture 22 - Weldability of Q&T Steels - I

Lecture 23 - Weldability of Q&T Steels - II

Lecture 24 - Weldability of Q&T Steels - III

Lecture 25 - Weldability of Q&T Steels - IV

Lecture 26 - Weldability of HTLA Steel - I

Lecture 27 - Weldability of HTLA Steel - II

Lecture 28 - Weldability of Cr-Mo Steel - I

Lecture 29 - Weldability of Cr-Mo Steel - II

Lecture 30 - Weldability of Cr-Mo Steel - III

Lecture 31 - Weldability of Pre-Coated Steel - I

Lecture 32 - Weldability of Pre-Coated Steel - II

Lecture 33 - Weldability of Stainless Steel - I

Lecture 34 - Weldability of Stainless Steel - II

Lecture 35 - Weldability of Martensitic Stainless Steel - I

Lecture 36 - Weldability of Martensitic Stainless Steel - II

Lecture 37 - Weldability of Ferritic Stainless Steel - I

Lecture 38 - Weldability of Austenitic Stainless Steel - I

Lecture 39 - Weldability of Austenitic Stainless Steel - II

Lecture 40 - Weldability of PH Stainless Steel

NPTEL : NOC:Manufacturing Guidelines for Product Design (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Product Design : Basics

Lecture 2 - Introduction of Manufacturing Processes

Lecture 3 - Manufacturing Processes : Advantages and Limitations - I

Lecture 4 - Manufacturing Processes : Advantages and Limitations - II

Lecture 5 - Process Capabilities : Basics

Lecture 6 - Engineering Materials

Lecture 7 - Properties of materials

Lecture 8 - Selection of materials - I

Lecture 9 - Selection of materials - II

Lecture 10 - Applications of Engineering Material

Lecture 11 - Robust design

Lecture 12 - Design for X

Lecture 13 - Product Design for Manual Assembly

Lecture 14 - DFMA Guidelines

Lecture 15 - Ergonomics in Product Design

Lecture 16 - Selection of processes - I

Lecture 17 - Selection of processes - II

Lecture 18 - Process Capabilities.

Lecture 19 - Design Guidelines for Sand Casting

Lecture 20 - Design Guidelines for Die Casting

Lecture 21 - Product Design Guidelines : Compression Molding and Extrusion

Lecture 22 - Design Guidelines for Extrusion and Injection Molding

Lecture 23 - Design Guidelines for Sheet Metal Working

Lecture 24 - Design Guidelines for Machining

Lecture 25 - Design Guidelines for Powder Metal Processing

Lecture 26 - Assembly Processes : Introduction

Lecture 27 - Adhesive Joining : Guidelines

Lecture 28 - Design Guidelines for Mechanical Fasteners

Lecture 29 - Design Guidelines for Welding

Lecture 30 - Design guidelines : Brazing and Soldering

Lecture 31 - Induction Welding : Plastics

Lecture 32 - Ultrasonic Welding : Plastics

Lecture 33 - Vibration and Spin Welding : Plastics

Lecture 34 - Microwave Joining

Lecture 35 - Hole making : Guidelines

Lecture 36 - Design for Environment

Lecture 37 - Design for Environment : Steps

Lecture 38 - Product Architecture

Lecture 39 - Rapid Prototyping

Lecture 40 - Product Design : Manufacturing Perspective

NPTEL : NOC:Inspection and Quality Control in Manufacturing (Mechanical Engineering)

Co-ordinators : Prof. Kaushik Pal

Lecture 1 - Introduction: Fundamental concepts of quality, inspection and their role in manufacturing

Lecture 2 - Need of Inspection: Types and Principles

Lecture 3 - Destructive Inspection - I

Lecture 4 - Destructive Inspection - II

Lecture 5 - Testing of Composite Materials

Lecture 6 - Nondestructive Inspection - Visual Inspection

Lecture 7 - Dye Penetrant Inspection

Lecture 8 - Magnetic Particle Inspection

Lecture 9 - Eddy Current Inspection

Lecture 10 - Ultrasonic Inspection

Lecture 11 - Acoustic Emission Inspection

Lecture 12 - Radiography Inspection

Lecture 13 - Leak Testing

Lecture 14 - Thermographic Nondestructive Testing

Lecture 15 - Advanced Nondestructive Testing Techniques, NDT Standards, Safety in NDT

Lecture 16 - Engineering Metrology - Linear Measurement

Lecture 17 - Angular Measurement and Measurement of Surface Finish

Lecture 18 - Screw Thread Metrology

Lecture 19 - Gear Measurement

Lecture 20 - Miscellaneous Measurements

NPTEL : NOC:Financial Mathematics (Mechanical Engineering)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Financial Mathematics

Lecture 2 - Important Mathematical Functions and its Characteristics

Lecture 3 - Progressions and Series, Growth and Decay Curves

Lecture 4 - Statistical Measures

Lecture 5 - Problem Solving on Mathematical Functions and Statistical Measures

Lecture 6 - Interest and Interest Rate, Time Value of Money

Lecture 7 - Simple Discount, Focal Date and Equation of Value

Lecture 8 - Introduction to Bank Discount

Lecture 9 - Introduction to Compound Interest

Lecture 10 - Problem Solving on Simple Interest and Bank Discount

Lecture 11 - Introduction to Discrete Compounding and Discrete Payments

Lecture 12 - Equal Payment Series and Gradient Series Factors

Lecture 13 - Geometric Gradient Series Factors

Lecture 14 - Annuities Due and Annuities Deferred

Lecture 15 - Problem Solving on Compounding Factors

Lecture 16 - Compounding Frequency of Interest

Lecture 17 - Interest Factors for Continuous Compounding

Lecture 18 - Introduction to Economic Equivalence

Lecture 19 - Principles of Equivalence

Lecture 20 - Problem Solving on Compounding Frequency and Economic Equivalence

Lecture 21 - Methods of Comparison of Alternatives

Lecture 22 - Payback Period

Lecture 23 - Capitalized Equivalent and Capital Recovery with Return

Lecture 24 - Project Balance

Lecture 25 - Problem Solving on Alternatives Comparison and Project Balance

Lecture 26 - Analysis of Credit and Loans

Lecture 27 - Assessing Interest and Structured Payments in Loans

Lecture 28 - Introduction to Cost of Credit and Amortization

Lecture 29 - Analysis of Amortization Schedule

Lecture 30 - Graduated Payment Mortgage, Sinking Funds

Lecture 31 - Introduction to Depreciation and Depletion

Lecture 32 - Types of Depreciation: SL Method and Declining Balance Method

Lecture 33 - Tax Depreciation Methods

Lecture 34 - SOD and UOP Method of Depreciation, Depletion

Lecture 35 - Problem Solving on Depreciation and Depletion

Lecture 36 - Introduction to Break-Even Analysis

Lecture 37 - Analysis of Break-Even Time and Dual Break-Even Points

Lecture 38 - Economic Order Quantity

Lecture 39 - Introduction to Leverage

Lecture 40 - Financial Leverage and Total Leverage

Lecture 41 - Introduction to Stocks

Lecture 42 - Stock Valuation

Lecture 43 - Two Stage Dividend Growth and Preferred Stocks

Lecture 44 - Introduction to Bonds

Lecture 45 - Bond Premium and Discount, Bond Purchase

Lecture 46 - Introduction to Mutual funds

Lecture 47 - Performance Measures

Lecture 48 - Options

Lecture 49 - Option Valuation

Lecture 50 - Introduction to Cost of Capital and Ratio Analysis

Lecture 51 - Introduction to Risk Measurement

Lecture 52 - Decision-Making Under Risk

Lecture 53 - Decision Under Uncertainty

Lecture 54 - Risk Premium, Portfolio Return and Risk

Lecture 55 - Portfolio Diversification

Lecture 56 - Introduction to Insurance, Mortality Table

Lecture 57 - Pure Endowment and Life Annuities

Lecture 58 - Introduction to Life Insurance

Lecture 59 - Types of Life Insurance Policies

Lecture 60 - Reserve Funds, Property and Casualty Insurance

NPTEL : NOC:Product Design Using Value Engineering (Mechanical Engineering)

Co-ordinators : Dr. Inderdeep Singh

Lecture 1 - Introduction to Product Design and Development

Lecture 2 - Product Design Steps and Product Analysis

Lecture 3 - Profit Consideration

Lecture 4 - Value Engineering (VE) History, Concept and Definitions

Lecture 5 - Value Engineering vs Cost Cutting

Lecture 6 - Creative Thinking

Lecture 7 - Problem Identification and VEJP

Lecture 8 - Types of Product Functions

Lecture 9 - Funtional Analysis

Lecture 10 - Functional Analysis System Technique

Lecture 11 - Function-Cost Relationship - I

Lecture 12 - Function-Cost Relationship - II

Lecture 13 - VE Applications in Product Design

Lecture 14 - Value Engineering: Case Study - I

Lecture 15 - Value Engineering: Case Study - II

Lecture 16 - VE Tools and Techniques - I

Lecture 17 - VE Tools and Techniques - II

Lecture 18 - VE Success Stories - I

Lecture 19 - VE Success Stories - II

Lecture 20 - Behavioral Roadblocks

NPTEL : NOC:Selection of Nanomaterials for Energy Harvesting and Storage Application (Mechanical Engineering)

Co-ordinators : Prof. Kaushik Pal

Lecture 1 - Introduction

Lecture 2 - Solar Energy Harvesting

Lecture 3 - Perovskite Solar Cells

Lecture 4 - Solar Thermal Energy

Lecture 5 - Heat Transfer Fluids

Lecture 6 - Hydrogen Energy: Introduction and Hydrogen Production from Fossil Fuels and Biomass

Lecture 7 - Hydrogen Production from Thermochemical Process

Lecture 8 - Hydrogen Production from Electrolysis

Lecture 9 - Photo-electrochemical Production of Hydrogen Using Solar Energy

Lecture 10 - Hydrogen Production from Biological Process

Lecture 11 - Nanogenerators: Introduction and Piezoelectric Nanogenerators

Lecture 12 - Triboelectric Nanogenerators

Lecture 13 - Pyroelectric Nanogenerators

Lecture 14 - Thermoelectric Nanogenerators and Electromagnetic generators

Lecture 15 - Other Energy Resources

Lecture 16 - Energy Storage

Lecture 17 - Electrochemical Energy Storage (Batteries)

Lecture 18 - Supercapacitors

Lecture 19 - Hydrogen Storage

Lecture 20 - Thermal Energy Storage

NPTEL : NOC:Robotics and Control: Theory and Practice (Mechanical Engineering)

Co-ordinators : Prof. N. Sukavanam, Prof. M. Felix Orlando

Lecture 1 - Introduction

Lecture 2 - Coordinate Frames and Homogeneous Transformations - I

Lecture 3 - Coordinate Frames and Homogeneous Frames - II

Lecture 4 - Differential Transformations

Lecture 5 - Transforming Differential Changes between Coordinate Frames

Lecture 6 - Kinematic Model for Robot Manipulator

Lecture 7 - Direct Kinematics

Lecture 8 - Inverse Kinematics

Lecture 9 - Manipulator Jacobian

Lecture 10 - Manipulator Jacobian Example

Lecture 11 - Trajectory Planning

Lecture 12 - Dynamics of Manipulator

Lecture 13 - Dynamics of Manipulator (Continued...)

Lecture 14 - Manipulator Dynamics Multiple Degree of Freedom

Lecture 15 - Stability of Dynamical System

Lecture 16 - Manipulator Control

Lecture 17 - Biped Robot Basics and Flat Foot Biped Model

Lecture 18 - Biped Robot Flat Foot and Toe Foot Model

Lecture 19 - Artificial Neural Network

Lecture 20 - Neural Network based control for Robot Manipulator

Lecture 21 - Redundancy Resolution of Human Fingers in Cooperative Object Translation - I

Lecture 22 - Redundancy Resolution of Human Fingers in Cooperative Object Translation - II

Lecture 23 - Fundamentals of Robot Manipulability

Lecture 24 - Manipulability Analysis of Human Fingers in Cooperative Rotational Motion

Lecture 25 - Robotic Exoskeletons: An Introduction

Lecture 26 - Introduction to Robotic Hand Exoskeleton

Lecture 27 - Design and Development of a Three Finger Exoskeleton

Lecture 28 - Force Control of an Index Finger Exoskeleton

Lecture 29 - Neural Control of a Hand Exoskeleton

Lecture 30 - Neural Control of a Hand Exoskeleton Based on Human Subjectâ€™s Intention

Lecture 31 - Robot Assisted Percutaneous Interventions

Lecture 32 - Experiments on Robot Assisted Percutaneous Interventions

Lecture 33 - Sliding Mode Control

Lecture 34 - Higher Order Sliding Mode Control

Lecture 35 - Smart Needles for Percutaneous Interventions - I

Lecture 36 - Smart Needles for Percutaneous Interventions - II

Lecture 37 - Flexible Link Kinematics - I

Lecture 38 - Flexible Link Kinematics - II

Lecture 39 - Model Based Control of Robot Manipulators

Lecture 40 - Simulation of Robot Manipulators

NPTEL : NOC:Acoustic Metamaterials (Mechanical Engineering)

Co-ordinators : Prof. Sneha Singh

Lecture 1 - Introduction

Lecture 2 - Sound Wave Propagation in Fluid - I

Lecture 3 - Sound Wave Propagation in Fluid - II

Lecture 4 - Sound Wave Propagation in Fluid - III

Lecture 5 - Sound Propagation at Medium Boundaries - I

Lecture 6 - Sound Propagation at Medium Boundaries - II

Lecture 7 - Standing Waves and Modes

Lecture 8 - Sound Signal Analysis - I

Lecture 9 - Sound Signal Analysis - II

Lecture 10 - Principles of Noise Control

Lecture 11 - Acoustic Materials

Lecture 12 - Enclosures

Lecture 13 - Barriers

Lecture 14 - Enclosures and Barriers - Tutorial

Lecture 15 - Sound Absorbing Materials

Lecture 16 - Porous-Fibrous Sound Absorbers

Lecture 17 - Panel Sound Absorbers

Lecture 18 - Helmholtz Resonators

Lecture 19 - Tutorial on Sound Absorbers

Lecture 20 - Perforated Panel Absorbers

Lecture 21 - Microperforated Panel Absorbers - 1

Lecture 22 - Microperforated Panel Absorbers - 2

Lecture 23 - Microperforated Panel Absorbers - 3

Lecture 24 - Introduction to Acoustic Metamaterials - 1

Lecture 25 - Introduction to Acoustic Metamaterials - 2

Lecture 26 - History of Acoustic Metamaterials

Lecture 27 - Applications of Acoustic Metamaterials

Lecture 28 - Membrane Type Acoustic Metamaterials - 1

Lecture 29 - Membrane Type Acoustic Metamaterials - 2

Lecture 30 - Membrane Type Acoustic Metamaterials - 3

Lecture 31 - Membrane Type Acoustic Metamaterials - 4

Lecture 32 - Advantages and Applications of Membrane Type AMM

Lecture 33 - Tutorial on Membrane Type AMM

Lecture 34 - Introduction to Sonic Crystals

Lecture 35 - Fundamentals of Crystals

Lecture 36 - Principle of Working of Sonic Crystals - 1

Lecture 37 - Principle of Working of Sonic Crystals - 2

Lecture 38 - Tutorial on Sonic Crystals

Lecture 39 - More on Sonic Crystals and Conclusions

NPTEL : NOC:Power Plant Engineering (Mechanical Engineering)

Co-ordinators : Prof. Ravi Kumar

Lecture 1 - Energy Scenario and Basic Concepts

Lecture 2 - Steam Power Plant Cycle

Lecture 3 - Fossil Fuel Steam Generator - I

Lecture 4 - Fossil Fuel Steam Generator - II

Lecture 5 - Mountings and Accessories - I

Lecture 6 - Mountings and Accessories - II

Lecture 7 - Boiler Performance

Lecture 8 - Coal Properties

Lecture 9 - Coal Handling

Lecture 10 - Problem Solving - I

Lecture 11 - Burning of Fuel

Lecture 12 - Ash Handling

Lecture 13 - Feed Water Treatment

Lecture 14 - Steam Turbines

Lecture 15 - Impulse Steam Turbines

Lecture 16 - Impulse-Reaction Steam Turbines

Lecture 17 - Energy Losses in Steam Turbines

Lecture 18 - Steam Condensers

Lecture 19 - Gas Turbines

Lecture 20 - Problem Solving - II

Lecture 21 - Hydroelectric power plant

Lecture 22 - Hydro plants and forces on plates

Lecture 23 - Hydro Turbines - I

Lecture 24 - Hydro Turbines - II

Lecture 25 - Problem solving - III

Lecture 26 - Principles of nuclear energy

Lecture 27 - Nuclear power plants - I

Lecture 28 - Nuclear power plants - II

Lecture 29 - Combined operations

Lecture 30 - Solar radiations

Lecture 31 - Solar thermal power

Lecture 32 - Wind energy

Lecture 33 - Wave and geothermal energy

Lecture 34 - Photo-voltaic conversion

Lecture 35 - Problem solving - IV

Lecture 36 - Direct energy conversion

Lecture 37 - Instrumentation in power plant

Lecture 38 - Economic of power generation

Lecture 39 - Environmental aspects of power generation

Lecture 40 - Problem solving - V

NPTEL : NOC:Principles of Industrial Engineering (Mechanical Engineering)

Co-ordinators : Prof. D K Dwivedi

Lecture 1 - Introduction

Lecture 2 - Introduction: Developments, Objectives, and Functions

Lecture 3 - Introduction: Functions and Tools

Lecture 4 - Tool of IE and Organizational Structure

Lecture 5 - Organisational Structure

Lecture 6 - Organizational Structure: Roles

Lecture 7 - Organizational Structure: Types

Lecture 8 - Organizational Structure: Product Strategies

Lecture 9 - Organizational Structure: Process and Product Organization

Lecture 10 - Organizational Structure and Culture

Lecture 11 - Organizational Structure: Principles

Lecture 12 - Plant Location and Layout: Selection of Site

Lecture 13 - Plant Location and Layout: Factor Affecting Selection of Site

Lecture 14 - Plant Location and Layout: Methods for Selection of Site - I

Lecture 15 - Plant Location and Layout: Methods for Selection of Site - II

Lecture 16 - Plant Location and Layout: Methods for Selection of Site - III

Lecture 17 - Plant Location and Layout: Methods for Selection of Site - IV

Lecture 18 - Plant Layout: Purpose and Types of Layout

Lecture 19 - Plant Layout: Types of Layout

Lecture 20 - Plant Layout: Cellular and Process Layout

Lecture 21 - Plant Layout: Process Layout Design - I

Lecture 22 - Plant Layout: Process Layout Design - II

Lecture 23 - Plant Layout: Product Layout Design

Lecture 24 - Organization of Facility

Lecture 25 - Organization of Facility and Material Handling

Lecture 26 - Material Handling

Lecture 27 - Production Planning and Control: Scope - I

Lecture 28 - Production Planning and Control: Scope - II

Lecture 29 - Production Planning and Control: Capacity Planning

Lecture 30 - Production Planning and Control: Capacity Planning and Scheduling

Lecture 31 - Production Planning and Control: MRP, Routing, Scheduling

Lecture 32 - Production Planning and Control: Scheduling

Lecture 33 - Production Planning and Control: Priority Sequencing - I

Lecture 34 - Production Planning and Control: Priority Sequencing - II

Lecture 35 - Production Planning and Control: Relative Performance of Priority Sequencing Rules

Lecture 36 - Inventory: Fundamentals

Lecture 37 - Inventory: Models - I

Lecture 38 - Inventory: Models - II

Lecture 39 - Inventory: Wilson Model

Lecture 40 - Inventory: Gradual Replenishment Model

Lecture 41 - Project Management and Network Modelling: Introduction

Lecture 42 - Network Modelling: PERT

Lecture 43 - Network Analysis: PERT - I

Lecture 44 - Network Analysis: PERT - II

Lecture 45 - Network Analysis: Crashing Network and CPM

Lecture 46 - Network Analysis: Critical Path Method

Lecture 47 - Forecasting: Introduction

Lecture 48 - Forecasting: Methods - I

Lecture 49 - Forecasting: Methods - II

Lecture 50 - Forecasting: Methods - III

Lecture 51 - Forecasting: Methods - IV

Lecture 52 - Forecasting: Methods - V

Lecture 53 - Quality Control: Introduction

Lecture 54 - Quality Control: Fundamentals

Lecture 55 - Quality Control: SPC - I

Lecture 56 - Quality Control: SPC - II

Lecture 57 - Quality Control: Control Charts - I

Lecture 58 - Quality Control: Control Charts - II

Lecture 59 - Quality Control: Control Charts for Attributes

Lecture 60 - Productivity and Work Study

NPTEL : NOC:Mechatronics (Mechanical Engineering)

Co-ordinators : Prof. Pushparaj Mani Pathak

Lecture 1 - Introduction

Lecture 2 - Mechatronics System Examples

Lecture 3 - Electric Circuits and Components

Lecture 4 - Semiconductor Electronics

Lecture 5 - pplication of Transistors

Lecture 6 - Sensors Performance Terminology

Lecture 7 - Displacement, Position and Proximity Sensors - I

Lecture 8 - Displacement, Position and Proximity Sensors - II

Lecture 9 - Force, Fluid Flow Sensors

Lecture 10 - Acceleration and Vibration Measurement Sensors

Lecture 11 - Mechanical Actuation Systems

Lecture 12 - Hydraulic and Pneumatic Actuators

Lecture 13 - Electrical Actuation Systems - I

Lecture 14 - Electrical Actuation Systems - II

Lecture 15 - Data Presentation Systems

Lecture 16 - Introduction to Signal Conditioning and Op-Amp

Lecture 17 - OP-AMP As Signal Conditioner

Lecture 18 - Analogue To Digital Converters

Lecture 19 - Digital To Analogue Converters

Lecture 20 - Artificial Intelligence

Lecture 21 - Digital Circuits - I

Lecture 22 - Digital Circuits - II

Lecture 23 - Microprocessor

Lecture 24 - Microcontroller

Lecture 25 - Microcontroller Programming Example

Lecture 26 - Mechanical System Model

Lecture 27 - Electrical System Model

Lecture 28 - Fluid System Model

Lecture 29 - Dynamic Response of Systems

Lecture 30 - Transfer Function and Frequency Response

Lecture 31 - Controllers

Lecture 32 - Digital Controllers

Lecture 33 - Program Logic Controllers

Lecture 34 - Input, output and Communication systems

Lecture 35 - Fault Finding

Lecture 36 - Project using Microcontroller - ATMEGA16

Lecture 37 - Myoelectrically Controlled Robotic Arm

Lecture 38 - ABU Robocon 2019 - Part I

Lecture 39 - ABU Robocon 2019 - Part II

Lecture 40 - Design of a Legged Robot

NPTEL : NOC:Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Anjani Kumar Tiwari

Lecture 1 - Course outline

Lecture 2 - Vectorial representation of forces and moments

Lecture 3 - Couple moment and reduction of a force system to a force and a couple

Lecture 4 - Examples of couple moment

Lecture 5 - Examples: moment in three dimensions

Lecture 6 - Free body diagram and support reactions

Lecture 7 - Equilibrium of rigid bodies in two and three dimensions

Lecture 8 - Examples: Equilibrium of rigid bodies in two dimensions

Lecture 9 - Examples: Equilibrium of rigid bodies in three dimensions

Lecture 10 - Examples: Beams and distributed loads

Lecture 11 - Flexible Cable

Lecture 12 - Flexible Cable, Catenary curve

Lecture 13 - Examples: Parabolic and Catenary cables

Lecture 14 - Flexible Cable: Concentrated load

Lecture 15 - Structures: Plane Trusses

Lecture 16 - Analysis of trusses: Method of joints

Lecture 17 - Analysis of trusses: Method of sections

Lecture 18 - Shear force and bending moment

Lecture 19 - Shear force and bending moment: distributed load

Lecture 20 - Principle of virtual work

Lecture 21 - Principle of virtual work: examples - I

Lecture 22 - Principle of virtual work: examples - II

Lecture 23 - Stable and unstable equilibrium

Lecture 24 - Friction

Lecture 25 - Friction: examples

Lecture 26 - Rope and belt friction

Lecture 27 - Rope and belt friction: examples

Lecture 28 - Rolling resistance

Lecture 29 - Revision: static

Lecture 30 - Coordinate systems: Cartesian and planar polar coordinates

Lecture 31 - Coordinate systems: spherical coordinates

Lecture 32 - Coordinate systems: cylindrical coordinates

Lecture 33 - Cartesian and planar polar coordinates: examples

Lecture 34 - Spherical and cylindrical coordinates: examples

Lecture 35 - Equation of motion in different coordinate systems

Lecture 36 - Equation of motion: examples

Lecture 37 - Work energy method

Lecture 38 - Work energy method: examples

Lecture 39 - Impulse momentum relation

Lecture 40 - Variable mass

Lecture 41 - Direct central impact

Lecture 42 - Oblique central impact

Lecture 43 - Moment of inertia

Lecture 44 - Moment of inertia: examples

Lecture 45 - Moment of inertia of composite bodies

Lecture 46 - Product of inertia and principal axes of inertia

Lecture 47 - Principal axes of inertia: examples - I

Lecture 48 - Principal axes of inertia: examples - II

Lecture 49 - Harmonic oscillator: simple harmonic motion

Lecture 50 - Simple harmonic motion: examples

Lecture 51 - Damped harmonic oscillator

Lecture 52 - Translation and rotation of rigid bodies

Lecture 53 - Translation and rotation of rigid bodies: examples

Lecture 54 - Plane motion of a rigid body

Lecture 55 - Plane motion of a rigid body: work energy equation

Lecture 56 - Plane motion of a rigid body: impulse-momentum equation

Lecture 57 - Three-dimensional dynamics of rigid bodies: angular momentum

Lecture 58 - Eulerâ€™s equations of motion

Lecture 59 - Eulerâ€™s equations of motion: examples

Lecture 60 - Revision: Dynamics

NPTEL : Micro and Smart Systems (Mechanical Engineering)

Co-ordinators : Dr. K.J. Vinoy, Prof. S. Gopalakrishnan, Prof. K.N. Bhat, Prof. G.K. Anathasuresh

Lecture 1 - Glimpses of Microsystems: Scaling Effects

Lecture 2 - Smart Materials and Systems

Lecture 3 - Microsensors

Lecture 4 - Microactuators

Lecture 5 - Microsystems: some Examples

Lecture 6 - Smart systems Application and Structural Health Monitoring

Lecture 7 - Microfabrication Technologies

Lecture 8 - Thin-film Materials and their Deposition

Lecture 9 - Approaches for Pattern Transfer

Lecture 10 - Surface Micromachining of Microstructures

Lecture 11 - Bulk Micromachining of Microsystems

Lecture 12 - Extended Approaches for Working Microsystems

Lecture 13 - Non-conventional Approaches for Microsystems

Lecture 14 - Packaging of Microsystems

Lecture 15 - Deformation Strains and Stresses

Lecture 16 - Microdevice Suspensions: Lumped Modeling

Lecture 17 - Residual Stress and Stress Gradients

Lecture 18 - Torsion and Twist

Lecture 19 - Vibrations of Microsystems Devices: Part-1

Lecture 20 - Vibrations of Microsystems Devices: Part-2 Micromachined Gyroscopes: Part-1

Lecture 21 - Micromachined Gyroscopes: Part-2 Modelling of Coupled Electrostatic Microsystems: Part-1

Lecture 22 - Modelling of Coupled Electrostatic Microsystems: Part-2

Lecture 23 - Coupled Electrothermal-elastic Modelling

Lecture 24 - Modelling of Microsystems: Scaling Effects

Lecture 25 - Finite Element Method and Microsystems

Lecture 26 - Theoretical Basis for the Finite Element Method

Lecture 27 - Energy Theorems and Weak Form of the Governing Equation

Lecture 28 - Finite Element Equation Development and Shape Functions

Lecture 29 - Isoparametric FE Formulation and some Examples

Lecture 30 - Finite Element for Structures with Piezoelectric Materials

Lecture 31 - Semiconductor Device Physics

Lecture 32 - BJT and MOSFET Characteristics and Op-Amps

Lecture 33 - Op-Amp Circuits and Signal conditioning for Microsystems Devices

Lecture 34 - Control and Microsystems

Lecture 35 - Vibration Control of a Beam

Lecture 36 - Signal Conditioning Circuits and Integration of Microsystems and Microelectronics

Lecture 37 - Pressure Sensor Design Concepts, Processing, and Packaging: Part-1

Lecture 38 - Pressure Sensor Design Concepts, Processing, and Packaging: Part-2

Lecture 39 - Pressure Sensor Design Concepts, Processing, and Packaging: Part-3 Capacitive Micro-accelerometer: Part-1

Lecture 40 - Capacitive Micro-accelerometer: Part-2

NPTEL : NOC:Variational Methods in Mechanics (Mechanical Engineering)

Co-ordinators : Prof. G.K. Anathasuresh

Lecture 1 - Classification of optimization problems and the place of Calculus of Variations in it - Part I

Lecture 2 - Classification of optimization problems and the place of Calculus of Variations in it - Part II

Lecture 3 - Genesis of Calculus of Variations - Part I

Lecture 4 - Genesis of Calculus of Variations - Part II

Lecture 5 - Formulation of Calculus of Variations problems in geometry and mechanics and design - Part I

Lecture 6 - Formulation of Calculus of Variations problems in geometry and mechanics and design - Part II

Lecture 7 - Unconstrained minimization in one and many variables - Part I

Lecture 8 - Unconstrained minimization in one and many variables - Part II

Lecture 9 - Constrained minimization KKT conditions - Part I

Lecture 10 - Constrained minimization KKT conditions - Part II

Lecture 11 - Sufficient conditions for constrained minimization - Part I

Lecture 12 - Sufficient conditions for constrained minimization - Part II

Lecture 13 - Mathematical preliminaries function, functional, metrics and metric space, norm and vector spaces - Part I

Lecture 14 - Mathematical preliminaries function, functional, metrics and metric space, norm and vector spaces - Part II

Lecture 15 - Function spaces and Gateaux variation

Lecture 16 - First variation of a functional Freche?t differential and variational derivative

Lecture 17 - Fundamental lemma of calculus of variations and Euler Lagrange equations - Part I

Lecture 18 - Fundamental lemma of calculus of variations and Euler Lagrange equations - Part II

Lecture 19 - Extension of Euler-Lagrange equations to multiple derivatives

Lecture 20 - Extension of Euler-Lagrange equations to multiple functions in a functional

Lecture 21 - Global Constraints in calculus of variations - Part I

Lecture 22 - Global Constraints in calculus of variations - Part II

Lecture 23 - Local (finite subsidiary) constrains in calculus of variations - Part I

Lecture 24 - Local (finite subsidiary) constrains in calculus of variations - Part II

Lecture 25 - Size optimization of a bar for maximum stiffness for given volume - Part I

Lecture 26 - Size optimization of a bar for maximum stiffness for given volume - Part II

Lecture 27 - Size optimization of a bar for maximum stiffness for given volume - Part III

Lecture 28 - Calculus of variations in functionals involving two and three independent variables - Part I

Lecture 29 - Calculus of variations in functionals involving two and three independent variables - Part II

Lecture 30 - General variation of a functional, transversality conditions. Broken extremals, Wierstrass-Erdmann corner conditions - Part I

Lecture 31 - General variation of a functional, transversality conditions. Broken extremals, Wierstrass-Erdmann corner conditions - Part II

Lecture 32 - Variational (energy) methods in statics; principles of minimum potential energy and virtual work

Lecture 33 - General framework of optimal structural designs - Part I

Lecture 34 - General framework of optimal structural designs - Part II

Lecture 35 - Optimal structural design of bars and beams using the optimality criteria method

Lecture 36 - Invariants of Euler-Lagrange equations and canonical forms

Lecture 37 - NoetherÂ's theorem

Lecture 38 - Minimum characterization of Sturm-Liouville problems

Lecture 39 - Rayleigh quotient for natural frequencies and mode shapes of elastic systems

Lecture 40 - Stability analysis and buckling using calculus of variations

Lecture 41 - Strongest (most stable) column

Lecture 42 - Dynamic compliance optimization

Lecture 43 - Electro-thermal-elastic structural optimization

Lecture 44 - Formulating the extremization problem starting from the differential equation, self-adjointness of the differential operator, and methods to deal with conservative and dissipative system

NPTEL : NOC:Compliant Mechanisms: Principles and Design (Mechanical Engineering)

Co-ordinators : Prof. G. K. Ananthasuresh

Lecture 1 - Overview

Lecture 2 - Spirit of compliant design

Lecture 3 - A glimpse of applications

Lecture 4 - Mobility and degrees of freedom in compliant mechanisms

Lecture 5 - MaxwellÂ's rule and GrÃ¼blerÂ's formula

Lecture 6 - Using compatibility and force equilibrium matrices to identify degrees of freedom and states of self-stress in trusses

Lecture 7 - Empirical formula for flexure joints

Lecture 8 - Types of elastic pairs (flexures)

Lecture 9 - Linear finite element analysis of compliant mechanisms with beam elements

Lecture 10 - A compliant mechanism kit

Lecture 11 - Linear and nonlinear finite element analyses using continuum elements

Lecture 12 - Subtleties in finite element analysis: geometric nonlinearity and contact

Lecture 13 - Deformation of a cantilever under a tip-load, using elliptic integrals

Lecture 14 - Elliptic integrals and their use in elastica analysis

Lecture 15 - Frisch-FayÂ's approach to large deformation of beam

Lecture 16 - Burns-CrossleyÂ's kinematic model

Lecture 17 - Howell-MidhaÂ's elastic model

Lecture 18 - Putting together the pseudo rigid-body model

Lecture 19 - Modeling a partially compliant mechanism

Lecture 20 - Kinematic coefficients of a four-bar linkage with and without springs

Lecture 21 - Solving equations of PRB modeling and comparing with finite element analysis

Lecture 22 - Loop-closure equations for PRB models of compliant mechanisms

Lecture 23 - Burmester theory for compliant mechanisms

Lecture 24 - PRB-based Synthesis Examples

Lecture 25 - Structural optimization approach

Lecture 26 - Early works on design for compliance

Lecture 27 - Design for deflection of trusses

Lecture 28 - Design for deflection of beams and frames

Lecture 29 - Design of elastic continua for desired deflection

Lecture 30 - Continuum element-based topology optimization of compliant mechanisms

Lecture 31 - YinSyn; synthesis of nonlinear responses with compliant mechanisms

Lecture 32 - Five different formulations for compliant mechanism design and some benchmark problems

Lecture 33 - Distributed compliance

Lecture 34 - How to achieve distributed compliance

Lecture 35 - Shape optimization

Lecture 36 - Cam-flexure clamp-case-study

Lecture 37 - SL model for compliant mechanisms

Lecture 38 - Feasibility maps for compliant mechanisms

Lecture 39 - Selection of compliant mechanisms for given user-specifications

Lecture 40 - Two case-studies using feasibility maps technique

Lecture 41 - SML model for compliant mechanisms for dynamic response

Lecture 42 - Re-design of compliant mechanisms; Matlab and Java codes

Lecture 43 - Non-dimensional analysis of beams

Lecture 44 - Deformation index and slenderness ratio of compliant mechanisms

Lecture 45 - Kinetoelastostatic maps

Lecture 46 - Designing with kinetoelastic maps

Lecture 47 - Non-dimensinalization of stress, frequency, and other measures

Lecture 48 - Designing compliant suspensions using kinetoelastic maps

Lecture 49 - Instant centre method for designing compliant mechanisms

Lecture 50 - Stiffness and compliance ellipsoids

Lecture 51 - Building block method of designing compliant mechanisms

Lecture 52 - Comparative analysis of different methods for designing compliant mechanisms

Lecture 53 - Aspects of Mechanical advantage of compliant mechanisms

Lecture 54 - Mechanical advantage of rigid-body and compliant mechanisms

Lecture 55 - Bistability in elastic systems

Lecture 56 - Analysis of bistable arches

Lecture 57 - Compliant mechanisms with bistable arches

Lecture 58 - Static balancing and zero-free-length springs

Lecture 59 - Static balance of a compliant mechanism using a linkage

Lecture 60 - Static balancing method for compliant mechanisms

Lecture 61 - A catalogue of compliant mechanisms

Lecture 62 - Compliant suspension mechanism in microsystems (MEMS)

Lecture 63 - Micromechanical signal processors using compliant mechanisms

Lecture 64 - A few special concepts of compliant mechanisms

Lecture 65 - Materials and prototyping of compliant mechanisms

Lecture 66 - Summary of the course

Lecture 67 - Micromachined accelerometers with Displacement-amplifying Compliant Mechanisms (DaCMs)

Lecture 68 - Miniature compliant mechanisms as cell-manipulation tools

Lecture 69 - Micro-newton force sensor

Lecture 70 - Compliant tissue cutting mechanism

Lecture 71 - A compliant pipe-crawling robots

Lecture 72 - A compliant easy-chair for the elderly

NPTEL : NOC:Heat Transfer and Combustion in Multiphase Systems (Mechanical Engineering)

Co-ordinators : Prof. Saptarshi Basu

Lecture 1 - Introduction to Multiphase

Lecture 2 - Thermodynamics of Multiphase systems

Lecture 3 - Thermodynamics of Interface - I

Lecture 4 - Thermodynamics of Interface - II

Lecture 5 - Interfacial phenomena key concepts - I

Lecture 6 - Interfacial phenomena key concepts - II

Lecture 7 - Interfacial heat and mass transfer - I - Interfacial mass, momentum and energy balance, Surface tension, WettingL07

Lecture 8 - Interfacial heat and mass transfer - II - Interfacial dynamics, Instabilities of the interface

Lecture 9 - Interfacial heat and mass transfer - III - Evaporation from thin films

Lecture 10 - Governing equations and interfacial conditions

Lecture 11 - Governing equations : Averaging techniques - I

Lecture 12 - Governing equations : Averaging techniques - II

Lecture 13 - Governing equations : Averaging techniques - III

Lecture 14 - Interface shapes

Lecture 15 - Transport processes at interface with key concepts - I

Lecture 16 - Transport processes at interface with key concepts - II

Lecture 17 - Interfacial transport

Lecture 18 - Interfacial transport including dynamic behavior

Lecture 19 - Interface behavior

Lecture 20 - Heat transfer and evaporation in droplets

Lecture 21 - Droplet vaporization models - I

Lecture 22 - Droplet vaporization models - II

Lecture 23 - Droplet vaporization dynamics - I

Lecture 24 - Droplet vaporization dynamics - II

Lecture 25 - Droplet liquid phase transport

Lecture 26 - Comprehensive droplet vaporization model and correlations - I

Lecture 27 - Comprehensive droplet vaporization model and correlations - II

Lecture 28 - Comparison of droplet vaporization models

Lecture 29 - Species transport in droplet

Lecture 30 - Heat transfer and transport processes in sessile droplets

Lecture 31 - Introduction to atomization

Lecture 32 - Atomization principles and governing parameters

Lecture 33 - Spray / droplet breakup models Â– I (TAB model)

Lecture 34 - Spray / droplet breakup models Â– II (WAVE model)

Lecture 35 - Droplet combustion - I

Lecture 36 - Droplet combustion - II

Lecture 37 - Regimes in spray combustion

Lecture 38 - Boiling - I

Lecture 39 - Boiling - II (Bubble dynamics)

Lecture 40 - Boiling - II (Bubble dynamics and critical heat flux)

NPTEL : NOC:Convective Heat Transfer (2018) (Mechanical Engineering)

Co-ordinators : Prof. Saptarshi Basu

Lecture 1 - Introduction to convective heat transfer

Lecture 2 - Governing equations I - Momentum Conservation

Lecture 3 - Governing equations II - Energy Conservation

Lecture 4 - Introduction to external forced convection

Lecture 5 - Scaling Analysis - Momentum

Lecture 6 - Scaling Analysis - Energy I

Lecture 7 - Scaling Analysis - Energy II

Lecture 8 - Similarity solution - Momentum

Lecture 9 - Similarity solution - Energy

Lecture 10 - Integral solutions - Momentum

Lecture 11 - Integral solutions - Energy

Lecture 12 - Suction and Blowing

Lecture 13 - Falkner-Skan solution

Lecture 14 - Arbitrary Wall temperature

Lecture 15 - Internal forced convection - Developing flow

Lecture 16 - Hydrodynamic fully developed flow

Lecture 17 - Mean temperature in fully developed flow

Lecture 18 - Uniform heat flux

Lecture 19 - Uniform wall temperature

Lecture 20 - Tube surrounded by isothermal flow

Lecture 21 - Heat transfer to fully developed flow - I

Lecture 22 - Heat transfer to fully developed flow - II

Lecture 23 - Laminar slug flow

Lecture 24 - Power law fluids

Lecture 25 - Forced convection - Tutorial I

Lecture 26 - Forced convection - Tutorial II

Lecture 27 - Forced convection - Tutorial III

Lecture 28 - Introduction to external natural convection

Lecture 29 - Scaling analysis - I

Lecture 30 - Scaling analysis - II

Lecture 31 - Integral solution

Lecture 32 - Similarity solution

Lecture 33 - Uniform wall heat flux

Lecture 34 - Thermal stratification

Lecture 35 - Mixed convection

Lecture 36 - Internal natural convection - Scaling analysis

Lecture 37 - Heat transfer regimes

Lecture 38 - Regime III

Lecture 39 - Regime IV - Shallow enclosure limit - I

Lecture 40 - Regime IV - Shallow enclosure limit - II

Lecture 41 - Partially divided enclosures

Lecture 42 - Inclined enclosures

Lecture 43 - Natural convection - Tutorial I

Lecture 44 - Natural convection - Tutorial II

Lecture 45 - Introduction to Turbulence

Lecture 46 - Reynoldâ€™s Averaged Navier Stokes equation - I

Lecture 47 - Reynoldâ€™s Averaged Navier Stokes equation - II

Lecture 48 - Turbulent boundary layer - Viscous sub layer

Lecture 49 - Turbulent boundary layer - Fully turbulent sub layer

Lecture 50 - Heat transfer in turbulent boundary layer

Lecture 51 - Turbulent internal flow - I

Lecture 52 - Turbulent internal flow - II

Lecture 53 - Turbulent internal flow - III

Lecture 54 - K - Îµ model

Lecture 55 - Turbulence - Tutorial

Lecture 56 - Experimental techniques - Thermochromic liquid crystals

Lecture 57 - Experimental techniques - IR thermography

Lecture 58 - Droplet evaporation - Sessile I

Lecture 59 - Droplet evaporation - Sessile II

Lecture 60 - Droplet evaporation - Contact free

NPTEL : NOC:A Short Lecture series on Contour Integration in the Complex Plane (Mechanical Engineering)

Co-ordinators : Prof. Venkata Sonti

Lecture 1 - Introduction to complex variables

Lecture 2 - Cauchy Riemann Equations

Lecture 3 - Analytic Functions

Lecture 4 - Simple definitions

Lecture 5 - Definition of sets, domains, theorem on antiderivative

Lecture 6 - Cauchy Gorsat Theorem

Lecture 7 - Implications of Cauchy Gorsat Theorem, Cauchy Integral Formula

Lecture 8 - Implications of CIF, converse of CG theorem

Lecture 9 - Examples in contour integrals, ratios of polynomials

Lecture 10 - Contour integration of sinc function

Lecture 11 - Method of path deformation

Lecture 12 - Method of path deformation (Continued...)

Lecture 13 - Infinite and finite branch cuts

Lecture 14 - Finite Branch Cut

Lecture 15 - Infinite branch cut example

Lecture 16 - Contour integration: rectangular contour

Lecture 17 - Finite square root branch cut

Lecture 18 - Example on finite branch cut

Lecture 19 - Pole on a branch cut

Lecture 20 - L shaped branch cut

Lecture 21 - L shaped branch cut continued

Lecture 22 - Inverse Laplace Transform

Lecture 23 - Inverse Laplace Transform (Continued...)

Lecture 24 - Additional material or corrections to lectures

Lecture 25 - Summary of the total course

NPTEL : NOC:Introduction to Soft Matter (Mechanical Engineering)

Co-ordinators : Prof. Aloke Kumar

Lecture 1 - Introduction

Lecture 2 - Deborah number

Lecture 3 - Response of Elastic solid

Lecture 4 - Response of Viscous fluid

Lecture 5 - Viscoelastic material

Lecture 6 - Creep and stress relaxation

Lecture 7 - Creep and stress relaxation functions

Lecture 8 - Linearity

Lecture 9 - Mechanical Analogues

Lecture 10 - Tutorial

Lecture 11 - Atoms and bonds

Lecture 12 - Interatomic bonds

Lecture 13 - Polymers

Lecture 14 - Polymers (Continued...)

Lecture 15 - Polymers (Continued...)

Lecture 16 - Freely jointed model

Lecture 17 - Constitutive equations

Lecture 18 - Constitutive equations (Continued...)

Lecture 19 - Constitutive equations (Continued...)

Lecture 20 - Viscoelastic effects

Lecture 21 - Lab Session

Lecture 22 - Polymer concentrations

Lecture 23 - Lagrangian and Eulerian perspectives

Lecture 24 - Maxwell model

Lecture 25 - Maxwell model (Continued...)

Lecture 26 - Kelvin-Meyer-Voigt model

Lecture 27 - Three parameter model

Lecture 28 - Three parameter model (Continued...)

Lecture 29 - Three parameter model (Continued...)

Lecture 30 - Jeffereyâ€™s model

Lecture 31 - Two Maxwell model

Lecture 32 - N-Maxwell model

Lecture 33 - N-Maxwell model (Continued...)

Lecture 34 - N-Kelvin Meyer Voigt model

Lecture 35 - Constitutive modelling

Lecture 36 - Objectivity

Lecture 37 - Objectivity

Lecture 38 - Sinusoidal oscillations

Lecture 39 - Sinusoidal oscillations (Continued...)

Lecture 40 - Sinusoidal oscillations (Continued...)

Lecture 41 - Summary

Lecture 42 - Tutorial

Lecture 43 - Tutorial (Continued...)

NPTEL : NOC:Robotics: Basics and Selected Advanced Concepts (Mechanical Engineering)

Co-ordinators : Prof. Ashitava Ghosal

Lecture 1 - Introduction, Types and Classification of Robots

Lecture 2 - Main Elements of a Robot

Lecture 3 - Modelling and Analysis of Robots

Lecture 4 - Mathematical Preliminaries, Homogeneous Transformations

Lecture 5 - Elements of robot - Joints, Elements of robots - Links

Lecture 6 - Examples of D-H parameters and Link transformation matrices

Lecture 7 - Introduction, Direct Kinematics of Serial Robots

Lecture 8 - Inverse Kinematics of Serial Robots

Lecture 9 - Inverse Kinematics of Serial Robots with n < 6, Inverse Kinematics of Serial Robots with n > 6

Lecture 10 - Elimination Theory and Solution of Non-linear Equations, Inverse Kinematics of a General 6R Robot

Lecture 11 - Introduction, Loop-closure Equations

Lecture 12 - Direct Kinematics of Parallel Manipulators

Lecture 13 - Mobility of Parallel Manipulators

Lecture 14 - Inverse Kinematics of Parallel Manipulators

Lecture 15 - Direct Kinematics of Stewart Platform Manipulators

Lecture 16 - Sun tracking using 3-DOF parallel manipulator

Lecture 17 - Stewart-Gough platform-based force-torque sensor

Lecture 18 - Vibration isolation using a Stewart-Gough platform

Lecture 19 - Introduction, Linear and Angular Velocity of Links

Lecture 20 - Serial Manipulator Jacobian Matrix

Lecture 21 - Parallel Manipulator Jacobian Matrix

Lecture 22 - Singularities in Serial and Parallel Manipulators

Lecture 23 - Statics of Serial and Parallel Manipulators

Lecture 24 - Hyper-redundant robots

Lecture 25 - Redundancy resolution in human arm

Lecture 26 - Flexible robots

Lecture 27 - Introduction, Lagrangian formulation

Lecture 28 - Examples of Equations of Motion

Lecture 29 - Inverse Dynamics and Simulation of Equations of Motion

Lecture 30 - Recursive Formulations of Dynamics of Manipulators

Lecture 31 - Motion planning

Lecture 32 - Control of a single link

Lecture 33 - Control of a multi-link serial manipulator

Lecture 34 - Control of a multi-link manipulator

Lecture 35 - Control of constrained and parallel manipulator, Cartesian control of serial manipulators

Lecture 36 - Force control of manipulators, Hybrid position/force control of manipulators

Lecture 37 - Advanced topics in non-linear control of manipulators

Lecture 38 - Wheeled Mobile Robots (WMR) on Flat Terrain

Lecture 39 - Wheeled Mobile Robots (WMR) on Uneven Terrain

Lecture 40 - Kinematics and Dynamics of WMR on Uneven Terrain

Lecture 41 - Over-Constrained Mechanism and Deployable Structures

Lecture 42 - Kinematic and Static Analysis

NPTEL : NOC:Sound and Structural Vibration (Mechanical Engineering)

Co-ordinators : Prof. Venkata R. Sonti

Lecture 1 - The longitudinal wave in vibrating spring

Lecture 2 - Harmonically excited systems

Lecture 3 - The concept of coincidence frequency

Lecture 4 - A classical problem in sound-structure interaction

Lecture 5 - Classical problem (Continued...)

Lecture 6 - Uncoupled solution to the classical problem

Lecture 7 - Uncoupled solution (Continued...).

Lecture 8 - Introduction to the coupled problem.

Lecture 9 - The coupled roots

Lecture 10 - Physical meaning of terms

Lecture 11 - Derivation of coupled roots using asymptotic method

Lecture 12 - Coupled roots derivation (Continued...)

Lecture 13 - Regions of heavy and light fluid loading

Lecture 14 - Light and heavy fluid loading (Continued...)

Lecture 15 - The coupled vibration field

Lecture 16 - The coupled acoustic field and stationary phase

Lecture 17 - The 2-D structural-acoustic waveguide

Lecture 18 - The coupled partial differential equations

Lecture 19 - Derivation of the coupled dispersion equation

Lecture 20 - A schematic of coupled waves

Lecture 21 - Derivation of coupled waves using asymptotic method

Lecture 22 - Asymptotic method (Continued...) and Maple demo

Lecture 23 - Physics of the coupled waves

Lecture 24 - Critical points

Lecture 25 - Heavy fluid loading

Lecture 26 - Summary of the rectangular waveguide

Lecture 27 - Impedance and mobility

Lecture 28 - Derivation of acoustic and vibration response

Lecture 29 - Derivation of vibro-acoustic response (Continued...)

Lecture 30 - Derivation of vibro-acoustic response (Continued...)

Lecture 31 - Numerical example

Lecture 32 - Coupled resonance analysis using matrices

Lecture 33 - Coupled resonance analysis (Continued...)

Lecture 34 - Sound radiation from a baffled panel

Lecture 35 - Derivation of pressure response.

Lecture 36 - Radiation efficiency

Lecture 37 - Physics of volume velocity cancellation

Lecture 38 - Derivations in the frequency domain: 1-D

Lecture 39 - Physics of the vibration spectrum in 2-D

Lecture 40 - Modal character across the frequency range

Lecture 41 - Simultaneous radiation from several modes

Lecture 42 - Panel radiation model using monopoles

Lecture 43 - Physics of panel radiation using monopole model

Lecture 44 - Physics of panel radiation using monopole model (Cointinued...)

Lecture 45 - Radiation resistance derivation from Maidanikâ€™s work (Continued...)

Lecture 46 - Radiation resistance derivation from Maidanikâ€™s work (Continued...)

Lecture 47 - Radiation resistance derivation from Maidanikâ€™s work (Continued...)

Lecture 48 - Modal average radiation efficiency

Lecture 49 - Modal average radiation efficiency (Cointinued...)

Lecture 50 - Transmission of sound through a rigid panel with flexible mounts

Lecture 51 - Frequency dependence of sound transmission

Lecture 52 - Sound transmission through a flexible partition

Lecture 53 - Transmission loss in different situations

Lecture 54 - Cylindrical shell vibration

Lecture 55 - Behavior of uncoupled shell waves

Lecture 56 - Fluid waves in rigid-walled cylindrical shells

Lecture 57 - Wave propagation characteristics in flexible cylindrical shells carrying fluid: Fullers paper

Lecture 58 - Wave impedance of an infinite plate: fluid loading

Lecture 59 - Fluid loading in a finite plate

Lecture 60 - Summary of the entire course

NPTEL : NOC:Vibrations of Plates and Shells (Mechanical Engineering)

Co-ordinators : Prof. Venkata R. Sonti

Lecture 1 - Introduction to differential geometry

Lecture 2 - Properties of surfaces: First fundamental form

Lecture 3 - Properties of surfaces: Second fundamental form

Lecture 4 - Surfaces of revolution

Lecture 5 - Gauss Codazzi relations

Lecture 6 - Gauss Codazzi (Continued...)

Lecture 7 - Differential element length in a thin shell

Lecture 8 - Strain of a differential element

Lecture 9 - Explicit strain expressions

Lecture 10 - Love simplifications and inconsistencies Of the theory

Lecture 11 - Euler Bernoulli Beam equation using the Hamilton's Law

Lecture 12 - Euler Bernoulli Beam and Hamilton's Law (Continued...)

Lecture 13 - Beta definition, force and moment resultants

Lecture 14 - Hamilton's Law for a general shell

Lecture 15 - The Hamilton's law (Continued...)

Lecture 16 - Final Dynamical Equations and boundary conditions

Lecture 17 - Physics of each term in the dynamic equations

Lecture 18 - Physics of each term (Continued...)

Lecture 19 - The sixth equation of motion

Lecture 20 - The sixth equation of motion (Continued...)

Lecture 21 - Equations of motion for a rectangular plate using Hamilton's law

Lecture 22 - Equations of motion for a rectangular Plate (Continued...)

Lecture 23 - Rectangular plate boundary conditions

Lecture 24 - Rectangular plate equation using force balance

Lecture 25 - Modeshapes and resonances of a vibrating beam

Lecture 26 - Modeshapes and resonances of a vibrating Rectangular plate

Lecture 27 - Modeshapes and resonances of a vibrating Circular plate

Lecture 28 - Vibrating circular plate (Continued...)

Lecture 29 - Modeshapes and resonances of a vibrating Circular ring

Lecture 30 - Details of vibrating rings

Lecture 31 - Insights into vibrations of ring

Lecture 32 - Cylindrical shell equations of motion using Force balance

Lecture 33 - Cylindrical shell: Transverse equation of motion

Lecture 34 - Orthogonality of modeshapes

Lecture 35 - Orthogonality of Modes (Continued...)

Lecture 36 - The Rayleigh Quotient

Lecture 37 - Rayleigh Quotient Example: Simply-supported beam

Lecture 38 - The Rayleigh Ritz method

Lecture 39 - The Rayleigh Ritz method applied to a Complicated system

Lecture 40 - The Lagrange Multiplier method

Lecture 41 - The penalty method

Lecture 42 - Orthogonal polynomials of RB Bhat

Lecture 43 - Rayleigh Ritz paper by RB Bhat

Lecture 44 - Numerical examples of the Rayleigh Ritz method

Lecture 45 - Numerical examples of Rayleigh Ritz method And animations

Lecture 46 - Raylegh Ritz applied to curved structures

Lecture 47 - Forced response of plates and shells

Lecture 48 - Forced response (Continued...)

Lecture 49 - Simply-supported plate response to various forces

Lecture 50 - Simply-supported plate response to various Forces (Continued...)

Lecture 51 - Simply-supported cylindrical shell response to a Point harmonic force

Lecture 52 - Cylindrical shell response (Continued...)

Lecture 53 - Cylindrical shell response (Continued...)

Lecture 54 - Cylindrical shell response to a traveling load using Only transverse modes

Lecture 55 - The Receptance method

Lecture 56 - The receptance method (Continued...)

Lecture 57 - Stiffening a cylindrical shell using rings

Lecture 58 - Stiffening of a cylindrical shell (Continued...)

Lecture 59 - Damping in structures

Lecture 60 - Loss factor and Complex Young modulus

NPTEL : NOC:Dynamics and Control of Mechanical Systems (Mechanical Engineering)

Co-ordinators : Prof. Ashitava Ghosal

Lecture 1 - Introduction to Course

Lecture 2 - Position and Orientation of a Rigid Body

Lecture 3 - Homogenous Transformation

Lecture 4 - Linear and angular velocity of rigid body

Lecture 5 - Motion of Rigid Body and Particles

Lecture 6 - Introduction to multi-body systems

Lecture 7 - Joints, Degrees of Freedom and Constraints

Lecture 8 - Position, Velocity and Acceleration in Multi-body Systems

Lecture 9 - Mass and Inertia of a Rigid Body

Lecture 10 - External forces and moments

Lecture 11 - Angular momentum, Spinning tops and Gyroscopes

Lecture 12 - Free-body diagram and Equations of motion

Lecture 13 - Newton-Euler Formulation for Serial Chains

Lecture 14 - Lagrangian Formulation

Lecture 15 - Examples of Equations of Motion

Lecture 16 - Equations of Motion Using Computer Tools

Lecture 17 - Introduction and Examples of equations of motion

Lecture 18 - Inverse dynamics and Simulations of equations Of motion

Lecture 19 - Simulation using Computer Tools

Lecture 20 - Introduction and Goal of control

Lecture 21 - State Space Formulation

Lecture 22 - Solution of State Equations

Lecture 23 - Stability of Dynamical Systems

Lecture 24 - Controllability and Observability of Linear Systems

Lecture 25 - Examples of Controllability and Observability

Lecture 26 - Introduction to Classical Control

Lecture 27 - Root Locus

Lecture 28 - Frequency Domain Approach

Lecture 29 - PID Control

Lecture 30 - Root Locus based Controller Design

Lecture 31 - State Space Design

Lecture 32 - 3 Case Studies

NPTEL : NOC:Optical Methods for Solid and Fluid Mechanics (Mechanical Engineering)

Co-ordinators : Prof. Aloke Kumar, Prof. Koushik Viswanathan

Lecture 1 - Introduction

Lecture 2 - Mathematical Preliminaries - I

Lecture 3 - Tensors and Deformations

Lecture 4 - Lagrangian and Eulerian Perspectives

Lecture 5 - Mathematical Preliminaries - II

Lecture 6 - Image Processing Preliminaries

Lecture 7 - Image Processing Operations

Lecture 8 - Light Matter Interaction - I

Lecture 9 - Lab Demo I: Optical Microscope

Lecture 10 - Optical System: Lenses

Lecture 11 - Lab Demo II: Lenses and Camera

Lecture 12 - Light Matter Interaction - II (Lab Demostration)

Lecture 13 - Light Matter Interaction - II (Lab Demostration)

Lecture 14 - Tracer Particles for Flow Visualisation

Lecture 15 - Particle Tracking Velocimetry

Lecture 16 - Particle Image Velocimetry - I

Lecture 17 - Particle Image Velocimetry - II

Lecture 18 - Particle Image Velocimetry - III

Lecture 19 - Particle Image Velocimetry - IV

Lecture 20 - Particle Image Velocimetry - V

Lecture 21 - Particle Image Velocimetry - VI

Lecture 22 - Schlieren and Shadowgraphy

Lecture 23 - Lab Demo III: PIV and Schlieren

Lecture 24 - Introduction to optical methods for solids

Lecture 25 - Basics of Digital Image Correlation

Lecture 26 - Iterative implementation of DIC

Lecture 27 - Example implementations

Lecture 28 - How is a DIC experiment set up ?

Lecture 29 - DIY(C)!

Lecture 30 - Introduction to Photoelasticity

Lecture 31 - Why do we see fringes ?

Lecture 32 - How does light interact with matter ?

Lecture 33 - Origin of Birefringence

Lecture 34 - Loaded sample in a polarizer

Lecture 35 - Stress-induced birefringence

Lecture 36 - Analyses of optical paths using matrix methods

Lecture 37 - Putting it all together

Lecture 38 - What is tomography ?

Lecture 39 - Signal processing and Fourier methods

Lecture 40 - Rays and the Radon transforms

Lecture 41 - Geometric interpretations

Lecture 42 - The inverse problem: From Radon transform to 2D cross-section

Lecture 43 - Cone beams, parallel beams and the Feldkamp algorithm

NPTEL : NOC:Statistical Thermodynamics for Engineers (Mechanical Engineering)

Co-ordinators : Prof. Saptarshi Basu

Lecture 1 - Introduction to Statistical Thermodynamics

Lecture 2 - Basic Probability Theory and Statistics

Lecture 3 - Important Probability Distributions

Lecture 4 - Combinatorial Analysis for Statistical Thermodynamics

Lecture 5 - Basic Concepts

Lecture 6 - Macrostates and Microstates

Lecture 7 - Bose Einstein and Fermi Dirac Statistics

Lecture 8 - Entropy and the equilibrium particle distribution

Lecture 9 - Operator Theory - 1

Lecture 10 - Stirling Approximation and Lagrange Multipliers

Lecture 11 - Equilibrium particle distribution

Lecture 12 - The Dilute Limit and Concept of Molecular Partition Function

Lecture 13 - The Molecular Partition Function and its relationship with Classical Thermodynamics

Lecture 14 - Historical Survey of Quantum Mechanics

Lecture 15 - Operator Theory - 2

Lecture 16 - Operator Theory - 3

Lecture 17 - Bohr Model for the Spectrum of Atomic Hydrogen

Lecture 18 - Heuristic Introduction to the Schrodinger Equation

Lecture 19 - The postulates of Quantum Mechanics

Lecture 20 - The Steady State Schrodinger Equation: Single Particle Analysis

Lecture 21 - Coordinate System - 1

Lecture 22 - Coordinate System - 2

Lecture 23 - Coordinate System - 3

Lecture 24 - The Steady State Schrodinger Equation: Multiparticle analysis

Lecture 25 - The Particle in a Box

Lecture 26 - The Uncertainity Principle

Lecture 27 - The Pauli Exclusion and the Correspondence Principle

Lecture 28 - Problem Solving - 1

Lecture 29 - Problem Solving - 2

Lecture 30 - The Internal Motion for a two particle system

Lecture 31 - The rotational and vibrational energy mode for a diatomic molecule

Lecture 32 - Hermite polynomials as vibrational energy mode solution

Lecture 33 - Equivalent two body model of atomic hydrogen

Lecture 34 - The Electronic Energy Mode for Atomic Hydrogen

Lecture 35 - Problem Solving - 3

Lecture 36 - The four quantum numbers and multielectron systems

Lecture 37 - Spectroscopic term symbols for multielectron atoms

Lecture 38 - Electron energies for multielectron systems

Lecture 39 - Combined energy modes for atoms and diatomic molecules

Lecture 40 - Perturbation analysis of the Schrodinger Wave equation

Lecture 41 - Selection rules

Lecture 42 - The Rotational and vibrational spectroscopy

Lecture 43 - Ro-vibrational spectroscopy (Simplex model)

Lecture 44 - Rotation vibration coupling (Complex model)

Lecture 45 - Ro-vibrational spectroscopy (Complex model)

Lecture 46 - Ro-vibronic spectroscopy

Lecture 47 - Working with Spectroscopic Schemes, Notations and Term Symbols

Lecture 48 - From Particles to assembly - I

Lecture 49 - From Particles to assembly - II

Lecture 50 - Connecting Quantum Mechanics to Classical Mechanics

Lecture 51 - The Equipartition principle and ideal gas

Lecture 52 - Thermodynamic properties of ideal monoatomic and diatomic gas

Lecture 53 - The zero of energy (rotational and vibrational)

Lecture 54 - Specific heats, Internal energy through Vibrational and Ro-vibrational energy modes

Lecture 55 - The Ro-vibrational partition function and Introduction to intersction of Radiationand Matter

Lecture 56 - Absorption and Emission of Radiation

Lecture 57 - The Rabi frequency and Beer's Law

Lecture 58 - Insights into radiative spectral transitions

Lecture 59 - Theory of Absoprtion Spectroscopy

NPTEL : NOC:Fundamentals of Acoustics (2024) (Mechanical Engineering)

Co-ordinators : Prof. Venkata R. Sonti

Lecture 1 - The vibrating spring-mass-damper system

Lecture 2 - Power calculations in a vibrating spring-mass-damper system

Lecture 3 - Wave propagation on a string

Lecture 4 - Examples of waves on strings: finite and semi-infinite cases

Lecture 5 - General solution to 1-D wave equation: physical insights

Lecture 6 - Wave solution: real notation vs complex notation

Lecture 7 - The vibrating string with a general mechanical impedance

Lecture 8 - The forced finite string with an end mass

Lecture 9 - The one-D wave solution: physical insights

Lecture 10 - Longitudinal wave propagation in a rod

Lecture 11 - Forced semi-infinite and finite rods

Lecture 12 - The derivation of the acoustic wave equation

Lecture 13 - The derivation of the acoustic wave equation (Continued...)

Lecture 14 - The derivation of the acoustic wave equation (Continued...)

Lecture 15 - The derivation of the acoustic wave equation (Continued...)

Lecture 16 - Sound propagation in piston driven semi-infinite and finite ducts

Lecture 17 - Acoustics inside a piston driven finite duct with a general end impedance

Lecture 18 - Time averaged power in a 1-D acoustic wave

Lecture 19 - The Free Space Green Function in acoustics

Lecture 20 - The Free Space Green Function (Continued...)

Lecture 21 - Various Green Functions and their uses

Lecture 22 - Derivation of the interior Kirchhoff Helmholtz Integral Equation

Lecture 23 - Derivation of the exterior Kirchhoff Helmholtz Integral Equation

Lecture 24 - Acoustic wave equation in spherical coordinates

Lecture 25 - Legendre polynomials, spherical harmonics, orthogonality relations

Lecture 26 - Spherical harmonics, Legendre polynomials and their orthogonality relations (Continued...)

Lecture 27 - Interior Neumann Green function

Lecture 28 - Exterior Neumann and Dirichlet Green functions

Lecture 29 - Pulsating sphere using the exterior Neumann Green function

Lecture 30 - Equivalence of Neumann Green function and separation of variables solution

Lecture 31 - Sound from a pulsating sphere using boundary matching technique

Lecture 32 - Sound from a pulsating sphere using boundary matching technique (Continued...)

Lecture 33 - Sound radiation from a spherical cap on a rigid sphere using the Neumann Green function

Lecture 34 - Scattering of a plane acoustic wave from a rigid sphere

Lecture 35 - Example to show that the surface in the KHIE is notional (not actual)

Lecture 36 - The Rayleigh Integral

Lecture 37 - Sound field of an oscillating piston in a rigid baffle

Lecture 38 - Sound field of an oscillating piston in a rigid baffle (Continued...)

Lecture 39 - Physics of the sound field of an oscillating piston in a rigid baffle

Lecture 40 - Physics of the sound field of an oscillating piston in a rigid baffle (Continued...)

Lecture 41 - Physics of the sound field of the oscillating piston (cap) on a rigid sphere

Lecture 42 - The Sommerfeld radiation condition

Lecture 43 - Sound field inside a rigid walled box due to initial conditions

Lecture 44 - Sound field inside a rigid walled box due to a harmonic source

Lecture 45 - Sound field inside a rigid walled hollow cylinder due to initial conditions

Lecture 46 - Modeshape visualization inside a rigid walled cylinder

Lecture 47 - Sound field inside a rigid walled hollow cylinder due to initial conditions (Continued...)

Lecture 48 - Green function inside a rigid walled cylinder

Lecture 49 - Measures of sound

Lecture 50 - Measures of sound (Continued...)

Lecture 51 - Average mean square value of different frequency sinusoids

Lecture 52 - Frequency analysis of sounds in terms of third octave bands

Lecture 53 - Transient solution of the wave equation using Fourier series

Lecture 54 - Total soln of harmonically forced wave equation with initial conditions using Fourier series

Lecture 55 - Total soln of forced wave eqn with initial conditns using Laplace transform and Fourierseries

Lecture 56 - Branched systems, Helmholtz resonator

Lecture 57 - The radiation impedance and acoustic power

Lecture 58 - Acoustic potential, combined systems, special techniques for solving acoustic wave equation

Lecture 59 - Why do we take the real value of the solution in acoustic wave problems

Lecture 60 - Course summary - Part 1

Lecture 61 - Course summary - Part 2

NPTEL : NOC:Phase Field Modelling: The Materials Science, Mathematics and Computational Aspects (Metallurgy and Material Science)

Co-ordinators : Dr. M.P. Gururajan

Lecture 1 - Module 1 : Lecture 1 - Solution models

Lecture 2 - Module 1 : Lecture 2 - Summary of solution models

Lecture 3 - Module 1 : Lecture 3 - G vs X diagrams

Lecture 4 - Module 1 : Lecture 4 - Phase diagrams

Lecture 5 - Module 1 : Lecture 5 - Bond breaking model

Lecture 6 - Module 2 : Lecture 6 - Chemical potential

Lecture 7 - Module 1 : Tutorial 1

Lecture 8 - Module 1 : Tutorial 2

Lecture 9 - Module 1 : Tutorial 3

Lecture 10 - Module 1 : Tutorial 4

Lecture 11 - Module 1 : Tutorial 5

Lecture 12 - Module 2 : Tutorial 6

Lecture 13 - Module 2 : Lecture 7 - Diffusion and chemical potential

Lecture 14 - Module 2 : Lecture 8 - Fick's law

Lecture 15 - Module 2 : Lecture 9 - Failure of classical diffusion equation

Lecture 16 - Module 2 : Lecture 10 - Some references

Lecture 17 - Module 3 : Lecture 11 - Spinodal decomposition - some history

Lecture 18 - Module 3 : Lecture 12 - Spinodal decomposition

Lecture 19 - Module 3 : Lecture 13 - Stability

Lecture 20 - Module 3 : Lecture 14 - Thermodynamic property : composition dependence

Lecture 21 - Module 3 : Lecture 15 - Regions of stability

Lecture 22 - Module 3 : Lecture 16 - Understanding spinodal region

Lecture 23 - Module 2 : Tutorial 7

Lecture 24 - Module 4 : Lecture 17 - Solution to classical diffusion equation

Lecture 25 - Module 4 : Lecture 18 - Diffusion and mobility - I

Lecture 26 - Module 4 : Lecture 19 - Diffusion and mobility - II

Lecture 27 - Module 4 : Lecture 20 - Failure of classical diffusion equation

Lecture 28 - Module 4 : Lecture 21 - Non-classical diffusion equation

Lecture 29 - Module 5 : Lecture 22 - GNU Octave : Introduction

Lecture 30 - Module 5 : Lecture 23 - GNU Octave : interactive mode

Lecture 31 - Module 5 : Lecture 24 - GNU Octave : script mode

Lecture 32 - Module 6 : Lecture 25 - Ideal solution using octave

Lecture 33 - Module 6 : Lecture 26 - Regular solution using octave

Lecture 34 - Module 6 : Lecture 27 - Constructing phase diagram

Lecture 35 - Module 6 : Lecture 28 - Plotting spinodal

Lecture 36 - Module 7 : Lecture 29 - Non-dimensionalisation of diffusion equation

Lecture 37 - Module 7 : Lecture 30 - Diffusion and Fourier law of heat conduction

Lecture 38 - Module 8 : Lecture 31 - Diffusion equation : Analytical solution - I

Lecture 39 - Module 8 : Lecture 32 - Diffusion equation : Analytical solution - II

Lecture 40 - Module 8 : Lecture 33 - Diffusion equation : Error function solution - I

Lecture 41 - Module 8 : Lecture 34 - Diffusion equation: Error function solution - II

Lecture 42 - Module 9 : Lecture 35 - Diffusion equation : finite difference method

Lecture 43 - Module 9 : Lecture 36 - Diffusion equation : zero flux BC and explicit method

Lecture 44 - Module 9 : Lecture 37 - Diffusion equation : zero flux BC and implicit method

Lecture 45 - Module 9 : Lecture 38 - Diffusion equation : imposed concentration BC and explicit/implicit methods

Lecture 46 - Module 10 : Lecture 39 - Periodic boundary conditions (PBC)

Lecture 47 - Module 10 : Lecture 40 - Expicit method with PBC

Lecture 48 - Module 10 : Lecture 41 - Spectral Techniques - I

Lecture 49 - Module 10 : Lecture 42 - Spectral Techniques - II

Lecture 50 - Module 10 : Lecture 43 - Implicit spectral method

Lecture 51 - Module 11 : Lecture 44 - Scalars, vectors and tensors

Lecture 52 - Module 11 : Lecture 45 - Coordinate transformation

Lecture 53 - Module 11 : Lecture 46 - Transformation laws

Lecture 54 - Module 11 : Lecture 47 - II rank tensors and Neumann principle

Lecture 55 - Module 12 : Lecture 48 - Group theory

Lecture 56 - Module 12 : Lecture 49 - Crystal: symmetry elements - I

Lecture 57 - Module 12 : Lecture 50 - Crystal: symmetry elements - II

Lecture 58 - Module 12 : Lecture 51 - Understanding Neumann's principle

Lecture 59 - Module 12 : Lecture 52 - Representation quadric

Lecture 60 - Module 13 : Lecture 53 - Variational calculus

Lecture 61 - Module 13 : Lecture 54 - Optimization of functionals - I

Lecture 62 - Module 13 : Lecture 55 - Optimization of functionals - II

Lecture 63 - Module 13 : Lecture 56 - Variational derivative

Lecture 64 - Module 13 : Lecture 57 - Free energy functional

Lecture 65 - Module 14 : Lecture 58 - Derivation of Cahn-Hilliard (CH) equation - I

Lecture 66 - Module 14 : Lecture 59 - Derivation of Cahn-Hilliard (CH) equation - II

Lecture 67 - Module 14 : Lecture 60 - Free energy versus concentration curves

Lecture 68 - Module 14 : Lecture 61 - Diffusion equation versus CH

Lecture 69 - Module 15 : Lecture 62 - Numerical solution of CH: finite difference

Lecture 70 - Module 15 : Lecture 63 - Numerical solution of CH: spectral method

Lecture 71 - Module 16 : Lecture 64 - Interfacial energy in CH

Lecture 72 - Module 16 : Lecture 65 - CH: analytical solution

Lecture 73 - Module 16 : Lecture 66 - Interfacial energy in CH: analytical calculation

Lecture 74 - Module 16 : Lecture 67 - Interfacial energy: numerical versus analytical values

Lecture 75 - Module 17 : Lecture 68 - Order-disorder transition and Allen-Cahn equation

Lecture 76 - Module 17 : Lecture 69 - AC: numerical solution

Lecture 77 - Module 18 : Lecture 70 - Spinodal decomposition in 2D

Lecture 78 - Module 18 : Lecture 71 - Order-disorder transformation

Lecture 79 - Module 18 : Lecture 72 - Gibbs Thomson effect

Lecture 80 - Module 18 : Lecture 73 - Grain growth

Lecture 81 - Module 19 : Lecture 74 - Precipitate growth - I

Lecture 82 - Module 19 : Lecture 75 - Precipitate growth - II

Lecture 83 - Module 20 : Lecture 76 - Grain growth: Fan-Chen model - I

Lecture 84 - Module 20 : Lecture 77 - Grain growth: Fan-Chen model - II

Lecture 85 - Module 21 : Lecture 78 - Grain boundary grooving - I

Lecture 86 - Module 21 : Lecture 79 - Grain boundary grooving - II

Lecture 87 - Module 22 : Lecture 80 - Overview of phase field modelling

NPTEL : NOC:Dealing with Materials Data: Collection, Analysis and Interpretation (Metallurgy and Material Science)

Co-ordinators : Dr. M.P. Gururajan

Lecture 1 - Descriptive Statistics - I

Lecture 2 - Descriptive Statistics - II

Lecture 3 - Probability and Distribution

Lecture 4 - Random variable and Expectation - I

Lecture 5 - Random variable and Expectation - II

Lecture 6 - Random variable and Expectation - III

Lecture 7 - Random variable and Expectation - IV

Lecture 8 - Module: Introduction to R

Lecture 9 - R:Demos and getting help

Lecture 10 - R as calculator and plotter: Diffusivity, scaled temperatures

Lecture 11 - R as calculator and plotter: Diffraction, configurational entropy

Lecture 12 - Data in tabular form: Properties of elements

Lecture 13 - Tabular data in R: alternate methodology

Lecture 14 - Dataframe in R: Properties of elements

Lecture 15 - R libraries for plotting

Lecture 16 - Importing and plotting data

Lecture 17 - Property charts: Importing and plotting data

Lecture 18 - Introduction to R: Summary of the module

Lecture 19 - Descriptive statistics

Lecture 20 - Presenting experimental results: Data on conductivity of ETP copper

Lecture 21 - Property based reports, errors, significant digits

Lecture 22 - Dealing with distributions: Grain size data

Lecture 23 - Grain size data: Property and rank based reports

Lecture 24 - Case study: Grain size in a two phase steel

Lecture 25 - Grain size in a two phase steel: Descriptive statistics

Lecture 26 - Presenting experimental results: data with error bars

Lecture 27 - Errors and their propagation

Lecture 28 - Fitting experimental data to distributions

Lecture 29 - Combining uncertainties

Lecture 30 - Summary:Descriptive statistics

Lecture 31 - Special Random Variables - I

Lecture 32 - Special Random Variables - II

Lecture 33 - Special Random Variables - III

Lecture 34 - Special Random Variables - IV

Lecture 35 - Special Random Variables - V

Lecture 36 - Probabilty Plots

Lecture 37 - Probability distributions

Lecture 38 - Properties of probability distributions

Lecture 39 - Bernoulli trials and binomial distributions

Lecture 40 - Atom probe technique and negative binomial distribution

Lecture 41 - Atom probe and hypergeometric distribution

Lecture 42 - Atom probe: analysis of error

Lecture 43 - Nucleation and Poisson distribution

Lecture 44 - Normal distribution

Lecture 45 - Normal distribution and error function

Lecture 46 - Probability scale

Lecture 47 - Sampling Distribution - I

Lecture 48 - Sampling Distribution - II

Lecture 49 - Sampling Distribution - III

Lecture 50 - Parameter Estimation - I

Lecture 51 - Parameter Estimator - II

Lecture 52 - Parameter Estimator - III

Lecture 53 - Parameter Estimator - IV

Lecture 54 - Bayesian Estimation

Lecture 55 - Log normal distribution

Lecture 56 - Lorentz/Cauchy distribution

Lecture 57 - Lifetime and exponential distributions

Lecture 58 - Distributions from statistical mechanics

Lecture 59 - Uniform distribution and summary of probability distributions

Lecture 60 - Data processing: Introduction

Lecture 61 - Distribution function of a data series

Lecture 62 - Estimating mean and mean-square-deviation of data

Lecture 63 - Data with unequal weights

Lecture 64 - Robust estimates

Lecture 65 - From data to underlying distribution

Lecture 66 - Bootstrap method

Lecture 67 - Summary:Data processing

Lecture 68 - Hypothesis Testing - I

Lecture 69 - Hypothesis Testing - II

Lecture 70 - Hypothesis Testing - III

Lecture 71 - Hypothesis Testing - IV

Lecture 72 - Hypothesis Testing - V

Lecture 73 - Hypothesis Testing - VI

Lecture 74 - Graphical handling of data

Lecture 75 - Fitting and graphical handling of data: Introduction

Lecture 76 - Data transformable to linear

Lecture 77 - Data of known functional form

Lecture 78 - Calibration,Fitting, Hypotheses testing

Lecture 79 - Analysis of variance

Lecture 80 - Summary:Fittng and graphical handling of data

Lecture 81 - Regression Analysis - I

Lecture 82 - Regression Analysis - II

Lecture 83 - Regression Analysis - III

Lecture 84 - Regression Analysis - IV

Lecture 85 - Analysis of Variance - I

Lecture 86 - Analysis of Variance - II

Lecture 87 - Design of Experiment - I

Lecture 88 - Design of Experiment - II

Lecture 89 - Design of Experiment - III

Lecture 90 - Design of Experiment - IV

Lecture 91 - Summary of the course

Lecture 92 - Case studies: Introduction

Lecture 93 - Case study 1: Data smoothing - I

Lecture 94 - Case study 1: Data smoothing - II

Lecture 95 - Case study 2: Error analysis

Lecture 96 - Case study 3: Calibration

Lecture 97 - Case study 4: Design of experiment

Lecture 98 - Case study 5: Hypothesis testing

Lecture 99 - Course summary

NPTEL : NOC:Aqueous Corrosion and its Control (Metallurgy and Material Science)

Co-ordinators : Prof. V. S. Raja

Lecture 1 - Introduction to the course and corrosion implications

Lecture 2 - Can we predict if a metal corrodes? - Part I

Lecture 3 - Can we predict if a metal corrodes? - Part II

Lecture 4 - Can we calculate the rate of corrosion: Electrochemical kinetics - Tafel relation?

Lecture 5 - Can we calculate the rate of corrosion: Electrochemical kinetics - diffusion and mixed potential theory?

Lecture 6 - Can we calculate the corrosion rate of metals: Mixed potential theory and passivity?

Lecture 7 - Passivity (Continued...)

Lecture 8 - DC polarisation experiments and their relation to mixed potential theory/Evans diagram

Lecture 9 - Pourbaix diagram and electrochemical corrosion

Lecture 10 - Forms of corrosion: Uniform v/s localised corrosion

Lecture 11 - Forms of corrosion: Factors affecting uniform corrosion

Lecture 12 - Forms of corrosion: Preventive measures for uniform corrosion - Part I

Lecture 13 - Forms of corrosion: Preventive measures for uniform corrosion - Part II

Lecture 14 - Forms of corrosion: Galvanic or dissimilar metal corrosion - Part I

Lecture 15 - Forms of corrosion: Galvanic or dissimilar metal corrosion - Part II

Lecture 16 - Forms of corrosion: Galvanic or dissimilar metal corrosion - Part III

Lecture 17 - Forms of corrosion: Crevice corrosion - Part I

Lecture 18 - Forms of corrosion: Crevice corrosion - Part II

Lecture 19 - Forms of corrosion: Pitting corrosion - Part I

Lecture 20 - Forms of corrosion: Pitting corrosion - Part II

Lecture 21 - Forms of corrosion: Intergranular corrosion - Part I

Lecture 22 - Forms of corrosion: Intergranular corrosion - Part II

Lecture 23 - Forms of corrosion: Intergranular corrosion - Part III

Lecture 24 - Forms of corrosion: Intergranular corrosion - Part IV

Lecture 25 - Forms of corrosion: Selective leaching or dealloying

Lecture 26 - Forms of corrosion: Flow assisted corrosion and erosion corrosion - Part I

Lecture 27 - Forms of corrosion: Erosion corrosion - Part II

Lecture 28 - Forms of corrosion: Fretting corrosion

Lecture 29 - Forms of corrosion: Stress corrosion cracking - Part I

Lecture 30 - Forms of corrosion: Stress corrosion cracking - Part II

Lecture 31 - Forms of corrosion: Stress corrosion cracking - Part III

Lecture 32 - Forms of corrosion: Hydrogen damage

Lecture 33 - Forms of corrosion: Microbial corrosion

Lecture 34 - Effective corrosion management

NPTEL : NOC:Cathodic Protection Engineering (Metallurgy and Material Science)

Co-ordinators : Prof. V.S. Raja

Lecture 1 - Introduction to the course and understanding corrosion

Lecture 2 - External corrosion of pipelines

Lecture 3 - Electrochemical principles

Lecture 4 - Criteria

Lecture 5 - Assessment of pipeline condition through surveys - Part I

Lecture 6 - Assessment of pipeline condition through surveys - Part II

Lecture 7 - Anode ground bed for cathodic protection

Lecture 8 - Perspectives in storage tanks and off-shore structures

Lecture 9 - Anodes

Lecture 10 - Worked out examples

Lecture 11 - Stray current corrosion and its control

Lecture 12 - Coatings and rectifier selection

Lecture 13 - Internal corrosion of oil and steel gas pipelines

Lecture 14 - Anodic protection engineering

NPTEL : NOC:Introduction to Materials Science and Engineering (Metallurgy and Material Science)

Co-ordinators : Prof. Rajesh Prasad

Lecture 1 - Intoduction

Lecture 2 - Crystal geometry

Lecture 3 - Unit cell

Lecture 4 - Classification of lattices

Lecture 5 - Gaps in Bravais lattice list

Lecture 6 - Symmetry - I

Lecture 7 - Symmetry - II

Lecture 8 - Classification of lattices on the basis of symmetry

Lecture 9 - A symmetry based approach to Bravais lattices

Lecture 10 - Miller indices of directions

Lecture 11 - Miller indices for planes

Lecture 12 - Miller indices for plane and its normal in Cubic Crystal

Lecture 13 - Weiss Zone law and its applications

Lecture 14 - Inter-planar spacing

Lecture 15 - Braggâ€™s Law

Lecture 16 - Close-packing of hard spheres

Lecture 17 - Hexagonal Close-Packed (HCP) structure

Lecture 18 - Lattice and motif of HCP crystals

Lecture 19 - c/a ratio of an ideal HCP crystal

Lecture 20 - ABCABC stacking of close-packed spheres

Lecture 21 - Voids in close-packed structures

Lecture 22 - Solid solutions - I

Lecture 23 - Solid solutions - II

Lecture 24 - Hume-Rothery rules

Lecture 25 - Ordered and disordered solid solutions

Lecture 26 - Graphene

Lecture 27 - Structure of graphite

Lecture 28 - Structure of diamond

Lecture 29 - Carbon nanotubes (CNT)

Lecture 30 - Buckminsterfullerene (C60)

Lecture 31 - Ionic solids

Lecture 32 - NaCl

Lecture 33 - CsCl

Lecture 34 - ZnS

Lecture 35 - BCC vs CsCl

Lecture 36 - Amorphous Solids

Lecture 37 - Polymers

Lecture 38 - Vinyl Polymers

Lecture 39 - Thermoplasts and Thermosets

Lecture 40 - Tacticity

Lecture 41 - Copolymers

Lecture 42 - Crystallinity in Polymers

Lecture 43 - Defects in Crystals

Lecture 44 - Vacancies

Lecture 45 - Edge dislocation: Half plane

Lecture 46 - Edge dislocation: Slip

Lecture 47 - Characteristic vectors of a dislocation

Lecture 48 - Edge, screw and mixed dislocations

Lecture 49 - Screw dislocations

Lecture 50 - Burgers circuit

Lecture 51 - Elastic energy of a dislocation line

Lecture 52 - Burgers vector: Shortest lattice translation

Lecture 53 - Burgers vector of a dislocation is constant along the line

Lecture 54 - Geometrical properties of a dislocations: Dislocation cannot end abruptly in a crystal: Free surface

Lecture 55 - Dislocation cannot end abruptly in a crystal: Grain boundaries

Lecture 56 - Dislocation cannot end abruptly in a crystal: Dislocation nodes

Lecture 57 - Dislocation cannot end abruptly in a crystal: Dislocation loop

Lecture 58 - Dislocation motion

Lecture 59 - 2D defects: Surfaces or interfaces

Lecture 60 - Free surface or external surface of the crystal

Lecture 61 - Stacking faults

Lecture 62 - Twin boundary

Lecture 63 - Grain boundary

Lecture 64 - Small angle symmetric tilt boundary

Lecture 65 - Ball bearing model

Lecture 66 - Phase diagrams: Introduction

Lecture 67 - Phases and components

Lecture 68 - Uses of phase diagrams

Lecture 69 - Phases present in the system

Lecture 70 - Composition of phases present in the system

Lecture 71 - Proportion of phases present in the system

Lecture 72 - Microstructure evolution during solidification in isomorphous systems

Lecture 73 - Eutectic system

Lecture 74 - Eutectic reaction

Lecture 75 - Eutectic, hypoeutectic and hypereutectic alloys

Lecture 76 - Gibbsâ€™ phase rule

Lecture 77 - Fe-C phase diagram

Lecture 78 - Eutectoid, hypoeutectoid and hypereutectoid steels

Lecture 79 - Microstructure of a hypoeutectoid steel

Lecture 80 - Microstructure of a hypereutectoid steel

Lecture 81 - Diffusion: Introduction

Lecture 82 - Fickâ€™s first law

Lecture 83 - Fickâ€™s second law

Lecture 84 - Error function solution of Fickâ€™s second law

Lecture 85 - Atomic mechanisms of diffusion

Lecture 86 - Substitutional diffusion revisited

Lecture 87 - Diffusion paths

Lecture 88 - Steady and unsteady state diffusion

Lecture 89 - Phase Transformation

Lecture 90 - Nucleation

Lecture 91 - Nucleation and capillary rise

Lecture 92 - Nucleation, growth and overall transformation

Lecture 93 - Time-temperature-transformation (TTT) diagram

Lecture 94 - Homogeneus and heterogeneous nucleation

Lecture 95 - Heat treatment of steels

Lecture 96 - TTT diagram of Eutectoid Steels

Lecture 97 - Quenching and martensite

Lecture 98 - Austempering and bainite

Lecture 99 - Tempering

Lecture 100 - Residual stresses and Quench cracks

Lecture 101 - Marquenching and martempering

Lecture 102 - TTT diagram of hypoeutectoid and hypereutectoid steels

Lecture 103 - TTT diagram of alloy steel

Lecture 104 - hardenability of steels

Lecture 105 - Glass Ceramics

Lecture 106 - Tensile test

Lecture 107 - Plastic deformation and crystal structure

Lecture 108 - Shape change

Lecture 109 - Slip

Lecture 110 - Resolved shear stress

Lecture 111 - CRSS

Lecture 112 - Schmid's law

Lecture 113 - CRSS:Theory vs experiment

Lecture 114 - Why is experimental CRSS less than theoretical CRSS

Lecture 115 - Strengthening mechaniksms

Lecture 116 - Dislocation density

Lecture 117 - Frank-Read source

Lecture 118 - strain hardening

Lecture 119 - Dislocation interaction leading to strain hardening - I

Lecture 120 - Dislocation interaction leading to strain hardening - II

Lecture 121 - Solid solution hardening

Lecture 122 - Grain size hardening

Lecture 123 - Age hardening - I

Lecture 124 - Age hardening - II

Lecture 125 - Metastable precipitates

Lecture 126 - Annealing of cold-worked metals

Lecture 127 - Recovery

Lecture 128 - Recrystallization

Lecture 129 - Grain Growth

Lecture 130 - True stress and true strain

Lecture 131 - Creep

Lecture 132 - Effect of stress and temperature on creep

Lecture 133 - Creep Mechanisms

Lecture 134 - Composites

Lecture 135 - Isostrain modulus

Lecture 136 - Isostress modulus

Lecture 137 - Fracture

Lecture 138 - Ductile and Brittle Fracture

Lecture 139 - Role of crack size

Lecture 140 - Griffith's Criterion

Lecture 141 - Stress Concentration

Lecture 142 - Ductile to brittle transition

Lecture 143 - Enhancing fracture resistance

Lecture 144 - Toughening of glass: Tempering

Lecture 145 - Toughening of glass: Ion-Exchange

Lecture 146 - Fatigue

Lecture 147 - Sub-Critical crack growth

NPTEL : NOC:Crystals, Symmetry and Tensors (Metallurgy and Material Science)

Co-ordinators : Prof. Rajesh Prasad

Lecture 1 (1a)

Lecture 2 (1b)

Lecture 3 (1c)

Lecture 4 (1d)

Lecture 5 (1e)

Lecture 6 (2a)

Lecture 7 (2b)

Lecture 8 (2c)

Lecture 9 (2d)

Lecture 10 (3a)

Lecture 11 (3b)

Lecture 12 (3c)

Lecture 13 (4a)

Lecture 14 (4b)

Lecture 15 (5a)

Lecture 16 (5b)

Lecture 17 (5c)

Lecture 18 (6a)

Lecture 19 (6b)

Lecture 20 (6c)

Lecture 21 (6d)

Lecture 22 (7a)

Lecture 23 (7b)

Lecture 24 (7c)

Lecture 25 (8a)

Lecture 26 (8b)

Lecture 27 (9a)

Lecture 28 (9b)

Lecture 29 (9c)

Lecture 30 (9d)

Lecture 31 (10a)

Lecture 32 (10b)

Lecture 33 (11a)

Lecture 34 (11b)

Lecture 35 (11c)

Lecture 36 (11d)

Lecture 37 (12a)

Lecture 38 (12b)

Lecture 39 (13a)

Lecture 40 (13b)

Lecture 41 (14a)

Lecture 42 (14b)

Lecture 43 (15a)

Lecture 44 (15b)

Lecture 45 (15c)

Lecture 46 (16a)

Lecture 47 (16b)

Lecture 48 (17)

Lecture 49 (18a)

Lecture 50 (18b)

Lecture 51 (18c)

Lecture 52 (18d)

Lecture 53 (19a)

Lecture 54 (19b)

Lecture 55 (19c)

Lecture 56 (19d)

Lecture 57 (20a)

Lecture 58 (20b)

Lecture 59 (20c)

Lecture 60 (20d)

Lecture 61 (20e)

Lecture 62 (21a)

Lecture 63 (21b)

Lecture 64 (21c)

Lecture 65 (21d)

Lecture 66 (21e)

Lecture 67 (22a)

Lecture 68 (22b)

Lecture 69 (22c)

Lecture 70 (22d)

Lecture 71 (23a)

Lecture 72 (23b)

Lecture 73 (23c)

Lecture 74 (24a)

Lecture 75 (24b)

Lecture 76 (24c)

Lecture 77 (25a)

Lecture 78 (25b)

Lecture 79 (25c)

Lecture 80 (25d)

Lecture 81 (26a)

Lecture 82 (26b)

Lecture 83 (27a)

Lecture 84 (27b)

Lecture 85 (27c)

Lecture 86 (27d)

Lecture 87 (27e)

Lecture 88 (27f)

Lecture 89 (28a)

Lecture 90 (28b)

Lecture 91 (28c)

Lecture 92 (28d)

Lecture 93 (28e)

NPTEL : NOC:Corrosion-Environmental Degradation-Surface Engineering (Metallurgy and Material Science)

Co-ordinators : Prof. (Hag) Harish Hirani

Lecture 1

Lecture 2

Lecture 3

Lecture 4

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Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

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Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

NPTEL : NOC:Introduction to Crystal Elasticity and Crystal Plasticity (Metallurgy and Material Science)

Co-ordinators : Prof. Swarup bag

Lecture 1 - Structure and properties of materials - Part I

Lecture 2 - Structure and properties of materials - Part II

Lecture 3 - Elasticity Isotropic elasticity of materials; Anisotropic elasticity - Part I

Lecture 4 - Elasticity Isotropic elasticity of materials; Anisotropic elasticity - Part II

Lecture 5 - Continuum Plasticity - I (Part A)

Lecture 6 - Continuum Plasticity - I (Part B)

Lecture 7 - Continuum Plasticity - II (Part A)

Lecture 8 - Continuum Plasticity - II (Part B)

Lecture 9 - Crystal Plasticity - I (Part A)

Lecture 10 - Crystal Plasticity - I (Part B)

Lecture 11 - Crystal Plasticity - II (Part A)

Lecture 12 - Crystal Plasticity - II (Part B)

Lecture 13 - Crystal Plasticity - II (Part C)

Lecture 14 - Hardening Mechanisms in Metals - Part I

Lecture 15 - Hardening Mechanisms in Metals - Part II

Lecture 16 - Hardening Mechanisms in Metals - Part III

Lecture 17 - Multi-Scale Approach to Materials Modelling

NPTEL : Advanced Characterization Techniques (Metallurgy and Material Science)

Co-ordinators : Dr. Krishanu Biswas, Prof.N.P.Gurao

Lecture 1 - Advanced Characterization Techniques

Lecture 2 - Advanced Characterization Techniques

Lecture 3 - Advanced Characterization Techniques

Lecture 4 - Advanced Characterization Techniques

Lecture 5 - Advanced Characterization Techniques

Lecture 6 - Advanced Characterization Techniques

Lecture 7 - Advanced Characterization Techniques

Lecture 8 - Advanced Characterization Techniques

Lecture 9 - Advanced Characterization Techniques

Lecture 10 - Advanced Characterization Techniques

Lecture 11 - Advanced Characterization Techniques

Lecture 12 - Advanced Characterization Techniques

Lecture 13 - Advanced Characterization Techniques

Lecture 14 - Advanced Characterization Techniques

Lecture 15 - Advanced Characterization Techniques

Lecture 16 - Advanced Characterization Techniques

Lecture 17 - Advanced Characterization Techniques

Lecture 18 - Advanced Characterization Techniques

Lecture 19 - Advanced Characterization Techniques

Lecture 20 - Advanced Characterization Techniques

Lecture 21 - Advanced Characterization Techniques

Lecture 22 - Advanced Characterization Techniques

Lecture 23 - Advanced Characterization Techniques

Lecture 24 - Advanced Characterization Techniques

Lecture 25 - Advanced Characterization Techniques

Lecture 26 - Advanced Characterization Techniques

Lecture 27 - Advanced Characterization Techniques

Lecture 28 - Advanced Characterization Techniques

Lecture 29 - Advanced Characterization Techniques

Lecture 30 - Advanced Characterization Techniques

Lecture 31 - Advanced Characterization Techniques

Lecture 32 - Advanced Characterization Techniques

Lecture 33 - Advanced Characterization Techniques

NPTEL : Electroceramics (Metallurgy and Material Science)

Co-ordinators : Dr. Ashish Garg

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

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Lecture 26

Lecture 27

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Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

NPTEL : Fuels Refractory and Furnaces (Metallurgy and Material Science)

Co-ordinators : Prof. Satish Ch. Koria

Lecture 1 - Energy Resources and Environment

Lecture 2 - Characterization of Fuels: Concepts

Lecture 3 - Characterization of Fuels: Concepts

Lecture 4 - Production of Secondary Fuels : Carbonization

Lecture 5 - Materials Balance in Coke-making

Lecture 6 - Heat Balance and Clean Development Mechanism

Lecture 7 - Production of Secondary Fuels: Gasification

Lecture 8 - Materials and Heat Balance in Gasification

Lecture 9 - Principles of combustion: Concepts and illustrations

Lecture 10 - Principles of combustion: Concepts and illustrations

Lecture 11 - Materials balance in combustion

Lecture 12 - Principles of Combustion: Flame Temperature

Lecture 13 - Flame Temperature Calculations

Lecture 14 - Refractory in Furnaces

Lecture 15 - Refractory in Furnaces

Lecture 16 - Furnace: Types and Classification

Lecture 17 - Heat Utilization in furnaces, energy flow diagrams

Lecture 18 - Heat Utilization in furnaces, energy flow diagrams

Lecture 19 - Heat Utilization in Furnaces: Heat Recovery Concepts and Illustrations

Lecture 20 - Heat Utilization in Furnaces: Heat Recovery Concepts and Illustrations

Lecture 21 - Transport Phenomena in Furnaces: Fluid Flow

Lecture 22 - Macroscopic Energy Balance: Concepts

Lecture 23 - Macroscopic Energy Balance: Applications to Design Head Meters, Stack and Blowers, Types of Flames

Lecture 24 - Macroscopic Energy Balance: Applications to Design Head Meters, Stack and Blowers, Types of Flames

Lecture 25 - Macroscopic Energy Balance: Applications to Design Head Meters, Stack and Blowers, Types of Flames

Lecture 26 - Macroscopic Energy Balance: Applications to Design Head Meters, Stack and Blowers, Types of Flames

Lecture 27 - Principles of Burner Design

Lecture 28 - Transport Phenomena in Furnaces: Heat Transfer and Refractory Design

Lecture 29 - Transport Phenomena in Furnaces: Heat Transfer and Refractory Design

Lecture 30 - Transport Phenomena in Furnaces: Convection and Radiation Heat Transfer, Role of Refractory

Lecture 31 - Transport Phenomena in Furnaces: Convection and Radiation Heat Transfer, Role of Refractory

Lecture 32 - Steady Heat flows in Furnace and Heat Exchanger

Lecture 33 - Exercises on Heat Flow in Furnaces and Heat Exchangers

Lecture 34 - Exercises on Heat Flow in Furnaces and Heat Exchangers

Lecture 35 - Miscellaneous Topics: Atmosphere in Furnaces

Lecture 36 - Miscellaneous Topics: Pyrometry

Lecture 37 - Miscellaneous Topics: Pyrometry

Lecture 38 - Miscellaneous topics: Electric Resistance Heating

Lecture 39 - Furnace efficiency, Fuel Saving, Carbon Offset: Concepts and Exercises

Lecture 40 - Furnace efficiency, Fuel Saving, Carbon Offset: Concepts and Exercises

NPTEL : Introduction to Biomaterials (Metallurgy and Material Science)

Co-ordinators : Dr. Kantesh Balani, Dr. Birkamjit Basu

Lecture 1 - Introduction to basic concepts of Biomaterials Science; Salient properties of important material classes; overview of body environment,

Lecture 2 - Manufacturing and properties of metals, ceramics, polymers and composites

Lecture 3 - Concept of biocompatibility, host response, structure-property of biological cell

Lecture 4 - Structure and properties of cells, protein and cellular adaptation process

Lecture 5 - Cell-I

Lecture 6 - Cell-II

Lecture 7 - Cell Migration and Cell Division and cell death

Lecture 8 - Cell Differentiation and Cell Death

Lecture 9 - Cell Apoptosis-I

Lecture 10 - Cell Apoptosis-II

Lecture 11 - Structure and properties of Protein; cell - material interaction

Lecture 12 - Assessment of biocompatibility of biomaterials

Lecture 13 - Biological testing (hemocompatibility, tribological testing)

Lecture 14 - Structure and properties of bone as well as in vivo testing and histocompatibility assessment

Lecture 15 - Important biometallic alloys

Lecture 16 - Ti Alloy

Lecture 17 - Co-Cr-Mo alloys

Lecture 18 - Bioceramics

Lecture 19 - Processing of Bioceramics

Lecture 20 - Ceramics, Bioceramics and Glasses

Lecture 21 - Sintering and mechanical properties of ceramics

Lecture 22 - Fracture and toughening of ceramic composites

Lecture 23 - Development of based bioceramic composites for hard tissue replacement

Lecture 24 - Alternative phosphate materials, based composites with bactericidal property and glass ceramics for dental restoration

Lecture 25 - Electrostatic Spraying of UHMWPE-HA-CNT composites

Lecture 26 - Thin Films and Coatings

Lecture 27 - hermal Spray Coatings

Lecture 28 - Biocompatibility of plasma sprayed CNT reinforced Hydroxyapatite biocomposite coatings

Lecture 29 - Biocompatibility of Alumina and CNT reinforced Hydroxyapatite

Lecture 30 - Glass-ceramics for dental restoration applications

Lecture 31 - Structure and properties of polymers

Lecture 32 - Biodegradable polymers (Importance)

Lecture 33 - Biodegradable polymers (Types)

Lecture 34 - Mechanisms of Bioerosion

Lecture 35 - External field and material interaction

Lecture 36 - Tissue Engineering and wound healing

Lecture 37 - Understanding Design Concepts of Bio-implants

Lecture 38 - Understanding Design Concepts of Dental-implants

Lecture 39 - Understanding Design Concepts of Orthopedic-implant

NPTEL : Materials and Energy balance in Metallurgical Processes (Metallurgy and Material Science)

Co-ordinators : Prof. Satish Ch. Koria

Lecture 1 - Introduction to Course

Lecture 2 - Measurement of Quantities

Lecture 3 - Exercises on Measurement of Quantities, Introduction to Stoichiometry

Lecture 4 - Stoichiometry Concept and Exercise

Lecture 5 - Exercise on Stoichiometry and Introduction to Thermochemistry

Lecture 6 - Thermochemistry

Lecture 7 - Exercise on Thermochemistry & Frequently Asked Questions

Lecture 8 - Errors in Measurements

Lecture 9 - Basics of Materials & Energy Balance

Lecture 10 - Introduction to Mineral Beneficiation

Lecture 11 - Materials Balance in Mineral Processing and Faq

Lecture 12 - Exercises in Mineral Processing

Lecture 13 - Calcination Concepts & Exercises

Lecture 14 - Pyromet ExtractionUnit Processes

Lecture 15 - Predominance Area Diagram

Lecture 16 - Material Balance in Roasting;illustration

Lecture 17 - Heat Balance in Roasting illustration

Lecture 18 - Exersises on Roasting

Lecture 19 - Exercises on Roasting

Lecture 20 - Smelting Matte Smelting

Lecture 21 - Exercise-I Matte Smelting

Lecture 22 - Exercise-II Matte Smelting

Lecture 23 - Reduction Smelting

Lecture 24 - Lead Smelting Material Balance

Lecture 25 - Imperial Smelting Process

Lecture 26 - Introduction to Ironmaking

Lecture 27 - Coke Making

Lecture 28 - Ironmaking Fundamentals

Lecture 29 - Material & Heat Balance in Ironmaking - I

Lecture 30 - Material & Heat Balance in Ironmaking - II

Lecture 31 - RIST Diagram - I

Lecture 32 - RIST Diagram - II

Lecture 33 - Concepts in Converting

Lecture 34 - Exercise in Converting

Lecture 35 - Additional Topics - I Melting in Cupola

Lecture 36 - Additional Topics - II Gasification

Lecture 37 - Additional Topics - III Material Balance in Gasification

Lecture 38 - Additional Topics - IV Industrial Furnaces

Lecture 39 - Energy Balance in Industrial Furnaces

Lecture 40 - Thoughts on Application of Energy Balance

NPTEL : Optoelectronic Materials and Devices (Metallurgy and Material Science)

Co-ordinators : Prof. Deepak Gupta, Prof. Monica Katiyar

Lecture 1 - Conductivity of materials, Drudeâ€™s theory and its failures

Lecture 2 - Free electron theory

Lecture 3 - Free electron theory

Lecture 4 - Crystal structure, Reciprocal lattice I

Lecture 5 - Reciprocal lattice II, Brillouin zone and Braggâ€™s diffraction condition

Lecture 6 - Electrons in a crystal, Blochâ€™s electron

Lecture 7 - Free electron band diagrams in an empty lattice

Lecture 8 - Effect of periodic potential, Origin of band-gap through Kronig-Penny model

Lecture 9 - Electron dynamics

Lecture 10 - Conduction in relation to band diagrams

Lecture 11 - Semiconductor E-k diagrams and their material properties

Lecture 12 - Equilibrium carrier statistics in semiconductors: density of states, fermi function and population density in bands

Lecture 13 - Equilibrium carrier statistics in semiconductors: qualitative examination of carrier densities in conduction and valence bands

Lecture 14 - Equilibrium carrier statistics in semiconductors: quantitative examination of carrier densities in intrinsic semiconductor

Lecture 15 - Doping in semiconductors

Lecture 16 - Equilibrium carrier statistics in semiconductors: complete ionization of dopant levels

Lecture 17 - Equilibrium carrier statistics in semiconductors: carrier freeze out

Lecture 18 - Semiconductor junctions in band-diagrams

Lecture 19 - Linear dielectric behavior

Lecture 20 - Non-linear dielectric behavior

Lecture 21 - Carrier recombination-generation - I: band-to-band transition

Lecture 22 - Carrier recombination-generation - II: Other mechanisms

Lecture 23 - R-G statistics via R-G centers

Lecture 24 - Optoelectronic materials and bandgap engineering

Lecture 25 - Optical properties of materials

Lecture 26 - Optical properties of single interfaces: Fresnal reflection coefficients

Lecture 27 - Optical Properties of two interfaces: thin film case

Lecture 28 - Drift

Lecture 29 - Diffusion

Lecture 30 - Continuity Equation

Lecture 31 - Resistor and diode (p-n junction)

Lecture 32 - Fundamentals of p-n junction

Lecture 33 - Fundamentals of p-n junction (Continued...)

Lecture 34 - Solar cells

Lecture 35 - Microelectronics processing

Lecture 36 - MOS capacitor

Lecture 37 - Transistor

Lecture 38 - Organic Electronics

Lecture 39 - Organic Light Emitting Diodes

Lecture 40 - Organic Solar Cells and Organics Thin Film Transistors

NPTEL : Steel Making (Metallurgy and Material Science)

Co-ordinators : Prof. Satish Ch. Koria, Prof. Dipak Mazumdar

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40

Lecture 41

Lecture 42

NPTEL : Structure of Materials (Metallurgy and Material Science)

Co-ordinators : Dr. Anandh Subramaniam

Lecture 1 - Overview

Lecture 2 - Geometry of Crystals: Symmetry, Lattices

Lecture 3 - Geometry of Crystals: Symmetry, Lattices

Lecture 4 - Geometry of Crystals: Symmetry, Lattices

Lecture 5 - Geometry of Crystals: Symmetry, Lattices

Lecture 6 - Geometry of Crystals: Symmetry, Lattices

Lecture 7 - Geometry of Crystals: Symmetry, Lattices

Lecture 8 - Geometry of Crystals: Symmetry, Lattices

Lecture 9 - Geometry of Crystals: Symmetry, Lattices

Lecture 10 - Geometry of Crystals: Symmetry, Lattices

Lecture 11 - Geometry of Crystals: Symmetry, Lattices

Lecture 12 - Geometry of Crystals: Symmetry, Lattices (Continued...) and Miller Indices

Lecture 13 - Miller Indices

Lecture 14 - Miller Indices (Continued...) and Crystal Structures

Lecture 15 - Crystal Structures

Lecture 16 - Crystal Structures

Lecture 17 - Crystal Structures

Lecture 18 - Crystal Structures

Lecture 19 - Crystal Structures

Lecture 20 - Crystal Structures

Lecture 21 - Crystal Structures (Continued...) and Defects in Crystals

Lecture 22 - Defects in Crystals

Lecture 23 - Defects in Crystals

Lecture 24 - Defects in Crystals

Lecture 25 - Defects in Crystals

Lecture 26 - Defects in Crystals

Lecture 27 - Defects in Crystals

Lecture 28 - Defects in Crystals

Lecture 29 - Defects in Crystals

Lecture 30 - Diffusion in Solids

Lecture 31 - Diffusion in Solids

Lecture 32 - Phase Diagrams

Lecture 33 - Phase Diagrams

Lecture 34 - Phase Diagrams

Lecture 35 - Phase Diagrams

Lecture 36 - Phase Diagrams

Lecture 37 - Phase Transformations

Lecture 38 - Phase Transformations

Lecture 39 - Phase Transformations

Lecture 40 - Phase Transformations

Lecture 41 - Phase Transformations

Lecture 42 - Phase Transformations

Lecture 43 - Phase Transformations

Lecture 44 - Phase Transformations

Lecture 45 - Phase Transformations

NPTEL : Environmental Degradation of Materials (Metallurgy and Material Science)

Co-ordinators : Dr. Kallol Mondal

Lecture 1 - Introduction, Basic definition of corrosion

Lecture 2 - Forms of Degradation, Thermodynamics of corrosion

Lecture 3 - Thermodynamics of corrosion

Lecture 4 - Thermodynamics of corrosion

Lecture 5 - Thermodynamics of corrosion, Electrochemical series, Concentration cell

Lecture 6 - Reduction Potential series, Pourbaix diagram

Lecture 7 - Pourbaix diagram

Lecture 8 - Pourbaix diagram

Lecture 9 - Pourbaix diagram, Kinetics of corrosion

Lecture 10 - Kinetics of corrosion, Rate expression, Solved problems

Lecture 11 - Solved problems on the corrosion rate, Exchange current density

Lecture 12 - Exchange current density, Polarization, Activation Polarization, Tafel Equation

Lecture 13 - Activation Polarization, Concentration Polarization

Lecture 14 - Concentration Polarization, Mixed Potential Theory

Lecture 15 - Mixed Potential Theory, Explanation of corrosion events on the basis of Mixed potential theory, Galvanization

Lecture 16 - Explanation of corrosion events on the basis of Mixed potential theory, Effect of impurity, Effect of area factor

Lecture 17 - Explanation of corrosion events on the basis of Mixed potential theory, Effect of area factor, Concentration polarization, Passivation

Lecture 18 - Passivation and Mixed potential theory

Lecture 19 - Passivation and Mixed potential theory

Lecture 20 - Different corrosion protection mechanisms, electrochemical ways of protection, cathodic protection

Lecture 21 - Cathodic and anodic protection

Lecture 22 - Anodic protection, Forms of corrosion, Factors of corrosion

Lecture 23 - Forms of corrosion, Uniform Corrosion, Galvanic corrosion

Lecture 24 - Galvanic corrosion

Lecture 25 - Crevice corrosion

Lecture 26 - Crevice corrosion, Pitting corrosion

Lecture 27 - Pitting corrosion, Intergranular corrosion

Lecture 28 - Intergranular corrosion, Dealloying

Lecture 29 - Dealloying, Erosion corrosion

Lecture 30 - Erosion corrosion, Cavitation

Lecture 31 - Cavitation, Fretting corrosion, corrosion cracking

Lecture 32 - Stress corrosion cracking: mechanisms (dissolution controlled)

Lecture 33 - Stress corrosion cracking: mechanisms (cleavage controlled), factors affecting SCC, hydrogen embrittlement, corrosion fatigue

Lecture 34 - Biologically influenced corrosion, liquid metal attack

Lecture 35 - Corrosion protection, change of materials, effect of design of component

Lecture 36 - Corrosion protection, change of environment, Inhibitors, coatings

Lecture 37 - Oxidation and hot corrosion, pitting Bedworth ratio, thermodynamics of oxidation

Lecture 38 - Thermodynamics of oxidation, Ellingham diagram, oxidation kinetics and laws

Lecture 39 - Oxide structure and Oxidation

Lecture 40 - Hot corrosion, corrosion testing and failure analysis, linear polarization

Lecture 41 - Degradation of composites, polymers and ceramics, corrosion and society

NPTEL : NOC:Phase Diagrams in Materials Science and Engineering (Metallurgy and Material Science)

Co-ordinators : Dr. Krishanu Biswas

Lecture 1 - Introduction to the course

Lecture 2 - Heterogeneous equilibrium and Free energy Formalism

Lecture 3 - Concept of Chemical Potential

Lecture 4 - Phase Rule-I

Lecture 5 - Phase Rule-II and Single Component Equilibria

Lecture 6 - Single Component Phase Diagram

Lecture 7 - Binary Phase Diagram - Isomorphous Diagram

Lecture 8 - Binary Ispmorphous System

Lecture 9 - Solidification of Isomorphous Alloys

Lecture 10 - Free Energy of Binary Isomorphous Phase Diagram

Lecture 11 - Phase Diagram of Binary Eutectic Systems Edit Lesson

Lecture 12 - Solidification of eutectic, hypo-eutectic and hyper-eutectic alloys & their morphologies - I

Lecture 13 - Solidification of eutectic, hypo-eutectic and hyper-eutectic alloys & their morphologies - II

Lecture 14 - Phase diagrams of binary eutectic two terminal solid solution

Lecture 15 - Phase diagrams of binary peritectic System - I

Lecture 16 - Phase diagrams of binary peritectic System - II

Lecture 17 - Phase diagrams of binary peritectic System with intermediate phases

Lecture 18 - Intermediate Phases

Lecture 19 - Introduction to Monotectic Phase Diagram

Lecture 20 - Microstructural Evolution of Monotectic Phase Diagram

Lecture 21 - Free Energy Composition diagrams for Monotectic systems and Syntactic phase diagram

Lecture 22 - Quasichemical theory - I

Lecture 23 - Quasichemical theory - II

Lecture 24 - Quasichemical theory Free enegy formalism

Lecture 25 - Solid state reaction

Lecture 26 - Introduction to Iron-Carbon phase diagram

Lecture 27 - Eutectoid transformation in Iron-Carbon phase diagram

Lecture 28 - Austenite to pearlite transformation in Iron-Carbon phase diagram

Lecture 29 - Hypo-eutectoid steels

Lecture 30 - Pearlite Transformation

Lecture 31 - Martensite Transformation - I

Lecture 32 - Martensite Transformation - II

Lecture 33 - Tempering of Martensite

Lecture 34 - Bainite Transformation

Lecture 35 - TTT curves for Steel

Lecture 36 - Cast Iron - I

Lecture 37 - Cast Iron - II

Lecture 38 - Ductile Iron and Nodular Iron

Lecture 39 - Malleable Iron

Lecture 40 - Alloyed Cast Iron

Lecture 41 - Phase Diagram for different Solid State Reaction

Lecture 42 - Phase Diagram of Ceramic

Lecture 43 - Ternary Phase Diagram - I

Lecture 44 - Ternary Phase Diagram - II

Lecture 45 - Ternary Phase Diagram and Tie Line Construction - I

Lecture 46 - Ternary Phase Diagram and Tie Line Construction - II

Lecture 47 - Ternary Phase Diagram and Tie Line Construction - III

Lecture 48 - Ternary Isomorphous Phase Diagram

Lecture 49 - Ternary Three Phase Equilibria

Lecture 50 - Three Phase Equilibria in Ternary Systems - I

Lecture 51 - Three Phase Equilibria in Ternary Systems - II

Lecture 52 - Solidification Behaviour of Ternary Alloy

Lecture 53 - Three Phase Equilibria

Lecture 54 - Ternary Four Phase Equilibria - I

Lecture 55 - Ternary Four Phase Equilibria - II

Lecture 56 - Solidification Behaviour of Ternary Eutectic Alloys

Lecture 57 - Phase Diagram of Ternary Eutectic with Terminal Solid Solution

Lecture 58 - Ternary Peritectic Reaction

Lecture 59 - Quasi-peritectic Reaction

Lecture 60 - Case Studies on Ternary Phase Diagrams - I

Lecture 61 - Case Studies on Ternary Phase Diagrams - II

NPTEL : NOC:Fundamentals of Material Processing - I (Metallurgy and Material Science)

Co-ordinators : Prof. Shashank Shekhar

Lecture 1 - Introduction

Lecture 2 - Solidification (Casting)

Lecture 3 - Solidification (Welding)

Lecture 4 - Thermodynamics of Solidification

Lecture 5 - Kinetics of Solidification (Homogeneous)

Lecture 6 - Kinetics of Solidification (Heterogeneous)

Lecture 7 - Heat Flow

Lecture 8 - Heat Flow (Continued...)

Lecture 9 - Heat Flow (Insulating Mold Condition)

Lecture 10 - Heat Flow (Insulating Mold Condition) (Continued...)

Lecture 11 - Heat Flow (Interface Resistance Controlled Solidification)

Lecture 12 - Heat Flow (Effect of Superheat)

Lecture 13 - Heat Flow (Solidification of Alloys)

Lecture 14 - Composition Variation

Lecture 15 - Composition Variation (Continued...)

Lecture 16 - Complete and Limited Liquid Diffusion

Lecture 17 - Mixed Mode Solidification

Lecture 18 - Mixed Mode Solidification and Zone Refining

Lecture 19 - Zone Refining (Continued...)

Lecture 20 - Cellular Solidification of Single Phase Alloy

Lecture 21 - Cellular Solidification of Single Phase Alloy (Continued...)

Lecture 22 - Cellular Solidification of Single Phase Alloy (Continued...)

Lecture 23 - Plane Front Solidification of Multiphase Alloy

Lecture 24 - Plane Front Solidification of Multiphase Alloy (Continued...)

Lecture 25 - Fluid Flow Considerations

Lecture 26 - Introduction to Powder Processing

Lecture 27 - Introduction to Powder Processing (Continued...)

Lecture 28 - Powder characterization

Lecture 29 - Powder Characterization Techniques

Lecture 30 - Powder Characterization using Surface Area

Lecture 31 - Powder Characterization using Gas Permeability Method

Lecture 32 - Powder Manufacturing

Lecture 33 - Powder Manufacturing (Continued...)

Lecture 34 - Powder Manufacturing (Continued...)

Lecture 35 - Powder Consolidation

Lecture 36 - Powder Consolidation (Continued...)

Lecture 37 - Particle Packing

Lecture 38 - Powder Compaction

Lecture 39 - Powder Compaction (Continued...)

Lecture 40 - Sintering Theory

NPTEL : NOC:Heat Treatment and Surface Hardening - I (Metallurgy and Material Science)

Co-ordinators : Dr. Kallol Mondal, Prof. Sandeep Sangal

Lecture 1 - Introduction to Heat Treatment and Importance of Material Tetrahedron

Lecture 2 - Case studies in reference to Material tetrahedron T/t information and processing

Lecture 3 - Few more case studies in reference to processing with T/t modification

Lecture 4 - Critical Definition and Phase Transformation Thermodynamics and Driving Force

Lecture 5 - Thermodynamics of Phase Transformation Driving force of Phase Transformation

Lecture 6 - Thermodynamics of Phase Transformation and Driving Force for Phase Transformation

Lecture 7 - Finding Value of Driving Force (?G) and Single Component (liquid-solid)

Lecture 8 - Finding Value of Driving Force (?G) and Nucleation Single Component (liquid-solid)

Lecture 9 - Nucleation Treatment Single Component (Solid-Liquid) - I

Lecture 10 - Nucleation Treatment Single Component (Solid-Liquid) - II

Lecture 11 - Solved Problem on Nucleation rate and How to determine the value of ?sl Physical Concept & Interfacial Energy

Lecture 12 - How to determine the value of ?sl (Physical Concept and Interfacial Energy)

Lecture 13 - Interfacial Energy - I

Lecture 14 - Interfacial Energy - II

Lecture 15 - Heterogeneous Nucleation - I

Lecture 16 - Heterogeneous Nucleation - II

Lecture 17 - Solid - Solid Transformation and Nucleation rate - I

Lecture 18 - Solid - Solid Transformation and Nucleation rate - II

Lecture 19 - Phase Diagram and G vs X plot - I

Lecture 20 - Phase Diagram and G vs X plot - II

Lecture 21 - Phase Diagram and G vs X plot - III

Lecture 22 - Introduction to Kinetics of Phase Transformation

Lecture 23 - Variation of ?G* and r* with Undercooling

Lecture 24 - Nucleation rate - I

Lecture 25 - Nucleation Rate - II

Lecture 26 - Critical Undercooling

Lecture 27 - Maximum nucleation rate for homogeneous nucleation

Lecture 28 - Maximum nucleation rate for heterogeneous nucleation

Lecture 29 - Nucleation kinetics in solid state

Lecture 30 - Interface controlled growth

Lecture 31 - Diffusion controlled growth

Lecture 32 - Avrami Kinetics - I

Lecture 33 - Avrami Kinetics - II

Lecture 34 - Avrami Kinetics - III

Lecture 35 - Time-Temperature-Transformation (TTT) diagram

Lecture 36 - Diffusion in Solids - I

Lecture 37 - Diffusion in Solids - II

Lecture 38 - Diffusion in Solids - III

Lecture 39 - Diffusion in Solids - IV

Lecture 40 - Applications of heat treatment

NPTEL : NOC:Fundamentals of Material Processing - Part 2 (Metallurgy and Material Science)

Co-ordinators : Prof. Shashank Shekhar, Prof. Jitesh J Thakkar

Lecture 1 - Introduction to Metal Working

Lecture 2 - Continuum Mechanics

Lecture 3 - Stress Invariants

Lecture 4 - Strain Tensors and Mohr circle for strains

Lecture 5 - Yield Stress Criterion

Lecture 6 - Effective Stress and Strain

Lecture 7 - Work Hardening and Flow Behaviour

Lecture 8 - Effect of Strain Rate

Lecture 9 - Combined Effect of Strain, Strain Rate and Temperature

Lecture 10 - Effect of Temperature

Lecture 11 - Cold, Warm and Hot Working

Lecture 12 - Mechanics of Metal Working

Lecture 13 - Wire Drawing

Lecture 14 - Wire Drawing (Continued...)

Lecture 15 - Hodographs

Lecture 16 - Upper-Bound Analysis

Lecture 17 - Plane Strain Indentation

Lecture 18 - Strain Calculation Models and Friction

Lecture 19 - Types of Friction

Lecture 20 - Effect of Friction in Rolling

Lecture 21 - Vacuum Technology

Lecture 22 - Vacuum Technology (Continued...)

Lecture 23 - Thermal Evaporation

Lecture 24 - Thermal Evaporation (Continued...)

Lecture 25 - Thermal Evaporation (Continued...)

Lecture 26 - Plasma Physics

Lecture 27 - Plasma Physics (Continued...)

Lecture 28 - Sputtering

Lecture 29 - Sputtering (Continued...)

Lecture 30 - Sputtering (Continued...)

Lecture 31 - Chemical Vapor Deposition

Lecture 32 - Chemical Vapor Deposition (Continued...)

Lecture 33 - Chemical Vapor Deposition (Continued...)

Lecture 34 - Chemical Vapor Deposition (Continued...)

Lecture 35 - Epitaxy, Molecular Beam Epitaxy and Atomic Layer Deposition

Lecture 36 - Adsorption and Nucleation

Lecture 37 - Thin Film Growth

Lecture 38 - Kinetics of Thin Film Growth

Lecture 39 - Thin Film Morphology- Zone Structure Model

Lecture 40 - Thin Film Characterization

Lecture 41 - Thin Film Characterization

NPTEL : NOC:Nature and Properties of Materials - An Introductory Course (Metallurgy and Material Science)

Co-ordinators : Dr. Ashish Garg

Lecture 1 - Material Evolution

Lecture 2 - Bonding in Materials

Lecture 3 - Correlation between bond and physical properties

Lecture 4 - Crystal Structure: Lattice and Basis

Lecture 5 - Unit Cell (Primitive and Non-primitive)

Lecture 6 - Crystal Systems and Bravais Lattices

Lecture 7 - Bravais Lattice and Symmetry in Crystals

Lecture 8 - Symmetry in Crystals

Lecture 9 - Symmetry and Correlation with the Bravais Lattice

Lecture 10 - Miller Indices (Planes and Directions)

Lecture 11 - Miller Indices - Part 2

Lecture 12 - Miller Indices - Part 3

Lecture 13 - Miller Indices and Weiss Zone Law

Lecture 14 - Structure of Metals and Alloys

Lecture 15 - Structure of Metals, Packing, Co-ordination and Interstices

Lecture 16 - Interstices, Solid Solutions and Alloys

Lecture 17 - Solid Solutions: Alloys

Lecture 18 - Solid Solutions: Alloy (Continued...)

Lecture 19 - Covalent Solids

Lecture 20 - Covalent Solids (Continued...) and Ionic Solids

Lecture 21 - Ionic Solids: Stability and Rules of Formation

Lecture 22 - Ionic solids (Continued...) : Formation of structure

Lecture 23 - ionic Solids (Continued...) : Close Packing of anions

Lecture 24 - Ionic Solids (Continued...) : Other cubic structures

Lecture 25 - Ionic Solids (Ceramics) : Remaining cubic and non-cubic structures

Lecture 26 - HCP based Structure

Lecture 27 - Structure of Non-crystalline Solids (glasses)

Lecture 28 - Structure of Non-Crystalline Solids:Glasses (Continued...)

Lecture 29 - Structure of Non-Crystalline Solids (Polymers)

Lecture 30 - Structure of Polymers

Lecture 31 - Structure of Polymers (Continued...)

Lecture 32 - Structure Determination (X-ray Diffraction)

Lecture 33 - X-ray Diffraction

Lecture 34 - X-ray Diffraction (Continued...)

Lecture 35 - X-ray Diffraction (Continued...)

Lecture 36 - X-ray Diffraction (Continued...)

Lecture 37 - X-ray Diffraction (Continued...)

Lecture 38 - Defects in Solids (Point Defects)

Lecture 39 - Point Defect Concentration

Lecture 40 - 2-D Defects

NPTEL : NOC:Defects in Crystalline Solids - Part I (Metallurgy and Material Science)

Co-ordinators : Prof. Shashank Shekhar

Lecture 1 - Introduction to Defects

Lecture 2 - Equilibrium Points Defects

Lecture 3 - Energy of Vacancy Formation

Lecture 4 - Vacancy Concentration Measurement Techniques

Lecture 5 - Self-interstitial Defects+Frenkel Defects

Lecture 6 - Schottky Defects+Extrinsic Defects

Lecture 7 - Interstitials in Iron

Lecture 8 - Defects Reaction+Kroger-Vink Notation

Lecture 9 - Defects Reaction and its Thermodynamics

Lecture 10 - Equilibrium Concentration using Defects Reaction

Lecture 11 - Examples on defect reaction

Lecture 12 - Diffusion (Interstitial Diffusion)

Lecture 13 - Non-steady state diffusion

Lecture 14 - Self-diffusion + Examples

Lecture 15 - Diffusion in substitutional alloys+Diffusion along defects

Lecture 16 - History of Dislocations

Lecture 17 - Volterra Model + Structure of Dislocations + Burger vectors

Lecture 18 - Characteristics of Dislocations

Lecture 19 - Mixed Dislocations + Dislocation Loops

Lecture 20 - Elastic Continuum Model + Strain field for screw dislocations

Lecture 21 - Stress and Strain Fields

Lecture 22 - Stress State around Edge Dislocations+Elastic Energy of Dislocations

Lecture 23 - Glide Forces on Dislocations+Line Tension on Dislocations

Lecture 24 - Climb Forces on Dislocations+Interaction Between Dislocations

Lecture 25 - Image Forces on Dislocations

Lecture 26 - Resistance to Dislocation Motion+Peierl Nebarro Valley

Lecture 27 - Slip System+Examples

Lecture 28 - Dislocations and Slips+Examples

Lecture 29 - Critical resolved Shear Stress+Examples (Continued...)

Lecture 30 - Glide+Kinks

Lecture 31 - Cross-slip+Climb

Lecture 32 - Climb+Jogs

Lecture 33 - Examples on Jogs+Dislocation Intersection

Lecture 34 - Dislocation Intersection and step characteristics+Superjogs

Lecture 35 - Strain and strain-rate due to dislocation motion+Velocity of dislocations+Observation of dislocations

Lecture 36 - Observation of dislocation (Continued...) + Dislocation Dynamics

Lecture 37 - Dislocations in FCC+Partial dislocations

Lecture 38 - Partial dislocations (Continued...) +Stacking Fault

Lecture 39 - Thompson's Tetrahedron+Examples

Lecture 40 - Dislocations in BCC+Asymmetry of Slip

NPTEL : NOC:Corrosion - Part I (Metallurgy and Material Science)

Co-ordinators : Dr. Kallol Mondal

Lecture 1 - Introduction to corrosion - I

Lecture 2 - Introduction to corrosion - II

Lecture 3 - Types and forms of corrosion

Lecture 4 - Uniform and Galvanic corrosion

Lecture 5 - Crevice and Pitting corrosion

Lecture 6 - Forms of corrosion: Explanation with Examples

Lecture 7 - Electrochemical Nature of Corrosion and its Thermodynamics

Lecture 8 - Thermodynamics aspects of corrosion - I

Lecture 9 - Thermodynamics aspects of corrosion - II

Lecture 10 - Thermodynamics aspects ofcorrosion - III

Lecture 11 - Relation Between Free Energy and Equilibrium Constant

Lecture 12 - Derivation of Nernst Equation

Lecture 13 - Standard Reduction Potential Series for Pure Metals

Lecture 14 - Reduction Potentials in Acidic and Neutral Solutions

Lecture 15 - Nernst equation in terms of pH

Lecture 16 - Limitations of Standard Reduction Potential Series of Pure Metals

Lecture 17 - Concentration Cell Formation and Galvanic Series

Lecture 18 - Examples of Concentration cell and Spontaneity of Corrosion Process

Lecture 19 - Spontaneity of Corrosion Process and Introduction to Pourbaix Diagram

Lecture 20 - Construction of Pourbaix Diagram

Lecture 21 - Construction of Pourbaix diagram for Ni-H2O system - I

Lecture 22 - Construction of Pourbaix diagram for Ni-H2O system - II

Lecture 23 - Construction of Pourbaix diagram for Ni-H2O system - III

Lecture 24 - Pourbaix diagram of Ni-H2O and AI-H2O

Lecture 25 - Inferences from Pourbaix diagram of Fe-H2O and AI-H2O

Lecture 26 - Estimation of Corrosion Rate - I

Lecture 27 - Estimation of Corrosion Rate - II

Lecture 28 - Estimation of Corrosion Rate - III

Lecture 29 - Exchange Current Density

Lecture 30 - Exchange Current Density and Standard Hydrogen Electrode

Lecture 31 - Electrical Double Layer and Polarization

Lecture 32 - Correlation between Current Density and Overvoltage

Lecture 33 - Introduction to Buttler-Volmer Equation

Lecture 34 - Derivation of Tafel Equation

Lecture 35 - Tafel Plot and Activation Polarization

Lecture 36 - Activation polarization, concentration polarization and total polarization

Lecture 37 - Summary of concentration polarization (CP) and introduction to mixed potential theory - I

Lecture 38 - Mixed potential theory - II

Lecture 39 - Understanding of mixed potential theory through the case studies and events of corrosion - I

Lecture 40 - Understanding of mixed potential theory through the case studies and events of corrosion - II

Lecture 41 - Understanding of mixed potential theory through the case studies and events of corrosion - III

NPTEL : NOC:Solar Photovoltaics: Principles, Technologies and Material (Metallurgy and Material Science)

Co-ordinators : Dr. Ashish Garg

Lecture 1 - Introduction to Solar Energy

Lecture 2 - Solar Radiation

Lecture 3 - Atmospheric Effects on Solar Radiation

Lecture 4 - Effect of Location on Time

Lecture 5 - Sun-Earth Angular Relations

Lecture 6 - Solar Radiation Measurements

Lecture 7 - Introduction to Band Theory

Lecture 8 - Semiconductor Basics - I

Lecture 9 - Semiconductor Basics - II

Lecture 10 - Electrical Properties of Semiconductors

Lecture 11 - Carrier Transport

Lecture 12 - Carrier Transport, Generation and Recombination

Lecture 13 - Recombinaton-Generation statistics

Lecture 14 - Recombinaton-Generation statistics (Continued...)

Lecture 15 - Recombinaton-Generation statistics (Continued...)

Lecture 16 - P-N Junction basics

Lecture 17 - P-N Junction Characterisitics

Lecture 18 - P-N Junction: Effect of Bias

Lecture 19 - P-N Junction Analysis (Dark)

Lecture 20 - P-N Junction Analysis (Dark)

Lecture 21 - P-N Junction Analysis (Light)

Lecture 22 - P-N Junction Analysis (Light)

Lecture 23 - P-N Junction Analysis (Light)

Lecture 24 - P-N Junction Analysis (Light)

Lecture 25 - Solar Cell Device Parameters

Lecture 26 - Solar Cell Device Parameters

Lecture 27 - Solar PV Technologies: Introduction

Lecture 28 - Generation-I Technologies (Mono Silicon Solar Cells)

Lecture 29 - Generation-I Technologies (Mono Silicon Solar Cells)

Lecture 30 - Generation-I Technologies (Poly Silicon Solar Cells)

Lecture 31 - Manufacturing of Si

Lecture 32 - Generation I Technologies: GaAs Solar Cells

Lecture 33 - Generation II Technologies: a-Si Solar Cells

Lecture 34 - Generation II Technologies: CdTe Solar Cells

Lecture 35 - Generation II Technologies: CdTe Solar Cells

Lecture 36 - Generation II Technologies: CIGS Solar Cells

Lecture 37 - Generation II Technologies: CIGS and Multijunction Solar Cells

Lecture 38 - Generation III Technologies: Organic Solar Cells

Lecture 39 - Generation III Technologies: Organic Solar Cells

Lecture 40 - Generation III Technologies: Organic and Dye Sensitized Solar Cells

Lecture 41 - Generation III Technologies: Perovskite and CZTS Solar Cells

NPTEL : NOC:Defects in Crystalline Solids - Part II (Metallurgy and Material Science)

Co-ordinators : Prof. Shashank Shekhar

Lecture 1 - Dislocation structure in FCC

Lecture 2 - Partial dislocations in FCC

Lecture 3 - Thompsons Tetrahedron

Lecture 4 - Dislocation lock in FCC

Lecture 5 - Other defects in FCC (Twins and Frank Partial)

Lecture 6 - Dislocation structure in BCC

Lecture 7 - Soft core and Hard core for Screw dislocation in BCC

Lecture 8 - Dislocation structure in HCP

Lecture 9 - Burger vector and partial dislocation in HCP

Lecture 10 - Dislocation structure in ionic crystal

Lecture 11 - Dislocation structure in superlattices

Lecture 12 - Stacking fault and Kear-Wilsdorf lock in superlattices

Lecture 13 - Dislocation interaction & Strain hardening

Lecture 14 - Origin and Nucleation of dislocations

Lecture 15 - Multiplication of dislocations

Lecture 16 - Interactin of point defects and dislocation - Solid Solution Strengthening

Lecture 17 - Cottrell atmosphere and Yield-point phenomenon

NPTEL : NOC:Corrosion - Part II (Metallurgy and Material Science)

Co-ordinators : Dr. Kallol Mondal

Lecture 1 - Recap of Electrochemical Polarization

Lecture 2 - Recap of Electrochemical Polarization - Activation and Concentration Polarization

Lecture 3 - Electrochemical Polarization: Activation and Concentration Polarization, Tafel Equation

Lecture 4 - Activation and Concentration Polarization: Mixed Potential Theory

Lecture 5 - Concentration Polarization and Mixed Potential Theory

Lecture 6 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Introduction

Lecture 7 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 1

Lecture 8 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 2

Lecture 9 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 2 (Continued...)

Lecture 10 - Explanation of Corrosion Processes on the basis of Mixed Potential Theory - Part 3

Lecture 11 - Effect of Exchange Current Density on Corrosion Rate of an Active Metal

Lecture 12 - Area Effect of the Cathodic and Anodic Component - I

Lecture 13 - Area Effect of the Cathodic and Anodic Component - II

Lecture 14 - Explanation of Corrosion Processess on the Basis of Mixed Potential Theory: Numerical Analysis

Lecture 15 - Galvanic Coupling between Two Active Metals

Lecture 16 - Theory of Sacrificial Anode for the Protection of Steel Objects

Lecture 17 - Effect of two Active Metals on Fe-corrosion when they are Galvanically Coupled

Lecture 18 - Corrosion of Metals when Cathodic Protection is Concentration Controlled

Lecture 19 - Effect of Velocity on the Corrosion Rate of an Active Metal

Lecture 20 - Concentration Polarization and Activation Polarization: Numerical Analysis

Lecture 21 - Numerical Problems and Passivation

Lecture 22 - Theory of Passivation - I

Lecture 23 - Theory of Passivation - II

Lecture 24 - Interaction between Passivation and Pourbaix Diagram - I

Lecture 25 - Interaction between Passivation and Pourbaix Diagram - II

Lecture 26 - Passivity

Lecture 27 - Interaction of Cathodic Polarization with an Active-Passive Metal

Lecture 28 - Interaction of Anodic Polarization with an Active-Passive Metal

Lecture 29 - Passivation and Mixed Potential Theory: Case Studies

Lecture 30 - Passivation and Mixed Potential Theory: Case Studies (Continued...)

Lecture 31 - Effect of Galvanic Coupling between an Active-Passive Metal and a Noble Metal

Lecture 32 - Anodic Protection of an Active-Passive Metal and an Introduction of Linear Polarization

Lecture 33 - Linear Polarization and Understanding Relative Corrosion Resistance of a Metal

Lecture 34 - Oxidation of Metals and Alloys

Lecture 35 - Different Stages of Oxidation and Pilling Bedworth Ratio

Lecture 36 - Pilling Bedworth Ratio of Different Metal Oxides

Lecture 37 - Thermodynamics of Oxidation

Lecture 38 - Construction of Ellingham Diagram - I

Lecture 39 - Construction of Ellingham Diagram - II

Lecture 40 - Kinetics of Oxidation

Lecture 41 - Oxide Structure and Oxidation Mechanism

NPTEL : NOC:Fundamentals and Applications of Dielectric Ceramics (Metallurgy and Material Science)

Co-ordinators : Dr. Ashish Garg

Lecture 1 - Outline of the Course

Lecture 2 - Basics of Crystal Structure

Lecture 3 - Basics of Crystallography and Bonding

Lecture 4 - Arrangement of Atoms in Crystal Lattice

Lecture 5 - Structure Formation: Ionic Solids

Lecture 6 - Pauling's Rule and Crystal Structure of Ceramics

Lecture 7 - Ceramic Materials: Crystal Structure

Lecture 8 - Defect Chemistry

Lecture 9 - Defect Chemistry: Non-Stoichiometric Oxides

Lecture 10 - Concentration and Effect of Intrinsic Impurities

Lecture 11 - Intrinsic and Extrinsic Defects

Lecture 12 - Defect Concentration: Non-Stoichiometric Oxides

Lecture 13 - Intrinsic Ionization in Metal Oxides

Lecture 14 - Brouwer's Diagram

Lecture 15 - Introduction to Dielectrics

Lecture 16 - Dielectric Displacement and Polarization Mechanism

Lecture 17 - Polarization Mechanisms

Lecture 18 - Dielectric Polarizability - 1

Lecture 19 - Dielectric Polarizability - 2

Lecture 20 - Frequency Dependence of Dielectrics

Lecture 21 - Losses in Dielectric Materials

Lecture 22 - Frequency Dependence of Dielectric Constant

Lecture 23 - Dipolar Relaxation

Lecture 24 - Debye Equations for Dipolar Relaxation

Lecture 25 - Impedance Spectroscopy

Lecture 26 - Impedance Spectroscopy and Dielectric Breakdown

Lecture 27 - Basics of Non-linear Dielectrics

Lecture 28 - Piezoelectric Effect

Lecture 29 - Pyroelectric Effect and Electrostriction

Lecture 30 - Thermodynamics of Piezoelectric and Pyroelectric Materials

Lecture 31 - Basics of Ferroelectric Materials

Lecture 32 - Ferroelectric Phase Transitions

Lecture 33 - Thermodynamics of Phase Transition in Ferroelectrics

Lecture 34 - Second Order Phase Transition in Ferroelectric Materials

Lecture 35 - First Order Phase Transition in Ferroelectric Materials

Lecture 36 - Domain Walls in Ferroelectric Materials

Lecture 37 - Domain Structure and Properties of Ferroelectric Materials

Lecture 38 - Phase Diagram and Measurements of Ferroelectric Materials

Lecture 39 - Principal of Measurements and Applications of Piezoelectric and Pyroelectric Materials

Lecture 40 - Applications of Piezoelectric and Pyroelectric Materials

NPTEL : NOC:Properties of Materials (Nature and Properties of Materials-III) (Metallurgy and Material Science)

Co-ordinators : Dr. Ashish Garg

Lecture 1 - Introduction to the Course

Lecture 2 - Basic Material Properties - Stress and Strain Tensor

Lecture 3 - Normal and Shear Stress and Transformation of Axes

Lecture 4 - Transformation of Axes and Principle Stresses

Lecture 5 - True and Engineering Stress and Strain

Lecture 6 - Illustration to True and Engineering Stress and Strain

Lecture 7 - Tensor Notation of Strain

Lecture 8 - Introduction to Elasticity and Elastic Properties

Lecture 9 - Theory of Elasticity

Lecture 10 - Atomic Basis of Elasticity

Lecture 11 - Elasticity of Different Materials, Design of Composites

Lecture 12 - Composites, Anelastic Behaviour

Lecture 13 - Stress-Strain Curve and Anelasticity

Lecture 14 - Mechanism of Anelasticity

Lecture 15 - Relaxation Time and Damping Capacity

Lecture 16 - Plastic Deformation of Materials

Lecture 17 - True and Engineering Stress-Strain Curves

Lecture 18 - Necking Phenomenon During Tension Test

Lecture 19 - Microscopic Mechanism of Plastic Deformation

Lecture 20 - Introduction to Slip

Lecture 21 - Slip Systems

Lecture 22 - Resolved Shear Stress

Lecture 23 - Critical Resolved Shear Stress

Lecture 24 - Theoretical Strength and Role of Dislocations

Lecture 25 - Dislocations and Slip - I

Lecture 26 - Dislocations and Slip - II

Lecture 27 - Dislocations and Peirells Nabarro Stress

Lecture 28 - Dislocation Generation: Frank Read Source

Lecture 29 - Dislocations and Strengthening

Lecture 30 - Strain Hardening

Lecture 31 - Grain Boundary Strengthening

Lecture 32 - Solid Solution Strengthening

Lecture 33 - Precipitation Hardening

Lecture 34 - Electrical Conduction in Metals

Lecture 35 - Free Electron Theory

Lecture 36 - Fermi-Dirac Statistics and Electronic conductivity of Metals

Lecture 37 - Fundamental of Semiconductors

Lecture 38 - Band Theory

Lecture 39 - Intrinsic Semiconductors

Lecture 40 - Extrinsic Semiconductors

NPTEL : NOC:Diffusion in Multicomponent Solids (Metallurgy and Material Science)

Co-ordinators : Prof. Kaustubh Kulkarni

Lecture 1 - Introduction to the Course and Thermodynamics Refresher

Lecture 2 - The Second law of Thermodynamics

Lecture 3 - Application of Second law and Illustration of Intermixing as Irreversible Process

Lecture 4 - Equilibrium, Stability and Phase Diagrams in Single Component Systems

Lecture 5 - Third Law of Thermodynamics and Numerical Examples

Lecture 6 - Thermodynamic Activity and Gibbs Free Energy of Mixing

Lecture 7 - Entropy of mixing of Multicomponent Ideal Solution

Lecture 8 - Regular Solution Model: Application to Ternary System

Lecture 9 - Gibbs Free Energy-Composition Curves, Phase Diagrams and Gibbs Phase rule

Lecture 10 - Exercise: Solution Thermodynamics

Lecture 11 - Driving force for Diffusion, Chemical Potentials and Concentrations

Lecture 12 - Diffusion flux and Frames of Reference

Lecture 13 - Fickâ€™s Law

Lecture 14 - Exercise: Deriving Sigma Cosine for any Cubic Lattice

Lecture 15 - Fick's Law for Multicomponent Diffusion

Lecture 16 - Diffusion Equation and Solution to Steady State Diffusion

Lecture 17 - Conversion of Set of Interdiffusion Coefficients from One Dependent Compared to Another

Lecture 18 - Refresher on Laplace Transform

Lecture 19 - Error Function and Its Laplace transform

Lecture 20 - Instantaneous Planar Source: Solution to Diffusion Equation and Its Applications

Lecture 21 - Solution to Diffusion Equation for Semi-Infinite Slab and Its Application in Carburizing of Steel

Lecture 22 - Solution to Diffusion Equation for Binary Diffusion Couple

Lecture 23 - Solution to Diffusion Equation for Multicomponent Diffusion Couple

Lecture 24 - Nature of Concentration Profiles in Binary and Multicomponent Diffusion Couples

Lecture 25 - Numerical Problems

Lecture 26 - Homogenization of Multicomponent alloys

Lecture 27 - Solution to Diffusion Equation: Periodic Boundary Conditions

Lecture 28 - Energetics of Vacancy Formation

Lecture 29 - Experimental Determination of Enthalpy of Vacancy Formation

Lecture 30 - Mechanisms of Diffusion in Metals and Alloys

Lecture 31 - Point Defects in Intermetallics and Ionic Compounds

Lecture 32 - Diffusion Mechanisms in Intermetallics

Lecture 33 - Theory of Random Walk: Mean Squared Displacement

Lecture 34 - Physical Significance of Diffusivity: Einstein-Smoluchowski Equation

Lecture 35 - Derivation of Correlation Factors in Cubic Crystals by Vacancy Mechanism

Lecture 36 - Correlation Factors for Substitutional Diffusion by Vacancy Mechanism in FCC Crystal

Lecture 37 - Correlation Effects in BCC and Diamond Cubic for Vacancy Mechanism

Lecture 38 - Practice Problems

Lecture 39 - Deriving Relation Between Diffusion Flux and Chemical Potential Gradients

Lecture 40 - Atomic Mobility, Diffusivity and Diffusion Under External Driving Force

Lecture 41 - Non-Ideality as Driving Force

Lecture 42 - Theory of diffusion

Lecture 43 - Experimental Determination of Interdiffusion Coefficients: Boltzmann Matano Analysis

Lecture 44 - Analysis of Interdiffusion Fluxes in Multicomponent Diffusion Couples

Lecture 45 - Various Techniques for Experimental Determination of Multicomponent Interdiffusion Coefficients

Lecture 46 - Experiement Determination of Interdiffusion Coefficients: Examples from Literature

Lecture 47 - Intrinsic Diffusion and Kirkendall Effect

Lecture 48 - Experiemental Determination of Intrinsic Diffusion Coefficients

Lecture 49 - A Brief Introduction to Ternary Phase Diagram

Lecture 50 - Multiphase Diffusion: Diffusion Paths and Diffusion Structures

Lecture 51 - Interdiffusion Analysis of Multiphase Diffusion Couples

NPTEL : NOC:Corrosion Failures and Analysis (Metallurgy and Material Science)

Co-ordinators : Prof. Kallol Mondal

Lecture 1 - An introduction to corrosion failure and analysis

Lecture 2 - Various forms of corrosion

Lecture 3 - Discussion of various factors affecting corrosion

Lecture 4 - Forms of corrosion: Uniform corrosion - Part 1

Lecture 5 - Forms of corrosion: Uniform corrosion - Part 2

Lecture 6 - Galvanic corrosion - I

Lecture 7 - Galvanic corrosion - II

Lecture 8 - Galvanic corrosion - III

Lecture 9 - Galvanic corrosion - IV

Lecture 10 - Importance of galvanic series

Lecture 11 - Factors associated with galvanic corrosion: Case study 1

Lecture 12 - Factors associated with galvanic corrosion: Case study 2

Lecture 13 - Factors associated with galvanic corrosion: Case study 3

Lecture 14 - Preventive measures and advantages of galvanic corrosion

Lecture 15 - Dealloying/Selective leaching

Lecture 16 - Dealloying or selective leaching: Mechanism

Lecture 17 - Dealloying or selective leaching: Applications and protection methods

Lecture 18 - Graphitic corrosion and protection from dezincification

Lecture 19 - Intergranular Corrosion

Lecture 20 - Intergranular corrosion in case of 304, 321 and 347 stainless steel

Lecture 21 - Intergranular Corrosion: Sensitization and Weld Decay

Lecture 22 - Intergranular Corrosion: Control of Sensitization - Weld Decay

Lecture 23 - Intergranular Corrosion: Knife Line Attack and Prevention Methods

Lecture 24 - Crevice Corrosion: Introduction

Lecture 25 - Crevice Corrosion: Mechanism

Lecture 26 - Crevice corrosion: Mechanism and Various stages

Lecture 27 - Crevice corrosion: Case studies and Protection methods

Lecture 28 - Pitting corrosion: Introduction and Case studies

Lecture 29 - Various conditions favouring pitting corrosion - I

Lecture 30 - Various conditions favouring pitting corrosion - II

Lecture 31 - Various conditions favouring pitting corrosion - III

Lecture 32 - Pitting Corrosion: Mechanism and Protection

Lecture 33 - Erosion Corrosion: Introduction

Lecture 34 - Erosion Corrosion: Characteristics

Lecture 35 - Erosion Corrosion: Protection methods and cavitation corrosion

Lecture 36 - Cavitation corrosion and its case studies

Lecture 37 - Cavitation corrosion, Fretting corrosion and their preventive measures

Lecture 38 - Environmental cracking or stress assisted corrosion failures

Lecture 39 - Stress corrosion cracking: Mechanism - I

Lecture 40 - Stress corrosion cracking: Mechanism - II

Lecture 41 - Stress corrosion cracking: Mechanism - III

Lecture 42 - Stress corrosion cracking: Corrosion fatigue and protection methods

NPTEL : NOC:Nanomaterials and their Properties (Metallurgy and Material Science)

Co-ordinators : Prof. Krishanu Biswas

Lecture 1 - Nanomaterials: An Overview - Part I

Lecture 2 - Nanomaterials: An Overview - Part II

Lecture 3 - Nanomaterials: Hierarchial Nanostructures - I

Lecture 4 - Nanomaterials: Hierarchial Nanostructures - II

Lecture 5 - Nanomaterials: Surfaces and Interfaces - I

Lecture 6 - Nanomaterials: Surfaces and Interfaces - I (Continued...)

Lecture 7 - Nanomaterials: Surfaces - I

Lecture 8 - Nanomaterials: Magic Numbers

Lecture 9 - Thermodynamics of Nanomaterials

Lecture 10 - Surfaces and Interfaces - II

Lecture 11 - Thermodynamics of Nanomaterials

Lecture 12 - Surfaces and Interfaces - II (Continued...)

Lecture 13 - Nanophase Diagrams

Lecture 14 - Effect of Size on Phase Diagrams

Lecture 15 - Synthesis of Nanomaterials

Lecture 16 - Synthesis Routes of Nanomaterials - II

Lecture 17 - Mechanical Properties of Nanomaterials - I

Lecture 18 - Mechanical Properties of Nanomaterials - II

Lecture 19 - Thermal Properties of Nanomaterials - I

Lecture 20 - Thermal Properties of Nanomaterials - II

Lecture 21 - Thermal Properties of Nanomaterials - III

Lecture 22 - Thermal Properties of Nanomaterials - III (Continued...)

Lecture 23 - Electrical Property of Nanomaterials

Lecture 24 - Magnetic Properties of Nanomaterials - I

Lecture 25 - Magnetic Properties of Nanomaterials - II

Lecture 26 - Optical Properties of Nanomaterials - I

Lecture 27 - Optical Properties of Nanomaterials - II

Lecture 28 - Special Cases: Carbon-Based Nanomaterials

Lecture 29 - Special Cases: Polymer-Based Nanomaterials

NPTEL : NOC:Mechanical Behaviour of Materials - Part I (Metallurgy and Material Science)

Co-ordinators : Prof. Shashank Shekhar, Prof. Sudhanshu Shekhar Singh

Lecture 1 - Introduction

Lecture 2 - Origin of Elasticity

Lecture 3 - Stress as a Tensor

Lecture 4 - Principal Stress

Lecture 5 - Mohr's Circle

Lecture 6 - Stress-Strain Relation

Lecture 7 - Viscoelasticity

Lecture 8 - Tensile Testing

Lecture 9 - Universal Testing Machine

Lecture 10 - Flow Stress

Lecture 11 - Yield Criterions: Basics

Lecture 12 - Yield Criterions: Tresca, Von-Mises

Lecture 13 - Effective Stress_Effective Strain

Lecture 14 - Plastic Instability

Lecture 15 - Effect of Strain-rate and Temperature

Lecture 16 - Dislocations: Discovery

Lecture 17 - Dislocations: Fundamentals

Lecture 18 - Dislocations: Characteristics

Lecture 19 - Stress and Strain Fields of Dislocations

Lecture 20 - Energy of Dislocations

Lecture 21 - Dislocation Motion Glide

Lecture 22 - Cross-slip of Dislocations

Lecture 23 - Climb motion of Dislocations

Lecture 24 - Steps in Dislocations

Lecture 25 - Slip Systems

Lecture 26 - More on Slip Systems

Lecture 27 - Critical Resolved Shear Stress

Lecture 28 - Dislocation Interactions

Lecture 29 - Image Forces

Lecture 30 - Partial Dislocations

Lecture 31 - Strengthening Mechanisms

Lecture 32 - Precipitation Strengthening: Basic Criteria

Lecture 33 - Precipitation Strengthening: Precipitate Characteristics

Lecture 34 - Precipitation Strengthening: Mechanisms

Lecture 35 - Effect of Temperature: Dispersion Strengthening

Lecture 36 - Solid Solution Strengthening: Basics

Lecture 37 - Solid Solution Strengthening: Interaction with Dislocations

Lecture 38 - Solid Solution Strengthening: Yield Point Phenomenon

Lecture 39 - Grain Boundary Strengthening

Lecture 40 - Strain Hardening: Single Xtal and Poly Crystal Deformation, Tylor Hardening

Lecture 41 - Strain Hardening: Dislocation Multiplication, Intersection and Locks

Lecture 42 - Summary of Strengthening Mechanisms

Lecture 43 - Hardness Testing

Lecture 44 - Impact Testing

Lecture 45 - Mechanical Behaviour of Composites

NPTEL : NOC:Mechanical Behaviour of Materials - Part II (Metallurgy and Material Science)

Co-ordinators : Prof. Sudhanshu Shekhar Singh, Prof. Shashank Shekhar

Lecture 1 - Theoretical Strength

Lecture 2 - Stress Based Approach (Inglis)

Lecture 3 - Energy Based Approach (Griifith)

Lecture 4 - Mode of Deformation and Stress Distribution Ahead of Crack Tip

Lecture 5 - Stress Triaxiality

Lecture 6 - Plastic Zone Size

Lecture 7 - Plastic Zone Size and Shape (Continued...)

Lecture 8 - Stress Intensity Factors for Different Geometries

Lecture 9 - Fracture Toughness

Lecture 10 - Fracture Toughness Measurement

Lecture 11 - Fracture Mechanisms

Lecture 12 - Ductile Fracture Mechanisms

Lecture 13 - Ductile Fracture Mechanisms_Tunneling

Lecture 14 - Cleavage Fracture

Lecture 15 - Fracture Mechanisms (Images)

Lecture 16 - Fatigue (Stress Parameters)

Lecture 17 - Fatigue Testing (S-N curve)

Lecture 18 - Low and High Cycle Fatigue

Lecture 19 - Fatigue Crack Initiation

Lecture 20 - Fatigue Crack Propagation

Lecture 21 - Fatigue Striations, Beachmarks and Images

Lecture 22 - Deformation of Composites

Lecture 23 - Deformation of Composites (Continued...)

Lecture 24 - Toughening of Ceramics

Lecture 25 - Fracture in Polymers

Lecture 26 - Creep Fundamentals

Lecture 27 - Creep Models

NPTEL : NOC:Electronic Properties of the Materials: Computational Approach (Metallurgy and Material Science)

Co-ordinators : Prof. Somnath Bhowmick

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

NPTEL : NOC:Corrosion Protection Methods (Metallurgy and Material Science)

Co-ordinators : Prof. Kallol Mondal

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39

Lecture 40 (Part 1)

Lecture 41 (Part 2)

NPTEL : NOC:Phase Diagrams in Single Component and Binary Systems in Bengali (Metallurgy and Material Science)

Co-ordinators : Prof. Kallol Mondal

Lecture 1 - Introduction to phase diagram

Lecture 2 - Definition of important terms

Lecture 3 - Understanding of thermodynamic equilibrium - I

Lecture 4 - Understanding of thermodynamic equilibrium - II

Lecture 5 - Understanding of thermodynamic equilibrium - III

Lecture 6 - Understanding of thermodynamic equilibrium - IV

Lecture 7 - Significance of chemical potential in phase equilibrium

Lecture 8 - Phase equilibrium in H2O system - Part 1

Lecture 9 - Phase equilibrium in H2O system - Part 2

Lecture 10 - Part A - Phase equilibrium in H2O system - Part 3

Lecture 11 - Part B - Phase equilibrium in H2O system - Part 4

Lecture 12 - Practical importance of water phase diagram

Lecture 13 - Solution thermodynamics - Part I

Lecture 14 - Solution thermodynamics - Part II

Lecture 15 - Solution thermodynamics - Part III

Lecture 16 - Solution thermodynamics - Part IV

Lecture 17 - Solution thermodynamics - Part V

Lecture 18 - Solution thermodynamics - part VI

Lecture 19 - solution thermodynamics - part VII

Lecture 20 - Graphical understanding of free energy and composition of condensed solutions - Part 1

Lecture 21 - Graphical understanding of free energy and composition of condensed solutions - Part 2

Lecture 22 - Free energy composition plots and evolution of phase diagram for condensed solution - I

Lecture 23 - Free energy composition plots and evolution of phase diagram for condensed solution - II

Lecture 24 - Free energy composition plots and evolution of phase diagram for condensed solution - III

Lecture 25 - Free energy composition plots and evolution of phase diagram for condensed solution - IV

Lecture 26 - Free energy composition plots and evolution of phase diagram for condensed solution - V

Lecture 27 - Isomorphous phase diagram, tie line, and lever rule

Lecture 28 - Calculation of phase diagram - Part I

Lecture 29 - Calculation of phase diagram - Part II

Lecture 30 - Introduction to the non-ideal solutions

Lecture 31 - The quasi-chemical approach

Lecture 32 - Quasi-chemical approach to obtain change in enthalpy in regular solutions

Lecture 33 - Effect of enthalpy change in change in Gibbs free energy - Part 1

Lecture 34 - Effect of enthalpy change in change in Gibbs free energy - Part 2

Lecture 35 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - I

Lecture 36 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - II

Lecture 37 - Effect of enthalpy change in change in Gibbs free energy and final Gibbs free energy - III

Lecture 38 - Free energies of liquid and solid solutions

Lecture 39 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - I

Lecture 40 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - II

Lecture 41 - Phase diagram on the basis of enthalpy of mixing of solid and liquid solutions - III

Lecture 42 - Eutectic, peritectic, and eutectoid phase diagrams - Part 1

Lecture 43 - Eutectic, peritectic, and eutectoid phase diagrams - Part 2

Lecture 44 - Phase rule - Part I

Lecture 45 - Derivation of phase rule

NPTEL : NOC:Artificial Intelligence and Machine Learning in Materials Engineering (Metallurgy and Material Science)

Co-ordinators : Prof. Krishanu Biswas

Lecture 1 - Introduction to the course - I

Lecture 2 - Introduction to the course - II

Lecture 3 - Introduction to AI - I

Lecture 4 - Introduction to AI - II

Lecture 5 - Basics of Materials Science - I

Lecture 6 - Basics of Materials Science - II

Lecture 7 - Basics of Materials Science - III

Lecture 8 - Basics of Materials Science - IV

Lecture 9 - Part 1 - Basics of Materials Science - V

Lecture 10 - Part 2 - Basics of Materials Science - VI

Lecture 11 - Part 1 - Basics of Materials Science - VII

Lecture 12 - Part 2 - Basics of Materials Science - VIII

Lecture 13 - Part 1 - Basics of Materials Science - IX

Lecture 14 - Part 2 - Basics of Materials Science - X

Lecture 15 - Part 1 - Basics of Materials Science - XI

Lecture 16 - Part 2 - Basics of Materials Science - XII

Lecture 17 - Part 1 - Basics of Materials Science - XIII

Lecture 18 - Part 2 - Basics of Materials Science - XIV

Lecture 19 - Part 1 - Basics of Materials Science - XV

Lecture 20 - Part 2 - Basics of Materials Science - XVI

Lecture 21 - Part 1 - Basics of Materials Science - XVII

Lecture 22 - Part 2 - Basics of Materials Science - XVIII

Lecture 23 - Part 1 - Basics of Materials Science - XIX

Lecture 24 - Part 2 - Basics of Materials Science - X

Lecture 25 - Part 1 - Basics of Materials Science - XI

Lecture 26 - Part 2 - Basics of Materials Science - XII

Lecture 27 - Part 1 - Basics of Materials Science - XIII

Lecture 28 - Part 2 - Basics of Materials Science - XIV

Lecture 29 - Part 1 - Machine Learning Algorithms - I

Lecture 30 - Part 2 - Machine Learning Algorithms - II

Lecture 31 - Part 1 - Machine Learning Algorithms - III

Lecture 32 - Part 2 - Machine Learning Algorithms - IV

Lecture 33 - Part 1 - Machine Learning Algorithms - V

Lecture 34 - Part 2 - Machine Learning Algorithms - VI

Lecture 35 - Part 1 - Machine Learning Algorithms - VII

Lecture 36 - Part 2 - Machine Learning Algorithms - VIII

Lecture 37 - Part 1 - Machine Learning Algorithms - IX

Lecture 38 - Part 2 - Machine Learning Algorithms - X

Lecture 39 - Part 1 - Machine Learning Algorithms - XI

Lecture 40 - Part 2 - Machine Learning Algorithms - XII

Lecture 41 - Part 1 - Machine Learning Algorithms - XIII

Lecture 42 - Part 2 - Machine Learning Algorithms - XIV

Lecture 43 - Part 1 - Machine Learning Algorithms - XV

Lecture 44 - Part 2 - Machine Learning Algorithms - XVI

Lecture 45 - Part 1 - Machine Learning Algorithms - XVII

Lecture 46 - Part 2 - Machine Learning Algorithms - XVIII

Lecture 47 - Part 1 - Deep Learning Methods - I

Lecture 48 - Part 2 - Deep Learning Methods - II

Lecture 49 - Part 1 - Deep Learning Methods - III

Lecture 50 - Part 2 - Deep Learning Methods - IV

Lecture 51 - Part 1 - Deep Learning Methods - V

Lecture 52 - Part 2 - Deep Learning Methods - VI

Lecture 53 - Part 1 - Deep Learning Methods - VII

Lecture 54 - Part 2 - Deep Learning Methods - VIII

Lecture 55 - Part 1 - Materials Design at Different Length Scale - I

Lecture 56 - Part 2 - Materials Design at Different Length Scale - II

Lecture 57 - Part 1 - Materials Design at Different Length Scale - III

Lecture 58 - Part 2 - Materials Design at Different Length Scale - IV

Lecture 59 - Part 1 - Materials Design at Different Length Scale - V

Lecture 60 - Part 2 - Materials Design at Different Length Scale - VI

Lecture 61 - Part 1 - Molecular Dynamic Simulation

Lecture 62 - Part 2 - Molecular Dynamic Simulation

Lecture 63 - Part 1 - Density Function Theory (DFT)

Lecture 64 - Part 2 - Density Function Theory (DFT)

Lecture 65 - Part 1 - Advanced Deep Learning - I

Lecture 66 - Part 2 - Advanced Deep Learning - II

Lecture 67 - Part 1 - Advanced Deep Learning - III

Lecture 68 - Part 2 - Advanced Deep Learning - IV

Lecture 69 - Part 1 - Data Preprocessing and Error Analyses - I

Lecture 70 - Part 2 - Data Preprocessing and Error Analyses - II

Lecture 71 - Part 1 - Material Informatics - I

Lecture 72 - Part 2 - Material Informatics - II

Lecture 73 - Part 1 - Materials Knowledge and Materials Data Science, Material Informatics - I

Lecture 74 - Part 2 - Materials Knowledge and Materials Data Science, Material Informatics - II

Lecture 75 - Part 1 - Materials knowledge and materials data science, Material informatics - III

Lecture 76 - Part 2 - Materials Knowledge and Materials Data Science, Material Informatics - IV

Lecture 77 - Part 1 - Materials Knowledge and Materials Data Science, Material Informatics - V

Lecture 78 - Part 2 - Conclusion

NPTEL : NOC:Metallurgical and Electronic Waste Recycling (Metallurgy and Material Science)

Co-ordinators : Prof. Arunabh Meshram

Lecture 1 - Introduction to Materials Recycling

Lecture 2 - Classification of Metallurgical and Electronic Wastes - Part 1

Lecture 3 - Classification of Metallurgical and Electronic Wastes - Part 2

Lecture 4 - Importance of Unit Operations - Part 1

Lecture 5 - Importance of Unit Operations - Part 2

Lecture 6 - Pretreatments in Recycling

Lecture 7 - Pyrometallurgy

Lecture 8 - Electrometallurgy

Lecture 9 - Hydrometallurgy

Lecture 10 - Refining

Lecture 11 - Aluminium dross recycling

Lecture 12 - Spent pot lining recycling

Lecture 13 - Red mud recycling

Lecture 14 - Aluminium scrap recycling

Lecture 15 - Salt slag recycling

Lecture 16 - Copper Smelter Slag recycling

Lecture 17 - Copper Smelter Slag and Raffinate recycling

Lecture 18 - Raffinate recycling (Continued...)

Lecture 19 - Spent Electrolyte recycling

Lecture 20 - Copper scrap recycling

Lecture 21 - Zinc ash recycling

Lecture 22 - Zinc ash and zinc dross recycling

Lecture 23 - Zinc dross recycling (Continued...)

Lecture 24 - Zinc dust recycling

Lecture 25 - Zinc dust and zinc scrap recycling

Lecture 26 - Ironmaking slag recycling

Lecture 27 - Ironmaking and steelmaking slag recycling

Lecture 28 - Steelmaking slag recycling (Continued...)

Lecture 29 - Steel scrap recycling

Lecture 30 - Wastewater recycling

Lecture 31 - Recycling of E-Waste

Lecture 32 - Waste Printed Circuit Boards (WPCBs) recycling

Lecture 33 - WPCBs recycling: Delamination

Lecture 34 - WPCBs recycling: Pyrometallurgical processes

Lecture 35 - WPCBs recycling: Hydrometallurgical processes

Lecture 36 - Battery Recycling: Ni-based batteries

Lecture 37 - Battery Recycling: Lead-acid batteries

Lecture 38 - Battery Recycling: Zinc-based batteries

Lecture 39 - Battery Recycling: Li-ion batteries

Lecture 40 - Environmental Impacts of Recycling

Lecture 41 - Conclusion

NPTEL : Advanced ceramics for strategic applications (Metallurgy and Material Science)

Co-ordinators : Prof. H.S. Maiti

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Crystal Structure

Lecture 4 - Crystal Structure (Continued...)

Lecture 5 - Crystal Structure (Continued...)

Lecture 6 - Crystal Structure (Continued...)

Lecture 7 - Defects in crystalline solids

Lecture 8 - Defects in crystalline solids (Continued...)

Lecture 9 - Dislocation

Lecture 10 - Two and Three Dimensional Defects

Lecture 11 - Electrical Conduction in ceramics

Lecture 12 - Electrical Conduction in Ceramics (Continued...)

Lecture 13 - Electrical Conduction in Ceramics (Continued...)

Lecture 14 - Electrical Conduction in Ceramics (Continued...)

Lecture 15 - Electrical Conduction in Ceramics (Continued...)

Lecture 16 - Electrical Conduction in Ceramics (Continued...)

Lecture 17 - Electrical Phenomenon in Insulators

Lecture 18 - Electrical Phenomenon in Insulators (Continued...)

Lecture 19 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics

Lecture 20 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)

Lecture 21 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)

Lecture 22 - Ferroelectric , Piezoelectric and Pyroelectric Ceramics (Continued...)

Lecture 23 - Relaxor Ferroelectric

Lecture 24 - Superconductivity

Lecture 25 - Superconductivity (Continued...)

Lecture 26 - Ceramic Gas Sensor

Lecture 27 - Ceramic Gas Sensor (Continued...)

Lecture 28 - Solid Oxide Fuel Cell

Lecture 29 - Solid Oxide Fuel Cell (Continued...)

Lecture 30 - Solid Oxide Fuel Cell (Continued...)

Lecture 31 - Hydrogen Generation through MIEC Reactor

Lecture 32 - Lithium Ion Battery

Lecture 33 - Lithium Ion Battery (Continued...)

Lecture 34 - Magnetic Ceramics

Lecture 35 - Magnetic Ceramics (Continued...)

Lecture 36 - Magnetic Ceramics (Continued...)

Lecture 37 - Magnetic Ceramics (Continued...)

Lecture 38 - Sintering of Ceramics

Lecture 39 - Sintering of Ceramics (Continued...)

Lecture 40 - Sintering of Ceramics (Continued...)

Lecture 41 - Sintering of Ceramics (Continued...)

Lecture 42 - Mechanical Properties of Ceramic Materials

Lecture 43 - Mechanical Properties of Ceramic Materials (Continued...)

Lecture 44 - Mechanical Properties of Ceramic Materials (Continued...)

Lecture 45 - Mechanical Properties of Ceramic Materials (Continued...)

Lecture 46 - Structural Ceramics Materials

Lecture 47 - Bioceramics

NPTEL : Non-ferrous Extractive Metallurgy (Metallurgy and Material Science)

Co-ordinators : Prof. H.S. Ray, Mr. L. Pugazhenthy

Lecture 1 - Brief History of Non-ferrous Metal

Lecture 2 - Brief History of Non-ferrous Metal (Continued...)

Lecture 3 - Sources of Non-ferrous Metal

Lecture 4 - Mineral Benefication Techniques

Lecture 5 - General Methods of Metal Extraction

Lecture 6 - Principles of Carbon Reduction

Lecture 7 - Principles of Hydrometalling

Lecture 8 - Principles of Electrometallurgy

Lecture 9 - Electrometallurgy (Continued...) and Temkin Model for Fused Salts

Lecture 10 - Refining of Metals - Chemical Methods

Lecture 11 - Refining of Metals - Physical Methods

Lecture 12 - Concluding part of Module - 4

Lecture 13 - Concluding part of Module - 4 (Continued...)

Lecture 14 - Module - 5 Extraction of Metals from Oxides, Extraction of Magnesium

Lecture 15 - Extraction Aluminium

Lecture 16 - Extraction Aluminium (Continued...1)

Lecture 17 - Extraction Aluminium (Continued...2)

Lecture 18 - Extraction Aluminium (Continued...3)

Lecture 19 - Extraction of Tin

Lecture 20 - Extraction of Ferro Alloys

Lecture 21 - Module - 6 Extraction of Metals from Sulphides Extraction of Copper

Lecture 22 - Extraction of Copper (Continued...)

Lecture 23 - Hydrometallurgy of Copper

Lecture 24 - Extraction of Lead

Lecture 25 - Extraction of Zinc-Imperial Smelting Process

Lecture 26 - Module - 7 Extraction of metals from halides, Extraction of reactor metals

Lecture 27 - Extraction of reactor metals (Continued...1)

Lecture 28 - Extraction of reactor metals (Continued...2)

Lecture 29 - Extraction of Titanium

Lecture 30 - Extraction of Precious Metals

Lecture 31 - Production of Secondary Metals and Treatment of Wastes

Lecture 32 - Energy and Environment Related Issues in Nonferrous Metals Production

Lecture 33 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...1)

Lecture 34 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...2)

Lecture 35 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...3)

Lecture 36 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...4)

Lecture 37 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...5)

Lecture 38 - Energy and Environment Related Issues in Nonferrous Metals Production (Continued...6)

Lecture 39 - Nonferrous Metals in India - Unleashing its true potential

Lecture 40 - Nonferrous Metals in India - Unleashing its true potential (Continued...)

Lecture 41 - Review and Summary

Lecture 42 - Review and Summary (Continued...1)

Lecture 43 - Review and Summary (Continued...2)

NPTEL : Principles of Physical Metallurgy (Metallurgy and Material Science)

Co-ordinators : Prof. R.N. Ghosh

Lecture 1 - Introduction

Lecture 2 - Atomic Bond and Crystal Structure

Lecture 3 - Atomic Bond and Crystal Structure (Continued...1)

Lecture 4 - Atomic Bond and Crystal Structure (Continued...2)

Lecture 5 - Experimental Tools & Techniques

Lecture 6 - Experimental Tools & Techniques (Continued...)

Lecture 7 - Solidification of Pure Metal

Lecture 8 - Plastic Deformation of Pure Metal

Lecture 9 - Plastic Deformation of Pure Metal (Continued...)

Lecture 10 - Crystal Defects in Metals

Lecture 11 - Crystal Defects in Metals (Continued...1)

Lecture 12 - Crystal Defects in Metals (Continued...2)

Lecture 13 - Crystal Defects in Metals (Continued...3)

Lecture 14 - Crystal Defects in Metals (Continued...4)

Lecture 15 - Diffusion in Solids

Lecture 16 - Diffusion in Solids (Continued...)

Lecture 17 - Numerical Examples in Diffusion

Lecture 18 - Solidification of Binary Alloys

Lecture 19 - Solidification of Binary Alloys (Continued...1)

Lecture 20 - Solidification of Binary Alloys (Continued...2)

Lecture 21 - Solidification of Binary Alloys (Continued...3)

Lecture 22 - Solidification of Binary Alloys (Continued...4)

Lecture 23 - Iron-Carbon Phase Diagram

Lecture 24 - Iron-Carbon Phase Diagram (Continued...)

Lecture 25 - Ternary Phase Diagram

Lecture 26 - Common Binary Alloys

Lecture 27 - Metal Working : Deformation Processing

Lecture 28 - Metal Working : Deformation Processing (Continued...)

Lecture 29 - Precipitation for Solid Solution

Lecture 30 - Precipitation for Solid Solution (Continued...)

Lecture 31 - Heat Treatment of Steel

Lecture 32 - Heat Treatment of Steel (Continued...1)

Lecture 33 - Heat Treatment of Steel (Continued...2)

Lecture 34 - Heat Treatment of Steel (Continued...3)

Lecture 35 - Heat Treatment of Steel (Continued...4)

Lecture 36 - Heat Treatment of Steel (Continued...5)

Lecture 37 - Surface Hardening

Lecture 38 - Structural Steel

Lecture 39 - Structural Steel (Continued...)

Lecture 40 - Ultra High Strength Steel

Lecture 41 - Preferred Orientation: Application

Lecture 42 - Metal Joining

NPTEL : Processing of Semiconducting Materials (Metallurgy and Material Science)

Co-ordinators : Dr. Pallab Banerji

Lecture 1 - Introduction to Electronics Materials

Lecture 2 - Electrical Conductivity of Materials

Lecture 3 - Direct and Indirect Band Semiconductors

Lecture 4 - Doping in Semiconductors

Lecture 5 - Semiconductor Statistics

Lecture 6 - Importance of Doping

Lecture 7 - Diffusion and Ion Implantation - I

Lecture 8 - Diffusion and Ion Implantation - II

Lecture 9 - Diffusion and Ion Implantation - III

Lecture 10 - Elemental Semiconductors

Lecture 11 - Compound Semiconductors

Lecture 12 - Bulk Crystal Growth - I

Lecture 13 - Bulk Crystal Growth - II

Lecture 14 - Ga As Crystal Growth

Lecture 15 - Defects in Crystals - I

Lecture 16 - Defects in Crystals - II

Lecture 17 - Band Gap Engineering - I

Lecture 18 - Band Gap Engineering - II

Lecture 19 - Chemical Vapour Deposition - I

Lecture 20 - Chemical Vapour Deposition - II

Lecture 21 - MOCVD

Lecture 22 - Molecular Beam Epitaxy - I

Lecture 23 - Molecular Beam Epitaxy - II

Lecture 24 - p - n Junction

Lecture 25 - Carrier Transport in P - N Junction

Lecture 26 - Characterization - I

Lecture 27 - Characterization - II

Lecture 28 - Optical Characterization - I

Lecture 29 - Metal-Semiconductor Contact - I

Lecture 30 - Metal-Semiconductor Contact - II

Lecture 31 - Applications of Metal-Semiconductor Contact

Lecture 32 - Oxidation - I

Lecture 33 - Oxidation - II

Lecture 34 - Different Types of Semiconductor - I

Lecture 35 - Oxidation - I

Lecture 36 - Oxidation - II

Lecture 37 - Dielectric Films

Lecture 38 - Low - K and High - K materials

Lecture 39 - Metallization

Lecture 40 - Materials for Photovoltaics

NPTEL : Science and Technology of Polymers (Metallurgy and Material Science)

Co-ordinators : Prof. B. Adhikari

Lecture 1 - Basic Concepts on Polymers

Lecture 2 - Basic Concepts on Polymers (Continued...)

Lecture 3 - Basic Concepts on Polymers (Continued...)

Lecture 4 - Polymer Raw Materials

Lecture 5 - Principles of Polymer Synthesis

Lecture 6 - Principles of Polymer Synthesis (Continued...)

Lecture 7 - Principles of Polymer Synthesis (Continued...)

Lecture 8 - Principles of Polymer Synthesis (Continued...)

Lecture 9 - Principles of Polymer Synthesis (Continued...)

Lecture 10 - Principles of Polymer Synthesis (Continued...)

Lecture 11 - Structure and Properties of Polymers (Continued...)

Lecture 12 - Structure and Properties of Polymers (Continued...)

Lecture 13 - Structure and Properties of Polymers (Continued...)

Lecture 14 - Structure and Properties of Polymers (Continued...)

Lecture 15 - Polymerization Techniques

Lecture 16 - Polymerization Techniques (Continued...)

Lecture 17 - Polymerization Techniques (Continued...)

Lecture 18 - Polymer Products

Lecture 19 - Polymer Products (Continued...)

Lecture 20 - Rubber Products

Lecture 21 - Rubber Products (Continued...)

Lecture 22 - Conducting Polymers

Lecture 23 - Conducting Polymers (Continued...)

Lecture 24 - Liquid Crystalline Polymers

Lecture 25 - Stimuli Responsive Polymer and its application

Lecture 26 - Stimuli Responsive Polymer and its application (Continued...)

Lecture 27 - Polymeric Nanomaterials and Devices (Continued...)

Lecture 28 - Polymeric Nanomaterials and Devices (Continued...)

Lecture 29 - Polymeric Nanomaterials and Devices (Continued...)

Lecture 30 - Environmental Degradation of Polymers

Lecture 31 - Environmental Degradation of Polymers (Continued...)

Lecture 32 - Polymer Composites

Lecture 33 - Polymer Composites (Continued...)

Lecture 34 - Polymer Composites (Continued...)

Lecture 35 - Multicomponent Polymeric Materials

Lecture 36 - Multicomponent Polymeric Materials (Continued...)

Lecture 37 - Multicomponent Polymeric Materials (Continued...)

Lecture 38 - Viscoelasticity

Lecture 39 - Engineering and Speciality Polymers

Lecture 40 - Engineering and Speciality Polymers (Continued...)

NPTEL : Advanced Materials and Processes (Metallurgy and Material Science)

Co-ordinators : Prof. B.S. Murty

Lecture 1 - Structure of Materials - Part I

Lecture 2 - Structure of Materials - Part II

Lecture 3 - Nano Crystalline Materials - Part I

Lecture 4 - Nano Crystalline Materials - Part II

Lecture 5 - Nano Crystalline Materials - Part III

Lecture 6 - Nano Crystalline Materials - Part IV

Lecture 7 - Amorphous Materials - Part I

Lecture 8 - Amorphous Materials - Part II

Lecture 9 - Amorphous Materials - Part III

Lecture 10 - Amorphous Materials - Part IV

Lecture 11 - Amorphous Materials - Part V

Lecture 12 - Quasicrystals - Part I

Lecture 13 - Quasicrystals - Part II

Lecture 14 - Nano Quasicrystals - Part I

Lecture 15 - Nano Quasicrystals - Part II

Lecture 16 - Rapid Solidification Processing

Lecture 17 - Mechanical Alloying

Lecture 18 - Advanced AI Alloys - Part I

Lecture 19 - Advanced AI Alloys - Part II

Lecture 20 - Advanced AI Alloys - Part III

Lecture 21 - Advanced AI Alloys - Part IV and Ti Alloys

Lecture 22 - Shape Memory Alloys

Lecture 23 - Strengthening Mechanisms - Part I

Lecture 24 - Strengthening Mechanisms - Part II

Lecture 25 - Superalloys

Lecture 26 - In-Situ Composites - Part I

NPTEL : NOC:Principles of Polymer Synthesis (Metallurgy and Material Science)

Co-ordinators : Prof. Rajat K Das

Lecture 1 - Historical development of polymer science

Lecture 2 - Molecular Weight Determination Of Polymers

Lecture 3 - Molecular Weight Determination Of Polymers (Continued...)

Lecture 4 - Molecular Weight Determination of Polymers (Continued...)

Lecture 5 - Molecular Weight Determination of Polymers (Continued...)

Lecture 6 - Principles of step growth polymerization

Lecture 7 - Principles of step growth polymerization (Continued...)

Lecture 8 - Principles of step growth polymerization (Continued...)

Lecture 9 - Principles of step growth polymerization (Continued...)

Lecture 10 - Principles of step growth polymerization (Continued...)

Lecture 11 - Principles of radical chain polymerization

Lecture 12 - Principles of radical chain polymerization (Continued...)

Lecture 13 - Principles of radical chain polymerization (Continued...)

Lecture 14 - Principles of radical chain polymerization (Continued...)

Lecture 15 - Principles of radical chain polymerization (Continued...)

Lecture 16 - Principles of radical chain polymerization (Continued...)

Lecture 17 - Principles of Chain Copolymerization

Lecture 18 - Principles of Chain Copolymerization (Continued...)

Lecture 19 - Principles of Chain Copolymerization (Continued...)

Lecture 20 - Principles of Living Chain polymerization

Lecture 21 - Principles of Living Chain polymerization (Continued...)

Lecture 22 - Design of Chemical Reactors

Lecture 23 - Design of Chemical Reactors (Continued...)

Lecture 24 - Design of Chemical Reactors (Continued...)

Lecture 25 - Design of Chemical Reactors (Continued...)

Lecture 26 - Design of Chemical Reactors (Continued...)

Lecture 27 - Design of Chemical Reactors (Continued...)

Lecture 28 - Design of Chemical Reactors (Continued...)

Lecture 29 - Design of Chemical Reactors (Continued...)

Lecture 30 - Design of Chemical Reactors (Continued...)

Lecture 31 - Design of Chemical Reactors (Continued...)

Lecture 32 - Synthesis of industrial polymers

Lecture 33 - Synthesis of industrial polymers (Continued...)

Lecture 34 - Synthesis of industrial polymers (Continued...)

Lecture 35 - Synthesis of industrial polymers (Continued...)

Lecture 36 - Synthesis of industrial polymers (Continued...)

Lecture 37 - Synthesis of industrial polymers (Continued...)

Lecture 38 - Synthesis of industrial polymers (Continued...)

Lecture 39 - Synthesis of industrial polymers (Continued...)

Lecture 40 - Synthesis of industrial polymers (Continued...)

Lecture 41 - Synthesis of industrial polymers (Continued...)

Lecture 42 - Synthesis of industrial polymers (Continued...)

Lecture 43 - Synthesis of industrial polymers (Continued...)

Lecture 44 - Synthesis of industrial polymers (Continued...)

Lecture 45 - Synthesis of industrial polymers (Continued...)

Lecture 46 - Synthesis of industrial polymers (Continued...)

Lecture 47 - Synthesis of industrial polymers (Continued...)

NPTEL : NOC:Advanced Materials and Processes (Metallurgy and Material Science)

Co-ordinators : Prof. Jayanta Das

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Introduction (Continued...)

Lecture 4 - Introduction (Continued...)

Lecture 5 - Introduction (Continued...)

Lecture 6 - Bulk Metallic Glass, Glassy and Amorphous Materials

Lecture 7 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 8 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 9 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 10 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 11 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 12 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 13 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 14 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 15 - Bulk Metallic Glass, Glassy and Amorphous Materials (Continued...)

Lecture 16 - Shape Memory Alloys

Lecture 17 - Shape Memory Alloys (Continued...)

Lecture 18 - Shape Memory Alloys (Continued...)

Lecture 19 - Shape Memory Alloys (Continued...)

Lecture 20 - Shape Memory Alloys (Continued...)

Lecture 21 - Shape Memory Alloys: Case Studies and Applications

Lecture 22 - Shape Memory Alloys: Case Studies and Applications (Continued...)

Lecture 23 - Shape Memory Alloys: Case Studies and Applications (Continued...)

Lecture 24 - Shape Memory Alloys: Case Studies and Applications (Continued...)

Lecture 25 - Shape Memory Alloys: Case Studies and Applications (Continued...)

Lecture 26 - Introduction of High Temperature Materials

Lecture 27 - Introduction of High Temperature Materials (Continued...)

Lecture 28 - Introduction of High Temperature Materials (Continued...)

Lecture 29 - Introduction of High Temperature Materials (Continued...)

Lecture 30 - Introduction of High Temperature Materials (Continued...)

Lecture 31 - Supearalloys

Lecture 32 - Supearalloys (Continued...)

Lecture 33 - Supearalloys (Continued...)

Lecture 34 - Supearalloys (Continued...)

Lecture 35 - Supearalloys (Continued...)

Lecture 36 - Nanomaterials: Part I

Lecture 37 - Nanomaterials: Part I (Continued...)

Lecture 38 - Nanomaterials: Part I (Continued...)

Lecture 39 - Nanomaterials: Part I (Continued...)

Lecture 40 - Nanomaterials: Part I (Continued...)

Lecture 41 - Nanomaterials: Part II

Lecture 42 - Nanomaterials: Part II (Continued...)

Lecture 43 - Nanomaterials: Part II (Continued...)

Lecture 44 - Nanomaterials: Part II (Continued...)

Lecture 45 - Nanomaterials: Part II (Continued...)

Lecture 46 - Soft and Hard Magnetic Materials

Lecture 47 - Soft and Hard Magnetic Materials (Continued...)

Lecture 48 - Soft and Hard Magnetic Materials (Continued...)

Lecture 49 - Soft and Hard Magnetic Materials (Continued...)

Lecture 50 - Soft and Hard Magnetic Materials (Continued...)

Lecture 51 - Advanced Processes

Lecture 52 - Advanced Processes (Continued...)

Lecture 53 - Advanced Processes (Continued...)

Lecture 54 - Advanced Processes (Continued...)

Lecture 55 - Advanced Processes (Continued...)

Lecture 56 - Advanced Functional Alloys

Lecture 57 - Advanced Functional Alloys (Continued...)

Lecture 58 - Advanced Functional Alloys (Continued...)

Lecture 59 - Advanced Functional Alloys (Continued...)

Lecture 60 - Advanced Functional Alloys (Continued...)

NPTEL : NOC:Surface Engineering for Corrosion and Wear Resistance Application (Metallurgy and Material Science)

Co-ordinators : Prof. Jyotsna Dutta Majumder, Prof. I. Manna

Lecture 1 - Structure of Solids

Lecture 2 - Microstructure of Solids

Lecture 3 - Defects in Crystalline Solids

Lecture 4 - Surface and Surface Energy

Lecture 5 - Surface Properties-due to mechanical activation

Lecture 6 - Surface dependent physical and chemical property

Lecture 7 - Surface Dependent Properties and Surface initiated Degradation

Lecture 8 - Fatigue

Lecture 9 - Wear Part - I

Lecture 10 - Wear Part - II

Lecture 11 - Wear Part - III

Lecture 12 - Corrosion - I

Lecture 13 - Corrosion - II

Lecture 14 - Corrosion - III

Lecture 15 - Corrosion - IV

Lecture 16 - Corrosion - V

Lecture 17 - Classification of Surface engineering

Lecture 18 - Strengthening of metals

Lecture 19 - Strengthening of Non-Metals

Lecture 20 - Diffusive transformation in Steel

Lecture 21 - Non-Diffusive transformation in Steel

Lecture 22 - Shot Peening

Lecture 23 - Shot Peening and Rolling

Lecture 24 - Flame Hardening and Induction Hardening

Lecture 25 - Case Carburizing

Lecture 26 - Liquid Carburizing and Gas Carburizing

Lecture 27 - Gas Nitriding

Lecture 28 - Liquid and Salt Bath Nitriding

Lecture 29 - Plasma Nitriding and Ion Implantation

Lecture 30 - Heat treatment after carburizing and Nitriding

Lecture 31 - Diffusion Coating Principle

Lecture 32 - Diffusion Coating Processes

Lecture 33 - Thick Coating by Cladding

Lecture 34 - High Temperature Degradation

Lecture 35 - Corrosion Prevention

Lecture 36 - Chemical Conversion Coating

Lecture 37 - Electroconversion Coating

Lecture 38 - Electro and Electroless Deposition Process

Lecture 39 - Hot Dipping - I

Lecture 40 - Hot Dipping - II

Lecture 41 - Thermal Spray Deposition - I

Lecture 42 - Thermal Spray Deposition - II

Lecture 43 - Thermal Spray Deposition - III

Lecture 44 - Thermal Spray Deposition - IV

Lecture 45 - Physical Vapur Deposition (PVD)

Lecture 46 - Sputtering

Lecture 47 - Chemical Vapor Deposition (CVD)

Lecture 48 - Composite Coating

Lecture 49 - Ion Implantation - I

Lecture 50 - Ion Implantation - II

Lecture 51 - Electron Beam Welding

Lecture 52 - Electron Beam Surface engineering

Lecture 53 - Laser Materials Processing: Introduction

Lecture 54 - Laser Assisted Materials Processing:Processes

Lecture 55 - Laser Surface Engineering:Hardening and Melting

Lecture 56 - Laser Surface Engineering with Laser surface hardening and laser surface melting

Lecture 57 - Laser Surface Alloying

Lecture 58 - Laser Surface Cladding

Lecture 59 - Surface Damage - Case Studies

Lecture 60 - Overview and Conclusion

NPTEL : NOC:Ironmaking and Steelmaking (Metallurgy and Material Science)

Co-ordinators : Prof. Gour Gopal Roy

Lecture 1 - Introduction

Lecture 2 - Various Routes of steelmaking

Lecture 3 - The Iron Blast Furnace

Lecture 4 - Thermodynamics of BF ironmaking

Lecture 5 - Thermodynamics of BF Ironmaking (Continued...)

Lecture 6 - Overall Heat and Material Balance in Blast Furnace

Lecture 7 - RIST Diagram based on overall heat and material balance

Lecture 8 - RIST Diagram based on heat and material balance in the Wustite Reserve Zone

Lecture 9 - Kinetics of gas solid reaction: Iron oxide reduction - Part 1

Lecture 10 - Kinetics of gas solid reaction: Iron oxide reduction - Part 2

Lecture 11 - Aerodynamics in Blast Furnace - Part 1

Lecture 12 - Aerodynamics in Blast Furnace - Part 2: Channeling

Lecture 13 - Aerodynamics in Blast Furnace - Part 3: Flooding

Lecture 14 - Coke rate and Fuel efficiency in Blast Furnace

Lecture 15 - oxygen enrichment of blast

Lecture 16 - Blast Furnace and it's Raw Material

Lecture 17 - Sintering of Iron Ore

Lecture 18 - Pelletization of Iron Ore

Lecture 19 - Coking Process

Lecture 20 - Testing of Burden Material

Lecture 21 - Burden Distribution

Lecture 22 - Blast Furnace products and their utilization

Lecture 23 - Blast Furnace Productivity

Lecture 24 - Modeling of Blast Furnace

Lecture 25 - New Potential Technologies for Blast Furnace

Lecture 26 - History of Steelmaking

Lecture 27 - Properties of slag

Lecture 28 - The Reaction Equilibria Unlisted

Lecture 29 - Dephosphorization of liquid steel

Lecture 30 - Kinetics of slag metal reaction

Lecture 31 - LD steelmaking: Basics, process steps, emulsion formation and stabilization

Lecture 32 - LD Steel making: Oxygen lance and jet action and decarburization

Lecture 33 - Evolution of impurities in steel and slag constituents during LD processing

Lecture 34 - Hybrid Processes

Lecture 35 - Electric steel making

Lecture 36 - Secondary Steel making: Introduction and de-oxidation

Lecture 37 - Secondary Steel making: Introduction and de-oxidation (Continued...)

Lecture 38 - Secondary Steel making: Vacuum Techniques for refining steel

Lecture 39 - Homogenization and Gas stirred ladle

Lecture 40 - Ladle de-sulphurization, alloying, stainless steel making

Lecture 41 - Inclusion and its control

Lecture 42 - Injection Metallurgy: Submerged injection of calcium powder

Lecture 43 - Cored wire injection-Modeling, melting sequence, effect of operating parameters

Lecture 44 - IM: Cored wire injection: Industrial implications

Lecture 45 - IM: Tundish metallurgy and design

Lecture 46 - Casting fundamentals- Heat Transfer

Lecture 47 - Casting fundamentals- segregation

Lecture 48 - Morphology of solidification structure and Ingot casting

Lecture 49 - Continuous casting

Lecture 50 - Downstream processing and near net shape casting

Lecture 51 - Introduction to Direct Reduction (DR) and smelting Reduction (SR) Processes

Lecture 52 - Introduction to Direct Reduction (DR) and smelting Reduction (SR) Processes (Continued...)

Lecture 53 - Coal Based DR Processes

Lecture 54 - Coal Based DR Processes (Continued...)

Lecture 55 - Gas based DR Processes

Lecture 56 - Gas based DR Processes (Continued...)

Lecture 57 - Smelting Reduction (SR) Processes

Lecture 58 - Smelting Reduction (SR) Processes (Continued...)

Lecture 59 - Ironmaking and Steelmaking in India

Lecture 60 - Ironmaking and Steelmaking in India (Continued...)

NPTEL : NOC:Non-Metallic Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Subhasish Basu Majumder

Lecture 1 - Classification and applications of non-metallic materials

Lecture 2 - Understanding on polymer structures

Lecture 3 - Characteristics of polymers and advanced polymeric materials

Lecture 4 - Processing of polymers

Lecture 5 - Polymer composites and issues related to recycling

Lecture 6 - Defects in crystalline materials:point, line, planar and three dimensional defects

Lecture 7 - Non- stoichiometry in non-metallic materials

Lecture 8 - Laws of thermodynamics, reaction kinetics - Part 1

Lecture 9 - Laws of thermodynamics, reaction kinetics - Part 2

Lecture 10 - Phase diagram and microstructure evolution in non-metallic materials

Lecture 11 - Carbonaceous materials

Lecture 12 - Fundamental of diffusion, Fickâ€™s laws, their solution and applications - Part 1

Lecture 13 - Fundamental of diffusion, Fickâ€™s laws, their solution and applications - Part 2

Lecture 14 - Phase transformation of non-metallic materials

Lecture 15 - Introduction to glass and amorphous solids

Lecture 16 - Understanding on conventional glass and amorphous solids

Lecture 17 - Glass-ceramics and specialty glasses

Lecture 18 - Mechanical properties of non-metallic materials, stress-strain response, elastic, and plastic deformation

Lecture 19 - Brittle and ductile materials, introduction to fracture mechanics, strength of brittle materials

Lecture 20 - Strengthening of materials, fatigue, and creep

Lecture 21 - Composite materials: Particle-reinforced composites, and fiber reinforced composites

Lecture 22 - Structural Composite

Lecture 23 - Dielectric and piezoelectric behavior

Lecture 24 - Ferroelectric Behaviour of Non-Metallic Materials and Ferroelectric thin film for Non-Volatile Memory Applications

Lecture 25 - Magnetic Properties : Origin of Magnetism, Para, Dia, Ferro, and Ferrimagnetism

Lecture 26 - Ceramic Magnets and their Applications

Lecture 27 - Thermal Properties : Specific Heat, Heat Conduction, Thermal Diffusivity, Thermal expansion

Lecture 28 - Thermoelectric Effect and Magnetocaloric Effect

Lecture 29 - Optical properties: Refractive index, absorption and transmission of electromagnetic radiation, LASERS

Lecture 30 - Introduction to electrochemistry, Galvanic cells, Cell potentials and Gibbs Energy, Concentration dependence

Lecture 31 - Electrochemical storage, rechargeable batteries

Lecture 32 - Introduction to electrochemical methods; cyclic voltammetry and other related techniques

Lecture 33 - Fuel Cell and Energy harvesting

Lecture 34 - Preparation of ceramic powders: auto-combustion, sol-gel synthesis, microwave assisted hydrothermal synthesis

Lecture 35 - Introduction to sintering, sintering mechanism

Lecture 36 - Solid-state sintering and microstructure development

Lecture 37 - Solid-state sintering and microstructure development (Continued...)

Lecture 38 - Liquid phase sintering and microstructure development, speciality sintering, reactive sintering

Lecture 39 - Processing of glass and amorphous/non-crystalline solids

Lecture 40 - Fundamental of thin film growth, growth mechanism and kinetics

Lecture 41 - Thin film growth techniques, thermal evaporation, CVD, sputtering, CSD

Lecture 42 - Fundamentals and processing of conducting and semiconducting ceramic devices

Lecture 43 - Processing of ceramics devices

Lecture 44 - Organic electronic materials: conducting polymers, semi-conducting organic materials, applications

Lecture 45 - Thermal analyses

Lecture 46 - Introduction of spectroscopic technique : UV-VIS spectroscopy

Lecture 47 - Infra-red and Raman spectroscopy

Lecture 48 - Optical and scanning electron microscopy

Lecture 49 - X-ray photoelectron spectroscopy

Lecture 50 - Measurement of mechanical properties, fracture toughness, MOR, hardness

Lecture 51 - Ferroelectric thin film: synthesis and characterization

Lecture 52 - Thermal analysis techniques: Differential scanning calorimetry and thermogravimetry

Lecture 53 - Measurement of optical properties

Lecture 54 - Novel ferroic composites: Synthesis and measurement

Lecture 55 - Fundamentals of corrosion, corrosion of materials

Lecture 56 - Oxidation, corrosion of ceramic materials, degradation of polymers: swelling and dissolution, bond rupture, weathering

Lecture 57 - Ceramics in biology and medicine

Lecture 58 - Design of Ceramics

Lecture 59 - Finishing of Ceramics

Lecture 60 - Fly-ash based glazed wall tiles: A case study

NPTEL : NOC:Scanning Electron-Ion-Probe Microscopy in Materials Characterization (Metallurgy and Material Science)

Co-ordinators : Prof. Debabrata Pradhan

Lecture 1 - Introduction to Microscopy

Lecture 2 - Scanning Electron Microscopy

Lecture 3 - SEM and Its Capabilities

Lecture 4 - Main Components of SEM - Electron Guns

Lecture 5 - Main Components of SEM - Electron Guns and Electromagnetic Lenses

Lecture 6 - Electron Probe Diameter Verses Electron Probe Current

Lecture 7 - Electron Beam - Specimen Interaction

Lecture 8 - Detectors

Lecture 9 - BSE Detector and Sample Preparation for SEM

Lecture 10 - Parameters Need to be Considered to obtain a Good SEM Image

Lecture 11 - How to Get a Good SEM Image

Lecture 12 - Additional Capabilities of SEM

Lecture 13 - Additional Capabilities of SEM (Continued...)

Lecture 14 - Additional Capabilities of SEM (Continued...)

Lecture 15 - Scanning Ion Microscopy - An Introduction

Lecture 16 - Ions Versus Electrons as Source for Microscopy

Lecture 17 - Ions Source in HIM

Lecture 18 - GFIS Properties and Ion Optical Column

Lecture 19 - Ion Optical Column

Lecture 20 - Ion-Solid Interactions and Signal Generation

Lecture 21 - Signal Generation and Contrast Mechanism

Lecture 22 - Contrast Mechanism and Imaging Modes

Lecture 23 - Scanning Transmission Ion Microscopy and Microanalysis with HIM

Lecture 24 - Creation and Modification of Materials by HIM

Lecture 25 - Introduction to Scanning Probe Microscopy

Lecture 26 - STM Instrumentation

Lecture 27 - Main Components of STM

Lecture 28 - Main Components of STM (Continued...)

Lecture 29 - Main Components of STM (Continued...)

Lecture 30 - Working Principle of STM

Lecture 31 - Operating Modes

Lecture 32 - Scanning Tunneling Spectroscopy

Lecture 33 - SPM - Atomic Force Microscopy (AFM)

Lecture 34 - Force Between Tip and Sample in AFM

Lecture 35 - Atomic Force Microscope - Parts

Lecture 36 - Modes of AFM Operation

Lecture 37 - Modes of AFM Operation (Continued...)

Lecture 38 - AFM Imaging

Lecture 39 - Phase Imaging, Noises and Resolution

Lecture 40 - Surface Properties Measurements using Other Forces

Lecture 41 - Surface Properties Measurements using AFM

Lecture 42 - Manipulation of Atoms, Molecules and Industrial Applications

Lecture 43 - Summary

NPTEL : NOC:Techniques of Material Characterization (Metallurgy and Material Science)

Co-ordinators : Prof. Shibayan Roy

Lecture 1 - Introduction to the course and basic principles of image formation

Lecture 2 - Image formation, resolution, magnification, depth of field and depth of focus

Lecture 3 - Aberrations in microscopy: General concepts

Lecture 4 - Introduction, types and image formation in Optical microscopy

Lecture 5 - Components of optical microscope

Lecture 6 - Bright field and Dark field modes

Lecture 7 - Phase contrast optical microscopy

Lecture 8 - Polarized light microscopy

Lecture 9 - Differential interference contrast

Lecture 10 - Fluorescence microscopy

Lecture 11 - Basic components of electron microscope

Lecture 12 - Basic components of electron microscope (Continued...)

Lecture 13 - Basic components of electron microscope (Continued...)

Lecture 14 - Electron-material interaction

Lecture 15 - Electron-material interaction (Continued...)

Lecture 16 - Electron-material interaction (Continued...) and Image formation and contrast generation

Lecture 17 - Modes of TEM (BF and DF)

Lecture 18 - Modes of TEM

Lecture 19 - Modes of TEM (Continued...) and Electron diffraction in TEM

Lecture 20 - Electron diffraction in TEM

Lecture 21 - Electron diffraction in TEM (Continued...)

Lecture 22 - Electron diffraction in TEM (Continued...)

Lecture 23 - Electron diffraction in TEM (Continued...)

Lecture 24 - Electron diffraction in TEM (Continued...)

Lecture 25 - Application of Electron diffraction

Lecture 26 - Signal generation in SEM

Lecture 27 - Signal generation in SEM (Continued...)

Lecture 28 - Signal generation in SEM (Continued...)

Lecture 29 - Signal generation in SEM (Continued...)

Lecture 30 - Signal generation in SEM (Continued...)

Lecture 31 - Basic components of SEM

Lecture 32 - Basic components of SEM (Continued...)

Lecture 33 - Optics of SEM

Lecture 34 - Optics of SEM (Continued...)

Lecture 35 - Optics of SEM (Continued...) and analytical detectors

Lecture 36 - Analytical detectors in SEM

Lecture 37 - Analytical (WDS) detector and contrast formation in SEM

Lecture 38 - Imaging in SEM

Lecture 39 - Imaging in SEM (Continued...)

Lecture 40 - Imaging in SEM (Continued...)

Lecture 41 - Imaging in SEM and X-ray diffraction

Lecture 42 - Continuous and characteristics X-ray spectrum

Lecture 43 - Characteristics X-ray radiation

Lecture 44 - Characteristics X-ray radiation (Continued...) and X-ray absorption

Lecture 45 - X-ray absorption (Continued...)

Lecture 46 - X-ray absorption and filters

Lecture 47 - Intensity of diffracted beam

Lecture 48 - Intensity of diffracted beam (Continued...)

Lecture 49 - Intensity of diffracted beam (Continued...)

Lecture 50 - Intensity of diffracted beam (Continued...)

Lecture 51 - Intensity of diffracted beam (Continued...)

Lecture 52 - Intensity of diffracted beam (Continued...)

Lecture 53 - Intensity of diffracted beam (Continued...)

Lecture 54 - Intensity of diffracted beam (Continued...)

Lecture 55 - Intensity of diffracted beam (Continued...)

Lecture 56 - Intensity of diffracted beam (Continued...) and X-ray diffraction profile and analysis

Lecture 57 - X-ray diffraction profile and analysis

Lecture 58 - X-ray diffraction profile and analysis (Continued...)

Lecture 59 - X-ray diffraction profile and analysis (Continued...)

Lecture 60 - Electron backscatter diffraction (EBSD)

NPTEL : NOC:Electrochemical Energy Storage (Metallurgy and Material Science)

Co-ordinators : Prof. Subhasish Basu Majumder

Lecture 1 - Fundamentals of electrochemistry, definition of primary and secondary batteries

Lecture 2 - Primary batteries and Secondary batteries

Lecture 3 - Supercapacitors

Lecture 4 - Concepts of thermodynamics pertinent to electrochemical cells

Lecture 5 - Kinetics of electrochemical cells and structural characteristics of electrodes

Lecture 6 - Introduction to EMF, redox potential, Faraday law and Nernstâ€™s law

Lecture 7 - Terminology related to secondary battery : half-cell,full-cell, redox couple,positive

Lecture 8 - Measurements: Cyclic voltammetry, nominal voltage, capacity, rate performance

Lecture 9 - Impedance spectroscopy measurement and analyses

Lecture 10 - Measurement of rechargeable cell: Case study

Lecture 11 - History and categories of lithium batteries

Lecture 12 - Operational mechanisms for lithium batteries: Intercalation materials, alloys

Lecture 13 - Differences of voltage profiles between intercalation materials, alloys, and conversion

Lecture 14 - Properties of electrode materials (Case study: alloy as anode)

Lecture 15 - Properties of electrode materials (conversion type oxide as case study)

Lecture 16 - Positive electrodes: Lithiated transition metal oxides, lithiated iron oxyphosphates etc

Lecture 17 - Negative electrodes: Carbonaceous materials, lithium titanium oxides etc

Lecture 18 - Electrolyte :Liquid Electrolyte, Polymer Electrolyte

Lecture 19 - Current Collector, Conductive Agents, Separator and Other Accessories

Lecture 20 - Novel materials for lithium ion rechargeable cells

Lecture 21 - Principle of Operation of Commerical Cells : viz. C - NMC, C - NCA etc

Lecture 22 - Principle of operation of commercial cells

Lecture 23 - Major characteristics of commercial Li ion cells: Cell performance,degradation phenomena

Lecture 24 - Fabrication of Li ion cell: Cylindrical configuration

Lecture 25 - Fabrication of Li ion cell: Pouch and prismatic cell

Lecture 26 - Positive electrodes: Layered oxide, polyanionic compounds (phosphates, sulphates etc)

Lecture 27 - Negative electrodes: Carbonaceous materials, alloy based and other materials

Lecture 28 - Electrolytes: Roles and requirements, organic electrolyte, ionic liquid electrolyte

Lecture 29 - Performance of Na ion rechargeable cell

Lecture 30 - Future perspective of Na ion cells

Lecture 31 - Introduction to battery module, BMS, thermal management and pack design

Lecture 32 - Degradation and safety issues of Li ion rechargeable cells

Lecture 33 - Introduction to battery management system: BMS topologies, hardware, concept of active

Lecture 34 - Introduction to thermal management: Active thermal management system, passive thermal

Lecture 35 - Packaging of battery pack and battery testing: Material selection, sealing of enclosure

Lecture 36 - Classification of supercapacitors: EDLC and pseudocapacitative type

Lecture 37 - Pseudocapacitor

Lecture 38 - Asymmetric supercapacitor and BATCAP: Battery supercapacitor hybrid electrochemical

Lecture 39 - Electrolytes for supercapacitors: Aqueous/organic liquid electrolytes/ionic liquid

Lecture 40 - Current collectors, separators etc. and their effect on performance

Lecture 41 - Operational principles of aqueous and Li - O2 batteries

Lecture 42 - Electrolytes for Li - O2 batteries

Lecture 43 - Limitations of Li - Air batteries

Lecture 44 - State of the art Li - Air batteries : Carbonaceous materials

Lecture 45 - State of the art Li - Air batteries: Case study

Lecture 46 - The element sulfur, principle of operation

Lecture 47 - Advantages and disadvantages of Li - S batteries, positive electrodes

Lecture 48 - Electrolyte and negative electrode for Li - S battery

Lecture 49 - State of the art Li - S batteries : Case study - I

Lecture 50 - State of the art Li - S batteries : Case study - II

Lecture 51 - Global Geographic Distribution of Raw Lithium Resources

Lecture 52 - Nature and geological origin of all potential lithium resources

Lecture 53 - State of the art extraction techniques and known production reserves

Lecture 54 - Recycling of lithium and other battery constituents from used battery

Lecture 55 - Recycling of lithium and other battery constituents from used battery (Continued...)

Lecture 56 - Lead Acid Batteries: Operational principles, main characteristics and applications

Lecture 57 - Lead Acid Batteries: Operational principles, main characteristics and applications (Continued...)

Lecture 58 - Ni-Cd and Ni-MeH Batteries: Operational principles, main characteristics and applications

Lecture 59 - Redox flow battery vanadium redox battery,operational principle, and main characteristics

Lecture 60 - Other Redox Flow Battery Technologies

NPTEL : NOC:Texture in Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Somjeet Biswas

Lecture 1 - Introduction

Lecture 2 - Texture and Anisotropy

Lecture 3 - Processing - Texture - Anisotropic Properties

Lecture 4 - Crystal Structure and Stereographic Projections

Lecture 5 - Utilization of Stereographic Projections

Lecture 6 - Diffraction and Bragg's Law

Lecture 7 - Structure Factor and Diffraction Extinction Criteria

Lecture 8 - Structure factor and diffraction extinction criteria (Continued...)

Lecture 9 - Pole figures

Lecture 10 - Pole figures (Continued...)

Lecture 11 - Inverse Pole Figures

Lecture 12 - Three Dimensional Texture Analysis

Lecture 13 - Euler Angles and ODFs

Lecture 14 - Euler Angles and ODFs (Continued...)

Lecture 15 - Euler Angles and ODFs (Continued...)

Lecture 16 - Euler Angles and ODFs (Continued...)

Lecture 17 - Symmetry Effects on Orientation Matrix

Lecture 18 - Euler Space and Orientation Matrices

Lecture 19 - Texture Fibre, Periodicity in Euler Space, Incomplete Pole Figures

Lecture 20 - Crystal Structures and Symmetry

Lecture 21 - Size of Euler Space in Relation to Crystal and Sample Symmetry

Lecture 22 - Macrotexture and Microtexture Measurements

Lecture 23 - Penetration Depth of X-ray, Neutron, e-1 and Basics of X-ray Generation

Lecture 24 - Characteristic X-ray, Absorption and Filters

Lecture 25 - Principles of pole figure measurements by X-ray diffraction

Lecture 26 - Texture Goniometer Components

Lecture 27 - Limitations and Errors in X-ray Texture Measurement and Corrections

Lecture 28 - Basics of Electron Microscopy - I

Lecture 29 - Basics of Electron Microscopy - II

Lecture 30 - Kikuchi Diffraction Pattern - I

Lecture 31 - Kikuchi Diffraction Pattern - II

Lecture 32 - Quantitative Evaluation of Kikuchi Diffraction Pattern - I

Lecture 33 - Quantitative evaluation of Kikuchi Diffraction Pattern - II

Lecture 34 - Quantitative evaluation of Kikuchi Diffraction Pattern - III

Lecture 35 - Analysis using the TSL-OIM software

Lecture 36 - Analysis using the AZtec Crystal software

Lecture 37 - Analysis using the ATEX software

Lecture 38 - Introduction to solidification texture

Lecture 39 - Solidification texture in Alloys

Lecture 40 - Solidification texture in FCC, BCC, and HCP structures

Lecture 41 - Phase Transformation Texture and Bain Strain

Lecture 42 - Orientation Relationships between FCC and BCC / BCT

Lecture 43 - Various Orientation Relationships and Variants

Lecture 44 - Basic Mechanics of Polycrystal Plasticity

Lecture 45 - Basic Mechanics of Polycrystal Plasticity (Continued...)

Lecture 46 - A Metallurgist Point of View

Lecture 47 - A Metallurgist Point of View (Continued...)

Lecture 48 - Texture in FCC polycrystals

Lecture 49 - Texture in BCC polycrystals - I

Lecture 50 - Texture in BCC polycrystals - II

Lecture 51 - Texture in HCP polycrystals - I

Lecture 52 - Texture in HCP polycrystals - II

Lecture 53 - Texture in HCP polycrystals - III

Lecture 54 - Static recrystallization

Lecture 55 - Dynamic recrystallization and recrystallization texture

Lecture 56 - Dynamic recrystallization and grain refinement during hot large strain shear

NPTEL : NOC:Bulk Material Transport and Handling Systems (Metallurgy and Material Science)

Co-ordinators : Prof. Khanindra Pathak

Lecture 1 - Classification of Mining and Bulk Sold Handling Systems

Lecture 2 - Properties of bulk material vis-a-vis different bulk handling operations

Lecture 3 - Fundamentals of BMH and Transport: Capacity and Productivity Concepts

Lecture 4 - Bulk material handling in Processing plants: Crushing and Screening Flow Charts

Lecture 5 - Introduction to Bulk Material Transport and Autonomous Vehicles

Lecture 6 - Constructional Components: Trends of Developments

Lecture 7 - Belt Conveyor Construction: Belting for Bulk Material Conveyor

Lecture 8 - Idlers and Belt Cleaners

Lecture 9 - Feeding and Discharging Devices

Lecture 10 - Safety and Troubleshooting

Lecture 11 - Size Selection and Power Calculation

Lecture 12 - Principle of operations and applicability

Lecture 13 - Basic Design Calculations

Lecture 14 - Introduction to Pneumatic Conveying systems

Lecture 15 - Design Calculations for Pneumatic Conveying

Lecture 16 - Exercise with Basic Design Calculations

Lecture 17 - Stackers and Reclaimers: Classification and Selection Criteria

Lecture 18 - Stackers and Reclaimers: Comparison of Different Types

Lecture 19 - Principles of Blending and Reclaiming

Lecture 20 - Case studies of stacker and reclaimers application

Lecture 21 - System Layout

Lecture 22 - Introduction to Bin Bunker and Silo

Lecture 23 - Introduction to Bunker

Lecture 24 - Introduction to Silo

Lecture 25 - Silo Failures and Maintenance

Lecture 26 - Basics of Silo Design

Lecture 27 - Feeder Selection and Design

Lecture 28 - Crushers: Classification and selection

Lecture 29 - Secondary Crushers

Lecture 30 - Screen: Classification and Selection

Lecture 31 - Monitoring and Maintenance of Processing Plant Equipment

Lecture 32 - Concentration and Separation

Lecture 33 - Fine Size Classification: Desliming and Cycloning

Lecture 34 - Froth Flotation Techniques, Magnetic Separation, Jigs and Thickeners

Lecture 35 - Jigs and Thickeners

Lecture 36 - Coal Washery Equipment and Practices

Lecture 37 - Classification and Selection

Lecture 38 - Crusher Selection and Application

Lecture 39 - Off-Highway trucks and Haul Roads - 1

Lecture 40 - Off-Highway trucks and Haul Roads - 2

Lecture 41 - Recent Developments in Truck Transportation

Lecture 42 - RopeCon Transportation

Lecture 43 - Aerial Ropeways: Introduction

Lecture 44 - Aerial Ropeways Calculation

Lecture 45 - Pipe Conveyor Belt: Enclosed Material Transport

Lecture 46 - Underground Mine Transport System

Lecture 47 - Rope Haulage for Underground Mine Transport

Lecture 48 - Main and Tail and Endless Rope Haulage

Lecture 49 - Pit Top and Pit Bottom Layout

Lecture 50 - Haulage calculation

Lecture 51 - Locomotive

Lecture 52 - Low Profile Dumper

Lecture 53 - Load Haul Dumper

Lecture 54 - Introduction to Cage and Skip Winding

Lecture 55 - Winding Calculations

Lecture 56 - Safety Aspects in Bulk Solid Handling and Transportation

Lecture 57 - Safety Aspects in Bulk Solid Handling and Transportation

Lecture 58 - Basic Introduction of Automatic Control

Lecture 59 - Automating Bulk Solids Processes

Lecture 60 - Online Monitoring

NPTEL : NOC:Environmental Degradation and Surface Engineering (Metallurgy and Material Science)

Co-ordinators : Prof. Indranil Manna, Prof. Jyotsna Dutta Majumdar

Lecture 1 - Introduction to Materials and Environment

Lecture 2 - Genesis of Materials Degradation

Lecture 3 - Classification of degradation and Parameters Influencing it - Part I

Lecture 4 - Parameters Influencing Degradation - Part II

Lecture 5 - Engineering Solution to Combat Environmental Degradation of Materials

Lecture 6 - Aqueous corrosion-thermodynamics of Wet Corrosion

Lecture 7 - Aqueous corrosion-Classification - Part I

Lecture 8 - Aqueous corrosion-Classification - Part II

Lecture 9 - Classification of Aqueous corrosion - Part III

Lecture 10 - Classification of Aqueous corrosion - Part IV

Lecture 11 - Friction and Wear-Part - I

Lecture 12 - Friction and Wear-Part - II

Lecture 13 - Wear- Classification of wear - Part I

Lecture 14 - Wear- Classification of wear - Part II

Lecture 15 - Fatigue â€“ Surface Dependent Property

Lecture 16 - Failure Analysis - Part I

Lecture 17 - Failure Analysis - Part II

Lecture 18 - Characteristics of Failure - Part I

Lecture 19 - Characteristics of Failure - Part II

Lecture 20 - Characteristics of Failure - Part III

Lecture 21 - Prevention

Lecture 22 - Prevention of Chemical/Electrochemical Degradation

Lecture 23 - Prevention of Chemical/Electrochemical Degradation (Continued...)

Lecture 24 - Prevention of Chemical/Electrochemical Degradation (Continued...)

Lecture 25 - Prevention of Mechanical Degradation

Lecture 26 - Non Destructive Testing

Lecture 27 - Mechanical and Electrochemical Testing - Part I

Lecture 28 - Mechanical and Electrochemical Testing - Part II

Lecture 29 - Mechanical and Electrochemical Testing - Part III

Lecture 30 - Characterization

Lecture 31 - Surface/Interface

Lecture 32 - Scope, Classification and Objectives of Surface Engineering

Lecture 33 - Shot Peening

Lecture 34 - Grinding and Polishing

Lecture 35 - Ultrasonic Peening and Laser Shock Peening

Lecture 36 - Conventional Surface Hardening (Flame and induction)

Lecture 37 - Pack Carburizing

Lecture 38 - Fluidized Bed Carburizing

Lecture 39 - Fused bath and Gas Nitriding

Lecture 40 - Plasma Nitriding

Lecture 41 - Diffusion Based Coatings - Solid State

Lecture 42 - Chemical Conversion Coatings

Lecture 43 - Electrodeposition

Lecture 44 - Electrophoretic and Electroless deposition

Lecture 45 - Galvanizing and Hot Dipping

Lecture 46 - Thick Coatings by Weld Overlay and Cladding

Lecture 47 - Introduction to thin film deposition

Lecture 48 - Physical Vapor Deposition including Sputtering

Lecture 49 - Chemical Vapor Deposition (CVD) and Composite Coating

Lecture 50 - Chemical Vapor Deposition (CVD) and Composite Coating

Lecture 51 - Spray Coating Techniques II - Plasma Spray and Cold Spray

Lecture 52 - Ion Implantation

Lecture 53 - Electron Beam Assisted Surface Engineering

Lecture 54 - Laser Material Processing

Lecture 55 - Laser Surface Engineering

Lecture 56 - Laser Assisted Additive Manufacturing, LAM

Lecture 57 - Strengthening Mechanisms in Surface Engineering

Lecture 58 - Microstructural Characterization after Surface Engineering

Lecture 59 - Compositional Characterization after Surface Engineering

Lecture 60 - Summary of surface engineering and Conclusion

NPTEL : NOC:Fracture, Fatigue and Failure of Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Indrani Sen

Lecture 1 - Modes of Fracture

Lecture 2 - Theoretical Strengths and Defects

Lecture 3 - Stress Concentration

Lecture 4 - Griffith Criterion

Lecture 5 - Griffith Criteria - Modification

Lecture 6 - Stress Intensity Factor

Lecture 7 - Fracture Toughness and Plane Stress-Plane Strain

Lecture 8 - Plastic Zone Size

Lecture 9 - Plane stress and plane strain fracture toughness

Lecture 10 - Plane stress and plane strain fracture toughness (Continued...)

Lecture 11 - Plane Strain Fracture Toughness Testing

Lecture 12 - Plane Strain-Plane Stress Fracture Toughness Testing

Lecture 13 - Plane Stress Fracture Toughness

Lecture 14 - Plane Stress fracture toughness-J integral

Lecture 15 - Experimental determination of JIC

Lecture 16 - J-integral and JIC

Lecture 17 - Impact Toughness

Lecture 18 - Impact Toughness (Continued...)

Lecture 19 - Impact Toughness (Continued...)

Lecture 20 - Impact Toughness (Continued...)

Lecture 21 - Impact Toughness (Continued...)

Lecture 22 - Fracture Toughness

Lecture 23 - Fracture Toughness (Continued...)

Lecture 24 - Fracture Toughness (Continued...)

Lecture 25 - Fracture Toughness (Continued...)

Lecture 26 - Fracture Toughness (Continued...)

Lecture 27 - Environment Assisted Fracture

Lecture 28 - Environment Assisted Fracture (Continued...)

Lecture 29 - Environment Assisted Fracture (Continued...)

Lecture 30 - Introduction to Fatigue

Lecture 31 - Stress Controlled Fatigue

Lecture 32 - Stress Controlled Fatigue (Continued...)

Lecture 33 - Stress Controlled Fatigue (Continued...)

Lecture 34 - Stress Controlled Fatigue (Continued...)

Lecture 35 - Strain Controlled Fatigue (Continued...)

Lecture 36 - Strain Controlled Fatigue (Continued...)

Lecture 37 - Strain Controlled Fatigue (Continued...)

Lecture 38 - Strain Controlled Fatigue (Continued...)

Lecture 39 - Fatigue Crack Nucleation

Lecture 40 - Notch Effect

Lecture 41 - Crack in Fatigue

Lecture 42 - Fatigue Crack Propagation

Lecture 43 - Fatigue Crack Propagation (Continued...)

Lecture 44 - Fatigue Crack Propagation (Continued...)

Lecture 45 - Fatigue Crack Propagation (Continued...)

Lecture 46 - Fatigue Crack Propagation (Continued...)

Lecture 47 - Fatigue Crack Propagation (Continued...)

Lecture 48 - Fatigue in Materials

Lecture 49 - Fatigue in Materials (Continued...)

Lecture 50 - Effect of Temperature on Fatigue

Lecture 51 - Failure Analysis

Lecture 52 - Failure Analysis (Continued...)

Lecture 53 - Failure Analysis (Continued...)

Lecture 54 - Failure Analysis - Case study - Titanic

Lecture 55 - Failure Analysis - Case Study - ALK

Lecture 56 - Failure Analysis - Case study - Point Pleasant Bridge

Lecture 57 - Failure Analysis - Case Study - Rail Crash

Lecture 58 - Failure Analysis - Case Study - Comet

Lecture 59 - Failure Analysis - Case Study - Columbia

Lecture 60 - Failure Analysis - Summary

NPTEL : NOC:Mine Closure and Sustainability Planning (Metallurgy and Material Science)

Co-ordinators : Prof. Khanindra Pathak

Lecture 1 - Introduction to closure concept

Lecture 2 - Mine Closure Objectives and Regulatory Aspects

Lecture 3 - Mining Footprint and Regulatory Aspects

Lecture 4 - Mine Closure Costs and Financing Approaches

Lecture 5 - Decommissioning of Mines

Lecture 6 - Demolition Techniques

Lecture 7 - Post Closure Liabilities and Activities

Lecture 8 - Post Closure Community Concerns and Sustainable Development Plans

Lecture 9 - Closure oriented Resource Development-Post Mining Land Uses

Lecture 10 - Post mining site monitoring

Lecture 11 - Planning inputs, tools and techniques

Lecture 12 - Tools and Techniques for Closure Plan Development and Procedures

Lecture 13 - Closure Plan Development Procedures

Lecture 14 - Monitoring, Review and Feedback of Closure Plan Implementation-Closure Criteria

Lecture 15 - Failure Mode and Effect Analysis Framework for Mine Closure Planning

Lecture 16 - Multiple Accounts Analysis (MAA) for Assessment of Closure Alternatives

Lecture 17 - Provisioning of capital

Lecture 18 - Closure costs and Rehabilitation Costs

Lecture 19 - Finance and Accounting: Closure cost estimate

Lecture 20 - Closure Economics and Audit

Lecture 21 - Application of Remote Sensing for Mine Closure-Introduction

Lecture 22 - Remote Sensing Sensors

Lecture 23 - Remote Sensing media and sensors

Lecture 24 - Image Processing and Data Interpretation

Lecture 25 - GIS for Mine Closure: Mapping and Geo-Spatial Data Analysis

Lecture 26 - Integration of phase operations

Lecture 27 - Integration of Interdepartmental work and phase operations - Part 1

Lecture 28 - Integration of Interdepartmental work and phase operations - Part 2

Lecture 29 - Risk Analysis Techniques and Management

Lecture 30 - Post Mine Closure Waste to Wealth Conversion

Lecture 31 - CSR and EMP Integration

Lecture 32 - Introduction to Asset Management

Lecture 33 - Principle of Asset Management and Decommissioning of Assets for Site Restoration

Lecture 34 - Brownfield Redevelopment and Value Addition to Assets

Lecture 35 - Landform Design and Post Mining Asset Creation

Lecture 36 - Concept of Sustainable Development and Mining industry

Lecture 37 - Sustainability Measurement and Reporting

Lecture 38 - Sustainability Measurement and Reporting (Continued...)

Lecture 39 - Sustainable Mineral Industry

Lecture 40 - Policy and Legislative Framework of Sustainability for SDG and Mine Closure

Lecture 41 - Communicating sustainability performance

Lecture 42 - Framework of Sustainability reporting

Lecture 43 - Sustainable accounting

Lecture 44 - Case studies on Sustainability initiatives in Mining Industry

Lecture 45 - Data Analytics for Sustainability management

Lecture 46 - Cleaner Production Based Closure Management

Lecture 47 - Regenerative environment design for sustainable Mine Closure

Lecture 48 - Reusable resource identification in post closure mine site

Lecture 49 - Optimization of Residual Value of Assets

Lecture 50 - Post Mining Site for Community wealth

Lecture 51 - Management of water resources

Lecture 52 - Soil Treatment and Revegetation

Lecture 53 - Bio-diversity: Post Land reclamation and plantation

Lecture 54 - Physical and Chemical Stability issues

Lecture 55 - Economic Utilization of Post Mining Structures and assets

Lecture 56 - Techniques for closing underground workings

Lecture 57 - Application of Industry 4.0 for Mine

Lecture 58 - Best mining practices for Sustainable mining - Case studies

Lecture 59 - Stability Monitoring and Enhancing tools

Lecture 60 - VR and AR Technology for Post Mining Mine site Visualization and Design

NPTEL : NOC:Fundamentals of Composite and Cellular Materials (Metallurgy and Material Science)

Co-ordinators : Dr. Siddhartha Roy, Dr. Tapas Laha

Lecture 1 - Fundamental aspects of hybrid materials

Lecture 2 - Materials selection basics for design with hybrid materials

Lecture 3 - Classes of materials and material property charts

Lecture 4 - Material property charts and concept of material indices

Lecture 5 - Material property chart-indices and concept of hybridization

Lecture 6 - Hybrid materials - Composite

Lecture 7 - Cellular solids - Applications of metal foams

Lecture 8 - Cellular solids - Applications of porous ceramics and polymer foams

Lecture 9 - Basics of Composite Materials and Classification

Lecture 10 - Composite Classification - Matrix and Reinforcement

Lecture 11 - Fibers - Fundamentals, Glass fiber

Lecture 12 - Fibers - Boron and Carbon Fibers

Lecture 13 - Fibers - Aramid and Ceramic fibers, Alumina fiber

Lecture 14 - Fibers - SiC fiber and Whiskers

Lecture 15 - Metal matrix composites (MMCs) - Basic concept, Liquid state processing

Lecture 16 - Metal matrix composites (MMCs) - Liquid and Solid state processing

Lecture 17 - Ceramic Matrix Composites (CMCs) - Basic concept, Processing techniques

Lecture 18 - Ceramic Matrix Composites (CMCs) - Processing techniques

Lecture 19 - CMCs and PMCs - Processing and Application

Lecture 20 - Fabrication of cellular ceramics

Lecture 21 - Sintering of ceramics - Aspects and mechanisms

Lecture 22 - Fabrication of cellular ceramics

Lecture 23 - Processing of metal foams - Foaming techniques

Lecture 24 - Processing of metal foams (Continued...)

Lecture 25 - Processing of metal foams (Continued...)

Lecture 26 - Polymer foams - Processing and properties

Lecture 27 - Additive manufacturing - Definition and Prospects

Lecture 28 - Cellular solids classification and Structure description

Lecture 29 - Structure of cellular solids - Pore structure characterization

Lecture 30 - Interfacial phenomena - Basic concept, Adhesion and Wettability

Lecture 31 - Interfacial phenomena - Factors affecting wettability

Lecture 32 - Interfacial phenomena - Interfacial bonding

Lecture 33 - Interfacial phenomena - Interfacial strength measurement

Lecture 34 - Interfacial phenomena - Case study - Al-MWCNT nanocomposite

Lecture 35 - Interfacial phenomena - Case studies: MMCs and CMCs

Lecture 36 - Interfacial phenomena - Case studies: MMCs and CMCs (Continued...)

Lecture 37 - Mechanics of Composites - Unidirectional Lamina

Lecture 38 - Mechanics: Fiber-reinforced composites - Transverse Loading

Lecture 39 - Mechanics: Fiber-reinforced composites - Problem Solving

Lecture 40 - Mechanics: Fiber-reinforced composites - Discontinuous fibers

Lecture 41 - Mechanics of Composites - Discontinuous fibers

Lecture 42 - Dependence of properties on pore structure

Lecture 43 - Mechanics of cellular solids

Lecture 44 - Mechanics of cellular solids (Continued...)

Lecture 45 - Deformation behavior of honeycomb and foams

Lecture 46 - Deformation behaviour of Foams

Lecture 47 - Deformation behaviour of Foams (Continued...)

Lecture 48 - Deformation behaviour of Foams (Continued...)

Lecture 49 - Thermal properties of foams

Lecture 50 - Other important properties of foams (Continued...)

Lecture 51 - Advanced composites - MMCs

Lecture 52 - Advanced composites - MMCs (Continued...)

Lecture 53 - Advanced composites - CMCs

Lecture 54 - Advanced composites - Advanced Processing Techniques

Lecture 55 - Advanced composites - Advanced Processing Techniques (Continued...)

Lecture 56 - Advanced composites - Advanced Processing Techniques (Continued...)

Lecture 57 - Advanced composites - Application oriented advanced composites

Lecture 58 - Microstructure and properties of natural cellular solid - wood

Lecture 59 - Advanced hybrid material - Functionally graded composite materials (FGMs)

Lecture 60 - Advanced hybrid material - Functionally graded composite materials (FGMs) (Continued...)

NPTEL : NOC:Principles of Extractive Metallurgy (Metallurgy and Material Science)

Co-ordinators : Prof. Tarun Kumar Kundu

Lecture 1 - Introduction, Classification and Uses of Metals

Lecture 2 - Introduction, Classification and Uses of Metals (Continued...)

Lecture 3 - Occurrence/Source of Metals

Lecture 4 - Metal Extraction Process Overview

Lecture 5 - Mineral Beneficiation: Overview and Mass Balances

Lecture 6 - Crushing and Grinding (Comminution)

Lecture 7 - Mineral Classification: Separation in Flowing Fluid

Lecture 8 - Mineral Concentration by Froth Flotation

Lecture 9 - Mineral Concentration by Froth Flotation

Lecture 10 - Magnetic and Electric Separation/Concentration

Lecture 11 - Sensor-based/Automatic Ore Sorting

Lecture 12 - Solid-Liquid Separation

Lecture 13 - Particle Size Estimation and Screening

Lecture 14 - Fuels in Metallurgical Processes and Coal Characteritics

Lecture 15 - Calorific Value and Caking Properties of Coal

Lecture 16 - Coke: Making and Properties

Lecture 17 - Combustion of Fuels

Lecture 18 - Combustion: Mass and Heat Balance

Lecture 19 - Combustion Heat Balance: Flame Temperature

Lecture 20 - Combustion Heat Utilization in Furnace

Lecture 21 - Heat Utilization in Furnace: Numerical Examples

Lecture 22 - Classification of Furnaces

Lecture 23 - Refractories for Furnace Linings

Lecture 24 - Refractories: Testing and Production

Lecture 25 - Agglomeration of Fines: Pelletization and Briquetting

Lecture 26 - Agglomeration of Fines: Sintering

Lecture 27 - Extraction of Metal from Sulfides: Roasting

Lecture 28 - Roasting Reactors and Heat Balance

Lecture 29 - Roasting: Predominance Area Diagram

Lecture 30 - Roasting: Application of Predominance Area Diagram

Lecture 31 - Reduction Smelting and Matte Smelting

Lecture 32 - Metallurgical Slag

Lecture 33 - Slag Viscosity, Surface Tention and Theories

Lecture 34 - Slag: Masson and Molecular Theory, Numerical Examples

Lecture 35 - Copper Extraction: Matte Smelting

Lecture 36 - Copper Extraction: Flash Smelting

Lecture 37 - Cu Extraction: Cyclone Flash Smelting and Numerical Examples

Lecture 38 - Cu Extraction: Conversion

Lecture 39 - Conversion of Nickel Sulphide and Numerical Examples

Lecture 40 - TSL Smelting, Continuous Conversion and Direct Cu-Production

Lecture 41 - Reduction Smelting: Lead Extraction

Lecture 42 - Reduction Smelting: Zinc Extraction and ISP

Lecture 43 - Extraction of Thin, Tungsten, Molybdenum and Numerical Examples

Lecture 44 - Extraction of Nb, V, Ferroalloys and Titania (from llmenite)

Lecture 45 - Silicothermy: Pyrometallurgical Magnesium Extraction

Lecture 46 - Reduction Smelting: Iron Extraction in Blast Furnace

Lecture 47 - Alternative Routes of Iron Extraction

Lecture 48 - Halide Metallurgy: Extraction of Ti, Zr, Hf, U, Si Purification

Lecture 49 - Purification of Bulk Metals: Chemical Refining

Lecture 50 - Chemical Refining: Purification of Lead

Lecture 51 - Chemical Refining of Zinc, Tin, Nickel, Ti (Zr, Hf, Th)

Lecture 52 - Physical Refining: Vacuum De-gassing, Zone Melting and Distillation

Lecture 53 - Hydrometallurgy: Unit Steps, Leaching Reagents and Methods

Lecture 54 - Physiochemical Aspect of Leaching, Bacterial Leaching, S/L Separation

Lecture 55 - Hydrometallurgy: Solution Purification and Metal Ion Reduction

Lecture 56 - Hydrometallurgy: Cementation, Electrowinning, Au Extraction and Bayer Process

Lecture 57 - Electrometallurgy: Electrowinning, Electrorefining, Current and Energy Efficiency

Lecture 58 - Electrometallurgy: Extraction of Mg and Al

Lecture 59 - Environmental Concern and Sustainable Metal Extraction

Lecture 60 - New Development in Metal Extraction: Solvometallurgy, Bio-Metallurgy, Membrane Technology

NPTEL : Advanced Metallurgical Thermodynamics (Metallurgy and Material Science)

Co-ordinators : Prof. B.S. Murty

Lecture 1 - Basic definitions

Lecture 2 - Free energy, Stability, equilibrium in a unary system

Lecture 3 - Effect of Pressure on equilibrium transformations: Clausius Clapeyron equation, phase diagram for unary system

Lecture 4 - Free energy of solutions, free energy-composition diagrams

Lecture 5 - Solution models, chemical potential

Lecture 6 - Phase rule, free energy-composition diagrams and phase diagrams

Lecture 7 - Evolution of phase diagrams

Lecture 8 - Evolution of phase diagrams, miscibility gap

Lecture 9 - To concept, partition less solidification

Lecture 10 - To concept, partition less solidification (Continued...)

Lecture 11 - Eutectic solidification, glass formation

Lecture 12 - Kauzmann paradox, order of a transformation, glass forming ability

Lecture 13 - Eutectic solidification, coupled growth, heterogeneous nucleation

Lecture 14 - Peritectic solidification, metastable phase diagrams

Lecture 15 - Errors in drawing phase diagrams, Fe-C vs. Fe-Fe3C phase diagram

Lecture 16 - Free energy of undercooled liquid, shape of nucleus

Lecture 17 - Solid state phase transformations - Precipitation

Lecture 18 - Precipitation

Lecture 19 - Precipitation - quasicrystals

Lecture 20 - Precipitate coarsening, stability of a phase, spinodal decomposition

Lecture 21 - Spinodal decomposition

Lecture 22 - Eutectioid reaction

Lecture 23 - Eutectioid reaction (Continued...)

Lecture 24 - Bainitic transformation

Lecture 25 - Kinetics of eutectoid transformations

Lecture 26 - Martensitic Transformation

Lecture 27 - Martensitic transformation, order-disorder transformation

Lecture 28 - Miscibility gap in phase diagrams

Lecture 29 - Phase diagram calculations

Lecture 30 - Thermodynamics of heterogeneous systems

Lecture 31 - Thermodynamics of heterogeneous systems (Continued...)

NPTEL : Materials Characterization (Metallurgy and Material Science)

Co-ordinators : Dr. S. Sankaran

Lecture 1 - Properties of light, Image formation

Lecture 2 - Magnification and resolution

Lecture 3 - Depth of field,focus and field of view

Lecture 4 - Lens defects,filters and light microscopy introduction

Lecture 5 - Optical microscope demo., Bright field imaging, opaque specimen illumination

Lecture 6 - Opaque stop microscopy, Phase contrast microscopy

Lecture 7 - Dark field microscopy, Polarization microscopy

Lecture 8 - Differential interference contrast and fluorescence microscopy

Lecture 9 - Sample preparation techniques for optical microscopy

Lecture 10A - Tutorial problems (Continuation...)

Lecture 10 - Tutorial problems

Lecture 11 - Introduction to scanning electron Microscopy

Lecture 12 - Lens aberrations, Object resolution, Image quality

Lecture 13 - Interaction between electrons and sample, Imaging capabilities, Structural analysis, Elemental analysis

Lecture 14 - SEM and its mode of operation, Effect of aperture size,Working distance,condenser lens strength

Lecture 15 - SEM and its mode of operation- continuation, Relation between probe current and probe diameter, Summary

Lecture 16 - Factors affecting Interaction volume, Demonstration of SEM

Lecture 17 - Image formation and interpretation

Lecture 18 - Image formation and interpretation continued, EDS, WDS

Lecture 19 - Special contrast mechanisms, Monte Carlo simulations of Interaction volume

Lecture 20 - Electron channeling contrast imaging (ECCI), Electron back scattered diffraction(EBSD)-Theory & instrument demonstration

Lecture 21 - Tutorial Problems on SEM

Lecture 22 - Basics of X-ray emission from source, electron excitation and X-ray interaction with materials in general

Lecture 23 - Properties of X-rays

Lecture 24 - Bragg's Law Derivation

Lecture 25 - Diffraction relationship with reciprocal space

Lecture 26 - X-ray scattering

Lecture 27 - Factors affecting intensities of X-ray peaks

Lecture 28 - Factors affecting intensities of X-ray peaks- continuation

Lecture 29 - Effect of crystallite size and strain on intensity of X-rays

Lecture 30 - Profile fit, Factors affecting peak brodening

Lecture 31 - Indexing of diffraction pattern, Quantitative analysis

Lecture 32 - Indexing, Quantitative analysis-continuation, Residual stress measurements

Lecture 33 - XRD and Residual stress measurement- lab demonstration

Lecture 34 - Introduction to Transmission Electron Microscopy (TEM)

Lecture 35 - Fundementals of Transmission Electron Microscopy (TEM)

Lecture 36 - Basics of Diffraction-1

Lecture 37 - Basics of Diffraction-2

Lecture 38 - TEM imaging-1

Lecture 39 - TEM imaging-2

Lecture 40 - TEM instrument demonstration

Lecture 41 - TEM sample preparation-1

Lecture 42 - TEM sample preparation-2

Lecture 43 - XRD Tutorial - 1

Lecture 44 - XRD tutorial - 2

Lecture 45 - TEM Tutorial - 1

Lecture 46 - TEM Tutorial - 2

Lecture 47 - Quantitative metallography - Tutorial 1

Lecture 48 - Quantitative metallography - Tutorial 2

Lecture 49 - Quantitative metallography - Tutorial 3

Lecture 50 - Quantitative metallography - Tutorial 4

Lecture 51 - Quantitative metallography - Tutorial 5

Lecture 52 - Quantitative metallography - Tutorial 6

Lecture 53 - Quantitative metallography - Tutorial 7

NPTEL : Physics of Materials (Metallurgy and Material Science)

Co-ordinators : Dr. Prathap Haridoss

Lecture 1 - Introduction

Lecture 2 - Properties of Materials

Lecture 3 - Thermal Expansion

Lecture 4 - Measuring Electrical Conductivity: DC and AC

Lecture 5 - Free Electron Gas

Lecture 6 - The Ideal Gas

Lecture 7 - Drude Model: Electrical Conductivity

Lecture 8 - Drude Model: Thermal Conductivity

Lecture 9 - Drude Model: Successes and Limitations

Lecture 10 - Drude Model: Source of Shortcomings

Lecture 11 - Large Systems and Statistical Mechanics

Lecture 12 - Maxwell Boltzmann Statistics

Lecture 13 - Classical Particles and Quantum Particles

Lecture 14 - History of Quantum Mechanics - 1

Lecture 15 - History of Quantum Mechanics - 2

Lecture 16 - Introduction to Drude Sommerfeld model

Lecture 17 - Fermi-Dirac Statistics - Part 1

Lecture 18 - Fermi-Dirac Statistics - Part 2

Lecture 19 - Features of the Fermi Dirac Distribution Function

Lecture 20 - Maxwell-Boltzmann Distribution Vs Fermi-Dirac Distribution

Lecture 21 - Anisotropy and Periodic Potential in a Solid

Lecture 22 - Confinement and Quantization - Part 1

Lecture 23 - Confinement and Quantization - Part 2

Lecture 24 - Density of States

Lecture 25 - Fermi Energy, Fermi Surface, Fermi Temperature

Lecture 26 - Electronic Contribution to Specific Heat at Constant Volume

Lecture 27 - Reciprocal Space-1: Introduction to Reciprocal Space

Lecture 28 - Reciprocal Space-2: Condition for Diffraction

Lecture 29 - Reciprocal Space-3: Ewald sphere, Simple Cubic, FCC and BCC in Reciprocal Space

Lecture 30 - Wigner Seitz Cell and Introduction to Brillouin Zones

Lecture 31 - Brillouin Zones, Diffraction, and Allowed Energy Levels

Lecture 32 - E Vs k, Brillouin Zones and the Origin of Bands

Lecture 33 - Calculating Allowed Energy Bands and Forbidden Band Gaps

Lecture 34 - Bands; Free Electron Approximation, Tight Binding Approximation

Lecture 35 - Semiconductors

Lecture 36 - Magnetic Properties

Lecture 37 - Electron Compounds; Phonons, Optoelectronic Materials

Lecture 38 - Superconductivity

Lecture 39 - Bose-Einstein Statistics

Lecture 40 - Physics of Nano Scale Materials; Course Summary

NPTEL : Electronic materials, devices, and fabrication (Metallurgy and Material Science)

Co-ordinators : Prof. Parasuraman S

Lecture 1 - Metals, semiconductors and insulators

Lecture 2 - Introduction to semiconductors

Lecture 3 - Density of states and Fermi-Dirac statistics

Lecture 4 - Assignment 1 - Bonding, DOS, and Fermi statistics

Lecture 5 - Intrinsic semiconductors

Lecture 6 - Intrinsic semiconductors - conductivity

Lecture 7 - Assignment 2 - Intrinsic semiconductors

Lecture 8 - Extrinsic semiconductors

Lecture 9 - Extrinsic semiconductors - Fermi level

Lecture 10 - Extrinsic semiconductors - conductivity

Lecture 11 - Assignment 3 - Extrinsic semiconductors

Lecture 12 - Metal-semiconductor junctions

Lecture 13 - Assigment 4 - Metal-semiconductor junctions

Lecture 14 - pn junctions in equilibrium

Lecture 15 - pn junctions under bias

Lecture 16 - pn junction breakdown and heterojunctions

Lecture 17 - Assignment 5 - pn junctions

Lecture 18 - Transistors

Lecture 19 - MOSFETs

Lecture 20 - Assignment 6 - transistors

Lecture 21 - Optoelectronic devices: Introduction

Lecture 22 - Optoelectronic devices: LEDs

Lecture 23 - Optoelectronic devices: LASERs

Lecture 24 - Optoelectronic devices: photodetector

Lecture 25 - Optoelectronic devices: solar cells

Lecture 26 - Assignment 7 - optical properties

Lecture 27 - Assignment 8 - optoelectronic devices

Lecture 28 - Semiconductor manufacturing: Introduction

Lecture 29 - Si wafer manufacturing

Lecture 30 - IC device manufacturing: overview

Lecture 31 - Layering: thermal oxidation

Lecture 32 - Doping: thermal and ion implantation

Lecture 33 - Lithography

Lecture 34 - Etching and deposition (growth)

Lecture 35 - Metallization and polishing

Lecture 36 - Process and device evaluation

Lecture 37 - Productivity and process yield

Lecture 38 - Clean room design and contamination control

Lecture 39 - Devices and IC formation

Lecture 40 - IC circuit logic and packaging

NPTEL : NOC:Fundamentals of optical and scanning electron microscopy (Metallurgy and Material Science)

Co-ordinators : Dr. S. Sankaran

Lecture 1 - Properties of light, Image formation

Lecture 2 - Magnification and resolution

Lecture 3 - Depth of field, focus and field of view

Lecture 4 - Lens defects, filters and light microscopy introduction

Lecture 5 - Optical microscope demo., Bright field imaging, opaque specimen illumination

Lecture 6 - Opaque stop microscopy, Phase contrast microscopy

Lecture 7 - Dark field microscopy, Polarization microscopy

Lecture 8 - Differential interference contrast and fluorescence microscopy

Lecture 9 - Sample preparation techniques for optical microscopy

Lecture 10 - Tutorial problems

Lecture 11 - Tutorial problems (Continued...)

Lecture 12 - Introduction to scanning electron Microscopy

Lecture 13 - Lens aberrations, Object resolution, Image quality

Lecture 14 - Interaction between electrons and sample, Imaging capabilities, Structural analysis, Elemental analysis

Lecture 15 - SEM and its mode of operation, Effect of aperture size,Working distance,condenser lens strength

Lecture 16 - SEM and its mode of operation- continuation, Relation between probe current and probe diameter, Summary

Lecture 17 - Factors affecting Interaction volume, Demonstration of SEM

Lecture 18 - Image formation and interpretation

Lecture 19 - Image formation and interpretation continued, EDS, WDS

Lecture 20 - Special contrast mechanisms, Monte Carlo simulations of Interaction volume

Lecture 21 - Electron channeling contrast imaging (ECCI), Electron back scattered diffraction (EBSD)-Theory & instrument demonstration

Lecture 22 - Tutorial Problems on SEM

NPTEL : NOC:Fundamentals of electronic materials and devices (Metallurgy and Material Science)

Co-ordinators : Prof. Parasuraman S

Lecture 1 - Electronic Materials

Lecture 2 - Semiconductors - Introduction

Lecture 3 - Electron statistics in a solid

Lecture 4 - Worked numericals on week 1 lessons

Lecture 5 - Intrinsic semiconductors

Lecture 6 - Intrinsic semiconductors - conductivity

Lecture 7 - Optional - worked assignment on intrinsic semiconductors

Lecture 8 - Extrinsic semiconductors - Introduction

Lecture 9 - Extrinsic semiconductors - Fermi level

Lecture 10 - Extrinsic semiconductors - Mobility

Lecture 11 - Worked assignment on extrinsic semiconductors

Lecture 12 - Metal-semiconductor junctions

Lecture 13 - pn junctions in equilibrium

Lecture 14 - Optional - worked assignment on metal-semiconductor junctions

Lecture 15 - pn junctions under bias

Lecture 16 - Junction breakdown and heterojunctions

Lecture 17 - Worked assignment on pn junctions

Lecture 18 - Transistors - overview

Lecture 19 - MOSFETs

Lecture 20 - Worked assignment on transistors

Lecture 21 - Optoelectronic devices - Introduction

Lecture 22 - Light emitting diodes

Lecture 23 - Solid state semiconductor lasers

Lecture 24 - Optional - worked assignment on optical properties

Lecture 25 - Photodetectors

Lecture 26 - Solar cells

Lecture 27 - Worked assignment on optoelectronic devices

NPTEL : NOC:Introduction to Reciprocal Space and its use in Solids (Metallurgy and Material Science)

Co-ordinators : Dr. Prathap Haridoss

Lecture 1 - Reciprocal space; Definition and Properties

Lecture 2 - Condition for Diffraction

Lecture 3 - Worked out examples

Lecture 4 - Ewald Sphere and lattices in reciprocal space

Lecture 5 - Wigner Sietz cells and Brillouin Zones

Lecture 6 - Worked out exmaples

Lecture 7 - Brillouin Zones, Diffraction and allowed energy levels

Lecture 8 - E Vs K, Brillouin zones and the Origin of Bands

Lecture 9 - Week 3 Worked out examples

Lecture 10 - Reciprocal space as Fourier transform of real lattice

Lecture 11 - Alternate notation of reciprocal space

NPTEL : NOC:Analysis and Modeling of Welding (Metallurgy and Material Science)

Co-ordinators : Dr. G. Phanikumar

Lecture 1 - Introduction to fusion welding processes: Part 1/2

Lecture 2 - Introduction to fusion welding processes: Part 2/2

Lecture 3 - Heat sources - Part 1/2

Lecture 4 - Heat sources - Part 2/2

Lecture 5 - Heat removal

Lecture 6 - Thermal Modelling - Part 1/2

Lecture 7 - Thermal Modelling - Part 2/2

Lecture 8 - Zones in a weldment

Lecture 9 - Analytical Solutions to Weld Thermal Field

Lecture 10 - Conduction to Keyhole mode

Lecture 11 - Fluid flow modelling - Part 1/2

Lecture 12 - Fluid flow modelling - Part 2/2

Lecture 13 - Solute transfer modelling - Part 1/2

Lecture 14 - Solute transfer modelling - Part 2/2

Lecture 15 - Solute segregation profile - Part 1/2

Lecture 16 - Solute segregation profile - Part 2/2

Lecture 17 - Microstructure Formation in Fusion Welds

Lecture 18 - Numerical Solutions to Thermal Field and Fluid Flow in Welding - Part 1

Lecture 19 - Numerical Solutions to Thermal Field and Fluid Flow in Welding - Part 2

Lecture 20 - Dissimilar Welding

NPTEL : NOC:Fundamentals of X-ray Diffraction and Transmission Electron Microscopy (Metallurgy and Material Science)

Co-ordinators : Dr. S. Sankaran

Lecture 1 - Basics of X-ray emission from source, electron excitation and X-ray interaction with materials in general

Lecture 2 - Properties of X-rays

Lecture 3 - Bragg's law derivation

Lecture 4 - Diffraction relationship with reciprocal space

Lecture 5 - X-ray scattering

Lecture 6 - Factors affecting intensities of X-ray peaks

Lecture 7 - Factors affecting intensities of X-ray peaks (Continued...)

Lecture 8 - Effect of crystallite size and strain on intensity of X-rays

Lecture 9 - Profile fit, Factors affecting peak brodening

Lecture 10 - Indexing of diffraction pattern, Quantitative analysis

Lecture 11 - Indexing and Quantitative analysis-continuation, Residual stress measurements

Lecture 12 - XRD and Residual stress measurement - lab demonstration

Lecture 13 - XRD Tutorial - 1

Lecture 14 - XRD tutorial - 2

Lecture 15 - Introduction to Transmission Electron Microscopy (TEM)

Lecture 16 - Fundamentals of Transmission Electron Microscopy (TEM)

Lecture 17 - Basics of Diffraction - 1

Lecture 18 - Basics of Diffraction - 2

Lecture 19 - TEM Imaging - 1

Lecture 20 - TEM Imaging - 2

Lecture 21 - TEM instrument demonstration

Lecture 22 - TEM sample preparation - 1

Lecture 23 - TEM sample preparation - 2

Lecture 24 - TEM Tutorial - 1

Lecture 25 - TEM Tutorial - 2

Lecture 26 - TEM Tutorial - 3

Lecture 27 - TEM Tutorial - 4

NPTEL : NOC:Theory and Practice of Non Destructive Testing (Metallurgy and Material Science)

Co-ordinators : Dr. Ranjit Bauri

Lecture 1 - Visual optical method

Lecture 2 - Dye Penetrant Testing - 1

Lecture 3 - Dye Penetrant Testing - 2

Lecture 4 - Dye Penetrant Testing - 3

Lecture 5 - Dye Penetrant Testing - 4

Lecture 6 - Magnetic particle testing - 1

Lecture 7 - Magnetic particle testing - 2

Lecture 8 - Magnetic particle testing - 3

Lecture 9 - Magnetic particle testing - 4

Lecture 10 - Magnetic particle testing - 5

Lecture 11 - Eddy current testing - 1

Lecture 12 - Eddy current testing - 2

Lecture 13 - Eddy current testing - 3

Lecture 14 - Eddy current testing - 4

Lecture 15 - Eddy current testing - 5

Lecture 16 - Ultrasonic testing - 1

Lecture 17 - Ultrasonic testing - 2

Lecture 18 - Ultrasonic testing - 3

Lecture 19 - Ultrasonic testing - 4

Lecture 20 - Ultrasonic testing - 5

Lecture 21 - Ultrasonic testing - 6

Lecture 22 - Ultrasonic testing - 7

Lecture 23 - Ultrasonic testing - 8

Lecture 24 - Ultrasonic testing - 9

Lecture 25 - Ultrasonic testing - 10

Lecture 26 - Acoustic Emission Testing - 1

Lecture 27 - Acoustic Emission Testing - 2

Lecture 28 - Acoustic Emission Testing - 3

Lecture 29 - Acoustic Emission Testing - 4

Lecture 30 - Acoustic Emission Testing - 5

Lecture 31 - Radiography - 1

Lecture 32 - Radiography - 2

Lecture 33 - Radiography - 3

Lecture 34 - Radiography - 4

Lecture 35 - Radiography - 5

Lecture 36 - Radiography - 6

Lecture 37 - Radiography - 7

Lecture 38 - Radiography - 8

Lecture 39 - Radiography - 9

Lecture 40 - Radiography - 10

NPTEL : NOC:Defects in Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Sundararaman M

Lecture 1 - Introduction to defects in materials

Lecture 2 - 1-D Lattice

Lecture 3 - 2-D Lattice

Lecture 4 - 3-D Lattice - a

Lecture 5 - 3-D Lattice - b

Lecture 6 - 3-D Lattice - c

Lecture 7 - 3-D Crystals

Lecture 8 - Types of Point Defects

Lecture 9 - Vacancy Concentration Determination - 1

Lecture 10 - Vacancy Concentration Determination - 2

Lecture 11 - Point Defect Interstitial

Lecture 12 - Transforamtion of co-ordinates

Lecture 13 - Tensor - 1

Lecture 14 - Tensor - 2

Lecture 15 - Strain

Lecture 16 - Stress

Lecture 17 - Description of Dislocation - 1

Lecture 18 - Description of Dislocation - 2

Lecture 19 - Stress field around Dislocation

Lecture 20 - Self Energy of Dislocation

Lecture 21 - Force on Dislocation

Lecture 22 - Forces Between Dislocation

Lecture 23 - Chemical Force on Dislocation

Lecture 24 - Perfect Dislocation in FCC Structures

Lecture 25 - Instrinsic Stacking Faults in FCC

Lecture 26 - Extrinsic Faults and Thompson Tetrahedron in FCC

Lecture 27 - Dislocations in BCC and HCP

Lecture 28 - Dislocations in Ordered Alloys and Dislocation Dislocation Interaction

Lecture 29 - Twinning - 1

Lecture 30 - Twinning - 2

Lecture 31 - Martensitic Transformation - 1

Lecture 32 - Martensitic Transformation - 2

Lecture 33 - Interfaces - 1

Lecture 34 - Interfaces - 2

Lecture 35 - Defect Interaction and Strength

NPTEL : NOC:Elementary Stereology for Quantitative Metallography (Metallurgy and Material Science)

Co-ordinators : Dr. S. Sankaran

Lecture 1 - Method of Stereology

Lecture 2 - Volume Fraction and Particle Size - Part 1

Lecture 3 - Volume Fraction and Particle Size - Part 2

Lecture 4 - Geometric Probability - Part 1

Lecture 5 - Geometric Probability - Part 2

Lecture 6 - Probability Distributions

Lecture 7 - Volume Fraction and Particle Size - Part 3

Lecture 8 - Volume Fraction and Particle Size - Part 4

Lecture 9 - Geometrical Probability - I

Lecture 10 - Geometrical Probability - II

Lecture 11 - Basic Stereological Parameters - Part 1

Lecture 12 - Basic Stereological Parameters - Part 2

Lecture 13 - Counting of grains and particles - Part 1

Lecture 14 - Description of Polycrystalline Microstructures derived measures

Lecture 15 - Counting of grains and particles - Part 2

Lecture 16 - Counting of Grains and Particles - Part 3

Lecture 17 - Counting of Grains and Particles - Part 4

Lecture 18 - Other Applications of the Disector

Lecture 19 - Stereology of Anisotropic Microstructures

NPTEL : NOC:Welding of Advanced High Strength Steels for Automotive Applications (Metallurgy and Material Science)

Co-ordinators : Prof. Murugaiyan Amirthalingam

Lecture 1 - Introduction to the course, Introduction to physical metallurgy of steels

Lecture 2 - Martensitic transformation, Introduction to modern automotive steels

Lecture 3 - Introduction to modern automotive steels

Lecture 4 - Introduction to advanced high strength steels

Lecture 5 - Introduction to Dual Phase Steel and TRIP Steel Heat Treatments

Lecture 6 - Thermal and Mechanical Processing of TRIP and Hot Forming Steels

Lecture 7 - Introduction to Welding Processes in Automotive Industries

Lecture 8 - Principles of Resistance Spot Welding (RSW)

Lecture 9 - Process Characteristics of Resistance Spot Welding - Part I

Lecture 10 - Process Characteristics of Resistance Spot Welding - Part II

Lecture 11 - Introduction to Laser Beam Welding - Part I

Lecture 12 - Introduction to Laser Beam Welding - Part II

Lecture 13 - Principles of Gas Metal Arc Welding - Part I

Lecture 14 - Principles of Gas Metal Arc Welding - Part II

Lecture 15 - Welding Metallurgy of Advanced High Strength Steels - Part I

Lecture 16 - Microstructural Evolution During Welding of Advanced High Strength Steels

Lecture 17 - Elemental Behaviour During Welding of Advanced High Strength Steels

Lecture 18 - Quantification of Microstructural Constituents in Automotive Steel Welds - Part I

Lecture 19 - Quantification of Microstructural Constituents in Automotive Steel Welds - Part II and Mechanical Properties

Lecture 20 - Methodologies to Improve the Weldability of Advanced High Strength Steels

NPTEL : NOC:Welding Processes (Metallurgy and Material Science)

Co-ordinators : Prof. Murugaiyan Amirthalingam

Lecture 1 - Introduction to the course

Lecture 2 - Classification of welding processes and definition of welding arc

Lecture 3 - Physics of welding arc - Part 1

Lecture 4 - Physics of welding arc - Part 2

Lecture 5 - Physics of welding arc - Part 3

Lecture 6 - Physics of welding arc - Part 4

Lecture 7 - Fundamentals of ionisation in welding arc

Lecture 8 - Electrical conductivity of welding arc

Lecture 9 - Electrical resistivity of welding arc

Lecture 10 - Heat transfer inside the arc

Lecture 11 - Arc ignition mechanisms Part - I

Lecture 12 - Arc ignition mechanisms Part - II

Lecture 13 - Principles of Gas Tungsten Arc Welding

Lecture 14 - Shielding gases for arc welding

Lecture 15 - Selection of shielding gases for engineering alloys

Lecture 16 - Arc welding power sources - Part 1

Lecture 17 - Arc welding power sources - Part 2

Lecture 18 - Arc welding power sources - Part 3

Lecture 19 - Variations in GTAW process

Lecture 20 - Square wave, variable polarity, GTAW with filler, hot wire GTAW

Lecture 21 - Dual gas GTAW and Plasma Welding processes

Lecture 22 - Multi cathode GTAW and Activated GTAW

Lecture 23 - Buried GTAW and Rate controlling parameters of GTAW

Lecture 24 - Introduction to consumable welding processes

Lecture 25 - Melting rate of consumable wires

Lecture 26 - Physics of droplet transfer in consumable welding

Lecture 27 - Modes of droplet transfer - Part 1

Lecture 28 - Modes of droplet transfer - Part 2

Lecture 29 - Modes of droplet transfer - Part 3

Lecture 30 - Shielded Metal Arc Welding

Lecture 31 - Flux cored arc welding - Introduction

Lecture 32 - Electrode fluxes and process characteristics of flux cored arc welding

Lecture 33 - Flux cored arc welding - Process characteristics

Lecture 34 - Advances in gas metal arc welding - Pulsed GMAW

Lecture 35 - Advances in gas metal arc welding - Controlled dip short circuiting processes

Lecture 36 - Submerged arc welding

Lecture 37 - Resistance welding - Fundamentals

Lecture 38 - Resistance spot welding - Part 1

Lecture 39 - Resistance spot welding - Part 2

Lecture 40 - Resistance spot welding - Part 3

Lecture 41 - Resistance spot welding - Part 4

Lecture 42 - Variants in resistance welding - Part 1

Lecture 43 - Variants in resistance welding - Part 2

Lecture 44 - Laser welding process - Introduction - Part 1

Lecture 45 - Laser welding process - Part 2

Lecture 46 - Laser welding process - Part 3

Lecture 47 - Laser welding process - Part 4

Lecture 48 - Electron beam welding process

Lecture 49 - Other welding processes - Electroslag welding

Lecture 50 - Magnetically Impelled Arc Butt (MIAB) welding

Lecture 51 - Aluminothermic (thermit) welding

Lecture 52 - Introduction to solid state welding processes - Friction welding

Lecture 53 - Friction stir welding - Part 1

Lecture 54 - Friction stir welding - Part 2

Lecture 55 - Other solid state welding processes

Lecture 56 - Joining processes for Plastics - Part 1

Lecture 57 - Joining processes for Plastics - Part 2

Lecture 58 - Adhesive bonding of plastics

Lecture 59 - Welding nomenclatures

NPTEL : NOC:Creep Deformation of Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Srikant Gollapudi

Lecture 1 - Importance of studying creep

Lecture 2 - Basics of plastic deformation and characteristics of dislocations - Part 1

Lecture 3 - Basics of plastic deformation and characteristics of dislocations - Part 2

Lecture 4 - Basics of plastic deformation and characteristics of dislocations - Part 3

Lecture 5 - Creep and different factors that influence creep deformation - Part 1

Lecture 6 - Creep and different factors that influence creep deformation - Part 2

Lecture 7 - Creep and different factors that influence creep deformation - Part 3

Lecture 8 - Creep and different factors that influence creep deformation - Part 4

Lecture 9 - Creep and different factors that influence creep deformation - Part 5

Lecture 10 - Creep and different factors that influence creep deformation - Part 6

Lecture 11 - Mechanisms of Creep - Part 1

Lecture 12 - Mechanisms of Creep - Part 2

Lecture 13 - Mechanisms of Creep - Part 3

Lecture 14 - Mechanisms of Creep - Part 4

Lecture 15 - Mechanisms of Creep - Part 5

Lecture 16 - Transitions in Creep Mechanisms and Creep Constitutive Equation

Lecture 17 - Deformation Mechanism Maps - Part 1

Lecture 18 - Deformation Mechanism Maps - Part 2

Lecture 19 - Modeling the Useful Creep Life of Materials/Components - Part 1

Lecture 20 - Modeling the Useful Creep Life of Materials/Components - Part 2

Lecture 21 - Modeling the Useful Creep Life of Materials/Components - Part 3

Lecture 22 - Creep Testing Methods - Part 1

Lecture 23 - Creep Testing Methods - Part 2

Lecture 24 - Improving Creep Resistance of Materials

NPTEL : NOC:Nanotechnology, Science and Applications (Metallurgy and Material Science)

Co-ordinators : Dr. Prathap Haridoss

Lecture 1 - Nanotechnology Science and Applications - Introduction

Lecture 2 - Nanotechnology : A Walk through History

Lecture 3 - Discussion on Feynmanâ€™s talk on Nanotechnology - Part I

Lecture 4 - Discussion on Feynmanâ€™s talk on Nanotechnology - Part II

Lecture 5 - Impact of the nanoscale on thermodynamic considerations

Lecture 6 - Phase Diagrams and Stable Phases

Lecture 7 - Calorimetry

Lecture 8 - Zirconia - ZrO2

Lecture 9 - Experimentally Investigating the Hall-Petch relationship

Lecture 10 - Impact of the Nanoscale on the Hall-Petch Relationship

Lecture 11 - Impact of the nanoscale on Mechanical properties

Lecture 12 - Superplasticity and the Nanoscale: Background

Lecture 13 - Superplasticity and the Nanoscale: Experimental aspects

Lecture 14 - Severe Plastic Deformation and the nanoscale: Experimental Utility

Lecture 15 - An approach to prepare bulk nanostructures

Lecture 16 - Nanosized Ferroelectrics

Lecture 17 - Impact of the nanoscale on optical properties

Lecture 18 - Experimental approach to study impact of the nanoscale on optical properties

Lecture 19 - Impact of the nanoscale on optical properties: measurements

Lecture 20 - Nanocomposites

Lecture 21 - Effect of Nanoscale on Magnetic Properties: Potential use of biomaterials

Lecture 22 - Effect of Nanostructure on Damping Properties

Lecture 23 - Carbon

Lecture 24 - Carbon Nanotubes

Lecture 25 - Graphene, a 2D nanomaterials

NPTEL : NOC:Powder Metallurgy (Metallurgy and Material Science)

Co-ordinators : Dr. Ranjit Bauri

Lecture 1 - Introduction to Powder Metallurgy

Lecture 2 - Powder Fabrication Methods: Mechanical Fabrication

Lecture 3 - Powder Fabrication Methods: Mechanical and Electrolytic Fabrication

Lecture 4 - Powder Fabrication Methods: Chemical Fabrication

Lecture 5 - Powder Fabrication Methods: Atomization

Lecture 6 - Gas atomization

Lecture 7 - Water Atomization

Lecture 8 - Centrifugal Atomization

Lecture 9 - Comparison of Atomization techniques

Lecture 10 - Nucleation and Growth

Lecture 11 - Thermodynamics and Kinetic of Solidification

Lecture 12 - Microstructure Control

Lecture 13 - Microstructure control: Effect of process parameters

Lecture 14 - Dendritic growth in pure metals

Lecture 15 - Dendritic growth in alloys

Lecture 16 - Crystalline and Amorphous structures

Lecture 17 - Crystalline vs Amorphous

Lecture 18 - T-T-T diagram: Formation of Amorphous solids

Lecture 19 - Effect of particle size on microstructure

Lecture 20 - Powder Characterization

Lecture 21 - Basis for particle size measurement

Lecture 22 - Measurement of particle size and size distribution

Lecture 23 - Particle size distribution

Lecture 24 - Dynamic Light Scattering - 1

Lecture 25 - Dynamic Light Scattering - 2

Lecture 26 - Particle size measurement - Other methods

Lecture 27 - Surface Area Analysis - 1

Lecture 28 - Surface Area Analysis - 2

Lecture 29 - BET Surface Area Analysis

Lecture 30 - Interparticle friction

Lecture 31 - Powder packing

Lecture 32 - Powder mixing and blending

Lecture 33 - Powder Lubrication and Coating

Lecture 34 - Powder compaction - 1

Lecture 35 - Powder compaction - 2

Lecture 36 - Powder compaction - 3

Lecture 37 - Cold Isostatic Pressing and; Powder Injection Molding

Lecture 38 - Powder Injection Molding - 2

Lecture 39 - Slurry Techniques

Lecture 40 - Tape casting

Lecture 41 - Sintering - 1

Lecture 42 - Sintering - 2

Lecture 43 - Sintering - 3

Lecture 44 - Sintering - 4

Lecture 45 - Sintering - 5

Lecture 46 - Sintering - 6

Lecture 47 - Sintering - 7

Lecture 48 - Sintering - 8

Lecture 49 - Sintering - 9

Lecture 50 - Sintering - 10

Lecture 51 - Liquid Phase Sintering - 1

Lecture 52 - Liquid Phase Sintering - 2

Lecture 53 - Liquid Phase Sintering - 3

Lecture 54 - Liquid Phase Sintering - 4

Lecture 55 - Liquid Phase Sintering - 5

Lecture 56 - Full Density Processing - 1

Lecture 57 - Full Density Processing - 2

Lecture 58 - Full Density Processing - 3

Lecture 59 - Full Density Processing - 4

Lecture 60 - Spark Plasma Sintering (SPS)

NPTEL : NOC:Carbon Materials and Manufacturing (Metallurgy and Material Science)

Co-ordinators : Prof. Swati Sharma

Lecture 1 - Introduction to Materials and Manufacturing

Lecture 2 - Mathematical Representation of Material Properties

Lecture 3 - Story of Carbon: Carbon on Earth and in Outer Space

Lecture 4 - Story of Carbon: Carbon in Technology

Lecture 5 - Isotopes of carbon

Lecture 6 - Hybridization in Carbon Atoms

Lecture 7 - sp3, sp2 and sp Hybridization: Diamond, Graphite and Carbyne

Lecture 8 - sp(2+n) Hybridization: Curved Carbon

Lecture 9 - Allotropes of Carbon and Their Classification

Lecture 10 - Carbon Allotrpoe Conversion

Lecture 11 - Phase Diagram of Carbon

Lecture 12 - Introduction to Engineering Carbons

Lecture 13 - Graphite Crystal Structure

Lecture 14 - Rhombohedral Graphite and Stacking Faults

Lecture 15 - Graphite Ore Processing

Lecture 16 - Synthetic Graphite Production from Needle Coke

Lecture 17 - Kish Graphite and PVC-Derived Graphite

Lecture 18 - Highly Oriented Pyrolytic Graphite

Lecture 19 - Pyrolysis of Gaseous Hydrocarbons

Lecture 20 - Polymer-derived Carbon: Coking and Charring Mechanism

Lecture 21 - Kinetics of Graphitization

Lecture 22 - Microstructure of Non-Graphitizing Carbon

Lecture 23 - Glass-Like Carbon: Introduction and Properties

Lecture 24 - Glass-Like Carbon: Industrial Manufacturing

Lecture 25 - Microfabrication with Glass-Like Carbon

Lecture 26 - Carbon Materials and Manufacturing

Lecture 27 - X-Ray and Nano-Imprint Lithography

Lecture 28 - Activated Carbon: Introduction and Properties

Lecture 29 - Activated Carbon: Industrial Manufacturing

Lecture 30 - Carbon Black: Introduction and Properties

Lecture 31 - Carbon Black: Industrial Manufacturing

Lecture 32 - Carbon Fiber: Introduction and Properties

Lecture 33 - Melt Spinning of Petroleum Pitches

Lecture 34 - Electrospinning and Viscoelasticity

Lecture 35 - Carbonization of Polyacrylonitrile (PAN) Fibers

Lecture 36 - Mechanical Property Testing Methods for Carbon Fibers

Lecture 37 - Defects in Carbon Fibers

Lecture 38 - Introduction to Carbon Fiber Reinforced Plastic (CFRP)

Lecture 39 - Machining of Carbon Fiber Reinforced Plastic

Lecture 40 - Carbon/Carbon Composite

Lecture 41 - Carbon/Metal and Carbon/Concrete Composites: Manufacture and Properties

Lecture 42 - Graphene: Introduction and Crystal Structure

Lecture 43 - Graphene: History and Nomenclature

Lecture 44 - Chemical Vapor Deposition of Graphene - I

Lecture 45 - Chemical Vapor Deposition of Graphene - II

Lecture 46 - Defects in Graphene and the (n,m) Notations

Lecture 47 - Carbon Nanotube: Introduction and Properties

Lecture 48 - Vapor Phase Growth of Carbon Nanotube

Lecture 49 - Vapor Deposited Diamond

Lecture 50 - Diamond Like Carbon

Lecture 51 - X-Ray Diffraction Analysis of Carbon Materials

Lecture 52 - Raman Spectroscopy of Carbon Materials

Lecture 53 - Transmission Electron Microscopy of Carbon Materials

Lecture 54 - Surface Area Analysis of Carbon Materials

Lecture 55 - Numerical Problems: Carbon Manufacturing and Characterization

Lecture 56 - Large Scale Industrial Applications of Carbon Materials

Lecture 57 - Micro and Nano Scale Applications of Carbon Materials: Rigid and flexible carbon devices

Lecture 58 - Supply Chain of Industrial Carbons

Lecture 59 - Summary of NPTEL Course on Carbon Materials and Manufacturing

NPTEL : NOC:Mechanical Behavior of Materials (Metallurgy and Material Science)

Co-ordinators : Prof. S. Sankaran

Lecture 1 - Introduction

Lecture 2 - Chemical Bonding in Materials

Lecture 3 - Strength of materials - A Short Overview - Part I

Lecture 4 - Strength of materials - A Short Overview - Part II

Lecture 5 - Strength of materials - A Short Overview - Part III

Lecture 6 - Strength of materials - A Short Overview - Part IV

Lecture 7 - Strength of materials - A Short Overview - Part V

Lecture 8 - Elastic Stress- Strain Relations - Part I

Lecture 9 - Elastic Stress- Strain Relations - Part II

Lecture 10 - Elastic properties - Part I

Lecture 11 - Elastic properties - Part II

Lecture 12 - Anelasticity

Lecture 13 - Introduction to Dislocations - I

Lecture 14 - Introduction to Dislocations - II

Lecture 15 - Introduction to Dislocations - III

Lecture 16 - Introduction to Dislocations - IV

Lecture 17 - Introduction to Dislocations - V

Lecture 18 - Introduction to Dislocations - VI

Lecture 19 - Introduction to Dislocations - VII

Lecture 20 - Introduction to Dislocations - VIII

Lecture 21 - Introduction to Dislocations - IX

Lecture 22 - Introduction to Plastic deformation - I

Lecture 23 - Introduction to Plastic deformation - II

Lecture 24 - Introduction to Plastic Deformation - III

Lecture 25 - Introduction to Plastic Deformation - IV

Lecture 26 - Introduction to Plastic Deformation - V

Lecture 27 - Introduction to Plastic Deformation - VI

Lecture 28 - Strengthening Mechanisms in Crystalline Materials - I

Lecture 29 - Strengthening Mechanisms in Crystalline Materials - II

Lecture 30 - Strengthening Mechanisms in Crystalline Materials - III

Lecture 31 - Strengthening Mechanisms in Crystalline Materials - IV

Lecture 32 - Strengthening Mechanisms in Crystalline Materials - V

Lecture 33 - Mechanical Testing - I

Lecture 34 - Mechanical Testing - II

Lecture 35 - Mechanical Testing - III

Lecture 36 - Mechanical Testing - IV

Lecture 37 - Mechanical Testing - V

Lecture 38 - Mechanical Testing - VI

Lecture 39 - Mechanical Testing - VII

Lecture 40 - Mechanical Testing - VIII

Lecture 41 - Mechanical Testing - IX

Lecture 42 - Mechanical Testing - X

Lecture 43 - Creep - I

Lecture 44 - Creep - II

Lecture 45 - Creep - III

Lecture 46 - Creep - IV

Lecture 47 - Creep - V

Lecture 48 - Creep - VI

Lecture 49 - Fracture Mechanics - I

Lecture 50 - Fracture Mechanics - II

Lecture 51 - Fracture Mechanics - III

Lecture 52 - Fracture Mechanics - IV

Lecture 53 - Fracture Mechanics - V

Lecture 54 - Fracture Mechanics - VI

Lecture 55 - Fracture Mechanics - VII

Lecture 56 - Fracture Mechanics - VIII

Lecture 57 - Fracture Mechanics - IX

Lecture 58 - Fracture Mechanics - X

Lecture 59 - Fracture Mechanics - XI

Lecture 60 - Fatigue - I

Lecture 61 - Fatigue - II

Lecture 62 - Fatigue - III

Lecture 63 - Fatigue - IV

Lecture 64 - Fatigue - V

NPTEL : NOC:Aluminium based Alloys and Metal Matrix Composites (Metallurgy and Material Science)

Co-ordinators : Prof. Ranjit Bauri

Lecture 1 - Pure Aluminium

Lecture 2 - Extraction of Aluminium

Lecture 3 - Alloy Designations

Lecture 4 - Cast Aluminium Alloys

Lecture 5 - Hypo and Hyper eutectic alloys

Lecture 6 - Modifying Al-Si alloys and Decoding Alloy Designation

Lecture 7 - Solid Solution Hardening - 1

Lecture 8 - Solid Solution Hardening - 2

Lecture 9 - Yield point phenomena and Strain aging

Lecture 10 - Cottrel-Bilby theory of strain aging

Lecture 11 - Portevinâ€“Le Chatelier (PLC) effect

Lecture 12 - Dynamic Strain Aging (DSA)

Lecture 13 - Features of Serrrated Flow - 1

Lecture 14 - Features of Serrrated Flow - 2

Lecture 15 - Precipitation hardening - 1

Lecture 16 - Precipitation hardening - 2

Lecture 17 - Precipitation hardening - 3

Lecture 18 - Precipitation hardening - 4

Lecture 19 - Precipitation hardening - 5

Lecture 20 - Precipitation hardening - 6

Lecture 21 - 7XXX and 8XXX Series Alloys

Lecture 22 - Strain Hardening - 1

Lecture 23 - Strain Hardening - 2

Lecture 24 - Recovery and Recrystallization

Lecture 25 - Recrystallization Mechanism

Lecture 26 - Recrystallization: Nucleation and Growth

Lecture 27 - Dynamic Recrystallization

Lecture 28 - Discontinuous and Continuous Dynamic Recrystallization

Lecture 29 - Continuous Dynamic Recrystallization

Lecture 30 - Geometric Dynamic Recrystallization (GDRX)

Lecture 31 - Grain boundary strenthening

Lecture 32 - Grain refinement methods

Lecture 33 - Homogeneous vs Heterogeneous Nucleation

Lecture 34 - Grain refinement by Melt inoculation

Lecture 35 - Mechanisms of grain refinement by melt inoculation - 1

Lecture 36 - Mechanisms of grain refinement by melt inoculation - 2

Lecture 37 - Melt inoculation: Fading and Poisoning

Lecture 38 - Grain refinement by melt vibration

Lecture 39 - Severe Plastic Deformation (SPD)

Lecture 40 - Dynamic recrystallization in SPD

Lecture 41 - Metal Matrix Composites

Lecture 42 - Processing of Metal Matrix Composites

Lecture 43 - Two-phase process, Insitu composites

Lecture 44 - Particle wetting and Bonding

Lecture 45 - Particle Distribution in MMCs - 1

Lecture 46 - Particle Distribution in MMCs - 2

Lecture 47 - Rule of Mixture - 1

Lecture 48 - Rule of Mixture - 2

Lecture 49 - Strengthening Mechanism in MMCs - 1

Lecture 50 - Strengthening Mechanism in MMCs - 2

Lecture 51 - Fracture Behavior of Fiber Reinforced Composites

Lecture 52 - Ductile Fracture of Metals

Lecture 53 - Fracture Behavior of Discontinuously Reinforced Composites

Lecture 54 - Fatigue

Lecture 55 - Fatigue Crack propagation and Growth

Lecture 56 - Fatigue Behavior of MMCs - 1

Lecture 57 - Fatigue Behavior of MMCs - 2

Lecture 58 - Fatigue Behavior of MMCs - 3

Lecture 59 - Fatigue Behavior of MMCs - 4

Lecture 60 - Fatigue Behavior of MMCs - 5

NPTEL : NOC:Welding Science and Technology (In Tamil) (Metallurgy and Material Science)

Co-ordinators : Prof. Murugaiyan Amirthalingam

Lecture 1 - Introduction and learning objectives

Lecture 2 - Definition of welding and necessity for welding

Lecture 3 - Classification of welding processes

Lecture 4 - Introduction to welding arc

Lecture 5 - Types of gas discharges

Lecture 6 - Characteristics of a welding arc

Lecture 7 - Role of polarity in a welding arc

Lecture 8 - Anode and cathode fall zones

Lecture 9 - Arc column - Part I

Lecture 10 - Arc column - Part II

Lecture 11 - Arc column - Part III

Lecture 12 - Characteristics of arc welding processes

Lecture 13 - Introduction to arc ignition and gas tungten arc welding

Lecture 14 - Gas tungsten arc welding - I

Lecture 15 - Shielding gases used for arc welding

Lecture 16 - Plasma welding

Lecture 17 - Consumable welding processes - I

Lecture 18 - Consumable welding processes - II

Lecture 19 - Fundamentals of resistance welding

Lecture 20 - Resistance spot welding - Part I

Lecture 21 - Resistance spot welding - Part II

Lecture 22 - Other resistance welding processes

Lecture 23 - High energy beam welding processes - Laser beam welding

Lecture 24 - High energy beam welding processes - Electron beam welding

Lecture 25 - Other welding processes - Part I

Lecture 26 - Other welding processes - Part II

NPTEL : NOC:Thermodynamics and Kinetics of Materials (Metallurgy and Material Science)

Co-ordinators : Prof. Saswata Bhattacharya

Lecture 1 - Basic Concepts

Lecture 2 - Energy, Heat and Work I - Part 1

Lecture 3 - Energy, Heat and Work II - Part 2

Lecture 4 - Heat capacity and Enthalpy

Lecture 5 - Heat capacity relations in materials

Lecture 6 - Introduction to the Second law of Thermodynamics

Lecture 7 - Clausius inequality and entropy of transformation

Lecture 8 - First and Second Laws Combined

Lecture 9 - Third Law, Absolute Zero, and Other Energy Functions

Lecture 10 - Axiomatic Approach and Thermodynamic Equilibrium in Simple Systems

Lecture 11 - Formulations of Equilibrium in Thermodynamic Systems

Lecture 12 - Fundamental relations and alternative formulations of equilibrium criterion

Lecture 13 - Maxwell relations and their application

Lecture 14 - Concepts of Statistical Thermodynamics - 1

Lecture 15 - Concepts of Statistical Thermodynamics - 2

Lecture 16 - Thermodynamic Equilibrium in Statistical Thermodynamics

Lecture 17 - Phase equilibria and phase transition in unary systems - 1

Lecture 18 - Phase equilibria and phase transition in unary systems - 2

Lecture 19 - Phase equilibria and phase transition in unary systems - 3

Lecture 20 - Applications of Clausius-Clapeyron Equation

Lecture 21 - Thermodynamics of solutions - 1

Lecture 22 - Thermodynamics of solutions - 2

Lecture 23 - Multicomponent solutions and mixing process

Lecture 24 - Thermodynamic properties due to mixing

Lecture 25 - Ideal and Real Solutions

Lecture 26 - Regular solutions and thermodynamic properties of mixing

Lecture 27 - Colligative Properties

Lecture 28 - Quasichemical Approach and regular solutions

Lecture 29 - Quasichemical solution model for ordered phases - I

Lecture 30 - Quasichemical solution model for ordered phases - II

Lecture 31 - Phase equilibria in multiphase, multicomponent, non-reacting systems

Lecture 32 - Binary phase diagrams and lever rule

Lecture 33 - Binary alloy phase diagrams and invariant points

Lecture 34 - Binary alloy phase diagrams - intermediate phases and miscibility gap

Lecture 35 - Thermodynamics of phase diagrams - G-x curves

Lecture 36 - Thermodynamic Stability and Numerical Modeling

Lecture 37 - Thermodynamics of reacting systems

Lecture 38 - Elements of thermodynamics of interfaces and thermodynamics of irreversible processes

NPTEL : NOC:Surface Engineering of Nanomaterials (Metallurgy and Material Science)

Co-ordinators : Prof. Kaushik Pal

Lecture 1 - Tribology and Its Classification

Lecture 2 - Friction Tribology

Lecture 3 - Wear and Corrosion

Lecture 4 - Lubrication

Lecture 5 - Effect of Tribology on Surface of Nanomaterials

Lecture 6 - Conventional Surface Engineering

Lecture 7 - Types of Surface Modifications

Lecture 8 - Physical Modifications

Lecture 9 - Chemical Modifications

Lecture 10 - Applications of Surface Engineering towards Nanomaterials

Lecture 11 - Deposition and Surface Modification Methods

Lecture 12 - Physical Vapour Deposition (PVD)

Lecture 13 - Chemical Vapour Deposition (CVD)

Lecture 14 - Advanced Surface Modification Practices

Lecture 15 - Advantages of Deposition for Surface Modification

Lecture 16 - Synthesis, Processing and Characterization of Nano-structured Coatings

Lecture 17 - Functional Coatings

Lecture 18 - Advanced Coating Practices

Lecture 19 - Characterization of Nano-coatings

Lecture 20 - Applications of Nano-coatings

Lecture 21 - Need of Advanced Methods for Surface and Coating Testings

Lecture 22 - Size Dependency in Nanostructures of Nanocoatings

Lecture 23 - Size Effect in Electrochemical Properties of Nanostructured Coatings

Lecture 24 - Size Effect in Mechanical Properties of Nanostructured Coatings

Lecture 25 - Size Effect in Physical and Other Properties of Nanostructured Coatings

Lecture 26 - Thin Films for Surface Engineering of Nanomaterials

Lecture 27 - Sputtering Techniques

Lecture 28 - Evaporation Processes

Lecture 29 - Thin Film Deposition through Gas Phase Techniques

Lecture 30 - Liquid Phase Techniques

Lecture 31 - Microencapsulation Processes

Lecture 32 - Microencapsulation: Kinetics of release

Lecture 33 - Plating of Nanocomposite Coatings - I

Lecture 34 - Plating of Nanocomposite Coatings - II

Lecture 35 - Advantages of Microencapsulation over Other Conventional Methods

Lecture 36 - Current Trends in Surface Modification of Nanomaterials - Part-1

Lecture 37 - Current Trends in Surface Modification of Nanomaterials - Part-2

Lecture 38 - Current Trends in Surface Modification of Nanomaterials - Part-3

Lecture 39 - Modified Nanomaterials: In-use for consumer products

Lecture 40 - Main Problems in Synthesis of Modified Nanomaterials

NPTEL : NOC:Material Science and Engineering (Metallurgy and Material Science)

Co-ordinators : Dr. Vivek Pancholi

Lecture 1 - Introduction

Lecture 2 - Atomic structure and bonding

Lecture 3 - Crystal systems and structures: Lattice

Lecture 4 - X-ray diffraction: Crystal structure determination

Lecture 5 - Crystal planes and directions: Indexing

Lecture 6 - Optical microscope

Lecture 7 - Optical aberration

Lecture 8 - Metallography

Lecture 9 - Microstructure: Understanding

Lecture 10 - Quantitative metallography

Lecture 11 - Crystallographic defects

Lecture 12 - Diffusion

Lecture 13 - Phase diagram - 1

Lecture 14 - Phase diagram - 2

Lecture 15 - Eutectic phase diagram

Lecture 16 - Equilibrium and non-equilibrium cooling

Lecture 17 - Equilibrium cooling of eutectic system

Lecture 18 - Solidification structure

Lecture 19 - Iron-carbon phase diagram

Lecture 20 - Nucleation and growth

Lecture 21 - TTT and CCT curves

Lecture 22 - Heat treatment

Lecture 23 - Precipitation

Lecture 24 - Elastic behaviour

Lecture 25 - Tensile test

Lecture 26 - Engineering and true stress and strain

Lecture 27 - Plastic deformation - 1

Lecture 28 - Plastic deformation - 2

Lecture 29 - Strengthening mechanism - 1

Lecture 30 - Strengthening mechanism - 2

Lecture 31 - Strengthening mechanism - 3

Lecture 32 - Strengthening mechanism - 4

Lecture 33 - Fracture: Part - 1

Lecture 34 - Fracture: Part - 2

Lecture 35 - Fatigue

Lecture 36 - Creep

Lecture 37 - NDT: Hardness measurement

Lecture 38 - Ceramics, polymers, composites

Lecture 39 - Electrical and magnetic properties

Lecture 40 - Alloy designation and properties

NPTEL : NOC:Structural Analysis of Nanomaterials (Metallurgy and Material Science)

Co-ordinators : Prof. Kaushik Pal

Lecture 1 - Introduction

Lecture 2 - Structure of Materials

Lecture 3 - Imperfections in Structure of Materials

Lecture 4 - Phase Diagram: Determination of Phases

Lecture 5 - Transformation of Phases

Lecture 6 - Basic Properties: Metals - I

Lecture 7 - Basic Properties: Metals - II

Lecture 8 - Basic Properties: Ceramics

Lecture 9 - Basic Properties: Polymers

Lecture 10 - Selection of Nanomaterials based on Applications

Lecture 11 - Introduction to X-Ray Diffraction

Lecture 12 - Diffraction Methods and Directions of XRD

Lecture 13 - Determination of Crystal Structures by XRD Patterns

Lecture 14 - Precise Parameter Measurements

Lecture 15 - Orientation of Single Crystals

Lecture 16 - Qualitative Analysis by Diffraction

Lecture 17 - Quantitative Analysis by Diffraction

Lecture 18 - Microscopic Structural Analysis of Nanomaterials - I

Lecture 19 - Microscopic Structural Analysis of Nanomaterials - II

Lecture 20 - Other Characterization Techniques

NPTEL : NOC:Thermo-Mechanical and Thermo-Chemical Processes (Metallurgy and Material Science)

Co-ordinators : Prof. S. R. Meka

Lecture 1 - Introduction to Thermomechanical Processes

Lecture 2 - Conventional Thermomechanical Processes

Lecture 3 - Non-conventional Thermomechanical Processes

Lecture 4 - Stress and Strain

Lecture 5 - Effect of Strain Rate and Temperature

Lecture 6 - Microstructure Evolution

Lecture 7 - Dynamic Recovery

Lecture 8 - Discontinuous Dynamic Recrystallization

Lecture 9 - Dynamic Recrystallization : Critical Stress and Strain

Lecture 10 - Continuous Dynamic Recrystallization (CDRX) and Geometrical Dynamic Recrystallization (GDRX)

Lecture 11 - Stereographic Projection

Lecture 12 - Using Stereographic Projection

Lecture 13 - Crystallographic Texture

Lecture 14 - Crystallographic Texture: Texture Components

Lecture 15 - Crystallographic Texture: Application

Lecture 16 - Constitutive Analysis

Lecture 17 - Constitutive Analysis: Low Strain Rate

Lecture 18 - Higher Strain Rate: Hot Working

Lecture 19 - Constitutive Based Model : Physical Based Model

Lecture 20 - Constitutive analysis : Case Study

Lecture 21 - Processing Maps : Deformation Mechanism maps

Lecture 22 - Processing Maps : Dynamic Material Model

Lecture 23 - Microstructure and Application

Lecture 24 - Processing Maps : Different Models

Lecture 25 - Processing Maps : Case Study

Lecture 26 - Equal Channel Angular Pressing (ECAP)

Lecture 27 - Friction Stir Processing (FSP)

Lecture 28 - Accumulative Roll Bonding (ARB)

Lecture 29 - Multi Axial Forging (MAF)

Lecture 30 - Severe Plastic Deformation : Case Study

Lecture 31 - Overview on Thermo-Chemical treatments

Lecture 32 - Overview on Thermo-Chemical treatments (Continued...)

Lecture 33 - Thermodynamic aspects of thermo-chemical treatments: Preliminaries

Lecture 34 - Thermodynamics of Gaseous Nitriding - I

Lecture 35 - Thermodynamics of Gaseous Nitriding - II

Lecture 36 - Gaseous Nitriding of Pure Iron

Lecture 37 - Gaseous Nitriding of Iron based alloys

Lecture 38 - Duplex and Dual Phase microstructures through nitriding

Lecture 39 - Alloying element nitride precipitation during nitriding of iron based alloys

Lecture 40 - Kinetics of gaseous nitriding

NPTEL : NOC:Welding Metallurgy (Metallurgy and Material Science)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to welding metallurgy

Lecture 2 - Overview of Welding Processes

Lecture 3 - Introduction to phase diagrams

Lecture 4 - Phase diagram of Iron Carbon system

Lecture 5 - Phase diagram of non ferrous metals and alloys

Lecture 6 - Phase Transformations

Lecture 7 - Time Temperature Transformation Diagrams

Lecture 8 - Continuous Cooling Transformation Diagrams

Lecture 9 - Carbon Equivalent, Schaeffler Diagrams

Lecture 10 - Problem solving on Phase Diagrams

Lecture 11 - Introduction to strengthening mechanism in metals

Lecture 12 - Solid solution strengthening and grain refinement

Lecture 13 - Precipitation Hardening and Martensite Strengthening

Lecture 14 - Strain Hardening and Strain Ageing

Lecture 15 - Problem solving on strengthening mechanism in metals

Lecture 16 - Introduction to Heat treatment Processes in Welding

Lecture 17 - Hardening and Hardenability

Lecture 18 - Martempering and Austempering

Lecture 19 - Case Hardening methods

Lecture 20 - Heat treatment of Non-Ferrous metals and alloys

Lecture 21 - Heat Sources in Welding

Lecture 22 - Heat Flow in Welding

Lecture 23 - Temperature Distribution in Welding

Lecture 24 - Effect of Welding Parameters

Lecture 25 - Metallurgical effect of Heat Flow on Welding

Lecture 26 - Principles of Solidification in Welding

Lecture 27 - Solute redistribution during Solidification

Lecture 28 - Constitutional Supercooling

Lecture 29 - Microsegregation and Banding

Lecture 30 - Grain Structure during Solidification in Welding

Lecture 31 - Distinct Zones in Fusion Welded Specimen

Lecture 32 - Heat Affected Zone

Lecture 33 - Properties of Heat Affect Zone

Lecture 34 - Microstructural Products in Weldments

Lecture 35 - Introduction to Preheat and Postweld Heat Treatment

Lecture 36 - Preheat and Postweld Heat Treatment of Different Materials

Lecture 37 - Residual Stresses in Welding

Lecture 38 - Causes of Residual Stress Development in Welding

Lecture 39 - Measurement of Residual Stresses in Weldments

Lecture 40 - Controlling Residual Stresses in Weldments

Lecture 41 - Introduction to Welding Distortion

Lecture 42 - Types of Welding Distortions

Lecture 43 - Angular Distortions in Welds

Lecture 44 - Bowing, Buckling and Twisting in Welds

Lecture 45 - Control of Distortion in Welds

Lecture 46 - Introduction to Cracks in Welds

Lecture 47 - Types of Weld Cracks

Lecture 48 - Specific Weld Cracks

Lecture 49 - Chevron Cracks and Reheat Cracks

Lecture 50 - Lamellar Cracks and Stress Corrosion Cracking

Lecture 51 - Introduction to Weldability of Metals

Lecture 52 - Weldability of Carbon Steels

Lecture 53 - Weldability of Alloy Steels

Lecture 54 - Weldability of Cast Iron

Lecture 55 - Weldability of Non Ferrous Metals and Alloys

Lecture 56 - Introduction to Welding Defects

Lecture 57 - Surface and Subsurface Welding Defects

Lecture 58 - Issues in Welding: Design for Static Loading

Lecture 59 - Considerations for Fatigue Loading in Welding

Lecture 60 - Design Features for Fatigue and Static Loading in Welding

NPTEL : NOC:Modeling of Tundish Steelmaking Process in Continuous Casting (Metallurgy and Material Science)

Co-ordinators : Dr. Pradeep K. Jha

Lecture 1 - Introduction to Continuous Casting Process

Lecture 2 - Role of Tundish in Continuous Casting

Lecture 3 - Types of Continuous Casting Machine

Lecture 4 - Components of Continuous Casting Unit

Lecture 5 - Tundish Metallurgy

Lecture 6 - Introduction to Physical Modeling

Lecture 7 - Concept of Similarity in Physical Modeling

Lecture 8 - Dimensional analysis

Lecture 9 - Physical Modeling of Isothermal and Non-Isothermal system

Lecture 10 - Consideration in Aqueous Modeling

Lecture 11 - Introduction to Stimulus Response Techniques

Lecture 12 - Characterization of Flow

Lecture 13 - Characterization of Flow in Actual Systems

Lecture 14 - Analysis of RTD Curves

Lecture 15 - Plug, Mixed and Dead Regions in Tundish

Lecture 16 - Fluid Flow Fundamentals

Lecture 17 - Mass Conservation Equation

Lecture 18 - Momentum Conservation Equation

Lecture 19 - Energy Conservation Equation

Lecture 20 - Navier Stokes Equations for Newtonian Fluid

Lecture 21 - Introduction to Turbulence in Fluid Flow

Lecture 22 - Characteristics of Turbulent Flow

Lecture 23 - RANS Equations

Lecture 24 - Turbulent Flow Calculations

Lecture 25 - Turbulence Modeling Using k-É› Model

Lecture 26 - Introduction to Heat Transfer Phenomena

Lecture 27 - Numerical Methods for Solving Governing Equation

Lecture 28 - Finite Volume Method for Convection and Diffusion Problems

Lecture 29 - Different Discretization Schemes

Lecture 30 - Assessment of Discretization Schemes

Lecture 31 - Elements of Mathematical Modeling in Tundish Steelmaking

Lecture 32 - Boundary Conditions

Lecture 33 - Flow Analysis in Tundish

Lecture 34 - Analysis of Fluid Flow and Mixing in Tundish

Lecture 35 - Non-isothermal Flow Considerations in Tundish

Lecture 36 - Intermixing in Tundish

Lecture 37 - Modeling Consideration For Inclusion Removal in Tundish - I

Lecture 38 - Modeling Consideration For Inclusion Removal in Tundish - II

Lecture 39 - Case Studies in Modeling of Tundish Steelmaking - 1

Lecture 40 - Case Studies in Modeling of Tundish Steelmaking - 2

NPTEL : NOC:Biomaterials for Bone Tissue Engineering Applications (Metallurgy and Material Science)

Co-ordinators : Prof. Bikramjit Basu

Lecture 1 - Introduction

Lecture 2 - Biomaterial

Lecture 3 - Biocompatibility

Lecture 4 - Host response

Lecture 5 - Tissue Eng

Lecture 6 - Scaffold

Lecture 7 - Bone structure

Lecture 8 - Bone properties

Lecture 9 - Implant - I

Lecture 10 - Implant - II

Lecture 11 - Proteins

Lecture 12 - Cell structure

Lecture 13 - Bacteria structure

Lecture 14 - Antibacterial assay

Lecture 15 - Cell fate processes

Lecture 16 - Cell division

Lecture 17 - Cell differentiation

Lecture 18 - Stem cells

Lecture 19 - Osseointegration

Lecture 20 - In vivo testing

Lecture 21 - Cell-material interaction

Lecture 22 - Cell-signalling

Lecture 23 - In vitro testing

Lecture 24 - Cytotoxicity assays

Lecture 25 - Biocompatibility assay

Lecture 26 - Clinical trials - I

Lecture 27 - Clinical trials - II

Lecture 28 - Metal manufacturing

Lecture 29 - Ceramics manufacturing

Lecture 30 - Polymers manufacturing

Lecture 31 - Additive manufacturing

Lecture 32 - HA-Ti-Toughness, Cell functionality

Lecture 33 - HA-CaTiO 3 development

Lecture 34 - HA- BaTiO 3 Functional Prop

Lecture 35 - HA-Ag antimicrob and cell viability

Lecture 36 - HA-ZnO, Cell fate and antimicrobial

Lecture 37 - Dental ceramics processing

Lecture 38 - Sr-based glass Ceramics

Lecture 39 - Acetabular socket (Compression mold)

Lecture 40 - ZTA femoral ball head fabrication

NPTEL : NOC:Iron Making (Metallurgy and Material Science)

Co-ordinators : Prof Govind S Gupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

Lecture 38

Lecture 39 - Live Session

NPTEL : NOC:Friction and Wear of Materials: Principles and Case Studies (Metallurgy and Material Science)

Co-ordinators : Prof. Dr. B. V. Manoj Kumar, Prof. Bikramjit Basu

Lecture 1 - Tribology: Introduction

Lecture 2 - Surfaces and contacts

Lecture 3 - Friction: Laws and mechanisms

Lecture 4 - Contact temperature

Lecture 5 - Lubrication

Lecture 6 - Wear mechanisms: Adhesive wear

Lecture 7 - Wear mechanisms: Abrasive wear

Lecture 8 - Wear mechanisms: Tribochemical wear and Oxidative wear

Lecture 9 - Wear mechanisms: Fatigue wear and Fretting wear

Lecture 10 - Wear mechanisms: Erosive wear

Lecture 11 - Overview of tribological materials

Lecture 12 - Friction and wear of metal matrix composites

Lecture 13 - Overview: Bioceramics and Biocomposites

Lecture 14 - Fabrication of engineering polymers

Lecture 15 - Polymer Ceramic Composites for Orthopedic Applications

Lecture 16 - Processing concepts of ceramics

Lecture 17 - Mechanical properties of ceramics

Lecture 18 - Fracture and toughening of brittle solids

Lecture 19 - Sliding wear of SiC Ceramics

Lecture 20 - Sliding wear of SiC-WC Composites

Lecture 21 - Friction and wear of HDPE-HA-Al2O3

Lecture 22 - Wear behavior of bioceramics and biocomposites

Lecture 23 - Tribological behavior of dental restorative materials

Lecture 24 - Wear of transformation toughened zirconia

Lecture 25 - Fretting wear of SiAlON Ceramics

Lecture 26 - Tribochemistry in wear of cermets

Lecture 27 - Overview: nanoceramic composites

Lecture 28 - Wear of YSZ nanoceramics

Lecture 29 - Wear behavior of nanostructured WC-ZrO2 nanocomposites

Lecture 30 - Erosive wear of SiC-WC composites

Lecture 31 - Overview: Cryogenic wear properties of materials

Lecture 32 - Sliding wear of alumina ceramics and zirconia ceramics in cryogenic environment

Lecture 33 - Sliding wear of silicon carbide in cryogenic environment

Lecture 34 - Wear of TiB2 Ceramic Composites

Lecture 35 - Erosive wear of ultra-high temperature NbB2-based ceramic composites

Lecture 36 - Erosive wear of ultra-high temperature ZrB2-based ceramic composites

Lecture 37 - Computational analysis in assessing wear

Lecture 38 - Basics of ceramics coating techniques

Lecture 39 - Erosive wear of WC-Co coating

Lecture 40 - Abrasive wear of WC-Co coating

NPTEL : NOC:Materials Design for Electronic, Electromechanical and Optical Functions (Metallurgy and Material Science)

Co-ordinators : Prof. Pavan Nukala

Lecture 1 - Description of material properties

Lecture 2 - Direct and Coupled properties

Lecture 3 - Tensor algebra and property tensor

Lecture 4 - Tensor algebra (Continued...)

Lecture 5 - Property tensor: higher rank tensor and nonlinear property

Lecture 6 - Property tensor (Continued...)

Lecture 7 - Field tensor: Stress and strain

Lecture 8 - Point symmetry operation: rotation and inversion

Lecture 9 - Point symmetry operation: rotoinversion

Lecture 10 - Point symmetry operation: examples in material system

Lecture 11 - Crystal Systems, Bravais Lattices and Symmetry

Lecture 12 - Crystal Systems, Bravais Lattices and Symmetry

Lecture 13 - Crystal Systems, Bravais Lattices and Symmetry

Lecture 14 - Crystal Systems, Bravais Lattices and Symmetry

Lecture 15 - Crystal Systems, Bravais Lattices and Symmetry

Lecture 16 - Development of point group - Part 1

Lecture 17 - Development of point group - Part 2

Lecture 18 - Development of point group - Part 3 : Some visualization in real crystals

Lecture 19 - Point groups, polar groups and consequences in property

Lecture 20 - Structure-symmetry- property correlation

Lecture 21 - Ferroelectricity, polar point groups - I

Lecture 22 - Ferroelectricity, polar point groups - II

Lecture 23 - Space Groups - I

Lecture 24 - Space Groups - II

Lecture 25 - Visualizing Important Crystals (A space group perspective)

Lecture 26 - Some more popular structures and their visualization

Lecture 27 - Symmetry-property correlation - Part 1

Lecture 28 - Symmetry-property correlation - Part 2

Lecture 29 - Symmetry-property correlation - Part 3

Lecture 30 - Thermodynamics and equilibrium properties - Part 1

Lecture 31 - Thermodynamics and equilibrium properties - Part 2

Lecture 32 - Thermodynamics and equilibrium properties - Part 3

Lecture 33 - Thermodynamics and equilibrium properties - Part 4

Lecture 34 - Statistical Mechanics

Lecture 35 - Title Statistical Mechanics (Continued...)

Lecture 36 - Properties as fluctuations and correlations of order parameter

Lecture 37 - Properties as fluctuations and correlations (Continued...)

Lecture 38 - Landau Theory and Phase Transitions

Lecture 39 - Landau Theory and Phase Transitions (Continued...)

Lecture 40 - Phase transitions and enhancement of fluctuations

Lecture 41 - Dissipative properties

Lecture 42 - Dissipative properties

Lecture 43 - Dissipative properties: Onsagers linear response theory

Lecture 44 - Onsagers linear response theory (Continued...)

Lecture 45 - Onsagers theory: A few case studies

Lecture 46 - Measurement of response function

Lecture 47 - Small Signal Measurement

Lecture 48 - Atomistic picture of Dielectric constant

Lecture 49 - Relaxation vs Resonance

Lecture 50 - Resonance

Lecture 51 - Causality

Lecture 52 - Kramers-Kronig relations

Lecture 53 - Kramers-Kronig and Spectroscopy

Lecture 54 - Spectroscopy at various time scale

Lecture 55 - Spectroscopy (Continued...)

Lecture 56 - Spectroscopy (Continued...)

NPTEL : Fundamentals of Environmental Pollution and Control (Mining Engineering)

Co-ordinators : Prof. J. Bhattacharyya

Lecture 1 - State of the Environment

Lecture 2 - Environmental Movement

Lecture 3 - Definitions of Environmental Terms

Lecture 4 - Water Pollutants

Lecture 5 - Water Pollutants (Continued...)

Lecture 6 - Water Pollution Modelling-Surface Water

Lecture 7 - Water Pollution Modelling-Surface Water(Continued...)

Lecture 8 - BOD Modelling - Part 1

Lecture 9 - BOD Modelling - Part 2

Lecture 10 - Oxygen Demanding Waste in Streams - Part 1

Lecture 11 - Oxygen Demanding Waste in Streams - Part 2

Lecture 12 - Ground Water and its Contamination

Lecture 13 - Ground Water and its Contamination (Continued...)

Lecture 14 - Ground Water and its Contamination (Continued...)

Lecture 15 - Waste Water Treatment

Lecture 16 - Wastewater Treatment (Continued...)

Lecture 17 - Wastewater Treatment (Continued...)

Lecture 18 - Chemical Treatment

Lecture 19 - Wetland Treatment and Bio-Technology Applications

Lecture 20 - Introduction to Soil

Lecture 21 - Parameters to Soil for Vegetative Growth

Lecture 22 - Parameters to Soil for Vegetative Growth (Continued...)

Lecture 23 - Soil Acidity

Lecture 24 - Soil Erosion

Lecture 25 - Mechanical Soil Erosion Control

Lecture 26 - Soil Erosion Prediction

Lecture 27 - Universal Soil Loss Equation

Lecture 28 - Air Pollutants

Lecture 29 - Health Effects of Air Pollutants - Part 1

Lecture 30 - Health Effects of Air Pollutants - Part 2

Lecture 31 - Air Pollutants and Meteorology - Part 1

Lecture 32 - Air Pollutants and Meteorology - Part 2

Lecture 33 - The Point-Source Gaussian Plume Model

Lecture 34 - Ground Level Concentration

Lecture 35 - Emission Control

Lecture 36 - EIA, EMP & EA

NPTEL : NOC:Drilling and Blasting Technology (Mining Engineering)

Co-ordinators : Prof. Kaushik Dey

Lecture 1 - Introduction to Drilling Technology

Lecture 2 - Introduction to Blasting Technology

Lecture 3 - Rock Formation

Lecture 4 - Rock Formation (Continued...)

Lecture 5 - Rock Formation (Continued...)

Lecture 6 - Rock Properties and Testing - 1

Lecture 7 - Rock Properties and Testing - 2

Lecture 8 - Drilling Mechanism

Lecture 9 - Drillability of Rock

Lecture 10 - Drilling Machines - 1

Lecture 11 - Drilling Machines - 2

Lecture 12 - Drilling Pattern - 1

Lecture 13 - Drilling Pattern - 2

Lecture 14 - Special Drilling Methods - I

Lecture 15 - Special Drilling Methods - II

Lecture 16 - Explosives - 1

Lecture 17 - Explosives - 2

Lecture 18 - Explosives accessories - 1

Lecture 19 - Explosives accessories - 2

Lecture 20 - Explosives accessories - 3

Lecture 21 - Explosives properties - 1

Lecture 22 - Explosives properties - 2

Lecture 23 - Explosives properties - 3

Lecture 24 - Basics of blasting - 1

Lecture 25 - Basics of blasting - 2

Lecture 26 - Explosive storage and transportation - 1

Lecture 27 - Explosive storage and transportation - 2

Lecture 28 - Surface blasting - 1

Lecture 29 - Surface blasting - 2

Lecture 30 - Surface blast design

Lecture 31 - Underground blast design - 1

Lecture 32 - Underground blast design - 2

Lecture 33 - Blasting results - 1

Lecture 34 - Blasting results - 2

Lecture 35 - Blasting results - 3

Lecture 36 - Blasting results - 4

Lecture 37 - Problems - 1

Lecture 38 - Problems - 2

Lecture 39 - Problems - 3

Lecture 40 - Problems - 4

NPTEL : NOC:Network Analysis for Mines and Mineral Engineering (Mining Engineering)

Co-ordinators : Prof. Kaushik Dey

Lecture 1 - Introduction to Network Analysis

Lecture 2 - Introduction to network and some terminology

Lecture 3 - Construction of network

Lecture 4 - Introduction to activity on node diagram and comparison with arrow diagram

Lecture 5 - Rules of dummy job,redundancy and cycles

Lecture 6 - Critical path and its calculation

Lecture 7 - Algorithm for critical path early start and early finish times

Lecture 8 - Late start and late finish times algorithm

Lecture 9 - Understanding the slack

Lecture 10 - Examples of slacks and calculation of AON network

Lecture 11 - Project due dates and earliest completion time examples

Lecture 12 - CPM model and cost modelling

Lecture 13 - Lowest cost schedule and optimum schedule

Lecture 14 - Crashing and stretching of jobs

Lecture 15 - Crashing and stretching of jobs (Continued...)

Lecture 16 - Introduction to PERT

Lecture 17 - Expected length of critical path calculation with examples

Lecture 18 - Probability of completion of a project

Lecture 19 - Event oriented project management

Lecture 20 - Algorithm and computer program

NPTEL : NOC:Mining Machinery (Mining Engineering)

Co-ordinators : Prof. Khanindra Pathak

Lecture 1 - Introduction to Mining Machinery - Part A

Lecture 2 - Introduction to Mining Machinery - Part B

Lecture 3 - Introduction to Machine Elements

Lecture 4 - Mechanical Transmission of Power

Lecture 5 - Shafts, Pulleys, Gears, and Geartrains Bearing and Brakes

Lecture 6 - Belt Drives, Chain Drives

Lecture 7 - Prime Movers

Lecture 8 - Fluid Power for Mining Machinery

Lecture 9 - Pneumatic Power for Mining Machinery

Lecture 10 - Steel Wire Rope : Types and Basic Calculation

Lecture 11 - Steel Wire Rope Maintenance

Lecture 12 - Principle of Rock - Tool Interaction

Lecture 13 - Site and Rock Preparation Equipment : Dozer Ripper

Lecture 14 - Site and Rock Preparation Equipment : Ripper

Lecture 15 - Drilling Machines for Mining

Lecture 16 - Site and Rock Preparation Equipment : Scraper

Lecture 17 - Site and Rock Preparation Equipment : Motor Grader

Lecture 18 - Surface Mining Machinery : Machinery for Cyclic Excavation : Electric Rope Shovel

Lecture 19 - Surface Mining Machinery : Machinery for Cyclic Excavation : Hydraulic Excavators and Back Hoe

Lecture 20 - Surface Mining Machinery : Machinery for Cyclic Excavation : Front End Loader

Lecture 21 - Surface Mining Machinery : Machinery for Cyclic Excavation : Dragline

Lecture 22 - Surface Mining Machinery : Machinery for Continuous Excavation : Bucket Wheel Excavator

Lecture 23 - Surface Mining Machinery : Machinery for Continuous Excavation : Bucket Chain Excavators

Lecture 24 - Surface Mining Machinery : Machinery for Continuous Excavation : Continuous Surface Miner

Lecture 25 - Surface Mining Machinery : Machinery for Continuous Excavation : Dredger

Lecture 26 - Underground Mining Machinery Loaders : Gathering Arm Loader

Lecture 27 - Underground Mining Machinery Loaders : Rocker Shovel and Side Discharge Loader

Lecture 28 - Underground Mining Machinery Loaders : Load Haul Dump (LHD) Loader

Lecture 29 - Underground Mining Machinery : Road Header

Lecture 30 - Underground Mining Machinery Underground Drills and Roof Bolter

Lecture 31 - Underground Mining Machinery Continuous Miner

Lecture 32 - Underground Mining Machinery Shuttle Car

Lecture 33 - Longwall Mining Machinery Shearer

Lecture 34 - Longwall Mining Machinery Armored Face Conveyor

Lecture 35 - Longwall Mining Machinery Power Support

Lecture 36 - Mine Pumps

Lecture 37 - Mine Pumps : Special Pumps

Lecture 38 - Basic Pumping Theory

Lecture 39 - Air Compressor

Lecture 40 - Fans for Mining

Lecture 41 - Transportation Machinery for Surface Mines

Lecture 42 - Automobiles in Mines and Mining Truck

Lecture 43 - Off-highway Trucks

Lecture 44 - Off-highway Trucks : Rimpull Curves and Tires

Lecture 45 - Off-highway Trucks : Performance

Lecture 46 - Belt Conveyor

Lecture 47 - Belt Conveyor Design Criteria

Lecture 48 - Power Requirements for Belt Conveyor

Lecture 49 - Belt Conveyor Maintenance

Lecture 50 - Aerial Rope Ways

Lecture 51 - Machinery for Underground Mine Transport

Lecture 52 - Endless Rope Haulage

Lecture 53 - Rope Haulage in Underground Mines

Lecture 54 - Locomotive

Lecture 55 - Equipment for Shaft : Winding Machines

Lecture 56 - Mechanics of Hoisting

Lecture 57 - Low Profile Dumper

Lecture 58 - Maintenance of Mining Machinery

Lecture 59 - Maintenance Management Information System

Lecture 60 - Non Destructive Testing

NPTEL : NOC:Underground Mining of Metalliferous Deposits (Mining Engineering)

Co-ordinators : Prof. Bibhuti Bhusan Mandal

Lecture 1 - Metals and Civilisation

Lecture 2 - Mine Life Cycle

Lecture 3 - Present Status of Mineral Deposits

Lecture 4 - Present Status of Underground Mining

Lecture 5 - Terminology - I

Lecture 6 - Terminology - II

Lecture 7 - Determination of Cut Off Grade - I

Lecture 8 - Determination of Cut Off Grade - II

Lecture 9 - Determination of Cut Off Grade - III

Lecture 10 - Dilution

Lecture 11 - Recovery

Lecture 12 - Adit - I

Lecture 13 - Adit - II

Lecture 14 - Incline Shaft

Lecture 15 - Shaft - I

Lecture 16 - Shaft - II

Lecture 17 - Shaft - III

Lecture 18 - Horizontal Drivages - I

Lecture 19 - Horizontal Drivages - II

Lecture 20 - Horizontal Drivages - III

Lecture 21 - Horizontal Drivages - IV

Lecture 22 - Raising and Winzing - I

Lecture 23 - Raising and Winzing - II

Lecture 24 - Raising and Winzing - III

Lecture 25 - Raising and Winzing - IV

Lecture 26 - Selection of Mining Methods - I

Lecture 27 - Selection of Mining Methods - II

Lecture 28 - Selection of Mining Methods - III

Lecture 29 - Selection of Mining Methods - IV

Lecture 30 - Selection of Mining Methods - V

Lecture 31 - Breast Stoping

Lecture 32 - Sampling Practices

Lecture 33 - Stope and Pillar - I

Lecture 34 - Stope and Pillar - II

Lecture 35 - Room and Pillar Mining - I

Lecture 36 - Room and Pillar Mining - II

Lecture 37 - Tributary area method

Lecture 38 - Pillar Failure

Lecture 39 - Shrinkage Stoping - I

Lecture 40 - Shrinkage Stoping - II

Lecture 41 - Cut and Fill stoping - I

Lecture 42 - Cut and Fill stoping - II

Lecture 43 - Cut and Fill stoping - III [Post Pillar Method]

Lecture 44 - Backfill Materials

Lecture 45 - Backfill Materials - II

Lecture 46 - Rock Bolting - I

Lecture 47 - Rock Bolting - II

Lecture 48 - Cable Bolting

Lecture 49 - Sublevel Stoping

Lecture 50 - Long Hole Stoping

Lecture 51 - Resuing Method of Stoping

Lecture 52 - Square Set Stoping

Lecture 53 - Vertical Crater Retreat Method - I

Lecture 54 - Vertical Crater Retreat Method - II

Lecture 55 - Sublevel Caving - I

Lecture 56 - Sublevel Caving - II

Lecture 57 - Block Caving - I

Lecture 58 - Block Caving - II

Lecture 59 - Safety in U/G Metal Mines - I

Lecture 60 - Safety in U/G Metal Mines - II

NPTEL : NOC:Surface Mining Technology (Mining Engineering)

Co-ordinators : Prof. Kaushik Dey

Lecture 1 - Rocks Mineral and Ore

Lecture 2 - Current Status of Surface Mining

Lecture 3 - Stripping Ratios and Pit Layouts - I

Lecture 4 - Stripping Ratios and Pit Layouts - II

Lecture 5 - Stripping Ratios and Pit Layouts - III

Lecture 6 - Phases of Surface Mining - I

Lecture 7 - Phases of Surface Mining - II

Lecture 8 - Phases of Surface Mining - III

Lecture 9 - Opening Through Box Cut - I

Lecture 10 - Opening Through Box Cut - II

Lecture 11 - Drilling Technology for Surface Blasting - I

Lecture 12 - Drilling Technology for Surface Blasting - II

Lecture 13 - Drilling Technology for Surface Blasting - III

Lecture 14 - Drilling Technology for Surface Blasting - IV

Lecture 15 - Technology for Surface Blasting - I

Lecture 16 - Technology for Surface Blasting - II

Lecture 17 - Technology for Surface Blasting - III

Lecture 18 - Technology for Surface Blasting - IV

Lecture 19 - Technology for Surface Blasting - V

Lecture 20 - Technology for Surface Blasting - VI

Lecture 21 - Excavation by Ripper - I

Lecture 22 - Excavation by Ripper - II

Lecture 23 - Excavation by Ripper - III

Lecture 24 - Excavation with Shovel - I

Lecture 25 - Excavation with Shovel - II

Lecture 26 - Excavation with Shovel - III

Lecture 27 - Excavation with Shovel - IV

Lecture 28 - Transportation in Surface Mines - I

Lecture 29 - Transportation in Surface Mines - II

Lecture 30 - Transportation in Surface Mines - III

Lecture 31 - Excavation with Surface Miner - I

Lecture 32 - Excavation with Surface Miner - II

Lecture 33 - Excavation with Surface Miner - III

Lecture 34 - Excavation with Surface Miner - IV

Lecture 35 - Excavation with Surface Miner - V

Lecture 36 - Excavation with Dragline - I

Lecture 37 - Excavation with Dragline - II

Lecture 38 - Excavation with Dragline - III

Lecture 39 - Highwall Mining - I

Lecture 40 - Highwall Mining - II

Lecture 41 - Highwall Mining - III

Lecture 42 - Excavation with Bucket Wheel Excavator - I

Lecture 43 - Excavation with Bucket Wheel Excavator - II

Lecture 44 - Excavation with Bucket Wheel Excavator - III

Lecture 45 - Some Auxiliary Operations

Lecture 46 - Haul Road - I

Lecture 47 - Haul Road - II

Lecture 48 - Haul Road - III

Lecture 49 - Inland Transportation System - I

Lecture 50 - Inland Transportation System - II

Lecture 51 - Dimensional Stone Mining - I

Lecture 52 - Dimensional Stone Mining - II

Lecture 53 - Dimensional Stone Mining - III

Lecture 54 - Seabed Mining -I

Lecture 55 - Seabed Minimg - II

Lecture 56 - Stability Of Bench Slopes - I

Lecture 57 - Stability Of Bench Slopes - II

Lecture 58 - Stability Of Bench Slopes - III

Lecture 59 - Closure Of Surface Mines - I

Lecture 60 - Closure Of Surface Mines - II

NPTEL : NOC:Mine Automation and Data Analytics (Mining Engineering)

Co-ordinators : Prof. Radhakanta Koner

Lecture 1 - Introduction to Automation

Lecture 2 - Principle of Automation and Strategies

Lecture 3 - Elements of Automated System

Lecture 4 - Elements of Automated System (Continued...)

Lecture 5 - Autonomous Haulage System

Lecture 6 - Autonomous Haulage System (Continued...)

Lecture 7 - Automated Drilling System

Lecture 8 - Automated Drilling System (Continued...)

Lecture 9 - Fleet Management System

Lecture 10 - Fleet Management System (Continued...)

Lecture 11 - Introduction to CMMS

Lecture 12 - Enterprise resource planning (ERP) system

Lecture 13 - Remote operation and control center

Lecture 14 - Remote operation and control center

Lecture 15 - Proximity Sensors

Lecture 16 - Proximity Sensors and Control System

Lecture 17 - Sensing System: Radar Technology

Lecture 18 - RFID in Mining Engineering

Lecture 19 - Introduction to Geo-fencing

Lecture 20 - CCD camera in Mine safety and management

Lecture 21 - GNSS in Mining

Lecture 22 - GNSS Case Studies - Part I

Lecture 23 - GNSS Case Studies - Part II

Lecture 24 - Image Processing and Analysis in Remote Sensing

Lecture 25 - Basics of Digital Image Processing

Lecture 26 - Automated communication andtracking technologies: Image processing

Lecture 27 - Automated Communication and Tracking Technologies: SCADA

Lecture 28 - SCADA and its Application in Mining

Lecture 29 - Introduction to VR Systems

Lecture 30 - Virtual Reality Application in Mining

Lecture 31 - Introduction to Augmented Reality (AR)

Lecture 32 - Augmented Reality Application in Mining

Lecture 33 - Introduction - I

Lecture 34 - Introduction - II

Lecture 35 - Introduction to Probability and its associated terms

Lecture 36 - Introduction to Probability and its associated terms

Lecture 37 - Discrete Random Variable - Part I

Lecture 38 - Discrete Random Variable - Part II

Lecture 39 - Continuous Random Variable - Part I

Lecture 40 - Continuous Random Variable - Part II

Lecture 41 - Hypothesis Testing - I

Lecture 42 - Hypothesis Testing - II

Lecture 43 - t-test

Lecture 44 - Chi-Squared Test

Lecture 45 - Introduction to Machine Learning

Lecture 46 - Regression

Lecture 47 - Logistic Regression

Lecture 48 - K Nearest Neighbor

Lecture 49 - Support Vector Machine

Lecture 50 - NaÃƒÂ¯ve Bayes Classifier

Lecture 51 - Artificial Neural Networks

Lecture 52 - K Means Clustering

Lecture 53 - DBSCAN

Lecture 54 - Principal Component Analysis (PCA)

Lecture 55 - Application of Big Data Analytics in Mining

Lecture 56 - Big Data and AI Used Cases

Lecture 57 - Cognitive Maintenance in Mining

Lecture 58 - Cognitive Maintenance Case Studies

Lecture 59 - Introduction to Orebody Modelling and Mine Design

Lecture 60 - Case studies on Orebody Modeling and Mine Design

NPTEL : NOC:Designing Learner-Centric MOOCs (Multi-Disciplinary)

Co-ordinators : Prof.Sridhar Iyer, Prof.Sahana Murthy, Dr.Jayakrishnan M., Dr.Sameer Sahasrabudhe

Lecture 1 - Course Introduction

Lecture 2 - Perspectives of the Teachers and Learners

Lecture 3 - Key Takeaways for Online Instruction

Lecture 4 - Evolution of MOOCs

Lecture 5 - Known Challenges

Lecture 6 - Need of LC in MOOCs Post Pandemic

Lecture 7 - Why LCM?

Lecture 8 - The LCM Model

Lecture 9 - What is an LeD?

Lecture 10 - Chunking a Lecture into LeD

Lecture 11 - Introducing Reflection Spot

Lecture 12 - Making Your Own LeD

Lecture 13 - Deciding Appropriateness of Various Mediums to Create LeDs

Lecture 14 - Example of Various Mediums from this course

Lecture 15 - What is an LbD?

Lecture 16 - Creating LbDs

Lecture 17 - Constructive Customized Feedback in LbDs

Lecture 18 - Giving Feedback for Open Ended Questions

Lecture 19 - What is an LxT?

Lecture 20 - Creating LxTs

Lecture 21 - Creating an Assimilation Quiz

Lecture 22 - Designing LxTs using LLMs

Lecture 23 - Licensing and Ethical usage

Lecture 24 - LeD : 5.1 Need of a Recap Week in a MOOC

Lecture 25 - Do's and Don'ts - Part 1

Lecture 26 - Do's and Don'ts - Part 2

Lecture 27 - LxT 5.2b- A Primer on Licensing Essentials

Lecture 28 - Recommendations for Effective LbDs

Lecture 29 - What is an LxI

Lecture 30 - Creating LxI with Reflection Quiz

Lecture 31 - LxI- Sharing Experiences

Lecture 32 - LxI- How to Achieve Learner - Learner Interaction?

Lecture 33 - LxI- Types of Focus Questions - 1

Lecture 34 - LxI- Types of Focus Questions - 2

Lecture 35 - Orchestrating your MOOC

Lecture 36 - Orchestration Dynamics in LCM

Lecture 37 - Assessment

Lecture 38 - How to Elicit Peer-to-Peer Interaction?

Lecture 39 - Incentivizing Participation in the Forum

Lecture 40 - Course Design in MOOC

Lecture 41 - From Regular Course to LCM

Lecture 42 - LeD 8.3 LCM Lite

Lecture 43 - Adopting LCM Model: Prof. Mandar Bhanushe

NPTEL : NOC:Introduction to Learning Analytics (Multi-Disciplinary)

Co-ordinators : Prof. Ramkumar Rajendran

Lecture 1 - Introduction to Learning Analytics

Lecture 2 - LA, EDM and Academic Analytics

Lecture 3 - Types of Learning Analytics - I

Lecture 4 - Types of Learning Analytics - II

Lecture 5 - Data Collection

Lecture 6 - Data Collection in TELE

Lecture 7 - Data collection in MOOC

Lecture 8 - Multichannel Data

Lecture 9 - Ethics and Data Privacy in LA

Lecture 10 - Descriptive Analytics

Lecture 11 - Data Visualization

Lecture 12 - YouTube Analytics Dashboard

Lecture 13 - MOOCs Analytics Dashboard

Lecture 14 - Predictive Analytics

Lecture 15 - Linear Regression

Lecture 16 - Weka demo and how to read the results

Lecture 17 - MOOC data for Course Project

Lecture 18 - Summary of the Course

NPTEL : NOC:Designing Learner-Centric e-Learning in STEM Disciplines (Multi-Disciplinary)

Co-ordinators : Prof.Sahana Murthy

Lecture 1 - Course Preview

Lecture 2 - What is this course about?

Lecture 3 - Course Format_Learner Centric MOOC (LCM)

Lecture 4 - E-Learning in STEM

Lecture 5 - Making online Teaching Decisions

Lecture 6 - Challenges in e-learning

Lecture 7 - What is Learner-centric Approach?

Lecture 8 - Promoting Learner Engagement with Content

Lecture 9 - Why and How to Design Interactive Videos?

Lecture 10 - What is an LeD?

Lecture 11 - Learning by Doing (LbD)

Lecture 12 - Articulation and Reflection

Lecture 13 - Construct your Own Understanding

Lecture 14 - Contextualized Learning

Lecture 15 - Feedback to Learners

Lecture 16 - Collaboration and Peer Learning

Lecture 17 - Addressing Diversity

Lecture 18 - Putting it All Together

Lecture 19 - Selection and Analysis of Effective Technology

Lecture 20 - Effective Integration of Technology

Lecture 21 - Instructional Design in e-learning

Lecture 22 - ADDIE Process of Instructional Design

Lecture 23 - Constructive Alignment

Lecture 24 - Implementing constructive alignment

Lecture 25 - Multimedia Principle and Contiguity Principle

Lecture 26 - Modality Principle and Redundancy Principle

Lecture 27 - Coherence Principle

Lecture 28 - Segmenting and Personalization Principles

Lecture 29 - Visual Communication Strategies for E-content

Lecture 30 - Forms of Learning

Lecture 31 - Integrating LC Elements in E-content

Lecture 32 - E-learning Design Process

Lecture 33 - Closing

NPTEL : NOC:Sustainable and Affordable Sanitation Solutions for Small Towns: Policy, Planning and Practice (Multi-Disciplinary)

Co-ordinators : Prof. N.C Narayanan

Lecture 1 - Introduction to the Issue of Sanitation

Lecture 2 - Overview of Sanitation in the country

Lecture 3 - Centralised or Decentralised?

Lecture 4 - Need for Participatory Planning

Lecture 5 - Context setting for the Alappuzha Project

Lecture 6 - Environmental Policy

Lecture 7 - Environmental Impact Assessment 2006 and National Urban Sanitation Plan

Lecture 8 - Environmental Governance - Challenges and Alternatives

Lecture 9 - Municipal Solid Waste Management

Lecture 10 - MSWM - Status, Policy, governance structure

Lecture 11 - Integrated Municipal Solid Waste Management

Lecture 12 - Plastic Waste Management

Lecture 13 - Municipal Solid Waste Management in Alappuzha

Lecture 14 - Liquid Waste Management - an Overview

Lecture 15 - Introduction to Faecal Sludge Management

Lecture 16 - Faecal Sludge Management for Alappuzha town

Lecture 17 - Introduction to liquid waste treatment technologies

Lecture 18 - Decentralized Waste Water Treatment system - An Introduction

Lecture 19 - Case studies - Decentralised waste water treatment

Lecture 20 - Decentralized waste water treatment systems plan for Alappuzha

Lecture 21 - History of Sanitation in Alappuzha

Lecture 22 - Organic waste management in Alappuzha

Lecture 23 - Inorganic waste management - Role of Kudumbashree and Haritha Karma Sena

Lecture 24 - Youth engagement for recaiming canals

Lecture 25 - Significance of institution building in reclaiming canals

NPTEL : NOC:Engineering Statistics (Multi-Disciplinary)

Co-ordinators : Prof. Manjesh Kumar Hanawal

Lecture 1 - Introduction to Probability

Lecture 2 - Consequences of Axioms

Lecture 3 - Interpretation of Probability

Lecture 4 - Total Probability law and Baye's Theorem - I

Lecture 5 - Total Probability law and Baye's Theorem - II

Lecture 6 - Random variables and Cumulative Density Function

Lecture 7 - Discrete and Continuous random variables - I

Lecture 8 - Discrete and Continuous random variables - II

Lecture 9 - Expectation and Variance

Lecture 10 - Function of Random variables

Lecture 11 - Generating RVs, Joint Distribution of RVs

Lecture 12 - Joint Distribution of RVs and Marginal densities

Lecture 13 - Covariance of Random variables

Lecture 14 - Moment Generating Functions

Lecture 15 - Conditional PMF and PDF

Lecture 16 - Law of Large numbers, Central Limit Theorem

Lecture 17 - Application of Central Limit Theorem - I

Lecture 18 - Application of Central Limit Theorem - II

Lecture 19 - Gamma and Chi-square distributions

Lecture 20 - Beta distributions and Exponential families

Lecture 21 - Random Sampling, Sample mean and Sample variance

Lecture 22 - Sampling from Gaussian distribution and t-distribution

Lecture 23 - Student's t- distribution

Lecture 24 - F-distribution and its properties

Lecture 25 - Convergence of Random variables and Consistency

Lecture 26 - Order statistics, Median and Percentiles

Lecture 27 - Generating random sample-Direct method

Lecture 28 - Generating random sample-Indirect method

Lecture 29 - Introduction to python

Lecture 30 - Python- Loops and Numpy library

Lecture 31 - Sufficiency Principles and Sufficient Statistics

Lecture 32 - Sufficient Statistics and Characterization of Sufficient Statistics

Lecture 33 - Characterization of Sufficient Statistics and Factorization Theorem

Lecture 34 - Example of Factorization Theorem, Minimal Sufficient Statistics

Lecture 35 - Minimal sufficient statistics

Lecture 36 - Test for minimal sufficient statistics withexamples, Ancillary Statistics

Lecture 37 - Likelihood Functions, Maximum Likelihood Estimator

Lecture 38 - Method of moments, Baye's Estimator

Lecture 39 - Evaluating Estimator, Cramer Rao Bound, Fisher Information

Lecture 40 - Evaluating Estimator, Cramer Rao Bound, Fisher Information (Continued...)

Lecture 41 - Hypothesis Testing, Likelihood Ratio Test

Lecture 42 - Hypothesis Testing, Bayes Test

Lecture 43 - Type I and II errors, Power Functions

Lecture 44 - Type I and II errors, Power Functions (Continued...)

Lecture 45 - Calculations of Power Functions

Lecture 46 - Unbiased Test, Uniformly Most Powerful Test,Neyman- Pearson Lemma, Interval Estimation

Lecture 47 - Interval Estimation

Lecture 48 - Interval Estimation (Continued...)

Lecture 49 - Constructiong Confidence Intervals from tests

Lecture 50 - Python- numpy and pandas functions II

Lecture 51 - Tutology of tests and confidence intervals

Lecture 52 - Tutology of tests and confidence intervals (Continued...)

Lecture 53 - p-value, p-test of significance of a statistical test

Lecture 54 - t-test and F-test, ANOVA

Lecture 55 - Non-parametric test, Goodness of fit, Chi- squared test

Lecture 56 - Distribution of Chi-squared test statistics

Lecture 57 - Kolmogrov-Smirnov test

Lecture 58 - Lilliefors's test and Explorator Data Analysis, Q-Q Plot and P-P Plot

Lecture 59 - Generating random samples using Python, Hypothesis Testing using Python

Lecture 60 - Generating random samples using Python, Hypothesis Testing using Python (Continued...)

NPTEL : NOC:Intelligent Feedback and Control (Multi-Disciplinary)

Co-ordinators : Prof. Leena Vachhani

Lecture 1 - Understanding PID Control

Lecture 2 - Process Model: Experimental Methods

Lecture 3 - Model Reduction

Lecture 4 - Disturbance Models and PID

Lecture 5 - PID Tuning Methods

Lecture 6 - PID Tuning Methods (Continued...)

Lecture 7 - Selection of PID Controller

Lecture 8 - Designing Controllers in a Jugaad Way

Lecture 9 - To explain why jugaad works....

Lecture 10 - Feedforward Design

Lecture 11 - State-space methods - Feedforward Control

Lecture 12 - Internal Model Control (IMC)

Lecture 13 - Overview of Control Techniques

Lecture 14 - Multivariable Control

Lecture 15 - Multivariable Control (Continued...)

Lecture 16 - Decoupler Design

Lecture 17 - Feedback Decouplers and Centralized Controllers

Lecture 18 - Large Scale MIMO Systems

Lecture 19 - Understanding irreducible transfer functions

Lecture 20 - Data Driven PID Control

Lecture 21 - Data Driven PID Control (Continued...)

Lecture 22 - Control and Learning

Lecture 23 - Control using Reinforcement Learning (RL)

Lecture 24 - Reinforcement learning based control for inverted pendulum

Lecture 25 - Policy Gradient based Reinforcement Learning

Lecture 26 - Using MATLAB for Reinforcement Learning

Lecture 27 - Course Summary

NPTEL : NOC:Similitude and Approximations in Engineering (Multi-Disciplinary)

Co-ordinators : Vijay Gupta

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

NPTEL : NOC:Fundamental of Fluid Mechanics for Chemical and Biomedical Engineers (Multi-Disciplinary)

Co-ordinators : Unknown

Lecture 1 - Introduction

Lecture 2 - Fluid Mechanics and Chemical Engineering

Lecture 3 - Biomedical Applications of Fluid Mechanics

Lecture 4 - Vectors: A review

Lecture 5 - Introductory Concepts - 1

Lecture 6 - Introductory Concepts - 2

Lecture 7 - Flow Visualisation

Lecture 8 - Dimensional Analysis - Pi Theorem

Lecture 9 - Dimensional Analysis- Ipsen Method

Lecture 10 - Similitude

Lecture 11 - Pressure Distribution in a Static Fluid

Lecture 12 - Force of Submerged Surfaces

Lecture 13 - Buoyancy

Lecture 14 - Surface Tension

Lecture 15 - Reynolds Transport Theorem

Lecture 16 - Mass Conservation

Lecture 17 - Momentum Conservation - I

Lecture 18 - Momentum Conservation - II

Lecture 19 - Energy Conservation

Lecture 20 - Fluid Translation

Lecture 21 - Fluid Rotation and Deformation

Lecture 22 - Mass Conservation: Derivation

Lecture 23 - Mass Conservation: Cylindrical Coordinates

Lecture 24 - Navier Stokes Equations: Derivation

Lecture 25 - Flow Between Two Parallel Plates

Lecture 26 - Flow in a Falling Liquid Film

Lecture 27 - Fully-developed flow in a circular channel

Lecture 28 - Flow between two concentric cylinders

Lecture 29 - Lubrication Approximation

Lecture 30 - Creeping Flows

Lecture 31 - Equation of Motion in Streamline Coordinates

Lecture 32 - Irrotational Flow

Lecture 33 - Bernoulli's Equation and Flow Measurement

Lecture 34 - Boundary Layers

Lecture 35 - Momentum Integral Equation

Lecture 36 - Flow Separation and Drag

Lecture 37 - Introduction to Turbulence

Lecture 38 - Turbulent Flow in a Pipe

Lecture 39 - Turbulent Boundary Layers

Lecture 40 - Flow in Pipes: Major Losses

Lecture 41 - Flow in Pipes: Minor Losses

Lecture 42 - Flow in Pipes: Types of Problems

Lecture 43 - Cavitation and NPSH

NPTEL : NOC:Sustainable Power Generation Systems (Multi-Disciplinary)

Co-ordinators : Dr. Pankaj Kalita

Lecture 1 - Introductory lectuer

Lecture 2 - Fundamentals of solar thermal collector

Lecture 3 - Low temperature solar thermal power plant

Lecture 4 - Medium and high temperature solar thermal power plant

Lecture 5 - Thermal analysis of solar thermal power plant

Lecture 6 - Fundamentals and concept of solar PV power plant

Lecture 7 - Offgrid solar photovoltaic systems

Lecture 8 - Offgrid solar photovoltaic systems deisgn

Lecture 9 - Grid connected solar photovoltaic systems

Lecture 10 - Performance of grid connected solar photovoltaic systems

Lecture 11 - Introduction to wind power generation

Lecture 12 - Wind data analysis

Lecture 13 - Performance parameters and blade geometry

Lecture 14 - Betz limit and optimum tip speed ratio

Lecture 15 - Design of wind farm

Lecture 16 - Fundamentals and working principle

Lecture 17 - Analysis of small hydro power generation

Lecture 18 - Introduction to biomass power generation

Lecture 19 - Biochemical conversion for electricity generation

Lecture 20 - Thermochemical conversion of solid fuels and gasification system

Lecture 21 - Hydrogen energy

Lecture 22 - Fuel cells technologies - Part I

Lecture 23 - Fuel cells technologies - Part II

Lecture 24 - Hydrogen energy tutorial

Lecture 25 - Fundamentals and methods of geothermal energy harvesting

Lecture 26 - Analysis of geothermal plant and resources

Lecture 27 - Fundamentals and working of ocean thermal energy conversion systems

Lecture 28 - Analysis of close rankine cycle OTEC system

Lecture 29 - Fundamentals and working of tidal energy conversion systems

Lecture 30 - Fundamentals and working of wave energy conversion systems

Lecture 31 - Overview and analysis of thermal energy storage

Lecture 32 - Fundamentals and analysis of mechanical energy storage system

Lecture 33 - Fundamentals and analysis of electro chemical energy storage system

Lecture 34 - Summary and numerical exercise

Lecture 35 - Fundamentals and methodology of evaluation of energy economics

Lecture 36 - Case study involving energy economics of biomass power generation system and LCA

Lecture 37 - Course Summary

NPTEL : NOC:Foundation Certificate in Palliative Care (Multi-Disciplinary)

Co-ordinators : Prof. Geeta Joshi, Prof. Piyush Gupta

Lecture 1 - Course Intro

Lecture 2 - Discussion on Course

Lecture 3 - Faculty Intro: Dr. Geeta Joshi and Dr. Piyush Gupta

Lecture 4 - Faculty Intro: Dr. Abhijit Dam

Lecture 5 - Principles of Palliative Care

Lecture 6 - Integrating Science

Lecture 7 - Growth of Palliative Care

Lecture 8 - Holistic Care

Lecture 9 - Palliative Care Concepts - Interview

Lecture 10 - National Scenario of Palliative Care

Lecture 11 - National Scenario

Lecture 12 - WHO Perspective

Lecture 13 - Allopathy

Lecture 14 - Ayush Ministry

Lecture 15 - Ayurveda

Lecture 16 - Ayur Siddha Nature Yoga

Lecture 17 - Naturopathy

Lecture 18 - NHAM

Lecture 19 - Ayush Modules

Lecture 20 - Unani

Lecture 21 - Homeopathy

Lecture 22 - PC Delivery

Lecture 23 - PC Delivery

Lecture 24 - Practicing PC

Lecture 25 - Home Based PC

Lecture 26 - Home Care

Lecture 27 - Home Nursing

Lecture 28 - Hospice

Lecture 29 - Caregiver

Lecture 30 - Caregiver

Lecture 31 - Integrative PC

Lecture 32 - AYUSH in PC

Lecture 33 - Siddha in PC

Lecture 34 - Siddha

Lecture 35 - Siddha

Lecture 36 - Intro Yoga

Lecture 37 - Yoga

Lecture 38 - Yoga and Stress

Lecture 39 - Introduction Pain

Lecture 40 - Classification Pain

Lecture 41 - Pain Assessment

Lecture 42 - Total Pain

Lecture 43 - Hospice Total Pain

Lecture 44 - WHO 3 Step Ladder

Lecture 45 - Pain Management

Lecture 46 - Cancer Pain

Lecture 47 - Pain Assessment

Lecture 48 - Symptom Assessment

Lecture 49 - Holistic Symptom Management

Lecture 50 - Constipation

Lecture 51 - Delirium

Lecture 52 - Dyspnea

Lecture 53 - Hygiene Bedsores

Lecture 54 - Pressure Sore

Lecture 55 - Secretions

Lecture 56 - Fungating

Lecture 57 - Fungating Wound

Lecture 58 - Fungating pdf

Lecture 59 - Oral NGT Catheter

Lecture 60 - Oral NGT Cathe pdf

Lecture 61 - Nutrition

Lecture 62 - Communication

Lecture 63 - Communications

Lecture 64 - Communication in PC

Lecture 65 - Body Language

Lecture 66 - Communicating Patients

Lecture 67 - Good and Bad Communication

Lecture 68 - Good and Bad Communication

Lecture 69 - Communication Bridging Gap

Lecture 70 - Overview of Psychological Reactions

Lecture 71 - Psychological Reactions

Lecture 72 - Psychological Aspects

Lecture 73 - Communicating with Patient

Lecture 74 - Breaking Bad News

Lecture 75 - Distress and Denial

Lecture 76 - BBN Collusion Denial

Lecture 77 - Emotional Reactions Breaking Denial

Lecture 78 - Communication Interview

Lecture 79 - Psychological Aspects

Lecture 80 - Anxiety Depression Distress

Lecture 81 - Counsellor in PC

Lecture 82 - Caregiver Burnout Yoga

Lecture 83 - PC in Elderly

Lecture 84 - Spirituality

Lecture 85 - Spirituality and Religion

Lecture 86 - Laws of Karma

Lecture 87 - Last Days of Life

Lecture 88 - Care of Dying and Bereavement

Lecture 89 - Quality of Death

Lecture 90 - Death

Lecture 91 - Grief and Bereavement

Lecture 92 - Ethics in PC

Lecture 93 - Volunteering

Lecture 94 - Volunteers

Lecture 95 - Volunteers

Lecture 96 - Community

Lecture 97 - Community Based PC

Lecture 98 - Community Based PC

Lecture 99 - Network Neighborhood

Lecture 100 - Nurse in Home Care

Lecture 101 - Care of Dying

Lecture 102 - Safety Precaution

Lecture 103 - Self Care

Lecture 104 - Respite Care

Lecture 105 - IT in PC

Lecture 106 - COC

Lecture 107 - Sandhi

Lecture 108 - Cancer Aid Society

Lecture 109 - Alpha

Lecture 110 - PC Services in Punjab

NPTEL : NOC:Multi-Criteria Decision Making and Applications (Multi-Disciplinary)

Co-ordinators : Prof. Raghu Nandan Sengupta

Lecture 1 - Example 01, 02, 03

Lecture 2 - Example 03, 04, 05, 06

Lecture 3 - Example 04, 05, 06 (Continued...)

Lecture 4 - Example 06 (Continued...), Example 07

Lecture 5 - Example 06 (Continued...), Example 07

Lecture 6 - MCDM: Definitions, Theory of Choice, MCDM Axioma, Condorcet Paradox

Lecture 7 - Theory of Choice, MCDM Axioms, Condorcet Paradox

Lecture 8 - MCDM Axioms, Condorcet Paradox, Utility Theory

Lecture 9 - Utility Theory, Expected value of Utility Function, Lotteries, Rational Choice, Properties of Utility Function

Lecture 10 - Rational Choice, Properties of Utility Function, Risk Aversion, Neutrality, Seeking Properties, Marginal Utility, Absolute Risk Aversion, Relative Risk Aversion

Lecture 11 - Utility Theory Examples, Properties of Utility Function, Risk Aversion, Neutrality, Seekingi Properties, Marginal Utility, Absolute Risk Aversion, Relative Risk Aversion

Lecture 12 - Properties of Utility Function, Risk Aversion, Neutrality, Seeking Properties, Marginal Utility, Absolute Risk Aversion, Relative Risk Aversion, Example of Utility Functions

Lecture 13 - Example of Utility Functions, Certainty Equivalent, Geomatric Mean Methods, Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 14 - Example of Utility Functions, Certainty Equivalent, Geomatric Mean Methods, Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 15 - Certainty Equivalent, Geomatric Mean Methods, Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 16 - Geomatric Mean Methods, Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 17 - Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 18 - Safety First Principle, Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 19 - Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 20 - Stochastic Dominance, Hyperbolic Absolute Risk Aversion Function

Lecture 21 - Concept of Pareto Optimally in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 22 - Concept of Pareto Optimality in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 23 - Pareto Optimality, Property of Dominance, Strong Pareto Optimality, Weak Pareto Optimality, Concepts of Pareto Optimality in 2D Space, Effective versus Inefficient Solutions

Lecture 24 - Concept of Pareto Optimality in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 25 - Concept of Pareto Optimality in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 26 - Concept of Pareto Optimality in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 27 - Concept of Pareto Optimality in 2D Space, Effective Versus Inefficient Solutions, Karusch Kuhn Tucker Condition, Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 28 - Scales of Measurements: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Goal Programming

Lecture 29 - Pareto Optimality, Concept of Pareto Optimality, Goal Programming

Lecture 30 - Pareto Optimality, Pareto Curves, Goal Programming

Lecture 31 - Goal Programming, Concepts of Pareto Optimality in 2D Space for LP, Concepts of Pareto Optimality in 3D Space for QP

Lecture 32 - Concepts of Pareto Optimality in 2D Space for LP, Concepts of Pareto Optimality in 3D Space for QP

Lecture 33 - LP Example of Goal Programming/MCDM, NLP Example of Goal Programming/MCDM

Lecture 34 - LP Example of Goal Programming/MCDM, NLP Example of Goal Programming/MCDM (Continued...)

Lecture 35 - LP Example of Goal Programming/MCDM, NLP Example of Goal Programming/MCDM (Continued...)

Lecture 36 - LP Example of Goal Programming/MCDM, NLP Example of Goal Programming/MCDM (Continued...)

Lecture 37 - Quadratic Programming, Goal Programming

Lecture 38 - Multi Attribute Utility Theory, TOPSIS

Lecture 39 - Multi Attribute Utility Theory, TOPSIS

Lecture 40 - Technique For Order Preference by Similarity to Ideal Solutions (TOPSIS)

Lecture 41 - Technique For Order Preference by Similarity to Ideal Solutions (TOPSIS)

Lecture 42 - Technique For Order Preference by Similarity to Ideal Solutions (TOPSIS)

Lecture 43 - Technique For Order Preference by Similarity to Ideal Solutions (TOPSIS), Elimination and Choice Translating Reality (ELECTRE)

Lecture 44 - Elimination and Choice Translating Reality (ELECTRE)

Lecture 45 - Elimination and Choice Translating Reality (ELECTRE)

Lecture 46 - Elimination and Choice Translating Reality (ELECTRE)

Lecture 47 - Elimination and Choice Translating Reality (ELECTRE)

Lecture 48 - Elimination and Choice Translating Reality (ELECTRE), e-ELECTRE

Lecture 49 - Elimination and Choice Translating Reality (ELECTRE), e-ELECTRE

Lecture 50 - Elimination and Choice Translating Reality (ELECTRE), e-ELECTRE, VIKOR

Lecture 51 - VIKOR (VIsekriterijumska Optimizacija I Kompromisno Resenje)

Lecture 52 - VIKOR (VIsekriterijumska Optimizacija I Kompromisno Resenje)

Lecture 53 - Analytical Hierarchy Process (AHP)

Lecture 54 - Analytical Hierarchy Process (AHP) (Continued...)

Lecture 55 - Analytical Hierarchy Process (AHP) (Continued...)

Lecture 56 - Data Envelopment Analysis (DEA)

Lecture 57 - Data Envelopment Analysis (DEA)

Lecture 58 - Decision Tree Analysis

Lecture 59 - Decision Tree Analysis (Continued...)

Lecture 60 - Example in Multi Objective Decision Making

NPTEL : NOC:Basic Certificate in Palliative Care (Multi-Disciplinary)

Co-ordinators : Prof. Geeta Joshi, Prof. Piyush Gupta

Lecture 1 - Prelude

Lecture 2 - Prologue BCPC

Lecture 3 - Introductory Dialogue - Week 1

Lecture 4 - Basics of Palliative Care

Lecture 5 - Community Participation

Lecture 6 - Communication Skills in Palliative Care - Part I

Lecture 7 - Communication Skills in Palliative Care - Part II

Lecture 8 - Introductory Dialogue - Week 2

Lecture 9 - What is Active Listening ?

Lecture 10 - Are You Really Listening ?

Lecture 11 - Active Listening Skills

Lecture 12 - Communication Skills for Health Professionals

Lecture 13 - Communication Competency in Health Professional

Lecture 14 - Talking About Death

Lecture 15 - Introductory Dialogue - Week 3

Lecture 16 - Psychological Aspects in PC

Lecture 17 - What is Psychological Distress ?

Lecture 18 - Types of Psychological Distress

Lecture 19 - Kessler Psychological Distress Scale

Lecture 20 - Generalized Anxiety Disorder (GAD)

Lecture 21 - Guilt and Regret

Lecture 22 - Introductory Dialogue - Week 4

Lecture 23 - Cultural Aspects in Palliative Care

Lecture 24 - Spirituality (FAQs)

Lecture 25 - Spiritual Distress

Lecture 26 - Ways to Lead Spiritual Life !

Lecture 27 - Introductory Dialogue - Week 5

Lecture 28 - What is Stress and Burnout

Lecture 29 - Some Tips to Manage Stress

Lecture 30 - Burnout in Health Care Professionals

Lecture 31 - Avoiding Burnout in Health Care Professionals

Lecture 32 - Voluteers to Prevent Burnout !

Lecture 33 - Self Care

Lecture 34 - Introductory Dialogue - Week 6

Lecture 35 - Ethical Aspects of End of Life

Lecture 36 - Impact of Bereavement on Family

Lecture 37 - Kubler-Ross Model

Lecture 38 - Theoretical Models of Grief and Bereavement

Lecture 39 - Psychology of Grief and Bereavement

Lecture 40 - Management of Grief and Bereavement

Lecture 41 - Introductory Dialogue - Week 7

Lecture 42 - Metastatic Bone Pain Management

Lecture 43 - How to Prescribe ENDs ?

Lecture 44 - Safe Use of ENDs

Lecture 45 - Neuropathic Pain and Its Management

Lecture 46 - Introduction to Intervention Pain Management

Lecture 47 - Introductory Dialogue - Week 8

Lecture 48 - Gastrointestinal Symptoms

Lecture 49 - Respiratory Symptoms Management - Part I

Lecture 50 - Respiratory Symptoms Management - Part II

Lecture 51 - Delirium and Dementia

Lecture 52 - Emergencies in Palliative Medicine

Lecture 53 - Recent Advances in Nausea and Vomiting

Lecture 54 - Introductory Dialogue - Week 9

Lecture 55 - Nursing Care Plans: Case Scenario

Lecture 56 - Bladder and Bowel Care

Lecture 57 - Stoma Care - Part I

Lecture 58 - Stoma Care - Part II

Lecture 59 - Skin Care in Colostomy

Lecture 60 - Introductory Dialogue - Week 10

Lecture 61 - Importance of Prognostication

Lecture 62 - Diagnosing the Dying !

Lecture 63 - Facing Death: How to Help ?

Lecture 64 - Subcutaneous Route

Lecture 65 - Introductory Dialogue - Week 11

Lecture 66 - National Health Mission (NHM)

Lecture 67 - Aushman Bharat

Lecture 68 - Government Schemes for Palliative Care

Lecture 69 - NDPS Rules 2015

Lecture 70 - Delivery Models of Palliative Care

Lecture 71 - Introductory Dialogue - Week 12

Lecture 72 - Availability of ENDs and Advocacy

Lecture 73 - Availability of ENDs and Advocacy

Lecture 74 - Euthanasia

Lecture 75 - Advance Directive

Lecture 76 - History of Opium - Part I

Lecture 77 - History of Opium - Part II

Lecture 78 - Panel Discussion

NPTEL : NOC:Fuzzy Logic and Neural Networks (Multi-Disciplinary)

Co-ordinators : Prof. Dilip Kumar Pratihar

Lecture 1 - Introduction to Fuzzy Sets

Lecture 2 - Introduction to Fuzzy Sets (Continued...)

Lecture 3 - Introduction to Fuzzy Sets (Continued...)

Lecture 4 - Introduction to Fuzzy Sets (Continued...)

Lecture 5 - Introduction to Fuzzy Sets (Continued...)

Lecture 6 - Introduction to Fuzzy Sets (Continued...)

Lecture 7 - Applications of Fuzzy Sets

Lecture 8 - Applications of Fuzzy Sets (Continued...)

Lecture 9 - Applications of Fuzzy Sets (Continued...)

Lecture 10 - Applications of Fuzzy Sets (Continued...)

Lecture 11 - Applications of Fuzzy Sets (Continued...)

Lecture 12 - Applications of Fuzzy Sets (Continued...)

Lecture 13 - Applications of Fuzzy Sets (Continued...)

Lecture 14 - Applications of Fuzzy Sets (Continued...)

Lecture 15 - Applications of Fuzzy Sets (Continued...)

Lecture 16 - Applications of Fuzzy Sets (Continued...)

Lecture 17 - Optimizationof Fuzzy Reasoning and Clustering Tool

Lecture 18 - Optimizationof Fuzzy Reasoning and Clustering Tool (Continued...)

Lecture 19 - Optimizationof Fuzzy Reasoning and Clustering Tool (Continued...)

Lecture 20 - Optimizationof Fuzzy Reasoning and Clustering Tool (Continued...)

Lecture 21 - Some Examples of Neural Networks

Lecture 22 - Some Examples of Neural Networks (Continued...)

Lecture 23 - Some Examples of Neural Networks (Continued...)

Lecture 24 - Some Examples of Neural Networks (Continued...)

Lecture 25 - Some Examples of Neural Networks (Continued...)

Lecture 26 - Some Examples of Neural Networks (Continued...)

Lecture 27 - Some Examples of Neural Networks (Continued...)

Lecture 28 - Some Examples of Neural Networks (Continued...)

Lecture 29 - Some Examples of Neural Networks (Continued...)

Lecture 30 - Some Examples of Neural Networks (Continued...)

Lecture 31 - Optimal Designs of Neural Networks

Lecture 32 - Optimal Designs of Neural Networks (Continued...)

Lecture 33 - Neuro-Fuzzy System

Lecture 34 - Neuro-Fuzzy System (Continued...)

Lecture 35 - Neuro-Fuzzy System (Continued...)

Lecture 36 - Neuro-Fuzzy System (Continued...)

Lecture 37 - Concepts of Soft Computing and Expert Systems

Lecture 38 - Concepts of Soft Computing and Expert Systems (Continued...)

Lecture 39 - A Few Applications

Lecture 40 - A Few Applications (Continued...)

Lecture 41 - A Few Applications (Continued...)

Lecture 42 - A Few Applications (Continued...)

NPTEL : NOC:Entrepreneurship Essentials (Multi-Disciplinary)

Co-ordinators : Prof. Manoj Kumar Mondal

Lecture 1 - Economic Contributions of Entrepreneurs

Lecture 2 - Definition, Motivation and Types of Entrepreneurship

Lecture 3 - Vision, Mission and Values

Lecture 4 - Entrepreneurial Qualities

Lecture 5 - Two Inspiring Stories

Lecture 6 - Myths and Realities around Entrepreneurship

Lecture 7 - Causes of Failure of Startups

Lecture 8 - Why Startups Fail (Continued...)

Lecture 9 - Forms of Legal Entities

Lecture 10 - Factors Driving Competitive Advantages

Lecture 11 - Marketing for Startups - I

Lecture 12 - Marketing for Startups - II

Lecture 13 - Marketing for Startups - III

Lecture 14 - Marketing Research

Lecture 15 - Marketing Research (Continued...)

Lecture 16 - Business Model Canvas

Lecture 17 - Value Proposition Canvas

Lecture 18 - Illustration of Business Model Canvas

Lecture 19 - Features of Winning Business Models

Lecture 20 - Business Model Innovation

Lecture 21 - Identifying Opportunities Based on Trend

Lecture 22 - Circle of Competence and Effectuation

Lecture 23 - Lean Startup - I

Lecture 24 - Lean Startup - II

Lecture 25 - Lean Startup - III

Lecture 26 - Design and Innovation - I

Lecture 27 - Design and Innovation - II

Lecture 28 - Design and Innovation - III

Lecture 29 - Design and Innovation - IV

Lecture 30 - Design and Innovation - V

Lecture 31 - Introduction to Financial Statements

Lecture 32 - Introduction to Financial Statements (Continued...)

Lecture 33 - Introduction to Financial Statements (Continued...)

Lecture 34 - Introduction to Financial Statements (Continued...)

Lecture 35 - Introduction to Financial Statements (Continued...)

Lecture 36 - Introduction to Financial Statements (Continued...)

Lecture 37 - Introduction to Financial Statements (Continued...)

Lecture 38 - Depreciation and Amortization and Treatment of Capital Gain or Loss from Sale of Fixed Asset

Lecture 39 - Cost, Volume, Profit: Break-Even Point Analysis - I

Lecture 40 - Cost, Volume, Profit: Break-Even Point Analysis - II

Lecture 41 - Founding Team and Early Recruits

Lecture 42 - Business Plan - I

Lecture 43 - Business Plan - II

Lecture 44 - Pitching the Business Plan - I

Lecture 45 - Pitching the Business Plan - II

Lecture 46 - Funding New Venture - I

Lecture 47 - Funding New Venture - II

Lecture 48 - Funding New Venture - III

Lecture 49 - Funding New Venture - IV

Lecture 50 - Funding New Venture - V

Lecture 51 - Some Dos and Donts

Lecture 52 - Go-To-Market Strategies - I

Lecture 53 - Go-To-Market Strategies - II

Lecture 54 - Capital Budgeting Decisions

Lecture 55 - Capital Budgeting Decisions (Continued...)

Lecture 56 - Start up Valuation - I

Lecture 57 - Start up Valuation - II

Lecture 58 - Human Resource Management - I

Lecture 59 - Human Resource Management - II

Lecture 60 - Growth Strategies

NPTEL : NOC:Roadmap for Patent Creation (Multi-Disciplinary)

Co-ordinators : Prof. Gouri Gargate

Lecture 1 - Roadmap for patent creation - Introduction

Lecture 2 - Roadmap for patent creation - Property and IP

Lecture 3 - Roadmap for patent creation - IPR

Lecture 4 - Roadmap for patent creation - IP and future areas

Lecture 5 - Roadmap for patent creation - Patent - Introduction

Lecture 6 - Patent searching and analysis

Lecture 7 - Patent-Definition

Lecture 8 - Novelty

Lecture 9 - Non obviousness

Lecture 10 - Industrial application

Lecture 11 - Parts of patent document

Lecture 12 - Terminologies and codes used in a patent document

Lecture 13 - How to read a patent ? - I

Lecture 14 - How to read a patent ? - II

Lecture 15 - How to read a patent ? - III

Lecture 16 - Roadmap for patent creation - IP identification tool

Lecture 17 - Roadmap for patent creation - Patentability tool

Lecture 18 - Roadmap for patent creation - IP audit framework

Lecture 19 - Roadmap for patent creation - Public patent databases

Lecture 20 - Roadmap for patent creation - Capsule version

Lecture 21 - Types of patent

Lecture 22 - Patent filing procedure in India

Lecture 23 - Patent timelines - India and PCT

Lecture 24 - Inventions not patent in India

Lecture 25 - Indicators for patentability

Lecture 26 - Use of patent database for research/project topic identification

Lecture 27 - Importance of laboratory notebook

Lecture 28 - In which technical category my invention falls - IPC

Lecture 29 - Patent - Statutory differences between India, Europe and USA

Lecture 30 - Identification of inventor and applicant and their rights

Lecture 31 - Developing your own IP system

Lecture 32 - When to publish and when to patent (confidentiality)

Lecture 33 - Statutory exceptions (anticipation)

Lecture 34 - Procedure for patent filing (Forms and fees)

Lecture 35 - Interaction with IP attorney (Initial drafting, FER reply and hearing)

Lecture 36 - Research/project planning

Lecture 37 - Post patent filing requirments

Lecture 38 - Patent commercialization

Lecture 39 - Capsule version

NPTEL : NOC:Accreditation and Outcome based Learning (Multi-Disciplinary)

Co-ordinators : Prof. Shyamal Kumar Das Mandal

Lecture 1 - Introduction

Lecture 2 - Challenges and Needs of 21st Century Education

Lecture 3 - Accreditation

Lecture 4 - Accreditation (Continued...)

Lecture 5 - Outcome based Learning

Lecture 6 - Important Steps in Outcome based education

Lecture 7 - Introduction to Taxonomies of Learning and Cognitive Domains of Learning

Lecture 8 - Psychomotor Domain and Affective Domain of Learning

Lecture 9 - Instructional Objectives or Outcome

Lecture 10 - Need and Use of Instructional Objectives or Outcome

Lecture 11 - Example of Different Instructional Objectives or Outcome and their Cognitive Level

Lecture 12 - Outcome-based Curriculum Design

Lecture 13 - Outcome-based Curriculum Design (Continued...)

Lecture 14 - Outcome-based Curriculum Design software framework

Lecture 15 - Course outcome, Module outcome and lecture/unit outcome and teaching learning process

Lecture 16 - Mapping of outcome based curriculum with Graduate attribute

Lecture 17 - Introduction to Assessment and Evaluation

Lecture 18 - Formative Assessment and Summative Assessments

Lecture 19 - Test Item analysis

Lecture 20 - Test Item analysis (Continued...)

Lecture 21 - Evaluation Rubrics

Lecture 22 - Mission and Vision, Program Educational Objectives (PEOs), Program Outcome (PO) and their Consistency

Lecture 23 - Mapping of course outcome and Program Outcome

Lecture 24 - Attainment of Program outcome and course outcome

Lecture 25 - Calculation of direct attainment

Lecture 26 - Calculation of Indirect Attainment

Lecture 27 - Introduction to Tutored Video Instruction (TVI)

Lecture 28 - TVI Learning Improvement Data - as reported in literature

Lecture 29 - Use of TVI as ELNET-3L program

Lecture 30 - Lessons on Good Teaching from ELNET-3L

Lecture 31 - Evaluation of Teaching Quality

Lecture 32 - Evaluation of Teaching Quality - A Research Proposal

Lecture 33 - Evaluation of Teaching Quality - A Research Proposal (Continued...)

Lecture 34 - Evaluation of Teaching Quality - A Research Proposal (Continued...)

Lecture 35 - Assessment and Evaluation - to Improve Teaching

Lecture 36 - Item Analysis - Theory and Practice

Lecture 37 - Learning Styles and Learning Approaches

Lecture 38 - Good Teaching Attributes and Characteristics

Lecture 39 - Teacher Effectiveness Research

Lecture 40 - Teacher Effectiveness Research (Continued...)

Lecture 41 - Teaching Learning Process using Outcome based Education

NPTEL : NOC:Introduction to Environmental Engineering and Science - Fundamental and Sustainability Concepts (Multi-Disciplinary)

Co-ordinators : Prof. Brajesh Kumar Dubey

Lecture 1 - Sustainability Concepts - Innovations and Challenges

Lecture 2 - Sustainability Concepts - Innovations and Challenges

Lecture 3 - Basics and Sustainability Concepts and Evolution

Lecture 4 - Engineering for Sustainability

Lecture 5 - Life Cycle Thinking and Circular Economy

Lecture 6 - Mass Concentration Units

Lecture 7 - Partial Pressure Units

Lecture 8 - Other Types of Units

Lecture 9 - Units (Continued...), Qualitative and Quantitative Measurements

Lecture 10 - Quantative Measurements Basics

Lecture 11 - Ecology

Lecture 12 - Energy Flow and Ecological Concepts

Lecture 13 - Population

Lecture 14 - Population, Consumption and Biodiversity

Lecture 15 - Environmental Chemistry

Lecture 16 - Mass Balance and Reactor Systems

Lecture 17 - Mass Balance in Continuous Reactor / Continuous Stirred Tank Reactor (CSTR) and Plug Flow Reactor

Lecture 18 - Plug Flow Reactor and Energy Flow

Lecture 19 - Energy Balance and Earth Overshot Day

Lecture 20 - Mass Transport Processes

Lecture 21 - Oxygen Demand in Environmental Systems

Lecture 22 - BOD Examples, Oxygen Levels in Surface Waters, COD

Lecture 23 - Environmental Health Basics and SDGs

Lecture 24 - Field Applications

Lecture 25 - Nutrient Cycle

Lecture 26 - Environmental Risk

Lecture 27 - Risk Assessment Steps and EIA Introduction

Lecture 28 - Environmental Risk Assessments with Concepts of EIA and LCA

Lecture 29 - Environmental Risk Assessments with Concepts of EIA and LCA (Continued...)

Lecture 30 - Environmental Risk Assessments with Concepts of EIA and LCA (Continued...)

Lecture 31 - Water Quantity

Lecture 32 - Water Availability and Usage

Lecture 33 - Population Forecasting

Lecture 34 - Water Quality

Lecture 35 - Water Quality (Continued...)

Lecture 36 - Plain Sedimentation

Lecture 37 - Coagulation

Lecture 38 - Review of Sedimentation and Rapid Sand Filtration

Lecture 39 - Disinfection and Water Supply

Lecture 40 - Water Treatment Plant Visit

Lecture 41 - Wastewater collection and characterization

Lecture 42 - Sewerage System and Sewage Characteristics

Lecture 43 - BOD Concepts and Preliminary Treatment of Wastewater

Lecture 44 - Wastewater Treatment - I

Lecture 45 - Activated Sludge Process and Sludge Disposal

Lecture 46 - Introduction to Solid Waste Management

Lecture 47 - Introduction to Solid Waste Management (Continued...)

Lecture 48 - Components of Solid Waste Management

Lecture 49 - Collection and Treatment

Lecture 50 - Waste Disposal and Summary

Lecture 51 - Basics of Air Pollution Issues - Global and Local

Lecture 52 - Air Pollutants and Air Pollution Index

Lecture 53 - Global Warming and Climate Change

Lecture 54 - Air Pollution Models

Lecture 55 - SDGs, Noise and Soil Pollution

Lecture 56 - Present Issues and Few Case Studies

Lecture 57 - Case Study - Solid Waste Management

Lecture 58 - Case Study - Industrial Pollution and Disasters

Lecture 59 - Case Study - Global Food Waste Initiatives

Lecture 60 - Case Study - Global Food Waste and Resource Recovery

NPTEL : NOC:Biophotonics (Multi-Disciplinary)

Co-ordinators : Prof. Basudev Lahiri

Lecture 1 - Introduction to Biophotonics - Part I

Lecture 2 - Introduction to Biophotonics - Part II

Lecture 3 - Introduction to Biophotonics - Part III

Lecture 4 - Nature of Light - Part I (As Wave)

Lecture 5 - Nature of Light - Part II (As Particle)

Lecture 6 - Fact of Matter - Part I

Lecture 7 - Fact of Matter - Part II

Lecture 8 - Basic of Light-Matter Interaction

Lecture 9 - Molecular Materials

Lecture 10 - Introduction to Fluorescence

Lecture 11 - The Cell

Lecture 12 - The Central Dogma

Lecture 13 - Genetic Code

Lecture 14 - Building Blocks

Lecture 15 - Remaining Topics

Lecture 16 - Light-Matter Interactions in Molecules (Basic of Spectroscopy)

Lecture 17 - Light-Matter Interactions in Molecules (Basic of Spectroscopy) (Continued...)

Lecture 18 - Interaction of Light with Cells

Lecture 19 - Interaction of Light with Tissues

Lecture 20 - Photoprocesses in Biopolymers

Lecture 21 - Laser Principles and Operation

Lecture 22 - Types of Lasers

Lecture 23 - Nonlinear Optical Processes

Lecture 24 - In Vivo Photoexcitation

Lecture 25 - Examples and Applications

Lecture 26 - Introduction

Lecture 27 - Microscopy Techniques

Lecture 28 - Near Field Microscopy and Optical Coherence Tomography

Lecture 29 - Fluorophores and Fluorescence Microscopy Techniques

Lecture 30 - The Future: AFM-IR

Lecture 31 - Biosensing Background

Lecture 32 - Optical Fiber Sensors

Lecture 33 - Metamaterials

Lecture 34 - Metamaterials as Biosensors

Lecture 35 - Biosensing with Optical Nano-antennas

Lecture 36 - Introduction to Photodynamic Therapy (PDT)

Lecture 37 - Application of Photodynamic Therapy (PDT)

Lecture 38 - Light Irradiation for Photodynamic Therapy (PDT)

Lecture 39 - Real Life Examples of Photodynamic Therapy (PDT)

Lecture 40 - Future of PDT and Photothermal Therapy (PTT)

Lecture 41 - Laser Based Tissue Engineering

Lecture 42 - Laser Tissue Contouring: Dermatological Application

Lecture 43 - Laser Tissue Welding and Tissue Regeneration

Lecture 44 - Laser Tissue Contouring: Ophthalmic Application

Lecture 45 - Laser in Dentistry

Lecture 46 - Tools for Micromanipulation

Lecture 47 - The Optical/Laser Tweezer

Lecture 48 - Design of Optical Tweezers

Lecture 49 - Optical Scissors

Lecture 50 - Selected Examples of Application

Lecture 51 - Introduction to nanotechnology

Lecture 52 - Processes of Nanotechnology

Lecture 53 - Nano-Lithography: The Art of Small

Lecture 54 - Thin Film Deposition

Lecture 55 - Bionanophotonics Applications

Lecture 56 - Introduction to Optogenetics

Lecture 57 - Controlling the Brain with Light

Lecture 58 - Optical Neuroimaging and Tomography

Lecture 59 - Functional Near Infrared Spectroscopy (fNIRS) of the Brain

Lecture 60 - Summary and Revisiting Few topics

NPTEL : NOC:Vacuum Technology and Process Application (Multi-Disciplinary)

Co-ordinators : Prof. V. Vasudeva Rao

Lecture 1 - Introduction to Vacuum, Natural Vacuum

Lecture 2 - History of Vacuum Technology

Lecture 3 - Kinetic Theory of Gases, Physical Parameters of Vacuum and Regions of Vacuum

Lecture 4 - Vacuum Process Applications - I

Lecture 5 - Vacuum Process Applications - II

Lecture 6 - Pumping Speed and Throughput Concepts

Lecture 7 - Rotary Vacuum Pump

Lecture 8 - Diffusion Pump

Lecture 9 - Roots Vacuum Pump

Lecture 10 - Rotary Piston Pump

Lecture 11 - Liquid Ring Pump

Lecture 12 - Steam Jet Ejector

Lecture 13 - Diaphragm Pump

Lecture 14 - Claw Pump

Lecture 15 - Screw Pump

Lecture 16 - Scroll Pump, Sorption Concepts and Pumps

Lecture 17 - Ion Pumping-Sputter Ion Pump

Lecture 18 - Turbomolecular Pump

Lecture 19 - Cryopumps

Lecture 20 - Selection Criteria of Vacuum Pumps

Lecture 21 - Primary vs Secondary Gauges, U Tube/McLeod gauges (Primary)

Lecture 22 - Bourdon/Capacitance Gauges (Mechanical Deflection)

Lecture 23 - Thermo-couple/Pirani gauges (Thermal Conductivity)

Lecture 24 - Spinning Rotor/Ionization/Bayard Alpert Gauges

Lecture 25 - Penning/ Inverted Magnetron gauges, Gauge calibration

Lecture 26 - Vacuum Materials (Metals, Glasses, Ceramics, Greases and Oils)

Lecture 27 - Vacuum Components (Flanges, Couplings, Seals, Valves)

Lecture 28 - Vacuum Chamber Design

Lecture 29 - Fabrication Techniques for Vacuum Systems

Lecture 30 - Testing of Vacuum Systems for Mechanical Failures, Gas Leaks and Outgassing

Lecture 31 - Gas Flow at Low Pressures, Conductance and Effective Pumping Speed Concepts

Lecture 32 - Conductance Calculations in Viscous Flow Region

Lecture 33 - Molecular Flow

Lecture 34 - Transition and Choked Flows

Lecture 35 - Conductance and Pump Down Calculations in Vacuum Systems

Lecture 36 - Design Aspects of Vacuum Systems for Different Applications - Part I

Lecture 37 - Design Aspects of Vacuum Systems for Different Applications - Part II

Lecture 38 - Design of a Vacuum Furnace for Metallurgical Processing

Lecture 39 - Leak Detection in Vacuum Systems

Lecture 40 - Magnetic Deflection Leak Detector and Quadrupole Residual Gas Analyzer

Lecture 41 - Vacuum Processes in Chemical and Pharmaceutical Industries

Lecture 42 - Vacuum for Food Processing

Lecture 43 - Vacuum Technology in the Packaging Industry

Lecture 44 - Vacuum in Wood Industry

Lecture 45 - Vacuum Systems for Medical and Dental Applications

Lecture 46 - Vacuum for Desalination of Sea Water and Treatment of Waste Water

Lecture 47 - Vacuum Technology for Power Sector

Lecture 48 - Vacuum Technology In Oil and Gas Industries

Lecture 49 - Vacuum Technology in LNG industry

Lecture 50 - Vacuum Technology for Cryogenic Applications

Lecture 51 - Vacuum Technology in High Speed Transportation (Hyperloop and Maglev)

Lecture 52 - Vacuum technology for Metallurgical applications

Lecture 53 - Vacuum Technology for Analytical Instruments

Lecture 54 - Vacuum based coating units for thin film deposition

Lecture 55 - Vacuum for solar energy (Thermal and PV)

Lecture 56 - Vacuum Technology for semiconductor chip manufacturing

Lecture 57 - Vacuum Technology for Display Systems

Lecture 58 - Vacuum Technology for Nuclear Applications - Part I

Lecture 59 - Vacuum Technology for Nuclear Applications - Part II

Lecture 60 - Vacuum technology for Space Applications

NPTEL : NOC:Basics of Health Promotion and Education Intervention (Multi-Disciplinary)

Co-ordinators : Prof. Sweety Suman Jha, Prof.Chandrashekhar Taklikar, Prof. Madumita Dobe, Prof. Arista Lahiri

Lecture 1 - Brief history of public health

Lecture 2 - Scope and Evolution of Health Promotion and Education

Lecture 3 - Ottawa Charter

Lecture 4 - Principles of health promotion

Lecture 5 - Settings and audiences for health promotion

Lecture 6 - Concepts of Health Behavior

Lecture 7 - Health Risk Behavior Vs Health Promotion Behavior

Lecture 8 - Concepts of Health Communication - Part I

Lecture 9 - Concepts of Health Communication - Part II

Lecture 10 - Health Literacy

Lecture 11 - Information Education and Communication (IEC)

Lecture 12 - Behavior Change Communication (BCC) - Part I

Lecture 13 - Behavior Change Communication (BCC) - Part II

Lecture 14 - Social and Behavior Change Communication (SBCC) - Part I

Lecture 15 - Social and Behavior Change Communication (SBCC) - Part II

Lecture 16 - Need Assessment for Health Promotion

Lecture 17 - Approaches for Health Promotion and Behavior Change

Lecture 18 - Models of Individual Health Behavior

Lecture 19 - Models of Inter-Personal Health Behaviour

Lecture 20 - Community and Group Models of Health Behavior Change

Lecture 21 - Planning HPE Intervention - Part I

Lecture 22 - Planning HPE Intervention - Part II

Lecture 23 - Implementing HPE Intervention - Part I

Lecture 24 - Implementing HPE Intervention - Part II

Lecture 25 - Monitoring HPE Intervention

Lecture 26 - Principles of Designing Messages

Lecture 27 - Processes and Approaches of Designing Messages - Part I

Lecture 28 - Processes and Approaches of Designing Messages - Part II

Lecture 29 - Overview of Pretesting

Lecture 30 - Pretesting of Health Promotion and Education Tools

Lecture 31 - Health Education Methods - Part I

Lecture 32 - Health Education Methods - Part II

Lecture 33 - Health Education Material - Part I

Lecture 34 - Health Education Material - Part II

Lecture 35 - Technology-based approaches to health behavior change

Lecture 36 - Evaluation of Theory-based HPE Interventions - Part I

Lecture 37 - Evaluation of Theory-based HPE Interventions - Part II

Lecture 38 - Analyzing Health Behavior Change Data

Lecture 39 - RE-AIM Framework for Health Promotion Program Evaluation

Lecture 40 - Health Impact Assessment

NPTEL : NOC:Basics of Mental Health and Clinical Psychiatry (Multi-Disciplinary)

Co-ordinators : Prof. Arijita Banerjee, Prof. Sumit Kumar

Lecture 1 - Introduction to Neuroanatomy

Lecture 2 - Cerebellum

Lecture 3 - Basal Ganglia

Lecture 4 - Thalamus and Hypothalamus

Lecture 5 - Cerebral Cortex

Lecture 6 - Synapse and Neurotransmitters - 1

Lecture 7 - Synapse and Neurotransmitters - 2

Lecture 8 - Limbic System

Lecture 9 - Physiology of Emotions

Lecture 10 - Reticular Formation

Lecture 11 - Electrical activity of brain

Lecture 12 - Descriptive Psychopathology

Lecture 13 - Principles of Personality Development

Lecture 14 - Schizophrenia

Lecture 15 - Mood Disorders - 1

Lecture 16 - Mood Disorders - 2

Lecture 17 - Anxiety Disorders - I

Lecture 18 - Anxiety Disorders - II

Lecture 19 - Eating Disorders

Lecture 20 - Physiology of sleep

Lecture 21 - Sleep Disorders

Lecture 22 - Learning and Memory - 1

Lecture 23 - Learning and Memory - 2

Lecture 24 - Neurocognitive Disorders - I

Lecture 25 - Neurocognitive Disorders - II

Lecture 26 - Substance - I

Lecture 27 - Substance - II

Lecture 28 - Physiology of sensations

Lecture 29 - Psychosomatic Illness

Lecture 30 - Emergency Psychiatry

Lecture 31 - Child Psychiatry - I

Lecture 32 - Child Psychiatry - II

Lecture 33 - Psychotherapy - I

Lecture 34 - Psychotherapy - II

Lecture 35 - Psychological Tests

Lecture 36 - Anti-psychotic drugs

Lecture 37 - Antidepressants

Lecture 38 - Mood Stabilizer

Lecture 39 - Anti-anxiety drugs

Lecture 40 - Forensic Psychiatry

NPTEL : NOC:Introduction to Reliability Engineering (Multi-Disciplinary)

Co-ordinators : Prof. Neeraj Kumar Goyal

Lecture 1 - Introduction to Reliability Engineering

Lecture 2 - Introduction to Reliability Engineering

Lecture 3 - Introduction to Reliability Engineering

Lecture 4 - Probability Basics

Lecture 5 - Probability Basics (Continued...)

Lecture 6 - Constant Failure Rate Model - I

Lecture 7 - Constant Failure Rate Model - II

Lecture 8 - Constant Failure Rate Model - III

Lecture 9 - Two Parameter Exponential Distribution

Lecture 10 - Weibull Distribution (2 Parmeter)

Lecture 11 - Burn-in Screening for Weibull

Lecture 12 - Weibull Distribution

Lecture 13 - Normal Distribution

Lecture 14 - Lognormal Distribution

Lecture 15 - System Reliability Modelling

Lecture 16 - System Reliability Modelling (Continued...)

Lecture 17 - System Reliability Modelling (Continued...)

Lecture 18 - System Reliability Modelling (Continued...)

Lecture 19 - System Reliability Modelling (Continued...)

Lecture 20 - System Reliability Modelling (Continued...)

Lecture 21 - Markov Analysis

Lecture 22 - Markov Analysis (Continued...)

Lecture 23 - Markov Analysis (Continued...)

Lecture 24 - Markov Analysis (Continued...)

Lecture 25 - Markov Analysis (Continued...)

Lecture 26 - Failure Data Analysis: Non-Parametric Approach

Lecture 27 - Failure Data Analysis: Non-Parametric Approach (Continued...)

Lecture 28 - Failure Data Analysis: Non-Parametric Approach (Continued...)

Lecture 29 - Failure Data Analysis: Non-Parametric Approach (Continued...)

Lecture 30 - Failure Data Analysis (Parametric)

Lecture 31 - Failure data analysis (Parametric) (Continued...)

Lecture 32 - Failure data analysis (Parametric) (Continued...)

Lecture 33 - Goodness of fit

Lecture 34 - Goodness of Fit (GoF) Tests

Lecture 35 - Goodness of Fit (GoF) Tests (Continued...)

Lecture 36 - Maintainability and Availability

Lecture 37 - Maintainability and Availability (Continued...)

Lecture 38 - Maintainability and Availability (Continued...)

Lecture 39 - Maintainability and Availability (Continued...)

Lecture 40 - Summary of the course Introduction to Reliability Engineering

NPTEL : NOC:Nanobio Technology Enabled Point-of-Care Devices (Multi-Disciplinary)

Co-ordinators : Prof. Gorachand Dutta

Lecture 1 - Introduction

Lecture 2 - Biosensors and its Application

Lecture 3 - Translational Research and Nano Biosensing

Lecture 4 - Nanomaterials for Healthcare Biosensing

Lecture 5 - Signal Amplification for Ultrasensitive Biosensors

Lecture 6 - Signal Amplification for Ultrasensitive Biosensors (Continued...)

Lecture 7 - Signal Amplification for Ultrasensitive Biosensors (Continued...)

Lecture 8 - Signal Amplification for Ultrasensitive Biosensors (Continued...)

Lecture 9 - Different Measurement Techniques for Electrochemical Biosensors

Lecture 10 - Limit of Detection and Wash-Free Detection for Biosensors

Lecture 11 - Wash-Free Detection for Biosensors (Continued...)

Lecture 12 - Label-Free Detection for Biosensors

Lecture 13 - Label-free detection and Multiplex Biosensors

Lecture 14 - Multiplex Biosensors (Continued...)

Lecture 15 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 16 - Enhanced electrocatalytic activity for biosensors

Lecture 17 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 18 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 19 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 20 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 21 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 22 - Strategy for Electrochemical Detection and Tuning of Electrocatalytic Activities

Lecture 23 - Effect of pretreatment on PCB and biosensor developement

Lecture 24 - Impact of surface Roughness of PCB and PCB for Glucose sensors

Lecture 25 - Tutorial on Biosensors Fabrication

Lecture 26 - Tutorial on Biosensors Fabrication (Continued...)

Lecture 27 - Tutorial on Biosensors Fabrication (Continued...)

Lecture 28 - Tutorial on Biosensors Fabrication (Continued...)

Lecture 29 - Tutorial on Biosensors Fabrication (Continued...)

Lecture 30 - Tutorial on Biosensors Fabrication (Continued...)

Lecture 31 - Self-Powered Biosensors

Lecture 32 - Biosensors for Safety and Security

Lecture 33 - Research Proposal and Ethical Clearance

Lecture 34 - Special Chemestry for Biosensing

Lecture 35 - Tutorial - 2

Lecture 36 - Tutorial - 3

Lecture 37 - Tutorial - 4

Lecture 38 - Lab Demonstration - 1

Lecture 39 - Lab Demonstration - 2

Lecture 40 - Lab Demonstration - 3

NPTEL : NOC:Adolescent Health and Well-Being : A Holistic Approach (Multi-Disciplinary)

Co-ordinators : Dr. Sumana Samanta, Dr. Parmeshwar Satpathy

Lecture 1 - Adolescent Health Statistics

Lecture 2 - Introduction to Nutrition and Dietetics

Lecture 3 - Role of Macronutrients

Lecture 4 - Role of Micronutrients

Lecture 5 - Basics of Adolescent Mental Health

Lecture 6 - Physiological and Psychological changes during Adolescence

Lecture 7 - Special Nutritional Requirements in Adolescents

Lecture 8 - Malnutrition in Adolescents and their effects in Adult life

Lecture 9 - Adolescent Immunization

Lecture 10 - High risk behaviour in Adolescents

Lecture 11 - Nutrition Care Process

Lecture 12 - Dietary Counseling and Nutrition Planning

Lecture 13 - Common Micronutrient Deficiency in Adolescents

Lecture 14 - Eating Disorders in Adolescents

Lecture 15 - National Initiatives related to Adolescents

Lecture 16 - Behavior Modification for Weight Management

Lecture 17 - Adolescents And Physical Activity

Lecture 18 - Combating Special Situations

Lecture 19 - Legislations for Adolescents

Lecture 20 - Innovations for Holistic Well-being of Adolescents

NPTEL : NOC:Research Methods in Health Promotion (Multi-Disciplinary)

Co-ordinators : Dr. Arista Lahiri, Dr. Sweety Suman Jha, Prof. Madhumita Dobe

Lecture 1 - Basics of Health Promotion

Lecture 2 - Basic Principles of Health Promotion

Lecture 3 - The Health Promotion Research Process

Lecture 4 - Process of Health Promotion Research: Integrity and Rigor

Lecture 5 - Ethics in Health Promotion Research

Lecture 6 - Health Behavior and Health Behavior Change

Lecture 7 - Theory, Research and Behavior Change Techniques

Lecture 8 - Intervention Mapping

Lecture 9 - Ecological Models of Health Behavior

Lecture 10 - Social Science Techniques

Lecture 11 - Precede-Proceed Model

Lecture 12 - Models of Individual Health Behavior - I

Lecture 13 - Models of Individual Health Behavior - II

Lecture 14 - Models of Interpersonal Health Behavior

Lecture 15 - Community and Group Models of Health Behavior Change

Lecture 16 - Research design and techniques

Lecture 17 - Observational research designs

Lecture 18 - Experimental Research Designs

Lecture 19 - Experimental Research Designs: Issues and Challenges

Lecture 20 - Measurements in Health promotion

Lecture 21 - Qualitative methods in Health Promotion - Part I

Lecture 22 - Qualitative Methods in Health Promotion - Part II

Lecture 23 - Qualitative Methods in Health Promotion - Part III

Lecture 24 - Qualitative Methods in Health Promotion - Part IV

Lecture 25 - Qualitative Methods in Health Promotion - Part V

Lecture 26 - Introduction to Mixed Methods Research

Lecture 27 - The Convergent Design

Lecture 28 - The Explanatory Sequential Design

Lecture 29 - The Exploratory Sequential Design (Continued...)

Lecture 30 - The Embedded Design

Lecture 31 - Different study tools and their application in health promotion research

Lecture 32 - Formulating an appropriate study tool (Quantitative data collection tools)

Lecture 33 - Validity and reliability of study tools in quantitative research - Part I

Lecture 34 - Validity and reliability of study tools in quantitative research - Part II

Lecture 35 - Formulating an appropriate study tool(Qualitative data collection tools)

Lecture 36 - Designing messages - Part I

Lecture 37 - Designing messages - Part II

Lecture 38 - Materials and Methods of Intervention Delivery - Part I

Lecture 39 - Materials and Methods of Intervention Delivery - Part II

Lecture 40 - Pretesting of an intervention tool

Lecture 41 - BCC and SBCC - Part I

Lecture 42 - BCC and SBCC - Part II

Lecture 43 - BCC and SBCC - Part III

Lecture 44 - BCC and SBCC - Part IV

Lecture 45 - BCC and SBCC - Part V

Lecture 46 - Community-Based Participatory Research in context to Health Promotion - Part I

Lecture 47 - Community-Based Participatory Research in context to Health Promotion - Part II

Lecture 48 - Community-Based Participatory Research in context to Health Promotion - Part III

Lecture 49 - Community-Based Participatory Research in context to Health Promotion - Part IV

Lecture 50 - Community-Based Participatory Research in context to Health Promotion - Part V

Lecture 51 - Quantitative analytical methods - Part I

Lecture 52 - Quantitative analytical methods - Part II

Lecture 53 - Quantitative analytical methods - Part III

Lecture 54 - Analysis of Qualitative data

Lecture 55 - Analyzing Mixed Methods data

Lecture 56 - Developing a research proposal in health promotion

Lecture 57 - Report writing in health Promotion: An Overview

Lecture 58 - Report writing: quantitative research in health promotion - Part I

Lecture 59 - Report writing: quantitative research in health promotion - Part II

Lecture 60 - Report Writing: Qualitative and Mixed Methods research

NPTEL : NOC:Urban Ecological Heritagescapes through Interactive Governance: Theories and Applications (Multi-Disciplinary)

Co-ordinators : Prof. Jenia Mukherjee

Lecture 1 - Introduction

Lecture 2 - Urban Heritage - Global Conventions and Declarations

Lecture 3 - Historical Urban Landscape (HUL) - Approach, Toolkit, and Actions

Lecture 4 - Urban Heritage - The Indian Context

Lecture 5 - SDG(s) 11(.4) - Transdisciplinary Possibilities, Pathways, and Actions

Lecture 6 - Historicizing lakes of Bangalore - social-ecological perspectives

Lecture 7 - Urban environmentalisms - lake-based and rights-based

Lecture 8 - Example 1: The Jakkur Lake

Lecture 9 - Example 2: The Puttenahalli Lake

Lecture 10 - Example 3: The Kaikondrahalli Lake

Lecture 11 - Kolkata's heritage - Applying the urban ecological heritage lens

Lecture 12 - Kolkata and EKW - conveying the co-evolutionary narrative

Lecture 13 - Living Systems infrastructure of Kolkata

Lecture 14 - Case study 1: The Nalban and Goltala Fisheries

Lecture 15 - Case study 2: Baro Chaynavi Cooperative

Lecture 16 - Case study 3: Jhagrashisha

Lecture 17 - EKW as heritage - Lessons from a Practical Empirical Implementation Project - I

Lecture 18 - EKW as heritage - Lessons from a Practical Empirical Implementation Project - I

Lecture 19 - Conclusions

NPTEL : NOC:Experimental Robotics (Multi-Disciplinary)

Co-ordinators : Prof. Dilip Kumar Pratihar

Lecture 1 - Introduction

Lecture 2 - Experiment 1: Teaching of Serial Manipulator

Lecture 3 - Experimentation I

Lecture 4 - Experiment 1: Teaching of Serial Manipulator (Continued...)

Lecture 5 - Experiment 2: Control of Tracked Mobile Manipulator

Lecture 6 - Experimentation II

Lecture 7 - Experiment 2: Control of Tracked Mobile Manipulator (Continued...)

Lecture 8 - Experiment 3: Path and Gait Planning of Six-legged Robot

Lecture 9 - Experimentation III

Lecture 10 - Experiment 3: Path and Gait Planning of Six-legged Robot (Continued...)

Lecture 11 - Experiment 4: Navigation of Drone

Lecture 12 - Experimentation IV

Lecture 13 - Experimentation IV (Continued...)

Lecture 14 - Experiment 5: Path and Gait Planning of 25 dof NAO Humanoid Robot

Lecture 15 - Experimentation V

Lecture 16 - Experiment 5: Path and Gait Planning of 25 dof NAO Humanoid Robot (Continued...)

Lecture 17 - Current Trends in Robotics Research

Lecture 18 - Summary of the Course

NPTEL : NOC:Medical Law (Multi-Disciplinary)

Co-ordinators : Prof. Narendran Thiruthy, Prof. Chaitanya Mittal

Lecture 1 - Interface between Medical Profession and Law

Lecture 2 - Role of Medical practitioners in Justice Administration

Lecture 3 - Dos and Don'ts of Doctors

Lecture 4 - Dos and Don'ts for Legal Practitioners

Lecture 5 - Knowledge exchange between Medical and Legal Practitioners

Lecture 6 - Consent in Law

Lecture 7 - Types of Consent in Medical Field

Lecture 8 - Ethics in Medical Profession

Lecture 9 - Importance of Documentation in Medical practice

Lecture 10 - Legal Implications of Improper Documentation

Lecture 11 - Legal Responsibilities of Medical Practitioners

Lecture 12 - Medical Negligence and Legal Implications

Lecture 13 - Legal Implications of Medical Malpractice

Lecture 14 - Landmark Judgments on Medical Negligence

Lecture 15 - Testimony of Doctors in Medical Negligence

Lecture 16 - Healthcare Policy and Law

Lecture 17 - Clinical Establishment Law

Lecture 18 - Legal liability of Hospitals/Clinical Establishments

Lecture 19 - Legal responsibility in Diagnostics

Lecture 20 - Penalties for non-compliance

Lecture 21 - Role of IPR in promoting medical innovation and technologies

Lecture 22 - Health Policy formulation and Role of IPR

Lecture 23 - Intellectual Property and Access to Medicine

Lecture 24 - Neglected diseases and Role of IPR

Lecture 25 - Patenting Therapeutic Practices and Techniques

Lecture 26 - Duties of Doctor in Courts

Lecture 27 - Evidence Law and Medical experts

Lecture 28 - Admissibility of Forensic Evidence

Lecture 29 - Various Legal procedures in Medical practice

Lecture 30 - Collection, preservation and dispatch of Forensic Evidence

Lecture 31 - Ethical insight into different aspects of Surrogacy practice

Lecture 32 - Surrogacy Regulation in India

Lecture 33 - Assisted Reproductive Technology Regulation in India

Lecture 34 - Pre-Conception and Pre-Natal Diagnostic

Lecture 35 - Penalties for non-compliance

Lecture 36 - Ethical Issues in Organ Transplantation

Lecture 37 - Law governing organ transplantation

Lecture 38 - Comparative Law on Organ Transplantation

Lecture 39 - Medico-Legal Issues in Clinical Trials

Lecture 40 - Regulatory Law for Clinical Trials in India

NPTEL : NOC:An Overview on Maternal Health Antenatal, Intranatal and Postnatal Care (Multi-Disciplinary)

Co-ordinators : Prof. Barnali Ghosh

Lecture 1 - Overview of Obstetrics

Lecture 2 - Anatomy of Vulva or pudendum

Lecture 3 - Anatomy of Vagina

Lecture 4 - Anatomy of Cervix and Uterus

Lecture 5 - Anatomy of Uterus

Lecture 6 - Anatomy of fallopian tubes and ovary

Lecture 7 - Anatomy of plvic floor and perineum

Lecture 8 - Gametogenesis

Lecture 9 - Fertilisation and Embryogenesis

Lecture 10 - Implantation

Lecture 11 - Placentation (normal and abnormal)

Lecture 12 - Placentation (normal and abnormal) (Continued...)

Lecture 13 - Umbilical cord and Fetal membranes - Part 1

Lecture 14 - Umbilical cord and Fetal membranes - Part 2

Lecture 15 - FETUS (physiology and circulation)

Lecture 16 - Physiological changes in pregnancy - Part 1

Lecture 17 - Physiological changes in pregnancy - Part 2

Lecture 18 - Physiological changes in pregnancy - Part 3

Lecture 19 - Hormones in pregnancy

Lecture 20 - Hormones in pregnancy (Continued...)

Lecture 21 - Diagnosis of pregnancy - 1

Lecture 22 - Diagnosis of Pregnancy - 2

Lecture 23 - Obstetrical Examination

Lecture 24 - Obstetrical Examinationon antenatal mother (Clinical Study)

Lecture 25 - Maternal Pelvis $ Foetal Skill - Part 1

Lecture 26 - Fetal Skull

Lecture 27 - Pre-conceptional counselling and care

Lecture 28 - Nutrition in Pregnancy

Lecture 29 - Antenatal Care - Part 1

Lecture 30 - Antenatal Care - Part 2

Lecture 31 - Antenatal Care - Part 3

Lecture 32 - Antenatal Assessment of Fetal Well-Being - Part 1

Lecture 33 - Antenatal Assessment of Fetal Well-Being - Part 2

Lecture 34 - Antenatal Assessment of Fetal Well-Being - Part 3

Lecture 35 - Prenatal Screening and Diagnosis of aneuploidies

Lecture 36 - Invasive and non-invasive Prenatal Diagnostic Test

Lecture 37 - Invasive and non-invasive Prenatal Diagnostic Test (Continued...)

Lecture 38 - Fetal Imaging and Amniotic Fluid Study

Lecture 39 - Fetal Imaging and Amniotic Fluid Study

Lecture 40 - Teratology, Teratogens and feto-toxic agents - Part 1

Lecture 41 - Teratology, Teratogens and feto-toxic agents - Part 2

Lecture 42 - Normal Labour - Stages and cause of onset

Lecture 43 - Physiology of Labor

Lecture 44 - Events of Normal Labour

Lecture 45 - Mechanism of Normal Labour

Lecture 46 - Mechanism of Normal Labour (Continued...)

Lecture 47 - Clinical course of Labour

Lecture 48 - Monitoring of Normal Labour - Part 1

Lecture 49 - Monitoring of Normal Labour - Part 2

Lecture 50 - Labour Analgesia

Lecture 51 - Labour Analgesia (Continued...)

Lecture 52 - Abnormal Labour

Lecture 53 - Intrapartum Fetal Monitoring - Partogram

Lecture 54 - Intrapartum Fetal Monitoring - Cardiotocography (CTG)

Lecture 55 - Intrapartum Fetal Monitoring - Cardiotocography (CTG) (Continued...)

Lecture 56 - Induction and Augmentation of Labour

Lecture 57 - WHO Labour Guide

Lecture 58 - Episiotomy

Lecture 59 - Instrumental Vaginal Delivery

Lecture 60 - Obstetric anal sphincter injuries OASIS

Lecture 61 - Lower Segment Caesarean Section

Lecture 62 - Normal Puerperal changes

Lecture 63 - Management of Puerperium

Lecture 64 - Post-Natal care and postpartum contraception

Lecture 65 - Maternal Health Indicators and demographic scenario

Lecture 66 - Government health programmes related to Maternal Health

Lecture 67 - Government health programmes related to Maternal Health (Continued...)

Lecture 68 - Comprehensive Abortion Care (MTP Amendment Act 2021)

NPTEL : NOC:Recommender Systems (Multi-Disciplinary)

Co-ordinators : Prof. Mamata Jenamani

Lecture 1 - Recommender system and its business value

Lecture 2 - Types of recommender system - I

Lecture 3 - Types of recommender system - II

Lecture 4 - Data Collection

Lecture 5 - Data Description

Lecture 6 - Data preprocessing

Lecture 7 - Dimensionality Reduction

Lecture 8 - Introduction to machine learning - I

Lecture 9 - Introduction to machine learning - II

Lecture 10 - Introduction to machine learning - III

Lecture 11 - Distance and Similarity

Lecture 12 - Distance and Similarity (Continued...)

Lecture 13 - User-Based Approach

Lecture 14 - Item-Based Approach

Lecture 15 - Additional Topics in Neighbourhood Based Approach

Lecture 16 - Association rule based model

Lecture 17 - UV Decomposition

Lecture 18 - The latent factor model

Lecture 19 - Basic latent factor models

Lecture 20 - Other advanced models

Lecture 21 - Introduction to content based recommender system: Foundations

Lecture 22 - Feature Engineering - I

Lecture 23 - Feature Engineering - II

Lecture 24 - Feature Engineering - III

Lecture 25 - Feature Engineering - IV

Lecture 26 - Decision Trees for content based recommendation

Lecture 27 - NaÃƒÂ¯ve Bayes classifier for content based recommendation

Lecture 28 - kNN Classifier for Recommender System

Lecture 29 - Rule based classification

Lecture 30 - Regression methods and conclusions

Lecture 31 - Introduction to evaluation ofrecommender system

Lecture 32 - Resampling methods

Lecture 33 - Evaluation metrics for accuracy

Lecture 34 - Drawing reliable conclusions - I

Lecture 35 - Drawing reliable conclusions - II

Lecture 36 - Hybrid recommender systems

Lecture 37 - Knowledge based recommender systems

Lecture 38 - Context-Sensitive recommender systems

Lecture 39 - Structural Recommendations in Networks

Lecture 40 - Trust aware recommender systems

NPTEL : NOC:Comprehensive Molecular Diagnostics and Advanced Gene Expression Analysis (Multi-Disciplinary)

Co-ordinators : Prof. Arindam Ghosh, Prof. Aritri Bir

Lecture 1 - Foundation of Molecular Biology

Lecture 2 - DNA Replication and Repair Mechanism

Lecture 3 - Transcription (RNA Synthesis)

Lecture 4 - Protein Synthesis (Translation)

Lecture 5 - Nucleic Acid Isolation and Detection Methods

Lecture 6 - PCR (Polymerase Chain Reaction) Fundamentals

Lecture 7 - Realtime PCR - Part 1

Lecture 8 - Realtime PCR - Part 2

Lecture 9 - Variations of the PCR - Part 1

Lecture 10 - Variations of the PCR - Part 2

Lecture 11 - DNA Cloning and Recombinant DNA technology - I

Lecture 12 - DNA Cloning and Recombinant DNA technology - II

Lecture 13 - DNA Cloning and Recombinant DNA technology - III

Lecture 14 - Genome Editing Technologies - I

Lecture 15 - Genome Editing Technologies - II

Lecture 16 - DNA Microarray

Lecture 17 - FISH (Fluorescence in situ Hybridization)

Lecture 18 - Methods to study DNA-protein interaction - I

Lecture 19 - Methods to study DNA-protein interaction - II

Lecture 20 - Epigenetics and DNA methylation analysis

Lecture 21 - DNA Sequencing - Part 1 - Maxam Gilbert Sequencing

Lecture 22 - DNA Sequencing - Part 2 - Sanger Sequencing

Lecture 23 - Next Generation Sequencing - Part 1

Lecture 24 - Next Generation Sequencing - Part 2

Lecture 25 - Next Generation Sequencing - Part 3

Lecture 26 - Overview, Importance, Methods in Proteomics

Lecture 27 - Proteomic Techniques - High performance liquid chromatography (HPLC)

Lecture 28 - Proteomic Techniques - Mass Spectrometry

Lecture 29 - Proteomic Techniques - Differential in-gel electrophoresis

Lecture 30 - Proteomic Techniques - Protein Microarray

Lecture 31 - Label-based Protein Quantification Technologies - Part 1

Lecture 32 - Label-based Protein Quantification Technologies - Part 2

Lecture 33 - Label free methods of protein quantification

Lecture 34 - Next Generation Proteomics

Lecture 35 - Proteomic Data Analysis and Bioinformatic Tools

Lecture 36 - Syndromic Panels and Multiplex Assay : Molecular identification of Microorganism

Lecture 37 - Molecular Diagnostics in Antimicrobial Resistance Testing

Lecture 38 - RNA Sequencing: Role in Infectious diseases - I

Lecture 39 - RNA Sequencing: Role in Infectious diseases - II

Lecture 40 - Point of Care (POC) diagnostics in Infectious diseases

Lecture 41 - Molecular genetics in tumorogenesis

Lecture 42 - Liquid biopsies in cancer detection

Lecture 43 - Digital PCR in Cancer detection

Lecture 44 - Mutation Detection Methods

Lecture 45 - Isothermal Nucleic Acid Amplification

Lecture 46 - Genetic Testing and Inherited Disorders - Part 1

Lecture 47 - Genetic Testing and Inherited Disorders - Part 2

Lecture 48 - Prenatal diagnostics and NIPT

Lecture 49 - Reproductive genetics and genetic counselling

Lecture 50 - Genetic counselling and patient education

Lecture 51 - Serial Analysis of Gene Expression

Lecture 52 - Metabolomics in Molecular Diagnostics

Lecture 53 - Immunoassay and Luminex Multiplex Assay

Lecture 54 - Molecular diagnostics in Metabolic, Cardiovascular and Gastrointestinal disorders

Lecture 55 - Molecular diagnostics in Endocrine, Neurodegenerative and Transplantation disorders

Lecture 56 - Pharmacogenomics and Personalized Medicine

Lecture 57 - Quality control (QC) in molecular diagnostics

Lecture 58 - Ethical concerns in molecular diagnostics

Lecture 59 - Artificial Intelligence and Machine learning in Genomics

Lecture 60 - Integration of Multiomics Data in Molecular Diagnostics

NPTEL : NOC:Thin Film Technology (Multi-Disciplinary)

Co-ordinators : Prof. Samit K Ray

Lecture 1 - General Introduction

Lecture 2 - Thin Film Materials and Components

Lecture 3 - Semiconductor Films and Heterostructures

Lecture 4 - Chemical Methods

Lecture 5 - Physical Vapor Deposition (PVD) : Thermal Evaporation

Lecture 6 - Thermal Evaporation

Lecture 7 - Sources of Thermal Evaporation

Lecture 8 - Evaporation of Elements and Compounds

Lecture 9 - Compound Evaporation and Thickness Uniformity

Lecture 10 - Film Thickness Monitoring and Control

Lecture 11 - Pulsed Laser Deposition

Lecture 12 - Sputtering Process and Mechanism

Lecture 13 - Plasma Discharge and DC Sputtering

Lecture 14 - RF Sputtering Process

Lecture 15 - Magnetron Sputtering

Lecture 16 - Sputtering of Binary Alloys and Compounds

Lecture 17 - Ion Beam and Hybrid Deposition

Lecture 18 - Introduction to CVD Process

Lecture 19 - Thermal CVD Process

Lecture 20 - Gas Transport and Growth Kinetics

Lecture 21 - CVD Processes and Systems

Lecture 22 - Plasma Enhanced CVD (PECVD)

Lecture 23 - Liquid Phase Epitaxy

Lecture 24 - Vapor Phase Epitaxy - Compound Semiconductors

Lecture 25 - Metal-Organic CVD (MOCVD)

Lecture 26 - Introduction and Film Purity

Lecture 27 - MBE System and Growth Mechanism

Lecture 28 - Effusion Source and Growth Rate

Lecture 29 - Insitu Growth Monitoring - RHEED Oscillation

Lecture 30 - Atomic Layer Deposition / Atomic Layer Epitaxy

Lecture 31 - Thin Film Growth Modes

Lecture 32 - Homogeneous Nucleation

Lecture 33 - Heterogenous Nucleation

Lecture 34 - Stranski-Krastanov (2D-3D) Growth Mode

Lecture 35 - SiGe Strained Layer Epitaxy (2D) and Ge Islands (3D)

Lecture 36 - Thickness Measurement

Lecture 37 - Thickness Measurement - Interference Method

Lecture 38 - Thickness and Optical Constants - Ellipsometry

Lecture 39 - Mechanical Properties - Film Porosity and Adhesion

Lecture 40 - Mechanical Properties â€“ Residual Stress

Lecture 41 - Electron Beam Techniques - SEM

Lecture 42 - Scanning Electron Microscopy

Lecture 43 - Microprobe and Transmission Electron Microscopy

Lecture 44 - Transmission Electron Microscopy

Lecture 45 - Scanning Probe Microscopy

Lecture 46 - X-ray Photoelectron Spectroscopy

Lecture 47 - Auger Electron Spectroscopy

Lecture 48 - Secondary Ion Mass Spectrometry (SIMS)

Lecture 49 - Different SIMS Techniques and Depth Profile Analysis

Lecture 50 - Rutherford Backscattering Spectrometry (RBS)

Lecture 51 - Basic Device Fabrication Techniques

Lecture 52 - Metal-Oxide-Semiconductor (MOS) Capacitor

Lecture 53 - n-MOSFET and CMOS FET Devices

Lecture 54 - Scaled Si MOSFET Devices

Lecture 55 - Heterostructure FET and Bipolar Transistors

Lecture 56 - Optoelectronic Materials and Devices

Lecture 57 - Light Emitting Devices

Lecture 58 - Photodetector Devices

Lecture 59 - Photovoltaic Devices

Lecture 60 - Nanotechnology and Photonic Devices

NPTEL : NOC:An Integrated Approach to Common Childhood Diseases and Developmental Disorders in India (Multi-Disciplinary)

Co-ordinators : Prof. Nabarun Karmakar, Prof. Soumi Kundu, Prof. Parama Banerjee

Lecture 1 - Neonatal screening in India - Clinical Aspect

Lecture 2 - Neonatal Screening - Biochemical Aspect - Part I

Lecture 3 - Neonatal Screening - Biochemical Aspect - Part II

Lecture 4 - Neonatal Screening - Biochemical Aspect - Part III

Lecture 5 - India Newborn Action Plan (INAP)

Lecture 6 - Congenital Adrenal Hyperplasia - Biochemical Aspect

Lecture 7 - Congenital Adrenal Hyperplasia

Lecture 8 - Congenital and Acquired hypothyroidism

Lecture 9 - National Program for Hemoglobinopathies

Lecture 10 - Common Genetic Disorders in children

Lecture 11 - Congenital Hearing Disorders

Lecture 12 - Congenital Ophthalmological Disorders

Lecture 13 - Congenital Orthopedic Disorders

Lecture 14 - Congenital Structural Disorders

Lecture 15 - Malnutrition in Indian Children

Lecture 16 - Clinical features and management of Protein Energy Malnutrition

Lecture 17 - Medico-Social aspects and Prevention of Malnutrition in India

Lecture 18 - Integrated Child Developmental Services (ICDS)

Lecture 19 - Community Nutrition Programs

Lecture 20 - Vitamin A

Lecture 21 - Vitamin A disorders in Children

Lecture 22 - Vitamin B 1, 2, 3

Lecture 23 - Vitamin B 6, 9

Lecture 24 - Vitamin B 9, 12

Lecture 25 - Vitamin C

Lecture 26 - Vitamin B and C disorders in Children

Lecture 27 - Vitamin D

Lecture 28 - Vitamin D disorders in Children

Lecture 29 - Iodine

Lecture 30 - National program for Vitamin A and Iodine deficiency disorders

Lecture 31 - Iron

Lecture 32 - Iron (Anaemia)

Lecture 33 - Anemia in Children - Part I

Lecture 34 - Anemia in Children - Part II

Lecture 35 - Anemia Mukt Bharat

Lecture 36 - Universal Immunization Program and Mission Indradhanush

Lecture 37 - Vaccine preventable disease - Part I

Lecture 38 - Vaccine preventable disease - Part II

Lecture 39 - Vaccine preventable disease - Part III

Lecture 40 - IAP immunization schedule and VPD surveillance

Lecture 41 - NVBDCP - Part I

Lecture 42 - NVBDCP - Part II

Lecture 43 - NVBDCP - Part III (Program aspect)

Lecture 44 - National program for TB and Leprosy

Lecture 45 - National program for AIDS and Hepatitis

Lecture 46 - Pneumonia

Lecture 47 - Diarrhea

Lecture 48 - IMNCI - Part I

Lecture 49 - IMNCI - Part II

Lecture 50 - RMNCH+A

Lecture 51 - Common Congenital Heart Diseases

Lecture 52 - Rheumatic Heart Disease

Lecture 53 - Childhood Asthma

Lecture 54 - Seizures in Childhood

Lecture 55 - Nephrotic syndrome

Lecture 56 - Developmental Delay and Cerebral Palsy

Lecture 57 - Common behavioral and psychiatric Disorders in Childhood - Part I

Lecture 58 - Common behavioral and psychiatric Disorders in Childhood - Part II

Lecture 59 - Learning and Developmental Disorders in Children

Lecture 60 - School Health Programme and Rashtriya Bal Swasthya Karyakram (RBSK)

NPTEL : NOC:Neuroscience of Human Movement (Multi-Disciplinary)

Co-ordinators : Prof. Varadhan

Lecture 0 - Neuroscience of Human Movement

Lecture 1 - Membrane Physiology - Part 1

Lecture 2 - Membrane Physiology - Part 2

Lecture 3 - Nernst Equation

Lecture 4 - Goldman Equation

Lecture 5 - Action Potential - Part 1

Lecture 6 - Action Potential - Part 2

Lecture 7 - Action Potential - Part 3

Lecture 8 - Action Potential - Part 4

Lecture 9 - Action Potential - Part 5

Lecture 10 - Review of Action Potential and Neurotransmitters

Lecture 11 - Neuromuscular Junction

Lecture 12 - Disorders of Neuromuscular Junction

Lecture 13 - Skeletal Muscles - Part 1

Lecture 14 - Skeletal Muscles - Part 2

Lecture 15 - Skeletal Muscles - Part 3

Lecture 16 - Skeletal Muscles - Part 4

Lecture 17 - Muscle force production

Lecture 18 - Motor Units - Part 1

Lecture 19 - Motor Units - Part 2

Lecture 20 - Motor Units - PIC and EMG

Lecture 21 - Receptors - Part 1

Lecture 22 - Receptors - Part 2

Lecture 23 - Spine and Spinal Cord

Lecture 24 - Excitation and Inhibition within Spinal Cord - Part 1

Lecture 25 - Excitation and Inhibition within Spinal Cord - Part 2

Lecture 26 - Monosynaptic Reflexes - Part 1

Lecture 27 - Monosynaptic Reflexes - Part 2

Lecture 28 - Monosynaptic Reflexes - Part 3

Lecture 29 - Oligosynaptic and Polysynaptic Reflexes - Part 1

Lecture 30 - Oligosynaptic and Polysynaptic Reflexes - Part 2

Lecture 31 - Pre-Programmed Reactions - Part 1

Lecture 32 - Pre-Programmed Reactions - Part 2

Lecture 33 - Spinal Cord Injuries and Central Pattern Generators

Lecture 34 - Animal Preparations for Neuroscience Experiments

Lecture 35 - Overview of motor control system

Lecture 36 - Terminology : Directional Terms and Planes (Primary Motor Cortex - Part - 1)

Lecture 37 - Primary Motor Cortex - Part 2

Lecture 38 - Primary Motor Cortex - Part 3

Lecture 39 - Primary Motor Cortex - Part 4

Lecture 40 - Primary Motor Cortex - Part 5

Lecture 41 - Primary Motor Cortex - Part 6

Lecture 42 - Primary Motor Cortex - Part 7

Lecture 43 - Primary Motor Cortex - Part 8

Lecture 44 - Primary Motor Cortex - Part 9

Lecture 45 - Primary Motor Cortex - Part 10

Lecture 46 - Primary Motor Cortex - Part 11

Lecture 47 - Primary Motor Cortex - Part 12

Lecture 48 - Primary Motor Cortex - Part 13

Lecture 49 - Primary Motor Cortex - Part 14

Lecture 50 - Primary Motor Cortex - Part 15

Lecture 51 - Cerebellum - Part 1

Lecture 52 - Cerebellum - Part 2

Lecture 53 - Cerebellum - Part 3

Lecture 54 - Cerebellum - Part 4

Lecture 55 - Cerebellum - Part 5

Lecture 56 - Cerebellum - Part 6

Lecture 57 - Cerebellum - Part 7

Lecture 58 - Cerebellum - Part 8

Lecture 59 - Cerebellum - Part 9

Lecture 60 - Cerebellum - Part 10

Lecture 61 - Cerebellum - Part 11

Lecture 62 - Cerebellum - Part 12

Lecture 63 - Basal Ganglia - Part 1

Lecture 64 - Basal Ganglia - Pathways

Lecture 65 - Basal Ganglia - Inputs

Lecture 66 - Basal Ganglia - Outputs

Lecture 67 - Basal Ganglia - Various Functions

Lecture 68 - Basal Ganglia - Motor Functions

Lecture 69 - Basal Ganglia - Motor Functions.

Lecture 70 - Basal Ganglia - Dopamine and Acetylcholine

Lecture 71 - Basal Ganglia - Disorders

Lecture 72 - Parkinson's Disease - Intro

Lecture 73 - Parkinson's Disease - Rate Model, Pathophysiology

Lecture 74 - Parkinson's Disease - Current therapeutic approaches and the future

Lecture 75 - Basal Ganglia - Various Disorders

Lecture 76 - Neuropsychiatric disorders due to BG dysfunction

Lecture 77 - Parietal and Premotor Cortex - Part 1

Lecture 78 - Parietal and Premotor Cortex - Part 2

Lecture 79 - Parietal and Premotor Cortex - Part 3

Lecture 80 - Parietal and Premotor Cortex - Part 4

Lecture 81 - Parietal and Premotor Cortex - Part 5

Lecture 82 - Parietal and Premotor Cortex - Part 6

NPTEL : NOC:Manage TB (Multi-Disciplinary)

Co-ordinators : Dr. M S Jawahar, Dr.V.V.Banu Rekha, Prof. Mohan Natrajan

Lecture 1 - How is TB affecting public health Globally and Nationally

Lecture 2 - Epidemiology of TB-Session - 1

Lecture 3 - Epidemiology of TB-Session - 2

Lecture 4 - Pathogenesis of TB-Session - 1

Lecture 5 - Pathogenesis of TB-Session - 2

Lecture 6 - Clinical manifestations of TB-Session - 1

Lecture 7 - Clinical manifestations of TB-Session - 2

Lecture 8 - Clinical manifestations of TB-Session - 3

Lecture 9 - Bacteriological Diagnosis of Tuberculosis - Smear and Culture

Lecture 10 - Demonstration of processing of sputum specimen for culture for diagnosis of tuberculosis

Lecture 11 - Demonstration of sputum smear examination for diagnosis of tuberculosis

Lecture 12 - Demonstration of solid culture method for diagnosis of tuberculosis

Lecture 13 - Demonstration of liquid culture method for diagnosis of tuberculosis in sputum

Lecture 14 - Phenotypic drug susceptibility testing in Tuberculosis

Lecture 15 - Demonstration of drug susceptibility testing of first line anti-TB drugs by liquid culture

Lecture 16 - Molecular Diagnosis of Tuberculosis-Session - 1

Lecture 17 - Molecular Diagnosis of Tuberculosis-Session - 2

Lecture 18 - Demonstration of Xpert MTB-RIF assay for diagnosis of tuberculosis from sputum specimens

Lecture 19 - Demonstration of Line Probe Assay (LPA) (Direct detection of tuberculosis and resistance to isoniazid and rifampicin) in sputum

Lecture 20 - Radiology in diagnosis of Tuberculosis-Session - 1

Lecture 21 - Radiology in diagnosis of Tuberculosis-Session - 2

Lecture 22 - Radiology in diagnosis of Tuberculosis-Session - 3

Lecture 23 - Radiology in diagnosis of Tuberculosis-Session - 4

Lecture 24 - Approach to diagnosis of Pulmonary TB

Lecture 25 - Case Discussion-Approach to diagnosis of TB in a person with presumptive pulmonary TB

Lecture 26 - Case Discussion-Approach to diagnosis of pulmonary TB in a patient with negative sputum smear for AFB

Lecture 27 - Approach to diagnosis of Extra-pulmonary TB

Lecture 28 - Case Discussion-Approach to diagnosis of TB in a person with swelling in the neck

Lecture 29 - Case Discussion-Approach to diagnosis of TB spine

Lecture 30 - Diagnosis of Childhood Tuberculosis-Session - 1

Lecture 31 - Diagnosis of Childhood Tuberculosis-Session - 2

Lecture 32 - Video demonstration of gastric fluid aspiration technique in a child

Lecture 33 - Case Discussion-Approach to diagnosis of TB in a child with presumptive pulmonary TB

Lecture 34 - Case Discussion-Approach to diagnosis of TB meningitis in a child

Lecture 35 - Drugs for treating Tuberculosis and Principles of Chemotherapy-Session - 1

Lecture 36 - Drugs for treating Tuberculosis and Principles of Chemotherapy-Session - 2

Lecture 37 - Treatment of Drug Sensitive Pulmonary Tuberculosis

Lecture 38 - Case discussion-Approach to treatment of drug sensitive TB

Lecture 39 - Management of drug resistant Tuberculosis-Session - 1

Lecture 40 - Management of drug resistant Tuberculosis-Session - 2

Lecture 41 - Case discussion-Approach to treatment of Multi-drug resistant TB (MDR-TB)/ Extensively drug resistant TB (XDR-TB)

Lecture 42 - Management of Extra-pulmonary Tuberculosis-Session - 1

Lecture 43 - Management of Extra-pulmonary Tuberculosis-Session - 2

Lecture 44 - Panel discussion-Practical difficulties in the management of Extra-pulmonary TB

Lecture 45 - Management of patients with HIV-TB coinfection-Session - 1

Lecture 46 - Management of patients with HIV-TB coinfection-Session - 2

Lecture 47 - Case discussion-Approach to management of HIV-TB

Lecture 48 - Management of TB in special situations

Lecture 49 - Case discussion-Approach to management of TB in pregnancy

Lecture 50 - Treatment of Pediatric Tuberculosis-Session - 1

Lecture 51 - Treatment of Pediatric Tuberculosis-Session - 2

Lecture 52 - Management of Adverse effects to anti-TB drugs-Session - 1

Lecture 53 - Management of Adverse effects to anti-TB drugs-Session - 2

Lecture 54 - Case discussion-Approach to management of jaundice during anti-TB treatment

Lecture 55 - Case discussion-Approach to management of skin rashes during anti-TB treatment

Lecture 56 - Non-tuberculous Mycobacteria- Diagnosis and Clinical management-Session - 1

Lecture 57 - Non-tuberculous Mycobacteria - Diagnosis and Clinical Management Session - 2

Lecture 58 - Newer Anti-TB drugs and regimens-Session - 1

Lecture 59 - Newer Anti-TB drugs and regimens-Session - 2

Lecture 60 - Management of Latent TB Infection-Session - 1

Lecture 61 - Management of Latent TB Infection-Session - 2

Lecture 62 - Airborne infection control in tuberculosis-Session - 1

Lecture 63 - Airborne infection control in tuberculosis-Session - 2

Lecture 64 - Vaccine for Tuberculosis-Session - 1

Lecture 65 - Vaccine for Tuberculosis-Session - 2

Lecture 66 - Services offered by Revised National TB Control Programme (RNTCP)-Session - 1

Lecture 67 - Services offered by Revised National TB Control Programme (RNTCP)-Session - 2

Lecture 68 - Services offered by Revised National TB Control Programme (RNTCP)-Session - 3

Lecture 69 - Services offered by Revised National TB Control Programme (RNTCP)-Session - 4

Lecture 70 - Tuberculosis notification-Session - 1

Lecture 71 - Tuberculosis notification-Session - 2

Lecture 72 - Addressing Social Barriers in Tuberculosis Control-Session - 1

Lecture 73 - Addressing Social Barriers in Tuberculosis Control-Session - 2

Lecture 74 - Standards for TB Care in India-Session - 1

Lecture 75 - Standards for TB Care in India-Session - 2

Lecture 76 - Global Tuberculosis Control Strategies

NPTEL : NOC:Ecology and Environment (Multi-Disciplinary)

Co-ordinators : Dr. Abhijit P. Deshpande

Lecture 1 - Sustainability

Lecture 2 - Dams

Lecture 3 - Dams

Lecture 4 - Adayar River

Lecture 5 - Adayar River

Lecture 6 - Urbanisation in Western Ghats and Biodiesel

Lecture 7 - Use And Throw Plastic

Lecture 8 - Nano Materials Information Technologhy

Lecture 9 - Definition of Health Risk

Lecture 10 - Transport Of Pollutants in the Environment

Lecture 11 - Assesment of Risk

Lecture 12 - Remediation and Liability

Lecture 13 - Remendiation and Liability

Lecture 14 - Life Cycle Analysis

Lecture 15 - Energy and Environment module - 1

Lecture 16 - Energy and Environment module - 2

Lecture 17 - Energy and Environment module - 3

Lecture 18 - Energy and Environment module - 4

Lecture 19 - Energy and Environment module - 5

Lecture 20 - Energy and Environment module - 6

Lecture 21 - Energy and Environment module - 7

Lecture 22 - Drinking Water Supply: Need and Challenges

Lecture 23 - Drinking Water Supply: Need and Challenges

Lecture 24 - Water Quality Standards And Philosophy of Water Treatment

Lecture 25 - Water Treatment: Point Of Use Filters

Lecture 26 - Wastewater Management in Developing Urban Environments: Indian Scenario

Lecture 27 - Wastewater Recycling: A Sustainable Option For Water Management

Lecture 28 - Sustainable Water Management In Urban Areas - Part 1

Lecture 29 - Sustainable Water Management In Urban Areas - Part 2

Lecture 30 - Ground Water Contamination

Lecture 31 - Groundwater - Sanitation Nexus

Lecture 32 - Chasing Sustainability - The Challenge - Part 1

Lecture 33 - Chasing Sustainability - The Challenge - Part 2

Lecture 34 - Devoloping Frame Works Of Action: Ethics - Part 1

Lecture 35 - Devoloping Frame Works Of Action: Ethics - Part 2

Lecture 36 - Social And sanitation

Lecture 37 - Promoting Policies For Eco-Productive Cities in the global House - Part 1

Lecture 38 - Promoting Policies For Eco-Productive Cities in the global House - Part 2

Lecture 39 - The need to study ecology

Lecture 40 - Ecosystem functions and services

Lecture 41 - What is studied in ecology?

Lecture 42 - Ecological footprint

Lecture 43 - Energy and Material flow in ecosystems and ecological efficiency

Lecture 44 - Energy flow, productivity and Biodiversity

Lecture 45 - Biodiversity, population and ecological principles

NPTEL : NOC:Current Regulatory Requirements for Conducting Clinical Trials in India (Multi-Disciplinary)

Co-ordinators : Prof. Nandini K Kumar, Prof. Sucheta Banerjee Kurundkar, Prof. A. B. Ramteke

Lecture 1 - C1 - L00

Lecture 2 - C1 - Introduction Assorted Interviews

Lecture 3 - C1 - L01

Lecture 4 - C1 - L02

Lecture 5 - C1 - L03

Lecture 6 - C1 - L04

Lecture 7 - C1 - L05

Lecture 8 - C1 - L06

Lecture 9 - C1 - L07

Lecture 10 - C1 - L08

Lecture 11 - C1 - L09

Lecture 12 - C1 - L10A

Lecture 13 - C1 - L10B

NPTEL : NOC:Regulatory Requirements for Medical Devices and IVD kits in India (Multi-Disciplinary)

Co-ordinators : Prof. A. B. Ramteke, Prof. Malay Mitra

Lecture 1 - C2 - Introduction Assorted Interviews

Lecture 2 - C2 - L00

Lecture 3 - C2 - L01

Lecture 4 - C2 - L02

Lecture 5 - C2 - L03

Lecture 6 - C2 - L04

Lecture 7 - C2 - L05

Lecture 8 - C2 - L06

Lecture 9 - C2 - L07

Lecture 10 - C2 - L08

Lecture 11 - C2 - L09

NPTEL : NOC:Numerical Methods for Engineers (Multi-Disciplinary)

Co-ordinators : Dr. Niket S.Kaisare

Lecture 1 - Introduction

Lecture 2 - Overview of Learning Modules

Lecture 3 - Course Plan

Lecture 4 - Tutorial: Excel

Lecture 5 - Errors and Approximations

Lecture 6 - Truncation and Round-Off Errors

Lecture 7 - Binary Numbers: Introduction

Lecture 8 - Floating Point: Real numbers in decimal system

Lecture 9 - Floating Point in Binary system

Lecture 10 - Iterative Method

Lecture 11 - Direct Method

Lecture 12 - Sequential Method

Lecture 13 - Linear Algebra: Basics

Lecture 14 - Introduction to Linear Equations

Lecture 15 - Rank Condition for Solving Linear Equations

Lecture 16 - Motivating Gauss Elimination

Lecture 17 - Gauss Elimination

Lecture 18 - Tutorial Recap: Gauss Elimination

Lecture 19 - Back Substitution to find solution

Lecture 20 - Gauss Jordan and LU Decomposition

Lecture 21 - Partial Pivoting in Gauss Elimination

Lecture 22 - Analysis of Gauss Elimination

Lecture 23 - Tri-Diagonal Systems: Practical Relevance

Lecture 24 - Thomas Algorithm for Tri-Diagonal Systems

Lecture 25 - Gauss Siedel Method

Lecture 26 - Analysis of Gauss Siedel Method

Lecture 27 - Gauss Siedel vs. Jacobi Methods

Lecture 28 - Bonus: Example using MS Excel

Lecture 29 - Summary: Linear Equations

Lecture 30 - Introduction to Nonlinear Equations

Lecture 31 - Bisection Method

Lecture 32 - Analysis of Bisection Method

Lecture 33 - Bonus: Excel Solution for Bisection Method

Lecture 34 - Regula-Falsi Method

Lecture 35 - Bonus: Excel Solution for Regula-Falsi Method

Lecture 36 - Regula-Falsi vs. Secant Method

Lecture 37 - Bonus: Excel Solution for Secant Method

Lecture 38 - Some special cases

Lecture 39 - Fixed-Point Iteration

Lecture 40 - Newton-Raphson Method

Lecture 41 - Analysis of Fixed-Point Iteration

Lecture 42 - Analysis of Newton-Raphson

Lecture 43 - Problems with Newton-Raphson

Lecture 44 - Multi-Variable Fixed-Point Iteration

Lecture 45 - Multi-Variable Newton-Raphson

Lecture 46 - Out of Syllabus: Improvements to NR Methods

Lecture 47 - Out of Syllabus: Roots of a polynomial

Lecture 48 - Summary

Lecture 49 - Introduction: Regression and Interpolation

Lecture 50 - Linear Regression in One Variable

Lecture 51 - Recap: Formula for Linear Regression

Lecture 52 - Bonus: Linear Regression using MS-Excel

Lecture 53 - Linear Regression in Multiple Variables

Lecture 54 - Matrix Method for Multi-Linear Regression

Lecture 55 - Polynomial Regression

Lecture 56 - Functional Regression

Lecture 57 - Bonus: X-Y versus Y-X data (Using MS Excel)

Lecture 58 - Interpolation: Introduction and A NaÃ¯ve Extension

Lecture 59 - Bonus: MS-Excel for NaÃ¯ve Interpolation

Lecture 60 - Lagrange Interpolating Polynomials

Lecture 61 - Newton's Forward Difference Polynomial

Lecture 62 - Newton's Divided Differences: Derivation

Lecture 63 - Interpolation Examples

Lecture 64 - Bonus: MS-Excel for Newton's Polynomial

Lecture 65 - Summary: Regression and Interpolation

Lecture 66 - Numerical Differentiation: Introduction

Lecture 67 - Numerical Differentiation Formula and Analysis

Lecture 68 - Derivation using Method of undetermined coefficients

Lecture 69 - Three-point differentiation formulae

Lecture 70 - Bonus: Differentiation using MS-Excel

Lecture 71 - Truncation vs. Round-Off Errors

Lecture 72 - Numerical Differentiation Examples

Lecture 73 - Summary of Numerical Differentiation

Lecture 74 - Numerical Integration: Introduction

Lecture 75 - Trapezoidal rule and Derivation

Lecture 76 - Simpson's Rules for Integration

Lecture 77 - Bonus: MS-Excel for Numerical Integration

Lecture 78 - Error Analysis for Simpson's Rules

Lecture 79 - Numerical Integration Examples

Lecture 80 - Bonus: Integration using MS-Excel

Lecture 81 - Summary of Newton Cotes Formulae

Lecture 82 - Richardson's Extrapolation

Lecture 83 - Gauss Quadrature

Lecture 84 - Summary of Numerical Integration

Lecture 85 - Introduction to ODE-IVP

Lecture 86 - Motivation using an Example (Bonus)

Lecture 87 - Euler's Methods and Second-Order Methods

Lecture 88 - Second-Order Runge-Kutta Methods

Lecture 89 - Summary of RK-2

Lecture 90 - Higher order RK Methods

Lecture 91 - Bonus: ODE-IVP using MS-Excel

Lecture 92 - Bonus: RK-2 and RK-4 Methods using MS-Excel

Lecture 93 - Summary and Recap

Lecture 94 - Introduction to Predictor-Corrector Methods

Lecture 95 - Stability of Implicit Methods: Overview

Lecture 96 - Stability Analysis of Euler's Methods

Lecture 97 - Extension to multiple variables

Lecture 98 - Local vs. Global Truncation Errors

Lecture 99 - Richardson's Extrapolation

Lecture 100 - Stiff System of ODEs: Introduction

Lecture 101 - Adaptive Step-sizing

Lecture 102 - Adaptive step-sizing and Embedded Methods

Lecture 103 - Bonus: Errors and Extrapolation using MS-Excel

Lecture 104 - Summary and Recap (Weeks 10 and 11)

Lecture 105 - Introduction to ODE-BVP

Lecture 106 - Shooting Method: An Overview

Lecture 107 - Finite Difference Method: An Overview

Lecture 108 - Solution using Shooting Method

Lecture 109 - Algorithm for Shooting Method

Lecture 110 - Problems with Shooting Method

Lecture 111 - Solving ODE-BVP using Finite Difference Method

Lecture 112 - Microsoft Excel based Solution

Lecture 113 - Recap of Week-12 (ODE-BVP)

NPTEL : Basic Course in Biomedical Research (Multi-Disciplinary)

Co-ordinators : Dr. Sanjay Mehendale

Lecture 1 - Introduction to health research

Lecture 2 - Formulating research question

Lecture 3 - Literature review

Lecture 4 - Measures of disease frequency

Lecture 5 - Descriptive study designs

Lecture 6 - Analytical study designs

Lecture 7 - Experimental study designs: Clinical trials

Lecture 8 - Validity of epidemiological studies

Lecture 9 - Qualitative research methods: An overview

Lecture 10 - Measurement of study variables

Lecture 11 - Sampling methods

Lecture 12 - Calculating sample size and power

Lecture 13 - Selection of study population

Lecture 14 - Study plan and project management

Lecture 15 - Designing data collection tools

Lecture 16 - Principles of data collection

Lecture 17 - Data management

Lecture 18 - Overview of data analysis

Lecture 19 - Ethical framework for health research

Lecture 20 - Conducting clinical trails

Lecture 21 - Preparing a concept paper for research projects

Lecture 22 - Elements of a protocol for research studies

NPTEL : NOC:Thermodynamics (Multi-Disciplinary)

Co-ordinators : Prof. Anand T. N. C

Lecture 1 - Basic concepts and definitions - Part 1

Lecture 2 - Basic concepts and definitions - Part 2

Lecture 3 - Basic concepts and definitions - Part 3

Lecture 4 - Tutorial problems on exact and inexact differential

Lecture 5 - Basic concepts and definitions - Part 4

Lecture 6 - Work - Part 1

Lecture 7 - Work - Part 2

Lecture 8 - Work - Part 3

Lecture 9 - Work - Part 4

Lecture 10 - Work - Part 5

Lecture 11 - Tutorial problem on 'Work' - Part 1

Lecture 12 - Tutorial problem - Part 2

Lecture 13 - Tutorial problem on 'Work' - Part 3

Lecture 14 - Tutorial problem on 'Work' - Part 4

Lecture 15 - Zeroth law of thermodynamics

Lecture 16 - Methods of temperature measurement

Lecture 17 - Modes of heat transfer

Lecture 18 - Tutorial problem on 'Modes of heat transfer'

Lecture 19 - Tutorial problem on 'Methods of temperature measurement'

Lecture 20 - First law of thermodynamics

Lecture 21 - Tutorial problem - Part 1

Lecture 22 - Tutorial problem - Part 2

Lecture 23 - Heat and work interactions for a system

Lecture 24 - Tutorial problem - Part 1

Lecture 25 - Pure substance

Lecture 26 - Tutorial problem - Part 2

Lecture 27 - Ideal gas - Part 1

Lecture 28 - Ideal gas - Part 2

Lecture 29 - Tutorial problem - Part 3

Lecture 30 - Tutorial problem - Part 4

Lecture 31 - Tutorial problem - Part 5

Lecture 32 - Specific heats at constant pressure and constant volume

Lecture 33 - Tutorial problem - Part 6

Lecture 34 - Tutorial problem - Part 7

Lecture 35 - Ideal gas - Part 3

Lecture 36 - Ideal gas - Part 4

Lecture 37 - Ideal gas - Part 5

Lecture 38 - Tutorial problem - Part 1

Lecture 39 - Tutorial problem - Part 2

Lecture 40 - Tutorial problem - Part 3

Lecture 41 - Tutorial problem - Part 4

Lecture 42 - Beyond ideal gases - Part 1

Lecture 43 - Beyond ideal gases - Part 2

Lecture 44 - Two phase system - Part 1

Lecture 45 - Two phase system - Part 2

Lecture 46 - Two phase system: water and steam

Lecture 47 - Tutorial problems (2 numbers)

Lecture 48 - Tutorial problem - Part 1

Lecture 49 - Tutorial problem - Part 2

Lecture 50 - Tutorial problem - Part 3

Lecture 51 - Tutorial problems on two-phase systems (2 numbers)

Lecture 52 - Tutorial problem (1 number)

Lecture 53 - Rate equation of the first law of thermodynamics for a control mass and a control volume

Lecture 54 - Energy equation for a steady-state, steady-flow process in selected engineering devices

Lecture 55 - Tutorial problems (3 numbers)

Lecture 56 - Tutorial problem - Part 1

Lecture 57 - Tutorial problem - Part 2

Lecture 58 - Quasi-static process revisited: Work against an external force

Lecture 59 - Second law of thermodynamics: limitations of the first law of thermodynamics

Lecture 60 - Second law of thermodynamics: direct and reverse heat engine

Lecture 61 - Second law of thermodynamics: Kelvin-Planck and Clausius statements

Lecture 62 - Second law of thermodynamics: reversible process

Lecture 63 - Second law of thermodynamics: Carnot's cycle and theorems

Lecture 64 - Second law of thermodynamcis: absolute temperature scale

Lecture 65 - Tutorial problems (2 numbers)

Lecture 66 - Tutorial problem (1 number)

Lecture 67 - Tutorial problem (1 number)

Lecture 68 - Tutorial problem (2 numbers)

Lecture 69 - Second law of thermodynamics: Clausius's inequality

Lecture 70 - Entropy - Part 1

Lecture 71 - Tutorial problem (1 number)

Lecture 72 - Entropy - Part 2

Lecture 73 - Entropy - Part 3

Lecture 74 - Entropy - Part 4

Lecture 75 - Tutorial problem (1 number)

Lecture 76 - Tutorial problem (1 number)

Lecture 77 - Tutorial problems (2 numbers)

Lecture 78 - Entropy - Part 5

Lecture 79 - Entropy - Part 6

Lecture 80 - Entropy - Part 7

Lecture 81 - Exergy - Part 1

Lecture 82 - Exergy - Part 2

Lecture 83 - Exergy - Part 3

Lecture 84 - Thermodynamics cycles: Rankine cycle

Lecture 85 - Tutorial problem (1 number)

Lecture 86 - Thermodynamics cycles: Brayton cycle

Lecture 87 - Tutorial problem (1 number)

Lecture 88 - Thermodynamics cycles: vapor compression refrigeration cycle

Lecture 89 - Tutorial problem (1 number)

NPTEL : NOC:Regulatory Requirements for Medical Devices including in Vitro Diagnostics in India (Version 2.0) (Multi-Disciplinary)

Co-ordinators : Prof. Malay Mitra, Prof. Aseem Sahu, Prof. Arun B.Ramteke

Lecture 1 - Courses Overview

Lecture 2 - Medical device and in vitro diagnostics: Introduction and types of devices including combination devices

Lecture 3 - Medical Device Rules, 2017: Implications on medical devices

Lecture 4 - Classification of medical devices

Lecture 5 - Labelling of medical devices and in vitro diagnostics

Lecture 6 - Standards of medical device, quality assurance and testing

Lecture 7 - Regulatory requirements of biocompatibility of medical devices and ISO 10993

Lecture 8 - Clinical investigation of medical devices, regulation of investigational medical devices

Lecture 9 - Quality assurance and quality management system

Lecture 10 - How to obtain a licence to manufacture a medical device?

Lecture 11 - ISO 14971 (Medical devices: Application of risk management to medical devices)

Lecture 12 - Inspection of medical device and IVD establishments

Lecture 13 - Import and export of medical devices and IVDs

Lecture 14 - Medical device regulation: International practices

NPTEL : NOC:Current Regulatory Requirements for Conducting Clinical Trials in India for Investigational New Drugs (Version 2.0) (Multi-Disciplinary)

Co-ordinators : Prof. Nandini K Kumar, Prof. Y. K. Gupta, Prof. D. K. Sable, Prof. Arun B. Ramteke, Prof. Rubina Bose, Prof. Sucheta Banerjee Kurundkar, Prof. Vishnu Rao

Lecture 1 - Courses Overview

Lecture 2 - Overview of Indian regulatory system

Lecture 3 - Overview of Drugs and Cosmetics Act and Rules thereunder

Lecture 4 - Overview of New Drugs and Clinical Trials Rules, 2019

Lecture 5 - Pre-Clinical Data Requirements

Lecture 6 - Rules Governing Clinical Trials

Lecture 7 - Phases of clinical trial, forms, and fees

Lecture 8 - Regulatory pathway and data requirements for NDCT, 2019

Lecture 9 - BA/BE study and study centers: Legal provisions

Lecture 10 - Guidelines to conduct BA/BE studies

Lecture 11 - Ethics Committee registration and re-registration

Lecture 12 - Ethical Considerations

Lecture 13 - Good Clinical Practice

Lecture 14 - Requirements for import/manufacture of new drug/IND for conducting clinical trials in India

Lecture 15 - Requirements for import/manufacture of new drug/IND for sale/ distribution and unapproved new drug for patients

Lecture 16 - Important issues

Lecture 17 - Special concern

Lecture 18 - Clinical trial related guidelines (NDCT Rules)

Lecture 19 - Content of Proposed Clinical Trial Protocol

Lecture 20 - Content of a Clinical Trial Report

Lecture 21 - Post Marketing Assessment and Clinical Trial Compensation

Lecture 22 - Common observations during submission of CT/BA/BE protocol

Lecture 23 - Common observations during CT/BA/BE centre inspections

Lecture 24 - Drug development process: Overview

Lecture 25 - Salient feature of NDCT 2019 - what's new in NDCT?

Lecture 26 - Online Submission 23A: Sugam

Lecture 27 - Online Submission (CTRI)

Lecture 28 - Tables Given in NDCT 2019 and its Content

NPTEL : NOC:Model Predictive Control: Theory and Applications (Multi-Disciplinary)

Co-ordinators : Dr. Niket S.Kaisare

Lecture 1 - Course Background: Model Predictive Control

Lecture 2 - Course Outline

Lecture 3 - Additional MATLAB Video - Array Operations

Lecture 4 - Additional MATLAB Video - Array Operations

Lecture 5 - Recap: Linear Algebra

Lecture 6 - Recap: Differential and Difference Equations

Lecture 7 - Recap: Process Control Basics

Lecture 8 - Introduction to Model Predictive Control

Lecture 9 - MPC: Salient Features

Lecture 10 - MPC: Historical Perspective

Lecture 11 - Vectors and Matrices

Lecture 12 - Vector Spaces

Lecture 13 - Linear Operation

Lecture 14 - Null and Image Spaces

Lecture 15 - Eigenvalues and Eigenvectors

Lecture 16 - Eigenvalue Decomposition and Tutorial

Lecture 17 - Recap of Week-2

Lecture 18 - Model Classification

Lecture 19 - Discrete-Time Models Overview

Lecture 20 - Discrete-Time Models

Lecture 21 - Finite Impulse Response Models

Lecture 22 - Finite Step Response Models

Lecture 23 - Recap and Plan for Week-4

Lecture 24 - State Space and Step Response Models

Lecture 25 - Nonlinear Models and Model Linearization

Lecture 26 - Model Types and Model Conversion

Lecture 27 - Model Conversion - 2

Lecture 28 - Model Conversion: TF to SS

Lecture 29 - How to handle MIMO systems

Lecture 30 - Discretization of State-Space Models

Lecture 31 - Introduction to Dynamic Matrix Control (DMC)

Lecture 32 - The DMC Algorithm: Future Predictions

Lecture 33 - The DMC Algorithm: Objective and Constraints

Lecture 34 - The DMC Algorithm: Optimization

Lecture 35 - Coding for DMC Algorithm: Setup

Lecture 36 - Coding for DMC Algorithm: Populate Matrices

Lecture 37 - Recap of DMC Algorithm

Lecture 38 - Extensions of DMC Algorithm

Lecture 39 - LTI Models and Coordinate Transform

Lecture 40 - LTI Models: Stability

Lecture 41 - LTI Models: Controllability

Lecture 42 - LTI Models: Conditions for controllability

Lecture 43 - Tutorial by Arvind (Recap of Controllability)

Lecture 44 - LTI Models: Observability

Lecture 45 - Linear Control: Introduction

Lecture 46 - Pole Placement Controller

Lecture 47 - Linear Quadratic Regulator: Batch Solution

Lecture 48 - LQR: Dynamic Programming Solution

Lecture 49 - State Estimation: Introduction

Lecture 50 - Stochastic Processes and Random Variables

Lecture 51 - State Estimation: Pole Placement Observer

Lecture 52 - Kalman Filter: Terminology

Lecture 53 - Kalman Filter: Derivation

Lecture 54 - Recap of Modules 7-9

Lecture 55 - Recap and Plan for this week

Lecture 56 - Linear Quadratic Gaussian

Lecture 57 - LQG Derivation and Separation Principle

Lecture 58 - Setpoint Tracking in LQ Control

Lecture 59 - Disturbance Rejection in LQ Control

Lecture 60 - Disturbance Modeling for Estimation

Lecture 61 - Estimation with Disturbance Modeling

Lecture 62 - Recap and Plan for this week

Lecture 63 - State-Space MPC: Deterministic case

Lecture 64 - Extension to Measured Disturbances

Lecture 65 - Offset-Free State Space MPC

Lecture 66 - Comparison of State-Space MPC with DMC

Lecture 67 - State-Space MPC: Disturbance Modeling

Lecture 68 - Disturbance Modeling: Background and Setup

Lecture 69 - Stochastic Output-Feedback State-Space MPC

Lecture 70 - Bonus Video: Disturbance Modeling for State Space MPC

Lecture 71 - Self-Guided Tutorial of MPC Toolbox

Lecture 72 - Help Session: Using MPC Toolbox

Lecture 73 - Recap of LQ Control and Linear MPC

Lecture 74 - Linear MPC - Key Features and Results

Lecture 75 - Practical Issues: Inferential Control

Lecture 76 - Practical Issues: Measurement Delay

Lecture 77 - Other Practical Issues

Lecture 78 - Some Classical Examples of MPC

NPTEL : NOC:Research Methodology (Multi-Disciplinary)

Co-ordinators : Prof. Soumitro Banerjee

Lecture 1 - What is Science? - Part 1

Lecture 2 - What is Science? - Part 2

Lecture 3 - Subjective Thinking Versus Objective Thinking

Lecture 4 - Idealism Versus Materialism

Lecture 5 - Causality - Part 1

Lecture 6 - Causality - Part 2

Lecture 7 - Logical Reasoning: Inductive Logic

Lecture 8 - Logical Reasoning: Deductive Logic - Part 1

Lecture 9 - Logical Reasoning: Deductive Logic - Part 2

Lecture 10 - Logical Reasoning: Syllogistic Logic - Part 1

Lecture 11 - Logical Reasoning: Syllogistic Logic - Part 2

Lecture 12 - Logical Reasoning: Syllogism Logic, Truth and Validity

Lecture 13 - Historical Perspective: Emergence of Materialism and Idealism - Part 1

Lecture 14 - Historical Perspective: Emergence of Materialism and Idealism - Part 2

Lecture 15 - Historical Perspective:Renaissance to the Development of Mechanical Materialism - Part 1

Lecture 16 - Historical Perspective:Renaissance to the Development of Mechanical Materialism - Part 2

Lecture 17 - Historical Perspective: The Advent of Empiricism and the Idea of Evolution

Lecture 18 - Historical Perspective: Science in Ancient India

Lecture 19 - Historical Perspective: The Advent of Scientific Materialism - Part 1

Lecture 20 - Historical Perspective: The Advent of Scientific Materialism - Part 2

Lecture 21 - Historical Perspective: The Rise and Fall of Positivism - Part 1

Lecture 22 - Historical Perspective: The Rise and Fall of Positivism - Part 2

Lecture 23 - What Scientists Actually Do - Part 1

Lecture 24 - What Scientists Actually Do - Part 2

Lecture 25 - Falsifiability and Reproducibility - Part 1

Lecture 26 - Falsifiability and Reproducibility - Part 2

Lecture 27 - Proposing a Hypothesis - Part 1

Lecture 28 - Proposing a Hypothesis - Part 2

Lecture 29 - Elements of Scientific Measurement - Part 1

Lecture 30 - Elements of Scientific Measurement - Part 2

Lecture 31 - The Central Limit Theorem and its Applications - Part 1

Lecture 32 - The Central Limit Theorem and its Applications - Part 2

Lecture 33 - Error Bars and Confidence Interval - Part 1

Lecture 34 - Error Bars and Confidence Interval - Part 2

Lecture 35 - Measurement of a Proportion - Part 1

Lecture 36 - Measurement of a Proportion - Part 2

Lecture 37 - Examples of Proportion Measurement

Lecture 38 - Box and Whisker Plot

Lecture 39 - Propagation of Errors - Part 1

Lecture 40 - Propagation of Errors - Part 2

Lecture 41 - Issues in Hypothesis Testing - Part 1

Lecture 42 - Issues in Hypothesis Testing - Part 2

Lecture 43 - Statistical Methods in Hypothesis Testing: Z-Test and T-Test - Part 1

Lecture 44 - Statistical Methods in Hypothesis Testing: Z-Test and T-Test - Part 2

Lecture 45 - Hypothesis Testing: The Chi-Square Test - Part 1

Lecture 46 - Hypothesis Testing: The Chi-Square Test - Part 2

Lecture 47 - Hypothesis Testing: The Chi-Square Test - Part 3

Lecture 48 - Hypothesis Testing: The Chi-Square Test - Part 4

Lecture 49 - Theoretical Research: Functional Relationships from Experimental Data - Part 1

Lecture 50 - Theoretical Research: Functional Relationships from Experimental Data - Part 2

Lecture 51 - Theoretical Research: Mathematical Models of Physical Systems

Lecture 52 - Order of Magnitude Calculations

Lecture 53 - Theoretical Research: Modeling Using Dimensional Analysis - Part 1

Lecture 54 - Theoretical Research: Modeling Using Dimensional Analysis - Part 2

Lecture 55 - An Example of Mathematical Modeling

Lecture 56 - Importance of Theory-Building in Science

Lecture 57 - Scientific Writing: Journal Papers - Part 1

Lecture 58 - Scientific Writing: Journal Papers - Part 2

Lecture 59 - Scientific Writing: Journal Papers - Part 3

Lecture 60 - Scientific Writing: Journal Papers - Part 4

Lecture 61 - Scientific Writing: PhD Thesis

Lecture 62 - Scientific Writing: Text Stylistics

Lecture 63 - Presentation in Scientific Conferences - Part 1

Lecture 64 - Presentation in Scientific Conferences - Part 2

Lecture 65 - Writing Grant Proposals - Part 1

Lecture 66 - Writing Grant Proposals - Part 2

Lecture 67 - Ethical Conduct in Science: Aspects of Scientific Ethics

Lecture 68 - Ethical Conduct in Science: Research Misconduct

Lecture 69 - Ethical Conduct in Science: Ethics in Scientific Publication - Part 1

Lecture 70 - Ethical Conduct in Science: Ethics in Scientific Publication - Part 2

Lecture 71 - Ethical Conduct in Science: Cases of Scientific Misconduct - Part 1

Lecture 72 - Ethical Conduct in Science: Cases of Scientific Misconduct - Part 2

NPTEL : NOC:Management of Medical Emergencies in Dental Practice (Multi-Disciplinary)

Co-ordinators : Multifaculty

Lecture 1 - Vasovagal Syncope

Lecture 2 - Vasovagal Syncope - Clinical Scenario

Lecture 3 - Postural Hypotension

Lecture 4 - Postural Hypotension - Clinical Scenario

Lecture 5 - Hyperventilation

Lecture 6 - Hyperventilation - Clinical Scenario

Lecture 7 - Asthma - Status Asthmaticus - Part 1

Lecture 8 - Asthma - Status Asthmaticus - Part 2

Lecture 9 - Asthma - Clinical Scenario

Lecture 10 - Chest Pain Of Cardiac Origin - Myocardial Infarction And Anigina Pectoris - Part 1

Lecture 11 - Chest Pain Of Cardiac Origin - Myocardial Infarction And Anigina Pectoris - Part 2

Lecture 12 - Chest Pain - Clinical Scenario

Lecture 13 - Acute Adrenal Insufficiency

Lecture 14 - Acute Adrenal Insufficiency - Clinical Scenario

Lecture 15 - Diabetes Mellitus

Lecture 16 - Diabetes Mellitus - Clinical Scenario

Lecture 17 - Throid Dysfunction

Lecture 18 - Allergies/Hypersensitivity Reaction - Part 1

Lecture 19 - Allergies/Hypersensitivity Reaction - Part 2

Lecture 20 - Epilepsy- Status Epilepticus

Lecture 21 - Chronic Kidney Disease

Lecture 22 - Hepatic Dysfunction

Lecture 23 - Basic Life Support - Part 1

Lecture 24 - Basic Life Support - Part 2

NPTEL : NOC:Basic Course in Ornithology (Multi-Disciplinary)

Co-ordinators : Prof. Mousumi Ghosh, Prof. Manjari Jain, Prof. R Jayapal, Prof. Anand Krishnan, Prof. Suhel Quader, Prof. V.V. Robin, Prof. Umesh Srinivasan

Lecture 1 - Introduction to Ornithology

Lecture 2 - Diversity and Classification - Part 1

Lecture 3 - Diversity and Classification - Part 2

Lecture 4 - Evolution and Speciation - Part 1

Lecture 5 - Evolution and Speciation - Part 2

Lecture 6 - Anatomy

Lecture 7 - Physiology

Lecture 8 - Colour

Lecture 9 - Life History

Lecture 10 - Foraging Behaviour

Lecture 11 - Mating and Breeding Behaviour

Lecture 12 - Social Behaviour

Lecture 13 - Methods of Science and Research Questions

Lecture 14 - Vocal Behaviour: Mechanisms - Part 1

Lecture 15 - Vocal Behaviour: Mechanisms - Part 2

Lecture 16 - Vocal Behaviour: Ecology and Evolution - Part 1

Lecture 17 - Vocal Behaviour: Ecology and Evolution - Part 2

Lecture 18 - Vocal Mimicry in Birds

Lecture 19 - Basics of Research Design

Lecture 20 - Bird Migration - LIVE Guest Lectuer

Lecture 21 - Bird Populations: Concepts

Lecture 22 - Bird Communities: Concepts - Part 1

Lecture 23 - Bird Communities: Concepts - Part 2

Lecture 24 - Interactive Session by Dr Mousumi Ghosh (NCF) and Dr Umesh Srinivasan (IISc)

Lecture 25 - Studying bird populations and communities - Part 1

Lecture 26 - Studying bird populations and communities - Part 2

Lecture 27 - Mixed Species Flocks - Live Session

Lecture 28 - Interactive session with Dr. Priti Bangal (NCF) and Dr. Umesh Srinivasan (IISc)

Lecture 29 - Introduction to Data Visualisation Analysis - Part 1

Lecture 30 - Introduction to Data Visualisation Analysis - Part 2

Lecture 31 - Basic Course in Ornithology - Guest Session on Avian Diseases

Lecture 32 - Biogeography

Lecture 33 - Macroecology

Lecture 34 - Macroecology - Case Study - LIVE

Lecture 35 - Week 10 Interactive session with Dr VV Robin and Dr Umesh Srinivasan

Lecture 36 - Bird Conservation - Concepts

Lecture 37 - Avian Conservation: Case study 1

Lecture 38 - Avian Conservation: Case study 2

Lecture 39 - Avian Conservation: Case study 3

Lecture 40 - Avian Conservation: Case study 4

Lecture 41 - Avian Conservation: Case study 5

Lecture 42 - LIVE - Citizen Science - Guest faculty by Dr Ashwin Viswanathan (NCF)

Lecture 43 - Molecular Techniques - Part 1

Lecture 44 - Molecular Techniques - Part 2

NPTEL : NOC:Oral Biology (Multi-Disciplinary)

Co-ordinators : Multifaculty

Lecture 1 - Craniofacial anatomy - Part 1

Lecture 2 - Craniofacial anatomy - Part 2

Lecture 3 - Tooth and It's Supporting Structures - Part 1

Lecture 4 - Tooth and It's Supporting Structures - Part 2

Lecture 5 - Specialised mucosa

Lecture 6 - Saliva-Composition and functions

Lecture 7 - Saliva Diagnostics

Lecture 8 - Stem cells in the oro-dental region

Lecture 9 - Stem cell isolation

Lecture 10 - Mineralization dynamics - Part 1

Lecture 11 - Mineralization dynamics - Part 2

Lecture 12 - TMJ Anatomy and Function

Lecture 13 - Oral defense mechanisms

Lecture 14 - Mucosal and regional immunology

Lecture 15 - Oral microbiome

Lecture 16 - Evaluation of Oral microbiome

Lecture 17 - Dysbiosis

Lecture 18 - Molecular mechanisms in oral cancer

Lecture 19 - Flow cytometry in cell and molecular biology

Lecture 20 - Basics of Biomaterial science and engineering

Lecture 21 - Biomimetics - Part 1

Lecture 22 - Biomimetics - Part 2

Lecture 23 - Biomaterials - Polymers

Lecture 24 - Biomaterials - Metals

Lecture 25 - Biomaterials - Ceramics and Colloids

Lecture 26 - 3-D Bioprinting

Lecture 27 - Protein mediated biomaterials

Lecture 28 - Immune response to biomaterials

Lecture 29 - Biomaterial Applications

Lecture 30 - Biocompatible assays

Lecture 31 - Immunoassay

NPTEL : NOC:Introduction to Biomimicry (Multi-Disciplinary)

Co-ordinators : Prof. Sivakumar Srinivasan, Prof. Satya Seshadri, Prof. Mrinalini, Prof. Shiva Subramaniam

Lecture 1 - Course overview

Lecture 2 - What is biomimicry ?

Lecture 3 - Why is biomimicry important ?

Lecture 4 - Nature's unifying patterns - Introduction

Lecture 5 - Case study

Lecture 6 - How to do biomimicry ?

Lecture 7 - Learning resources - Biomimicry Institute

Lecture 8 - Skills, attitudes and mindset for a biomimic

Lecture 9 - Course activity

Lecture 10 - Recap of Week 1

Lecture 11 - What are we mimicking ?

Lecture 12 - Function and Strategy

Lecture 13 - Approaches to biomimicry

Lecture 14 - From Problem to Solution

Lecture 15 - Using the UNSDG to identify challenges

Lecture 16 - Recap of Week 2

Lecture 17 - Step 1 - Define the problem

Lecture 18 - Step 2 - Biologize the problem

Lecture 19 - Step 3 - Discover strategies in nature

Lecture 20 - Applying the Biomimicry Design Spiral

Lecture 21 - Step 4 - Abstract design strategies from nature

Lecture 22 - Step 5 - Emulate nature's strategies in your solution

Lecture 23 - Step 6 - Evaluate feasibility

Lecture 24 - How to apply the biomimicry process ?

Lecture 25 - Recap of Week 4

Lecture 26 - Nature's Unifying Patterns I

Lecture 27 - Systems Thinking - Introduction

Lecture 28 - Systems Thinking - Understanding consequences

Lecture 29 - Nature's Unifying Patterns II

Lecture 30 - Tools - Mind mapping

Lecture 31 - Using biomimicry to design a solution

Lecture 32 - Recap of Week 6

Lecture 33 - Developing creative confidence

Lecture 34 - Learning from the biomimicry process

Lecture 35 - The need for creativity in our lives

Lecture 36 - Unlocking your creativity

Lecture 37 - Taking your biomimicry ideas to market

Lecture 38 - The journey so far

Lecture 39 - Finding the hero in you

Lecture 40 - Course wrap-up

NPTEL : NOC:Electrocardiogram - Interpretation and Application in Clinical Practice (Multi-Disciplinary)

Co-ordinators : Multi-faculty

Lecture 1 - Introduction - Electrocardiogram - Interpretation and application in clinical practice

Lecture 2 - Basic Conduction of Heart

Lecture 3 - ECG Lead system

Lecture 4 - Recording of a Standard ECG (Lead placements and measurements)

Lecture 5 - Waveforms, Intervals and Segments

Lecture 6 - Vector Electrocardiography

Lecture 7 - From Action Potentials to Arrhythmias

Lecture 8 - Pathophysiology, Myocardial Ischemia / Injury

Lecture 9 - Myocardial Infarction (MI), Pathophysiology

Lecture 10 - Drug effects on ECG

Lecture 11 - Patient identification, preparation and interpretation of ECG

Lecture 12 - Sinus rhythms and Bradyarrythmias

Lecture 13 - Approach to tachyarrhythmias

Lecture 14 - AV Blocks and Bundle Branch Block

Lecture 15 - Chamber enlargement and Heart Failure

Lecture 16 - Electrolyte Abnormalities on ECG

Lecture 17 - Recognizing signs and ECG changes in Myocardial Ischemia/Injury

Lecture 18 - ECG changes in myocardial infarction

Lecture 19 - Miscellaneous ECG findings and cardiac arrest

Lecture 20 - Pacemaker Rhythms

NPTEL : NOC:One Health (Multi-Disciplinary)

Co-ordinators : Multi Faculty

Lecture 1 - Introduction to the One Health Concept and National and International health/public health agencies

Lecture 2 - Global Health vs One Health

Lecture 3 - Basics of Research Ethics

Lecture 4 - Integrated human and animal disease surveillance systems

Lecture 5 - Emerging infectious diseases

Lecture 6 - Process of disease emergence and assessment of the risk factors

Lecture 7 - Mechanisms of pathogen cross over across species boundaries

Lecture 8 - Importance of disease detection, Identification and monitoring in public health

Lecture 9 - Introduction to disease vectors and basics of Medical Entomology

Lecture 10 - The factors influencing an emerging disease

Lecture 11 - Antimicrobial resistance a global threat and Importance of antibiotic stewardship program

Lecture 12 - Introduction of Food safety and food borne diseases

Lecture 13 - What are zoonotic diseases and its role in our changing world

Lecture 14 - The integration of human, animal and ecosystem health in control and prevention of these diseases

Lecture 15 - Community engagement for zoonotic disease control in humans and animals through One Health

Lecture 16 - Basics of Epidemiological Studies

Lecture 17 - Rapid Response system, Disaster Management and Outbreak Investigation Plans

Lecture 18 - Basic statistical methods and their application and the measurement of disease frequency

Lecture 19 - Principles of survey design and the concepts of sampling and Mixed method research

Lecture 20 - Introduction to health policy

Lecture 21 - Risk Communication and Pandemic Preparedness

Lecture 22 - Role of community in disease control and ways for community engagement

Lecture 23 - Uses of different types of media for communication

NPTEL : NOC:Canning Technology, Value Addition of Seafood (Fish Processing) (Multi-Disciplinary)

Co-ordinators : Dr. Abhilash Sasidharan, Dr. Maya Raman

Lecture 1 - Course overview Canning technology and Value addition of sea food

Lecture 2 - Introduction and the concept of canning technology

Lecture 3 - History of canning technology - Part 1

Lecture 4 - History of canning technology - Part 2

Lecture 5 - Canning Technology and Value Addition Containers and their Properties - Part 1

Lecture 6 - Canning Technology and Value Addition Containers and their Properties - Part 2

Lecture 7 - Canning Technology and Value Addition Containers and their Properties - Part 3

Lecture 8 - Canning Technology and Value Addition Containers and their Properties - Part 4

Lecture 9 - Canning Technology and Value Addition - Canning process - Part 1

Lecture 10 - Canning Technology and Value Addition - Canning process - Part 2

Lecture 11 - Canning Technology and Value Addition - Thermal process calculations - Part 1

Lecture 12 - Canning Technology and Value Addition - Thermal process calculations - Part 2

Lecture 13 - Microbiology and spoilage of canned food - Part 1

Lecture 14 - Microbiology and spoilage of canned food - Part 2

Lecture 15 - Process of seafood canning - Part 1

Lecture 16 - Process of seafood canning - Part 2

Lecture 17 - Seafood pre-processing - Part 1

Lecture 18 - Seafood pre-processing - Part 2

Lecture 19 - Additives - Part 1

Lecture 20 - Additives - Part 2

Lecture 21 - SOP for seafood canning - Part 1

Lecture 22 - SOP for seafood canning - Part 2

Lecture 23 - SOP for seafood canning - Part 3

Lecture 24 - Nutritional quality of seafood

Lecture 25 - Muscle structure of seafood

Lecture 26 - Spoilage in seafood

Lecture 27 - Preservation methods

Lecture 28 - Value addition in thermally processed foods

Lecture 29 - Quality standards for seafood value added products - Part 1

Lecture 30 - Quality standards for seafood value added products - Part 2

Lecture 31 - Quality standards for seafood value added products - Part 3

NPTEL : NOC:Food Packaging Technology (Multi-Disciplinary)

Co-ordinators : Dr. Jenny Ann John, Dr. Maya Raman

Lecture 1 - Course overview

Lecture 2 - Introduction

Lecture 3 - Paper as packaging material - Part 1

Lecture 4 - Paper as packaging material - Part 2

Lecture 5 - Paper as packaging material - Part 3

Lecture 6 - Glass as packaging material

Lecture 7 - Metal as packaging material - Part 1

Lecture 8 - Metal as packaging material - Part 2

Lecture 9 - Plastic as packaging material - Part 1

Lecture 10 - Plastic as packaging material - Part 2

Lecture 11 - Introduction to packaging system

Lecture 12 - Product characteristics and packaging requirements

Lecture 13 - Rigid, semi-rigid, flexible packaging forms - Part 1

Lecture 14 - Rigid, semi-rigid, flexible packaging forms - Part 2

Lecture 15 - Designing of packaging material

Lecture 16 - Testing of packaging material - Part 1

Lecture 17 - Testing of packaging material - Part 2

Lecture 18 - Testing of packaging material - Part 3

Lecture 19 - Testing of packaging material - Part 4

Lecture 20 - Testing of package performance

Lecture 21 - Principles developing safe and protective packing

Lecture 22 - Transport worthiness test - Part 1

Lecture 23 - Transport worthiness test - Part 2

Lecture 24 - Transport worthiness test - Part 3

Lecture 25 - Safety aspects of food packaging

Lecture 26 - Packaging accessories and advances in packaging

Lecture 27 - Active packaging - Part 1

Lecture 28 - Active packaging - Part 2

Lecture 29 - MA and Aseptic packaging

Lecture 30 - Edible packaging - Part 1

Lecture 31 - Edible packaging - Part 2

Lecture 32 - Vacuum packing machine

Lecture 33 - CA and MA packing machine

Lecture 34 - Gas packing machine

Lecture 35 - Seal and shrink packing machine

Lecture 36 - Form fill sealing machine

Lecture 37 - Aseptic packaging systems

Lecture 38 - Retort pouches

Lecture 39 - Bottling machine - Part 1

Lecture 40 - Bottling machine - Part 2

Lecture 41 - Carton making machine

Lecture 42 - Package printing machines - Part 1

Lecture 43 - Package printing machines - Part 2

NPTEL : NOC:Vulnerability Studies: An Introduction (Multi-Disciplinary)

Co-ordinators : Prof. Pramod K Nayar

Lecture 1 - Introduction

Lecture 2 - Fragility

Lecture 3 - Resilience

Lecture 4 - Interpreting Vulnerability, precarity of work and Access Equality for Equal Opportunity - Part I

Lecture 5 - Interpreting Vulnerability, precarity of work and Access Equality for Equal Opportunity - Part II

Lecture 6 - Social Vulnerability and Group Vulnerability

Lecture 7 - Willed Vulnerability - Endurance Sports

Lecture 8 - Illness, Storytelling and Embodiment

Lecture 9 - Illness, Storytelling and Embodiment Reading - Audre Lordeâ€™s : The Cancer Journals

Lecture 10 - Group Discussion - Vulnerable Bodies

Lecture 11 - The Aesthetics of Vulnerability - I

Lecture 12 - The Aesthetics of Vulnerability - II Traumatic Materialism

Lecture 13 - The Aesthetics of Vulnerability - III Melodrama

Lecture 14 - Vulnerability Aesthetics The Sublime

Lecture 15 - The Aesthetics of Vulnerability - Discussion

Lecture 16 - Biopolitics, biopower and vulnerability - I

Lecture 17 - Biopolitics, biopower and vulnerability - II

Lecture 18 - Pandemics and Biopolitics

Lecture 19 - Biopolitics and vulnerable populations in Contemporary Literature

Lecture 20 - Discussion on Biopolitics

Lecture 21 - Ecoprecarity

Lecture 22 - Ecodystopia - I

Lecture 23 - Ecodystopia - II

Lecture 24 - Discussion on Ecoprecarity and Ecodystopias - I

Lecture 25 - Discussion on Ecoprecarity and Ecodystopias - II

Lecture 26 - Aging and Vulnerability in Literature

Lecture 27 - Aging and Vulnerability - 2

Lecture 28 - Aging and Vulnerability - 3

Lecture 29 - Discussion on Vulnerability and Aging - 1

Lecture 30 - Discussion on Vulnerability and Aging - 2

Lecture 31 - Childhood and Vulnerability - 1

Lecture 32 - Childhood and Vulnerability - 2

Lecture 33 - Childhood and Vulnerability - 3

Lecture 34 - Discussion on Childhood and Vulnerability - I

Lecture 35 - Discussion on Childhood and Vulnerability - II

Lecture 36 - Imperial Vulnerability - I

Lecture 37 - Imperial Vulnerability - II

Lecture 38 - Posthuman Vulnerability

Lecture 39 - Contemporary Genres of Resilience - The Graphic Novel - I

Lecture 40 - Contemporary Genres of Resilience - The Graphic Novel - II

NPTEL : NOC:Pulmonary Function Tests - Interpretation and Application in Clinical Practice (Multi-Disciplinary)

Co-ordinators : Multi-Faculty

Lecture 1 - Functional Anatomy of the Respiratory Tract

Lecture 2 - Mechanics of Respiration - Section 1

Lecture 3 - Mechanics of Respiration - Section 2

Lecture 4 - Ventilation, Perfusion Ventilation Perfusion Relationship

Lecture 5 - Essential Principles of Spirometer

Lecture 6 - Types of Pulmonary function tests

Lecture 7 - Obstructive Lung Diseases: Pathophysiology

Lecture 8 - Restrictive lung Diseases: Pathophysiology

Lecture 9 - Drug Effects on Pulmonary Function

Lecture 10 - Lung Disorders in Children

Lecture 11 - Assessment of Lung Functions in Children

Lecture 12 - Static and Dynamic lung function tests

Lecture 13 - Interpretation of Normal Pulmonary Function Tests

Lecture 14 - Indications for Pulmonary Function Testing

Lecture 15 - Obstructive Airway Diseases - Approach

Lecture 16 - Clinical Diagnosis of Restrictive Lung Disease - Part 1

Lecture 17 - Clinical Diagnosis of Restrictive Lung Disease - Part 1

Lecture 18 - Essential Criteria For a Good Pulmonary Function Testing

Lecture 19 - Interpretation of pulmonary function tests in Restrictive lung disease

Lecture 20 - Interpretation of PFT in Obstructive lung diseases

Lecture 21 - Diffusion Capacity of Lungs for Carbon Monoxide DLCO

Lecture 22 - Radiological assessment of obstructive and restrictive lung disorders

Lecture 23 - Laboratory Video - Pulmonary Function tests - Interpretation and application in clinical practice

NPTEL : NOC:Making Learning Engaging Through Interactive Games (Multi-Disciplinary)

Co-ordinators : Prof. Kartic Vaidyanathan

Lecture 1 - Need for interactive gamified learning

Lecture 2 - Learnings from the Master Class titled Confessions of a Converted Lectuer by Prof Eric Mazur

Lecture 3 - Understanding Play and its context in learning in 21st century

Lecture 4 - Benefits of Game Based Learning Scientific Evidences

Lecture 5 - Learning Stoichiometry calculations using board game Case Study

Lecture 6 - Benefits of Game Based Learning across age groups and subjects

Lecture 7 - Benefits of Puzzle Games

Lecture 8 - Game Based Learning Adoption by Countries Overview

Lecture 9 - Yu Kai Chow Psychology of gamification

Lecture 10 - Board Card Game Activity Game Sources

Lecture 11 - Board Card Game Mechanics Across Subjects - Part 1

Lecture 12 - Board Card Game Mechanics Across Subjects - Part 2

Lecture 13 - Growth Mindset Card Game Game Play of UNO adaptation

Lecture 14 - How Play Game Mechanics Enhance Learning in the UNO Game

Lecture 15 - Tools for bulding Board Card Games Snake and Ladder

Lecture 16 - Sample Games Created Inspired by Snake and Ladder Mechanics

Lecture 17 - Sample Card Games Created Across Subjects and Different Mechanics by Students

Lecture 18 - Tools for building Bingo Games

Lecture 19 - Puzzle Game Design Tools

Lecture 20 - Mentimeter

Lecture 21 - Quizizz

Lecture 22 - Wordwall

Lecture 23 - GIMKIT - Part 1

Lecture 24 - GIMKIT - Part 2

Lecture 25 - Raptivity Digital Tool Demo

Lecture 26 - Example scenarios of student and faculty created digital games across topic

Lecture 27 - Dr. Preeti AghalayamÃ¢'s - Experience narration with interactive games

Lecture 28 - Interview with Dr. Anuradha Prashant

Lecture 29 - Interview with Dr. Ankur Gera and her faculty team

Lecture 30 - Interview with Dr. GK SuraishKumar

Lecture 31 - Interview with Dr. Jacey Lynn Minoi

Lecture 32 - Interview with Dr. Kirupa Priyadarshini

Lecture 33 - Dave Eng Interviews Prof. Silviana Falcon Who has Written Lectuers and Play

NPTEL : NOC:Intellectual Property Portfolio Management (Multi-Disciplinary)

Co-ordinators : Prof. Rajat Agrawal

Lecture 1 - Understanding Basics

Lecture 2 - Types of IPR and Their Applications

Lecture 3 - Innovation and Intellectual Property

Lecture 4 - Understanding Various Portfolios

Lecture 5 - International and National Scenario of IP

Lecture 6 - Patent Filing Strategies

Lecture 7 - Patent Filing

Lecture 8 - Country Selection for Patent Filing in Foreign Countries

Lecture 9 - International Filing - 1

Lecture 10 - International Filing - 2

Lecture 11 - Ranking Based Tier Strategies

Lecture 12 - Centralization of Patent Renewals and Translations

Lecture 13 - Budgeting for Patent Portfolio

Lecture 14 - Monitoring Based Countermeasures

Lecture 15 - General Cost Saving Measures

Lecture 16 - Various IP Strategies (Patent)

Lecture 17 - Various IP Strategies (Trademark, Copyright, Trade secret)

Lecture 18 - Understanding Elements of IP Strategies

Lecture 19 - IP Valuation Strategy

Lecture 20 - IP SWOT (Strength, Weaknesses, Opportunities, Threats) Analysis

Lecture 21 - Generations of Innovation

Lecture 22 - Idea Generation

Lecture 23 - Innovation Management

Lecture 24 - Innovation Management System ISO 56000

Lecture 25 - Strategies to Protect Innovation

Lecture 26 - Ensuring Quality and Extracting Values from the Patent Portfolio

Lecture 27 - International Patent Classification (IPC) System

Lecture 28 - Patent Landscape

Lecture 29 - Patent Infringement

Lecture 30 - PATENTSCOPE Search System

Lecture 31 - IP Incubating

Lecture 32 - IP Accounting

Lecture 33 - IP Commercialization

Lecture 34 - IP and Taxation

Lecture 35 - Lean IP Management

Lecture 36 - National IP Strategies

Lecture 37 - Significance of IP Audit

Lecture 38 - IP and SDGs

Lecture 39 - IP Enforcement

Lecture 40 - Case Studies

NPTEL : NOC:Teaching and Learning in Engineering (TALE) (Multi-Disciplinary)

Co-ordinators : Prof. N.J. Rao

Lecture 1 - Overview of TALE and Good Engineer

Lecture 2 - Education and Teaching

Lecture 3 - Learning, Instruction and Assessment

Lecture 4 - What is OBE?

Lecture 5 - Accreditation

Lecture 6 - Outcomes

Lecture 7 - Program Outcomes - 1

Lecture 8 - Program Outcomes - 2

Lecture 9 - Taxonomy of Learning

Lecture 10 - Cognitive Levels

Lecture 11 - General Categories of Knowledge

Lecture 12 - Metacognitive Knowledge

Lecture 13 - Vincenti Categories of Engineering Knowledge

Lecture 14 - Affective and Psychomotor Domains

Lecture 15 - Taxonomy Table

Lecture 16 - Course Outcomes - 1

Lecture 17 - Course Outcomes - 2

Lecture 18 - Course Outcomes - POs and PSOs

Lecture 19 - Attainment of COs

Lecture 20 - Attainment of POs and PSOs

NPTEL : NOC:Teaching and Learning in General Programs (Multi-Disciplinary)

Co-ordinators : Prof. N.J. Rao

Lecture 1 - Teaching and Learning in General Programs (TALG)

Lecture 2 - Education and Teaching

Lecture 3 - Learning, Assessment and Instruction

Lecture 4 - Outcome Based Education (OBE)

Lecture 5 - Accreditation

Lecture 6 - Program Outcomes

Lecture 7 - POs and PSOs

Lecture 8 - Taxonomy of Learning: Cognitive Levels - 1

Lecture 9 - Taxonomy of Learning: Cognitive Levels - 2

Lecture 10 - Taxonomy of Learning: Knowledge Categories

Lecture 11 - Taxonomy of Learning: Metacognitive Knowledge

Lecture 12 - Affective Domain

Lecture 13 - Psychomotor Domain

Lecture 14 - Taxonomy Tables

Lecture 15 - Course Outcomes - 1

Lecture 16 - Course Outcomes - 2

Lecture 17 - Tagging the Course Outcomes

Lecture 18 - Attainment of Course Outcomes

Lecture 19 - Attainment of POs and PSOs

NPTEL : NOC:TALE 2 - Course Design and Instruction of Engineering Courses (Multi-Disciplinary)

Co-ordinators : Prof K Rajani Kanth

Lecture 1 - Engineering Programs, NBA Accreditation and Engineering Courses

Lecture 2 - Course Design

Lecture 3 - ISD and ADDIE

Lecture 4 - Analysis Phase - 1

Lecture 5 - Analysis Phase - 2

Lecture 6 - Design Phase

Lecture 7 - Technology and Targets

Lecture 8 - Assessment Pattern and Assessment Instruments

Lecture 9 - Item Banks

Lecture 10 - Development Phase

Lecture 11 - Instruction Material and Learning Material

Lecture 12 - Implement Phase - 1

Lecture 13 - Implement Phase - 2

Lecture 14 - Evaluate Phase

Lecture 15 - Course Exit Survey

Lecture 16 - Evaluating Laboratories and Electives

Lecture 17 - Exit Surveys for Projects

Lecture 18 - Summary Feedback

Lecture 19 - Instruction: An Overview

Lecture 20 - Instructional Situations

Lecture 21 - How Brains Learn - 1

Lecture 22 - How Brains Learn - 2

Lecture 23 - How Brains Learn - 3

Lecture 24 - Instructional Components - 1

Lecture 25 - Instructional Components - 2

Lecture 26 - Merrillâ€™s Principles of Learning

Lecture 27 - ID based on Merrillâ€™s Principles

Lecture 28 - Direct Approach to Instruction

Lecture 29 - Project Based Approach to Instruction

Lecture 30 - Problem Based Approach to Instruction

Lecture 31 - Experiential Approach to Instruction

Lecture 32 - Simulation Approach to Instruction

Lecture 33 - Instruction for Design

Lecture 34 - Instruction for Metacognitive Learning

Lecture 35 - So, what should a teacher do?

NPTEL : NOC:NBA Accreditation and Teaching Learning in Engineering (NATE) (Multi-Disciplinary)

Co-ordinators : Prof. N J Rao, Prof. K. Rajanikanth

Lecture 1 - NATE

Lecture 2 - NBA Accreditation

Lecture 3 - Outcome Based Education

Lecture 4 - Self Assessment Report

Lecture 5 - Education, Teaching, Learning, Instruction, and Assessment

Lecture 6 - PEOs and POs (1-5)

Lecture 7 - POs (6-9)

Lecture 8 - POs (10-12)

Lecture 9 - PSOs

Lecture 10 - Taxonomy of Learning

Lecture 11 - Cognitive Processes - 1

Lecture 12 - Cognitive Processes - 2

Lecture 13 - Categories of Knowledge - 1

Lecture 14 - Categories of Knowledge - 2

Lecture 15 - Taxonomy Table

Lecture 16 - Affective and Psychomotor Domains

Lecture 17 - Course Outcomes - 1

Lecture 18 - Course Outcomes - 2

Lecture 19 - Tagging Course Outcomes

Lecture 20 - Computing Attainment of COs

Lecture 21 - Computing PO and PSO Attainment

Lecture 22 - Course Design Component of Teaching as per Finkâ€™s Model

Lecture 23 - ISD and ADDIE Models

Lecture 24 - ADDIE - Analysis Phase 1

Lecture 25 - ADDIE - Analysis Phase 2

Lecture 26 - ADDIE - Design Phase

Lecture 27 - Technology for Assessment; Setting Targets

Lecture 28 - Assessment Plan and Assessment Instruments

Lecture 29 - Item Banks

Lecture 30 - ADDIE- Development Phase

Lecture 31 - ADDIE - Implement Phase 1

Lecture 32 - ADDIE - Implement Phase 2

Lecture 33 - Exit Surveys - 1

Lecture 34 - Exit Surveys - 2

Lecture 35 - ADDIE - Evaluate Phase

Lecture 36 - Instruction An Overview

Lecture 37 - Instructional Situations

Lecture 38 - How Brains Learn

Lecture 39 - Instructional Components

Lecture 40 - Principles of Instruction Design

Lecture 41 - Direct Instruction - 1

Lecture 42 - Direct Instruction - 2

Lecture 43 - Project Based Approach to Instruction

Lecture 44 - Problem Based Approach to Instruction

Lecture 45 - Instruction for Design thinking

Lecture 46 - Simulation Approach to Instruction

Lecture 47 - Instruction for Metacognitive Learning

Lecture 48 - So, What Should the teacher do?

Lecture 49 - NBA Criterion 1 Vision, Mission, PEOs - 1

Lecture 50 - NBA Criterion 1 Vision, Mission, PEOs - 2

Lecture 51 - NBA Criterion 2 Teaching-Learning Processes - 1

Lecture 52 - NBA Criterion 2 Teaching-Learning Processes - 2

Lecture 53 - NBA Criterion 3 COs and POs - 1

Lecture 54 - NBA Criterion 3 COs and POs - 2

Lecture 55 - NBA Criterion 4 Students' Performance

Lecture 56 - NBA Criterion 5 Faculty Information and Contributions

Lecture 57 - NBA Criterion 6 Facilities and Technical Support

Lecture 58 - NBA Criterion 7 Continuous Improvement

Lecture 59 - NBA Criterion 8 First Year Academics

Lecture 60 - NBA Criterion 9 Student Support Systems

Lecture 61 - NBA Criterion 10 Governance, Institutional Support and Financial Resources

Lecture 62 - Summary

NPTEL : Nano structured materials-synthesis, properties, self assembly and applications (Nanotechnology)

Co-ordinators : Prof. A.K. Ganguli

Lecture 1 - Introduction to Nanotechnology

Lecture 2 - Introduction to Nanotechnology (Continued...)

Lecture 3 - Synthetic Methodologies

Lecture 4 - Synthetic Methodologies (Continued...)

Lecture 5 - Synthetic Methodologies (Continued...)

Lecture 6 - Synthetic Methodologies (Continued...)

Lecture 7 - Synthetic Methodologies (Continued...)

Lecture 8 - Synthetic Methodologies (Continued...)

Lecture 9 - Template Methods - I

Lecture 10 - Template Methods - II

Lecture 11 - Spray Pyrolysis

Lecture 12 - V-L-S Method

Lecture 13 - Lithography - I

Lecture 14 - Lithography - II

Lecture 15 - Fullerences and Carbon Nanotubes - I

Lecture 16 - Fullerences and Carbon Nanotubes - II

Lecture 17 - Fullerences and Carbon Nanotubes - III

Lecture 18 - Metal and Metal Oxide Nanowires - I

Lecture 19 - Metal and Metal Oxide Nanowires - II

Lecture 20 - Metal and Metal Oxide Nanowires - III

Lecture 21 - Self Assembly of Nanostructures - I

Lecture 22 - Self Assembly of Nanostructures - II

Lecture 23 - Self Assembly of Nanostructures - III

Lecture 24 - Core Shell Nanostructures - I

Lecture 25 - Core Shell Nanostructures - II

Lecture 26 - Core Shell Nanostructures - III

Lecture 27 - Nanocomposites - I

Lecture 28 - Nanocomposites - II

Lecture 29 - Photocatalysis - I

Lecture 30 - Photocatalysis - II

Lecture 31 - Photocatalysis - III

Lecture 32 - Dielectric Properties - I

Lecture 33 - Dielectric Properties - II

Lecture 34 - Magnetic Properties - I

Lecture 35 - Magnetic Properties - II

Lecture 36 - Magnetic Properties - III

Lecture 37 - Optical Properties - I

Lecture 38 - Optical Properties - II

Lecture 39 - Mechanical Properties

Lecture 40 - Concluding Lecture

NPTEL : Nanostructures and Nanomaterials: Characterization and Properties (Nanotechnology)

Co-ordinators : Dr. Anandh Subramaniam, Dr. Kantesh Balani

Lecture 1 - Introduction to Nanomaterials

Lecture 2 - Introduction to Nanomaterials

Lecture 3 - Introduction to Nanomaterials

Lecture 4 - Introduction to Nanomaterials

Lecture 5 - Introduction to Nanomaterials

Lecture 6 - Introduction to Nanomaterials

Lecture 7 - Introduction to Nanomaterials

Lecture 8 - Introduction to Nanomaterials

Lecture 9 - Introduction to Nanomaterials

Lecture 10 - Introduction to Nanomaterials

Lecture 11 - Surface Effects and Physical properties of nanomaterials

Lecture 12 - Surface Effects and Physical properties of nanomaterials

Lecture 13 - Surface Effects and Physical properties of nanomaterials

Lecture 14 - Surface Effects and Physical properties of nanomaterials

Lecture 15 - Surface Effects and Physical properties of nanomaterials

Lecture 16 - Defect Structure & Mechanical Behaviour of Nanomaterials

Lecture 17 - Defect Structure & Mechanical Behaviour of Nanomaterials

Lecture 18 - Defect Structure & Mechanical Behaviour of Nanomaterials

Lecture 19 - Defect Structure & Mechanical Behaviour of Nanomaterials

Lecture 20 - Defect Structure & Mechanical Behaviour of Nanomaterials

Lecture 21 - Electrical, Magnetic and Optical Properties of Nanomaterials

Lecture 22 - Electrical, Magnetic and Optical Properties of Nanomaterials

Lecture 23 - Electrical, Magnetic and Optical Properties of Nanomaterials

Lecture 24 - Electrical, Magnetic and Optical Properties of Nanomaterials

Lecture 25 - Electrical, Magnetic and Optical Properties of Nanomaterials

Lecture 26 - Atomic Bonding

Lecture 27 - Overview of Nano structures and Nano materials

Lecture 28 - Carbon Nanostructures

Lecture 29 - Multi-Scale Hierarchy

Lecture 30 - Self Assembly

Lecture 31 - Nanomaterials in Nature: Bone

Lecture 32 - Surfaces and Interfaces

Lecture 33 - Non-wetting

Lecture 34 - Nanomaterials Science and Nanomanufacturing

Lecture 35 - Surface Adsorption Isotherms (Langmuir/Bet)

Lecture 36 - Reciprocal Lattice

Lecture 37 - Transmission Electron Microscopy

Lecture 38 - Transmission Electron Microscopy

Lecture 39 - Auger Electron Spectroscopy

Lecture 40 - X-Ray Photoelectron Spectroscopy (XPS)

Lecture 41 - Electron Energy Loss Spectroscopy (EELS)

Lecture 42 - Deformation Behavior of Nanomaterials

Lecture 43 - Fracture and Creep

Lecture 44 - Nanomechanics

Lecture 45 - Nanotribology

NPTEL : Elements of Ocean Engineering (Ocean Engineering)

Co-ordinators : Dr. Ashoke Bhar

Lecture 1 - Introduction

Lecture 2 - Physical Oceanography - I

Lecture 3 - Physical Oceanography - II

Lecture 4 - Physical Oceanography - III

Lecture 5 - Physical Oceanography - IV

Lecture 6 - Sediments & Open Ocean

Lecture 7 - Open Ocean - I

Lecture 8 - Open Ocean - II

Lecture 9 - Physical Properties of Water

Lecture 10 - Water and Waves

Lecture 11 - Waves - I

Lecture 12 - Waves - II

Lecture 13 - Waves - III

Lecture 14 - Introduction to Offshore Structures - I

Lecture 15 - Introduction to Offshore Structures - II

Lecture 16 - Waves - IV

Lecture 17 - The Wave Spectra

Lecture 18 - The Wave Spectra (Continued...1)

Lecture 19 - The Wave Spectra (Continued...2)

Lecture 20 - Offshore Structures - I

Lecture 21 - Offshore Structures - II

Lecture 22 - Offshore Structures - III

Lecture 23 - Floating Offshore Structures

Lecture 24 - Drilling from Platforms

Lecture 25 - Drilling and Topsides

Lecture 26 - Topsides

Lecture 27 - Mooring Systems

Lecture 28 - Mooring Systems (Continued...1)

Lecture 29 - Static Analysis of Mooring Cable

Lecture 30 - Static Analysis of Mooring Cable (Continued...)

Lecture 31 - Mooring Systems (Continued...2)

Lecture 32 - Mooring Systems (Continued...3)

Lecture 33 - Mooring Systems (Continued...4)

Lecture 34 - Mooring Systems (Continued...5)

Lecture 35 - Mooring Systems (Continued...6)

Lecture 36 - Fixed Offshore Structures

Lecture 37 - Fixed Offshore Structures (Continued...)

Lecture 38 - Structural Analysis of Jacket Platforms

Lecture 39 - Structural Analysis of Jacket Platforms (Continued...1)

Lecture 40 - Structural Analysis of Jacket Platforms (Continued...2)

Lecture 41 - Jacket Pile Selection

Lecture 42 - Jacket Pile Selection (Continued...1)

Lecture 43 - Jacket Pile Selection (Continued...2)

Lecture 44 - Floating Platform Design

Lecture 45 - Semi-Submersibles

Lecture 46 - Semi-Submersibles & TLPs

Lecture 47 - Tension Leg Platform

Lecture 48 - Tension Leg Platform (Continued...)

Lecture 49 - SPAR Platform

NPTEL : Hydrostatics and Stability (Ocean Engineering)

Co-ordinators : Dr. Hari V. Warrior

Lecture 1 - Introduction

Lecture 2 - Archimedes Principle

Lecture 3 - Archimedes Principle (Continued...)

Lecture 4 - Numerical Integration

Lecture 5 - Problems in Stability - I

Lecture 6 - Problems in Stability - II

Lecture 7 - Problems in Stability - III

Lecture 8 - Problems in Integration

Lecture 9 - Free Surface Effect

Lecture 10 - Inclining Experiment

Lecture 11 - Hydrostatic Curves - I

Lecture 12 - Hydrostatic Curves - II

Lecture 13 - Stability Curve

Lecture 14 - Dynamical Stability - I

Lecture 15 - Dynamical Stability - II

Lecture 16 - Healing Moment - I

Lecture 17 - Healing Moment - II

Lecture 18 - Healing Moment - III

Lecture 19 - Dynamical Stability - III

Lecture 20 - Discussion

Lecture 21 - Righting Stability - I

Lecture 22 - Righting Stability - II

Lecture 23 - Trim Calculations - I

Lecture 24 - Trim Calculations - II

Lecture 25 - Trim Stability - I

Lecture 26 - Trim Stability - II

Lecture 27 - Dry Docking - I

Lecture 28 - Dry Docking - II

Lecture 29 - Bilging - I

Lecture 30 - Bilging - II

Lecture 31 - Bilging - III

Lecture 32 - Bilging - IV

Lecture 33 - Safety Regulations

Lecture 34 - Safety Regulations (Continued...)

Lecture 35 - Safety Regulations (Continued...)

Lecture 36 - Ship Stability on Waves

Lecture 37 - Ship Stability on Waves (Continued...)

Lecture 38 - Ship Stability on Waves (Continued...)

Lecture 39 - Wave Theory

Lecture 40 - Conclusion

NPTEL : Marine Construction and Welding (Ocean Engineering)

Co-ordinators : Prof. N.R. Mandal

Lecture 1 - Introduction to ships & offshore structures

Lecture 2 - Characteristics of shipbuilding industry

Lecture 3 - Structural Requirement

Lecture 4 - Basic Structural Components

Lecture 5 - Structural Subassemblies

Lecture 6 - Bulkheads

Lecture 7 - Decks & Shells

Lecture 8 - Structural Assemblies Double Bottom Construction

Lecture 9 - Wing Tanks & Duct Keels

Lecture 10 - Fore & Altend Construction

Lecture 11 - General Cargo Carrier

Lecture 12 - Bulk Carrier

Lecture 13 - Structural Details

Lecture 14 - Container Ship

Lecture 15 - RO-RO Ship

Lecture 16 - Oil Tanker

Lecture 17 - Structural Alignment & Continuity

Lecture 18 - Steel Material Preparation

Lecture 19 - Shot Blasting

Lecture 20 - Acid Pickling

Lecture 21 - Plate Cutting

Lecture 22 - Plate & Section Forming - I

Lecture 23 - Plate & Section Forming - II

Lecture 24 - Line Heating

Lecture 25 - Fusion Welding & Power Source

Lecture 26 - Welding Parameters & their Effects

Lecture 27 - Welding Methods

Lecture 28 - Shielded Metal Arc Welding

Lecture 29 - Gas Metal Arc Welding - I

Lecture 30 - Gas Metal Arc Welding - II

Lecture 31 - Gas Tungsten Arc Welding

Lecture 32 - Submerged Arc Welding

Lecture 33 - Electroslag Welding

Lecture 34 - Electrogas Welding

Lecture 35 - Friction Stir Welding

Lecture 36 - FSW Metallurgy

Lecture 37 - Welding Defects & NDT

Lecture 38 - Welding Distortions

Lecture 39 - Distortion Mechanism & Types of Distortion

Lecture 40 - Distortion Control & Mitigation

Lecture 41 - Welding Sequence

NPTEL : Marine Hydrodynamics (Ocean Engineering)

Co-ordinators : Dr. T. Sahoo

Lecture 1 - Introduction to Marine Hydrodynamics

Lecture 2 - Law of Conservation of Mass - Continuity of Equation

Lecture 3 - Streamlines and Flow Direction

Lecture 4 - Worked Examples on Various Types of Flow

Lecture 5 - Equation of Motion (Law of Conservation of Momentum)

Lecture 6 - Applications of Equations of Motion

Lecture 7 - Applications of Equations of Motion (Continued...)

Lecture 8 - Two Dimensional Flows

Lecture 9 - Two Dimensional Flows (Continued...)

Lecture 10 - Source, Sink and Doublet

Lecture 11 - Worked Examples on Two Dimensional Flows

Lecture 12 - Conformal Mapping and Joukowsky Transformation

Lecture 13 - Uniform Flow Past an Elliptic Cylinder

Lecture 14 - Aerofoil theory

Lecture 15 - Aerofoil theory (Continued...)

Lecture 16 - Aerofoil theory (Continued...)

Lecture 17 - Schwarz - Christoffel Transformation

Lecture 18 - Motion of a cylinder

Lecture 19 - Vertex Motion

Lecture 20 - Irrotational Flow - A Bird's eyeview

Lecture 21 - Introduction to Water Waves

Lecture 22 - Basic Equation and Conditions of Water Waves

Lecture 23 - Water particle kinematics in wave motion

Lecture 24 - Capillary Gravity Waves

Lecture 25 - Linearised Long Wave Equation

Lecture 26 - Linearised Long Wave Equation (Continued...)

Lecture 27 - Wave motion in two layer fluids

Lecture 28 - Worked Examples on Wave Motion

Lecture 29 - Worked Examples on Wave Motion (Continued...)

Lecture 30 - Gravity wave transformation and energy rotation

Lecture 31 - Gravity wave transformation and energy rotation (Continued...)

Lecture 32 - Gravity wave transformation and energy rotation (Continued...)

Lecture 33 - Navier - Stokes equation of motion

Lecture 34 - Analysis of Basic Flow Problems

Lecture 35 - Analysis of Basic Flow Problems (Continued...)

Lecture 36 - Unsteady unidirectional flows

Lecture 37 - Unsteady unidirectional flows (Continued...)

Lecture 38 - An introduction to Boundary Layer Theory

Lecture 39 - Solution methods for Boundary Layer Equations

Lecture 40 - Solutions Methods for Boundary Layer Equations (Continued...)

NPTEL : Seakeeping and Manoeuvring (Ocean Engineering)

Co-ordinators : Prof. Debabrata Sen

Lecture 1 - Regular Water Waves - I

Lecture 2 - Regular Water Waves - II

Lecture 3 - Definition of Ship Motions & Encounter Frequency

Lecture 4 - Single Degree of Freedom Motions in Regular Waves

Lecture 5 - Uncoupled Heave, Pitch and Roll - I

Lecture 6 - Uncoupled Heave, Pitch and Roll - II

Lecture 7 - Uncoupled Heave, Pitch and Roll - III

Lecture 8 - Uncoupled Heave, Pitch and Roll - IV

Lecture 9 - Uncoupled Heave, Pitch and Roll - V

Lecture 10 - Coupled Motions

Lecture 11 - Irregular Waves

Lecture 12 - Description of Irregular Waves by Spectrum

Lecture 13 - Theoretical Wave Spectrum

Lecture 14 - Ship Motion in Irregular Waves - I

Lecture 15 - Ship Motion in Irregular Waves - II

Lecture 16 - Ship Motion in Irregular Waves - III

Lecture 17 - Description of Short-Crested Sea

Lecture 18 - Motions in Short-Crested Sea

Lecture 19 - Derived Responses & Dynamic Effects - I

Lecture 20 - Derived Responses & Dynamic Effects - II

Lecture 21 - Derived Responses & Dynamic Effects - III

Lecture 22 - Seakeeping Considerations in Design

Lecture 23 - Manoeuvring: Introduction & Basic Equations

Lecture 24 - Dynamic Equations of Motion - I

Lecture 25 - Dynamic Equations of Motion - II

Lecture 26 - Hydrodynamic Derivatives

Lecture 27 - Controls-Fixed Stability

Lecture 28 - Stability & Cotrollability: Definitive Manoeuvres

Lecture 29 - Definitive Manoeuvres - I

Lecture 30 - Definitive Manoeuvres - II

Lecture 31 - Definitive Manoeuvres - III

Lecture 32 - Non-linear Equations of Motion

Lecture 33 - Non-linear Equations & Model Tests

Lecture 34 - Captive Model Tests and Experimental Determination of Hydrodynamic Derivatives

Lecture 35 - PMM Tests - I

Lecture 36 - PMM Tests - II

Lecture 37 - Rudder & Control Surfaces - I

Lecture 38 - Rudder & Control Surfaces - II

Lecture 39 - Theoretical Determination of Hydrodynamic Derivatives - I

Lecture 40 - Theoretical Determination of Hydrodynamic Derivatives - II

NPTEL : Applied Thermodynamics for Marine Systems (Ocean Engineering)

Co-ordinators : Prof. P.K. Das

Lecture 1 - Introduction & Some Definitions

Lecture 2 - First Law of Thermodynamics (Closed System)

Lecture 3 - First Law of Thermodynamics (Open System)

Lecture 4 - Second Law of Thermodynamics

Lecture 5 - Second Law and Carnot Principle

Lecture 6 - Property of Pure Substance, Steam Table

Lecture 7 - Ideal Gas Laws, Different Processes

Lecture 8 - Introduction to Vapour Power Cycle

Lecture 9 - Vapour Power Cycle

Lecture 10 - Steam Power Cycle, Steam Nozzle

Lecture 11 - Basic Concept of Turbine, Velocity Diagram

Lecture 12 - Steam Turbine-Impulse

Lecture 13 - Reaction Turbine Compounding

Lecture 14 - Comparison of Different Staging Arrangement

Lecture 15 - Basics Laws of Fluid Mechanics

Lecture 16 - Pipe Friction, Major Loss, Minor Loss

Lecture 17 - Pipeline & Pipe Network

Lecture 18 - Refrigeration Vapour Compression Cycle

Lecture 19 - Psychometrics

Lecture 20 - Psychometrics (Continued...)

Lecture 21 - Psychometric Processes

Lecture 22 - Psychometric Processes (Continued...), Air Conditioning

Lecture 23 - Summer & Winter Air Conditioning

Lecture 24 - Gas Power Cycles, Cycles for IC Engines

Lecture 25 - Gas Turbine Cycles

Lecture 26 - Modification of Brayton Cycle

Lecture 27 - Introduction to Convective Heat Transfer Forced & Free Convection

NPTEL : Performance of Marine Vehicles at Sea (Ocean Engineering)

Co-ordinators : Prof. Debabrata Sen, Prof. S.C. Misra

Lecture 1 - Components of Resistance - I

Lecture 2 - Components of Resistance - II

Lecture 3 - Dimensional Analysis

Lecture 4 - Frictional Resistance

Lecture 5 - Wave Making Resistance

Lecture 6 - Other Components of Resistance

Lecture 7 - Model Experiments

Lecture 8 - Shallow Water Effects

Lecture 9 - Ship hull form and Resistance

Lecture 10 - Propeller Geometry - Part I

Lecture 11 - Propeller Geometry - Part II

Lecture 12 - Introduction to High Speed Crafts - Part I

Lecture 13 - Introduction to High Speed Crafts - Part II

Lecture 14 - Propeller in Open Water - Part I

Lecture 15 - Propeller in Open Water - Part II

Lecture 16 - Propeller 'behind' a ship

Lecture 17 - Propeller experiments

Lecture 18 - Propeller theories - Part I

Lecture 19 - Propeller Theories

Lecture 20 - Cavitation

Lecture 21 - Regular Sea Waves - I

Lecture 22 - Regular Sea Waves - II

Lecture 23 - Irregular sea Waves - I

Lecture 24 - Irregular Sea Waves - II

Lecture 25 - Ship Motion in Regular Waves - I

Lecture 26 - Ship Motion in Regular Waves - II

Lecture 27 - Ship Motion in Regular Waves - III

Lecture 28 - Ship Motion in irregular Waves - I

Lecture 29 - Ship Motion in irregular Waves - II

Lecture 30 - Ship Motion in irregular Waves - III

Lecture 31 - Motion in Short Crested Sea,Coupled Motions

Lecture 32 - Derived Responses

Lecture 33 - Ship Controllability : Introductory Notes

Lecture 34 - Equation of Motion in Horizontal Plane

Lecture 35 - Hydrodynamic Derivatives and Stability

Lecture 36 - Hydrodynamic Derivatives and Stability

Lecture 37 - Ship Trials and Maneuvers - I

Lecture 38 - Ship Trials and Maneuvers - II

Lecture 39 - Heel During Turn, IMO Requirements

Lecture 40 - Rudder Hydrodynamics

NPTEL : Strength and Vibration of Marine Structures (Ocean Engineering)

Co-ordinators : Prof. S.K. Satsangi, Prof. A.H. Sheikh

Lecture 1 - Introduction to Ship Structures - I

Lecture 2 - Introduction to Ship Structures - II

Lecture 3 - Deflection of Structure Beam - I

Lecture 4 - Deflection of Structure Beam - II

Lecture 5 - Deflection of Structure Beam - III

Lecture 6 - Deflection of Structure Beam - IV

Lecture 7 - Statically Indeterminate Structures - I

Lecture 8 - Statically Indeterminate Structures - II

Lecture 9 - Statically Indeterminate Structures - III

Lecture 10 - Statically Indeterminate Structures - IV

Lecture 11 - Statically Indeterminate Structures - V

Lecture 12 - Statically Indeterminate Structures - VI

Lecture 13 - Longitudinal Bending of Hull Girder - I

Lecture 14 - Longitudinal Bending of Hull Girder - II

Lecture 15 - Longitudinal Bending of Hull Grider - III

Lecture 16 - Theory of Column - I

Lecture 17 - Theory of Column - II

Lecture 18 - Theory of Column - III

Lecture 19 - Theory of Column - IV

Lecture 20 - Calculation of Momentum of Inertia of Main Section

Lecture 21 - Bending in Inclined Condition

Lecture 22 - Calculation of Deflection/Shear Stress

Lecture 23 - Ship Vibration - I

Lecture 24 - Ship Vibration - II

Lecture 25 - Ship Vibration - III

Lecture 26 - Ship Vibration - IV

Lecture 27 - Ship Vibration - V

Lecture 28 - Propeller Induced Vibration & Hull Frequency Estimation

Lecture 29 - Hull Frequency Estimation from Basic Group (Continued...)

Lecture 30 - Analysis of Bulkhead - I

Lecture 31 - Analysis of Bulkhead - II

Lecture 32 - Stress Concentration/Structural Discontinuities

Lecture 33 - Composite Construction

Lecture 34 - Method of Plastic Analysis

Lecture 35 - Calculation of Natural Frequency of Hull Girder

Lecture 36 - Hull Resonance Diagram

NPTEL : NOC:Water Economics and Governance (Ocean Engineering)

Co-ordinators : Prof. Manoj Kumar Tiwari

Lecture 1 - Introduction

Lecture 2 - Global Water Availability and Uses

Lecture 3 - Water Availability and Uses in India

Lecture 4 - Surface Water and Ground Water Resources

Lecture 5 - Water Use Practices and Major Challenges

Lecture 6 - Background to Water Rights

Lecture 7 - Water Rights

Lecture 8 - Right to Sanitation

Lecture 9 - Rights to Water and Sanitation - Underline Principals and Implementation

Lecture 10 - Water Rights : Challenges

Lecture 11 - Water Sustainability : Basic Concept

Lecture 12 - The Dublin Statement on Water Sustainability

Lecture 13 - Action Agenda in the Dublin Statement on Water Sustainability

Lecture 14 - Water Sustainability : Viewpoints

Lecture 15 - Water Sustainability : Conflicts

Lecture 16 - Valuing Water : Economic Value of Water

Lecture 17 - Valuing Water : Use and Non-Use Values

Lecture 18 - Valuing Water : Valuation of Water

Lecture 19 - Valuing Water : Water Valuation Methods

Lecture 20 - Valuing Water : Full Value and Losses

Lecture 21 - Pricing Water : Sustainable Water Pricing

Lecture 22 - Pricing Water : Setting Water Tariffs

Lecture 23 - Pricing Water : Water Tariff Models

Lecture 24 - Pricing Water : Water Tariff Models

Lecture 25 - Pricing Water : Water Tariff Models

Lecture 26 - Water Pricing : Need of Reforms

Lecture 27 - Conflicts in Water Pricing

Lecture 28 - Conflicts in Water Pricing

Lecture 29 - Conflicts in Water Pricing

Lecture 30 - Water Pricing Case Studies

Lecture 31 - Economics of Water Projects

Lecture 32 - Economics of Water Projects : Economic Analysis

Lecture 33 - Economics of Water Projects : Financial Analysis

Lecture 34 - Economics of Water Projects : Benefit-Cost Analysis

Lecture 35 - Economics of Demand and Sectoral Allocation

Lecture 36 - Economics Evaluation of Water Projects

Lecture 37 - Evaluation of Water Projects : Capital Budgeting Methods

Lecture 38 - Evaluation of Water Projects : Capital Budgeting Methods

Lecture 39 - Evaluation of Water Projects : Capital Budgeting Methods

Lecture 40 - Evaluation of Water Projects : Capital Budgeting Methods

Lecture 41 - Evaluation of Water Projects : Selection of Capital Budgeting Methods (Continued...)

Lecture 42 - Evaluation of Water Projects : Selection of Capital Budgeting Methods (Continued...)

Lecture 43 - Water Governance

Lecture 44 - Elements, Dimensions and Principles of Water Governance

Lecture 45 - Principles of Water Governance

Lecture 46 - Principles of Water Governance and Effective Water Governance Schemes

Lecture 47 - Effective Water Governance Schemes and its Benchmarking

Lecture 48 - Decision Making and Implementation in Water Governance and its Benchmarking

Lecture 49 - Water Governance in India : Historical Perspective

Lecture 50 - Water Governance in India : Pre- and Post- Independent

Lecture 51 - Water Governance in India : Water Programmes and Policies

Lecture 52 - Water Governance in India : Water Programmes and Policies (Continued...)

Lecture 53 - Water Governance in India : Environmental Protection and Water Reforms

Lecture 54 - Water Dispute Management : Water Conflicts

Lecture 55 - Water Dispute Management : Interstate and Interstate Water Disputes

Lecture 56 - Water Dispute Management : Interstate Water Dispute Resolution

Lecture 57 - Water Dispute Management : Case Studies

Lecture 58 - Global Water Diplomacy : Trans-boundary Water

Lecture 59 - Global Water Diplomacy : Conflict Vs Cooperation

Lecture 60 - Global Water Diplomacy : Cooperation for Water

Lecture 61 - Course Summary

Lecture 62 - Course Summary (Continued...)

Lecture 63 - Live Session-1

Lecture 64 - Live Session-2

Lecture 65 - Live Session-2 (April 20, 2018)

NPTEL : NOC:Marine Propulsion (Ocean Engineering)

Co-ordinators : Prof. Anirban Bhattacharyya

Lecture 1 - Introduction

Lecture 2 - Propeller Geometry

Lecture 3 - Propeller Geometry (Continued...)

Lecture 4 - Propeller Theory - I

Lecture 5 - Propeller Theory - II

Lecture 6 - Propeller Theory - III

Lecture 7 - Propeller Theory - IV

Lecture 8 - Propeller Theory - V

Lecture 9 - Propeller Theory - VI

Lecture 10 - Propeller Theory - VII

Lecture 11 - Propeller in Open Water

Lecture 12 - Dimensional Analysis and Similarity

Lecture 13 - Propeller Open Water Characteristics

Lecture 14 - Propeller Open Water Characteristics (Continued...)

Lecture 15 - Methodical Propeller Series

Lecture 16 - Hull-Propeller Interaction

Lecture 17 - Hull-Propeller Interaction (Continued...)

Lecture 18 - Ship Powering and Efficiency Components

Lecture 19 - Engine-Propeller Matching - Part I

Lecture 20 - Engine-Propeller Matching - Part II

Lecture 21 - Propeller Model Tests - Part I

Lecture 22 - Propeller Model Tests - Part II

Lecture 23 - Propeller Model Tests - Part III

Lecture 24 - Propeller Cavitation - Part I

Lecture 25 - Propeller Cavitation - Part II

Lecture 26 - Propeller Strength - Part I

Lecture 27 - Propeller Strength - Part II

Lecture 28 - Propeller Design - Part I

Lecture 29 - Propeller Design - Part II

Lecture 30 - Propeller Design - Part III

Lecture 31 - Controllable Pitch Propeller

Lecture 32 - Ducted Propeller

Lecture 33 - Ducted Propeller (Continued...)

Lecture 34 - Problems on Propeller Performance

Lecture 35 - Surface Piercing Propeller, Podded Propeller, Thruster

Lecture 36 - Waterjet Propulsion

Lecture 37 - Unconventional Propulsors

Lecture 38 - Unconventional Propulsors (Continued...)

Lecture 39 - Miscellaneous Topics

Lecture 40 - Energy Saving Devices

NPTEL : NOC:Numerical Ship and Offshore Hydrodynamics (Ocean Engineering)

Co-ordinators : Prof. Ranadev Datta

Lecture 1 - Introduction

Lecture 2 - Introduction to Seakeeping - 1

Lecture 3 - Introduction to Seakeeping - 2

Lecture 4 - Seakeeping - 3

Lecture 5 - Seakeeping - 4

Lecture 6 - Seakeeping - 5

Lecture 7 - Seakeeping - 6

Lecture 8 - Seakeeping - 7

Lecture 9 - Hydrodynamics - 1

Lecture 10 - Hydrodynamics - 2

Lecture 11 - Wave and Wave Effect

Lecture 12 - Waves - 2

Lecture 13 - Waves - 3

Lecture 14 - Introduction to BEM

Lecture 15 - Introduction to BEM (Continued...)

Lecture 16 - Lower Order Panel Method

Lecture 17 - Lower Order Panel Method (Continued...)

Lecture 18 - Case Study - Part 1

Lecture 19 - Case Study - Part 2

Lecture 20 - Demonstration of Panel Method Code

Lecture 21 - Frequency Domain Panel Method

Lecture 22 - Frequency Domain Panel Method (Continued...)

Lecture 23 - Frequency Domain Panel Method (Continued...)

Lecture 24 - Frequency Domain Panel Method (Continued...)

Lecture 25 - Frequency Domain Panel Method (Continued...)

Lecture 26 - Frequency Domain Panel Method (Continued...)

Lecture 27 - Frequency Domain Panel Method (Continued...)

Lecture 28 - Frequency Domain Panel Method (Continued...)

Lecture 29 - Cummins Equation

Lecture 30 - IRF Based Solution - Part 1

Lecture 31 - IRF Based Solution - Part 2

Lecture 32 - Time Domain Solution Using IRF

Lecture 33 - Time Domain Solution Using IRF (Continued...)

Lecture 34 - Numerical Computation of IRF Based Method

Lecture 35 - Numerical Computation of IRF Based Method (Continued...)

Lecture 36 - Forward Speed Effects

Lecture 37 - Strip Theory - Part 1

Lecture 38 - Strip Theory - Part 2

Lecture 39 - Strip Theory - Part 3

Lecture 40 - Strip Theory - Part 4

Lecture 41 - Strip Theory - Part 5

Lecture 42 - Strip Theory - Part 6

Lecture 43 - Strip Theory - Part 7

Lecture 44 - Time Domain Panel Method

Lecture 45 - Time Domain Panel Method (Continued...)

Lecture 46 - Time Domain Panel Method (Continued...)

Lecture 47 - Time Domain Panel Method (Continued...)

Lecture 48 - Time Domain Panel Method (Continued...)

Lecture 49 - Non Linear Time Domain Panel Method

Lecture 50 - Non Linear Time Domain Panel Method (Continued...)

Lecture 51 - Time Domain Panel Method - Code Development

Lecture 52 - Ship Hydroelasticity

Lecture 53 - Hydroelasticity

Lecture 54 - Hydroelasticity (Continued...)

Lecture 55 - Hydroelasticity (Continued...)

Lecture 56 - Semi Analytic Method

Lecture 57 - Semi Analytic Method (Continued...)

Lecture 58 - Including Non linear Forces in BEM Code

Lecture 59 - Including Non linear Forces in BEM Code (Continued...)

Lecture 60 - Closer

NPTEL : Design of Offshore Structures (Ocean Engineering)

Co-ordinators : Dr. S. Nallayarasu

Lecture 1 - Loads On Offshore Structures - 1

Lecture 2 - Loads On Offshore Structures - 2

Lecture 3 - Loads On Offshore Structures - 3

Lecture 4 - Loads On Offshore Structures - 4

Lecture 5 - Loads On Offshore Structures - 5

Lecture 6 - Loads On Offshore Structures - 6

Lecture 7 - Loads On Offshore Structures - 7

Lecture 8 - Concepts of Fixed Offshore Platform Deck and Jacket - 1

Lecture 9 - Concepts of Fixed Offshore Platform Deck and Jacket - 2

Lecture 10 - Concepts of Fixed Offshore Platform Deck and Jacket - 3

Lecture 11 - Concepts of Fixed Offshore Platform Deck and Jacket - 4

Lecture 12 - Concepts of Fixed Offshore Platform Deck and Jacket - 5

Lecture 13 - Steel Tubular Member Design - 1

Lecture 14 - Steel Tubular Member Design - 2

Lecture 15 - Steel Tubular Member Design - 3

Lecture 16 - Steel Tubular Member Design - 4

Lecture 17 - Steel Tubular Member Design - 5

Lecture 18 - Tubular Joint Design for Static and Cyclic Loads - 1

Lecture 19 - Tubular Joint Design for Static and Cyclic Loads - 2

Lecture 20 - Tubular Joint Design for Static and Cyclic Loads - 3

Lecture 21 - Tubular Joint Design for Static and Cyclic Loads - 4

Lecture 22 - Tubular Joint Design for Static and Cyclic Loads - 5

Lecture 23 - Tubular Joint Design for Static and Cyclic Loads - 6

Lecture 24 - Tubular Joint Design for Static and Cyclic Loads - 7

Lecture 25 - Tubular Joint Design for Static and Cyclic Loads - 8

Lecture 26 - Tubular Joint Design for Static and Cyclic Loads - 9

Lecture 27 - Tubular Joint Design for Static and Cyclic Loads - 10

Lecture 28 - Tubular Joint Design for Static and Cyclic Loads - 11

Lecture 29 - Tubular Joint Design for Static and Cyclic Loads - 12

Lecture 30 - Jackup RIGS-Analysis and Design - 1

Lecture 31 - Jackup RIGS-Analysis and Design - 2

Lecture 32 - Jackup RIGS-Analysis and Design - 3

Lecture 33 - Jackup RIGS-Analysis and Design - 4

Lecture 34 - Jackup RIGS-Analysis and Design - 5

Lecture 35 - Design Against Accidental Loads - 1

Lecture 36 - Design Against Accidental Loads - 2

Lecture 37 - Design Against Accidental Loads - 3

Lecture 38 - Design Against Accidental Loads - 4

Lecture 39 - Design Against Accidental Loads - 5

Lecture 40 - Design Against Accidental Loads - 6

Lecture 41 - Design Against Accidental Loads - 7

Lecture 42 - Design Against Accidental Loads - 8

NPTEL : Foundation for Offshore Structures (Ocean Engineering)

Co-ordinators : Dr. S. Nallayarasu

Lecture 1 - Basics of Soil Mechanics - I

Lecture 2 - Basics of Soil Mechanics - II

Lecture 3 - Basics of Soil Mechanics - III

Lecture 4 - Basics of Soil Mechanics - IV

Lecture 5 - Basics of Soil Mechanics - V

Lecture 6 - Basics of Soil Mechanics - VI

Lecture 7 - Basics of Soil Mechanics - VII

Lecture 8 - Bearing Capacity of Foundations - I

Lecture 9 - Bearing Capacity of Foundations - II

Lecture 10 - Pile Foundation - I

Lecture 11 - Pile Foundation - II

Lecture 12 - Pile Foundation - III

Lecture 13 - Pile Foundation - IV

Lecture 14 - Pile Foundation - V

Lecture 15 - Pile Foundation - VI

Lecture 16 - Pile Installation - I

Lecture 17 - Pile Installation - II

Lecture 18 - Pile Driveability Analysis - I

Lecture 19 - Pile Driveability Analysis - II

Lecture 20 - Pile Driveability Analysis - III

Lecture 21 - Pile Driveability Analysis - IV

Lecture 22 - Pile Driveability Analysis - V

Lecture 23 - Onbottom Stability of Jackets - I

Lecture 24 - Onbottom Stability of Jackets - II

Lecture 25 - Pile Load Test - I

Lecture 26 - Pile Load Test - II

Lecture 27 - Pile Load Test - III

Lecture 28 - Special Topics

Lecture 29 - Special Foundations - I

Lecture 30 - Special Foundations - II

Lecture 31 - Special Foundations - III

Lecture 32 - Pile Group Effects

Lecture 33 - Two Pile Group Effect For Axial Load

NPTEL : Health,Safety and Environmental Management in Petroleum and Offshore Engineering (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction and Terminologies

Lecture 2 - Introduction to HSE

Lecture 3 - Safety assurance and assessment

Lecture 4 - Safety assurance and assessment (Continued...)

Lecture 5 - Safety in design and operations

Lecture 6 - Organizing for safety

Lecture 7 - Hazard classification and assessment, Hazard evaluation and hazard control

Lecture 8 - HaZOP

Lecture 9 - HaZOP (Continued...)

Lecture 10 - Hazard evaluation and hazard control

Lecture 11 - Hazard Identification and Management in Oil & Gas Industry using HAZOP

Lecture 12 - FMEA

Lecture 13 - FMEA (Continued...)

Lecture 14 - Environmental Issues and Management

Lecture 15 - Impact of Oil and Gas Industry on Marine Environment

Lecture 16 - Oil Hydrocarbon in Marine Environment

Lecture 17 - Chemicals and Wastes from Offshore and Oil Industry

Lecture 18 - Dispersion Models â€“ Atmospheric Pollution

Lecture 19 - Atmospheric Pollution (Continued...)

Lecture 20 - Hazard Assessment and Accident Scenario

Lecture 21 - Dose Assessment, Safety Regulation

Lecture 22 - Toxic Release and Dispersion Modeling

Lecture 23 - Chemical Exposure Index (CEI)

Lecture 24 - Chemical Exposure Index (Continued.)

Lecture 25 - Quantitative Risk Assessment

Lecture 26 - Quantitative Risk Assessment (Liquid Release Models Case Study - Continued...)

Lecture 27 - Fire and Explosion Modeling

Lecture 28 - Fire and Explosion Modeling Flammability Diagrams

Lecture 29 - Explosion Modeling

Lecture 30 - Fire and Explosion Preventive Measures

Lecture 31 - Probabilistic Risk Analysis

Lecture 32 - Safety Measures in Design and Process Operations

Lecture 33 - Case Studies

Lecture 34 - Case Studies (Continued...)

Lecture 35 - Software Used in HSE â€“ an Over View

NPTEL : Port and Harbour Structures (Ocean Engineering)

Co-ordinators : Prof. R. Sundaravadivelu

Lecture 1 - Layout of ports

Lecture 2 - Continuation of layout of ports

Lecture 3 - Visakhapatnam port

Lecture 4 - Ships and size of ships

Lecture 5 - Port planning

Lecture 6 - Harbour layout

Lecture 7 - Site characteristics & navigation channel

Lecture 8 - Bathymetric survey

Lecture 9 - Tide, surge, tsunami and wave

Lecture 10 - Wave rose diagram

Lecture 11 - Breakwater

Lecture 12 - Design of breakwater - Part-1

Lecture 13 - Design of breakwater - Part-2

Lecture 14 - Berm breakwater

Lecture 15 - Dredging & methods of disposal

Lecture 16 - Berthing structures modelling

Lecture 17 - Berthing structures - analyses

Lecture 18 - Loads

Lecture 19 - Types of berthing structures

Lecture 20 - Design of berthing, structures-1

Lecture 21 - Design of offshore berthing, structures-1

Lecture 22 - Estimation of mooring, berthing and seismic forces

Lecture 23 - Estimation seismic forces

Lecture 24 - Active and passive earth pressure and differential water pressure

Lecture 25 - Load combinations and design

Lecture 26 - Fenders

Lecture 27 - Mechanical handling system

Lecture 28 - Single buoy mooring and open sea jetty - Part 1

Lecture 29 - Single buoy mooring and open sea jetty - Part 2

Lecture 30 - Slipway, drydock,floating dock, shiplift

Lecture 31 - Soil structure interaction

Lecture 32 - Calulation of fixity depth

Lecture 33 - Pile load test

Lecture 34 - Ground improvement techniques

Lecture 35 - Analysis of pile with spring support

Lecture 36 - UPV,Half cell potential, Low high Integrity Test

Lecture 37 - Mooring Dolphin at KPT

Lecture 38 - Coastal structures and environmental management

Lecture 39 - BOQ and Cost Estimate

Lecture 40 - Proposed Mega Terminal Chennai

Lecture 41 - Preliminary Project Report on Shipyard

Lecture 42 - Procedures & clearances before implementation of a project

Lecture 43 - Detailed project report

Lecture 44 - Environmental studies of a project

Lecture 45 - Design of pile

Lecture 46 - Design and construction of diaphragm wall

Lecture 47 - Emprical relationship between spt and several soil properties

Lecture 48 - Model studies for a deep water port_case study

NPTEL : Ship Resistance and Propulsion (Ocean Engineering)

Co-ordinators : Dr. P. Krishnankutty, Prof. V. Anantha Subramanian

Lecture 1 - Syllabus and Introduction

Lecture 2 - Seaway Effects on Resistance

Lecture 3 - Ship Types and Powering Aspects

Lecture 4 - Frictional Resistance and Turbulence Stimulation

Lecture 5 - Wave Making Resistance

Lecture 6 - Bulbous Bow on Ship Resistance

Lecture 7 - Air and Wind Resistance Dimensional Analysis - I

Lecture 8 - Dimensional Analysis - II, Model Tests and Ship Resistance Prediction Methods - I

Lecture 9 - Model Tests and Ship Resistance Prediction Methods - II

Lecture 10 - Model Tests and Ship Resistance Prediction Methods - III

Lecture 11 - Resistance in Shallow Water

Lecture 12 - Canal Effects on Resistance Holtrap-Mennen Method for Ship Resistance Prediction

Lecture 13 - Ship Resistance Prediction Methods - I

Lecture 14 - Ship Resistance Prediction Methods - II

Lecture 15 - Resistance of Advanced Marine Vehicles - I

Lecture 16 - Resistance of Advanced Marine Vehicles - II

Lecture 17 - Resistance of Advanced Marine Vehicles - III

NPTEL : Coastal Engineering (Ocean Engineering)

Co-ordinators : Prof. V. Sundar

Lecture 1 - Wave deformation - I

Lecture 2 - Wave deformation - II

Lecture 3 - wave deformation (problems - I)

Lecture 4 - wave deformation (problems - II)

Lecture 5 - wave deformation (problems - III)

Lecture 6 - Sediment charecteristics - I

Lecture 7 - Sediment charecteristics - II

Lecture 8 - Radiation stresses - I

Lecture 9 - Radiation stresses - II

Lecture 10 - Longshore sediment transport - I

Lecture 11 - Longshore sediment transport - II

Lecture 12 - Longshore sediment transport (problems - I)

Lecture 13 - Longshore sediment transport (problems - II)

Lecture 14 - Coastal erosion protection measures - I

Lecture 15 - Coastal erosion protection measures - II

Lecture 16 - Coastal erosion protection measures - III

Lecture 17 - Coastal erosion protection measures - IV

Lecture 18 - Coastal erosion protection measures - V

Lecture 19 - Coastal erosion protection measures - VI

Lecture 20 - Coastal erosion protection measures - VII

Lecture 21 - Coastal erosion protection measures - VIII

Lecture 22 - Coastal erosion protection measures - IX

Lecture 23 - Coastal erosion protection measures - X

Lecture 24 - Cheaper CEP methods - XI

Lecture 25 - Geosynthetics - I

Lecture 26 - Geosynthetics - II

Lecture 27 - Breakwaters - I

Lecture 28 - Breakwaters - II

Lecture 29 - Breakwaters - III

Lecture 30 - Breakwaters - IV

Lecture 31 - Forces on coastal structures - I

Lecture 32 - Forces on coastal structures - II

Lecture 33 - Scour under marine structures

Lecture 34 - Physical modelling of coastal structures - I

Lecture 35 - Physical modelling of coastal structures - II

Lecture 36 - Tsunami - I

Lecture 37 - Tsunami - II

NPTEL : Wave Hydrodynamics (Ocean Engineering)

Co-ordinators : Prof. V. Sundar

Lecture 1 - Basic Fluid Dynamics - I

Lecture 2 - Basic Fluid Dynamics - II

Lecture 3 - Introduction

Lecture 4 - Wave Motion - I

Lecture 5 - Wave Motion - II

Lecture 6 - Wave Motion - III

Lecture 7 - Wave Motion Problems

Lecture 8 - Standing Wave Theory

Lecture 9 - Wave Deformation - I

Lecture 10 - Wave Deformation - II

Lecture 11 - Wave Deformation and Problems

Lecture 12 - Random Waves

Lecture 13 - Random Waves and Problems - I

Lecture 14 - Random Waves and Problems - II

Lecture 15 - Random Waves and Problems - III

Lecture 16 - Simulation of Random Waves

Lecture 17 - Directional waves

Lecture 18 - Wave Loads on Structures - I

Lecture 19 - Wave Loads on Structures - II

Lecture 20 - Wave Loads on Structures and Problems - I

Lecture 21 - Wave Loads on Structures and Problems - II

Lecture 22 - Wave loads on Large Boides

Lecture 23 - Finite Amplitude Wave Theories

Lecture 24 - Hydrodynamic Testing Facility

Lecture 25 - Hydrodynamic Testing Facility at IITM

NPTEL : Ocean Structures and Materials (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction and objectives

Lecture 2 - Fixed type offshore structures

Lecture 3 - Compliant type offshore structures - I

Lecture 4 - Compliant type offshore structures - II

Lecture 5 - Drill ships and basics of drilling

Lecture 6 - Subsea production systems

Lecture 7 - Environmental loads - I

Lecture 8 - Environmental loads - II

Lecture 9 - Types of coastal structures - I

Lecture 10 - Types of coastal structures - II

Lecture 11 - Summary of coastal structures

Lecture 12 - Tutorials on Module - I

Lecture 13 - Outline of planning of ocean structures

Lecture 14 - Introduction to design

Lecture 15 - Construction techniques

Lecture 16 - Dredging - I

Lecture 17 - Dredging - II

Lecture 18 - Uncertainties in analysis and design

Lecture 19 - Design adequacy - Example I

Lecture 20 - Design adequacy - Example II

Lecture 21 - Dredging equipments' specifications

Lecture 22 - Ocean Pollution

Lecture 23 - Foundation and sea bed anchors

Lecture 24 - Introduction to materials - I

Lecture 25 - Introduction to materials - II

Lecture 26 - Concrete in marine environment

Lecture 27 - Concrete: problems and solutions

Lecture 28 - Repair materials for marine structures

Lecture 29 - Corrosion in concrete - I

Lecture 30 - Corrosion in concrete - II

Lecture 31 - Material sin repair and rehabilitation

Lecture 32 - Materials for special repair

Lecture 33 - New materials for coastal embankments - I

Lecture 34 - New materials for coastal embankments - II

Lecture 35 - Non-destructive testing

Lecture 36 - Structural health monitoring

Lecture 37 - Wireless sensor networking

Lecture 38 - Repair and rehabilitation-Fenders

NPTEL : Dynamics of Ocean Structures (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction to different types of ocean structures - I

Lecture 2 - Introduction to different types of ocean structures - II

Lecture 3 - Introduction to different types of ocean structures - III

Lecture 4 - Types of Compliant towers

Lecture 5 - New Generation offshore and Coastal structures

Lecture 6 - Environmental forces

Lecture 7 - Wave forces, Current

Lecture 8 - Introduction to Structural dynamics

Lecture 9 - Characteristics of single degree - of - freedom model

Lecture 10 - Methods of writing equation of motion

Lecture 11 - Free and forced vibration of single degree - of - freedom systems

Lecture 12 - Undamped and damped systems - I

Lecture 13 - Undamped and damped systems - II

Lecture 14 - Undamped and damped systems - III

Lecture 15 - Comparison of methods

Lecture 16 - Examples

Lecture 17 - Numerical problems in single degree - of - freedom systems

Lecture 18 - Two degrees - of - freedom systems

Lecture 19 - Eigenvalues and Eigenvectors

Lecture 20 - Orthogonality of modes

Lecture 21 - Study of Multi degrees - of - freedom systems

Lecture 22 - Equations of motion

Lecture 23 - Natural frequencies and mode shapes

Lecture 24 - Stodla, Rayleigh - Ritz and influence coefficient methods, Dunkerley

Lecture 25 - Continuous system

Lecture 26 - Structural action of offshore structures

Lecture 27 - Fluid - Structure interaction - I

Lecture 28 - Fluid - Structure interaction - II Dynamic analysis of offshore jacket platforms

Lecture 29 - Steps of analysis using software

Lecture 30 - Steps of analysis using software (Continued...)

Lecture 31 - Dynamic analysis of articulated towers

Lecture 32 - Iterative frequency domain - I

Lecture 33 - Iterative frequency domain - II

Lecture 34 - Multi - legged articulated towers

Lecture 35 - Response control of multi-legged articulated towers using tuned mass dampers Experimental and analytical studies on MLAT

Lecture 36 - Development of Tension Leg Platforms and geometric optimization

Lecture 37 - Dynamic analyses of TLPs

Lecture 38 - Development of Mass, stiffness and damping matrices of TLP from first principles

Lecture 39 - Estimate of classical damping

Lecture 40 - TLPs under seismic excitation

Lecture 41 - Direct Integration method

Lecture 42 - Development of new generation offshore structures

Lecture 43 - Introduction to stochastic dynamics of ocean structures

Lecture 44 - Response spectrum

Lecture 45 - Narrow band process

Lecture 46 - Return period, Fatigue prediction

Lecture 47 - Modal response method, Modal mass contribution

Lecture 48 - Missing mass correction, Example problems

Lecture 49 - Duhamel's integral

NPTEL : Advanced Marine Structures (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction and Scope

Lecture 2 - Fixed type structures

Lecture 3 - Compliant type structures

Lecture 4 - New generation marine structures

Lecture 5 - Environmental loads - I

Lecture 6 - Environmental loads - II

Lecture 7 - Environmental loads - III

Lecture 8 - Environmental loads - IV

Lecture 9 - Other loads - I

Lecture 10 - Other loads - II

Lecture 11 - Ultimate load design principles - I

Lecture 12 - Ultimate Limit State - I

Lecture 13 - Ultimate Limit State - II

Lecture 14 - Ultimate Limit State - III

Lecture 15 - Partial safety factor

Lecture 16 - Plastic design - I

Lecture 17 - Plastic design - II

Lecture 18 - Plastic design - III

Lecture 19 - Plastic design - IV - Example problems - I

Lecture 20 - Plastic analysis - Example problems - II

Lecture 21 - Plastic analysis - Example problems - III

Lecture 22 - Theories of failure - I

Lecture 23 - Theories of failure - II

Lecture 24 - Theories of failure - III

Lecture 25 - Theories of failure - IV

Lecture 26 - Shear centre - I

Lecture 27 - Shear centre - II - Examples

Lecture 28 - Plastic capacity of sections under combined loads - I

Lecture 29 - Plastic capacity of sections under combined loads - II

Lecture 30 - Impact analysis- fundamentals - I

Lecture 31 - Impact analysis- fundamentals - II

Lecture 32 - Ultimate capacity of tubular joints

Lecture 33 - Fluid structure interaction - I

Lecture 34 - Fluid structure interaction - II

Lecture 35 - Fluid induced vibration - I

Lecture 36 - Fluid induced vibration - II

Lecture 37 - Flow through perforated members - I

Lecture 38 - Flow through perforated members - numerical studies - II

Lecture 39 - Flow through perforated members - III - Analytical studies

Lecture 40 - Introduction to Reliability - I

Lecture 41 - Introduction to Reliability - II

Lecture 42 - Introduction to Reliability - III

Lecture 43 - Reliability framework in Marine structures

Lecture 44 - Ultimate Limit state and Reliability approach - I

Lecture 45 - Ultimate limit state and Reliability approach - II

Lecture 46 - Levels of Reliability

Lecture 47 - FOSM and AFOSM methods of Reliability

Lecture 48 - Fracture and Fatigue

Lecture 49 - Fatigue failure

Lecture 50 - Fatigue loading and fatigue analysis

Lecture 51 - Deterministic fatigue analysis

Lecture 52 - Spectral fatigue analysis

Lecture 53 - Stress concentration and fatigue analysis

NPTEL : NOC:Dynamics of Ocean Structures (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction to Offshore structures

Lecture 2 - Introduction to Offshore structures (Continued...)

Lecture 3 - Environmental Loads

Lecture 4 - Structural action of Ocean structures

Lecture 5 - Single Degree of Freedom

Lecture 6 - Equations of Motion

Lecture 7 - Free Vibration of SDOF systems

Lecture 8 - Damped and Undamped Forced Vibration

Lecture 9 - Damped Forced Vibration

Lecture 10 - Response building

Lecture 11 - Numerical Example (SDOF)

Lecture 12 - Numerical Example II

Lecture 13 - Numerical Example

Lecture 14 - Numerical Example - MDOF

Lecture 15 - Numerical Example - Eigen value problems

Lecture 16 - Orthogonality of modes - MDOF system models

Lecture 17 - Numerical Methods for MDOF systems

Lecture 18 - Influence Coefficient Method - MDOF

Lecture 19 - STODLA Method - MDOF

Lecture 20 - Stodla Method - Examples

Lecture 21 - Rayleighs Method

Lecture 22 - Modal Response Analysis for MDOF

Lecture 23 - Rayleigh Damping

Lecture 24 - Caughey Damping

Lecture 25 - Damping Matrix by Super Positioning Method

Lecture 26 - Duhamels Integral

Lecture 27 - Modal superposition and truncation

Lecture 28 - Modal participation and missing mass corrections

Lecture 29 - Fluid Structure Interaction

Lecture 30 - Fluid Structure Interaction - II

Lecture 31 - Retrofitting and Rehabilitation - Application through Dynamics

Lecture 32 - Drag and Earthquake Forces

Lecture 33 - Articulated Towers

Lecture 34 - Fluid Structure Interaction Application in Ocean Structure

Lecture 35 - Response Control of Compliant Structures (MLAT)

Lecture 36 - MLATs with Passive Dampers

Lecture 37 - Tension Leg Platforms

Lecture 38 - Tension Leg Platforms - II

Lecture 39 - Fluid Structure Interaction.

Lecture 40 - Dynamic Analysis of TLPs under Springing and Ringing Waves

Lecture 41 - Numerical Integration

Lecture 42 - Dynamic Analysis of Offshore Triceratops

Lecture 43 - Stochastic Process

Lecture 44 - Stochastic Process (Continued...)

Lecture 45 - Response Spectrum - I

Lecture 46 - Response Spectrum - II

Lecture 47 - Return Period and Fatigue Damage

NPTEL : NOC:Health, Safety and Environmental Management in Offshore and Petroleum Engineering (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

Lecture 30

Lecture 31

Lecture 32

Lecture 33

Lecture 34

Lecture 35

Lecture 36

Lecture 37

NPTEL : NOC:Risk and Reliability of offshore structures (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction

Lecture 2 - Uncertainties

Lecture 3 - Uncertainties - II

Lecture 4 - Probability and Plausibility

Lecture 5 - Rules of Probability

Lecture 6 - Plausible Reasoning - I

Lecture 7 - Plausible Reasoning - Quantitative rules

Lecture 8 - Quantitative Rules

Lecture 9 - Probability Distribution

Lecture 10 - Random Variables

Lecture 11 - Random Variables - II

Lecture 12 - Sampling Estimates

Lecture 13 - Modelling of Environmental Loads

Lecture 14 - Exercises - I

Lecture 15 - Introduction

Lecture 16 - Components of Reliability analysis

Lecture 17 - Levels of Reliability

Lecture 18 - Error Estimation

Lecture 19 - Reliability methods - I

Lecture 20 - Reliability methods - II

Lecture 21 - Reliability methods - III

Lecture 22 - Reliability methods - IV

Lecture 23 - System Reliability - I

Lecture 24 - System Reliability - II

Lecture 25 - System Reliability - III

Lecture 26 - Failure domains

Lecture 27 - Failure domains II

Lecture 28 - Application Problem - I

Lecture 29 - Application Problem - I (Continued...)

Lecture 30 - Application Problem II

Lecture 31 - Application Problem II (Continued...)

Lecture 32 - Application Problem II (Continued...)

Lecture 33 - Risk and Reliability

Lecture 34 - Reliability analysis of structural systems

Lecture 35 - Codes on structural reliability

Lecture 36 - Variables in Reliability analysis

Lecture 37 - Mechanical models in Reliability analysis

Lecture 38 - Mechanical modes in Reliability analysis - II

Lecture 39 - Stochastic Process - I

Lecture 40 - Stochastic Process - II

Lecture 41 - Fatigue Reliability

Lecture 42 - Design SN curve

Lecture 43 - Simplified Fatigue Assessment

Lecture 44 - Short term fatigue damage

Lecture 45 - Behaviour of tubular joints

Lecture 46 - Tubular Joints - Experimental studies on T-Joints

Lecture 47 - Risk Assessment

Lecture 48 - Logical Risk analysis

Lecture 49 - Risk analysis of Mechanical Systems

Lecture 50 - FMEA II

Lecture 51 - Design FMEA for Offshore Triceratops

Lecture 52 - Fault Tree Analysis

Lecture 53 - Event Tree Analysis

Lecture 54 - Consequence Analysis

Lecture 55 - Risk Acceptability

Lecture 56 - Risk and Hazard assessment

Lecture 57 - Risk Picture

Lecture 58 - Risk Management

NPTEL : NOC:HSE for offshore and petroleum engineers-Practices (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction

Lecture 2 - Drilling Operation and Consequences

Lecture 3 - Drilling Accidents

Lecture 4 - Oil Spills

Lecture 5 - Ecological Monitoring

Lecture 6 - Pollution Modeling - I

Lecture 7 - Pollution Modeling - II

Lecture 8 - Pollution Modeling - III

Lecture 9 - Hazard Management

Lecture 10 - Introduction

Lecture 11 - HSE Practices

Lecture 12 - Lessons learnt from accidents

Lecture 13 - HSE guidelines

Lecture 14 - HSE lessons

Lecture 15 - Risk Assessment - I

Lecture 16 - Financing Risk

Lecture 17 - Financing Risk Example Problem

Lecture 18 - Risk Assessment and Accident Analysis

Lecture 19 - Accident analysis

Lecture 20 - Hazard assessment - I

Lecture 21 - Hazard Analysis - I

Lecture 22 - Hazop - I

Lecture 23 - Hazop - II

Lecture 24 - Hazop - III

Lecture 25 - Hazop - IV

Lecture 26 - Hazop - V

Lecture 27 - Hazop (Case study)

Lecture 28 - Accidents in offshore platforms

Lecture 29 - Hazard Control

Lecture 30 - FMEA

Lecture 31 - FMEA Example

Lecture 32 - FMEA Example - II

Lecture 33 - Excercises

Lecture 34 - Dose Response Assessment

Lecture 35 - Flammability characteristics

Lecture 36 - Flammability diagram

Lecture 37 - Explosions

Lecture 38 - Chemical Explosions

Lecture 39 - Fire and Explosion Prevention - I

Lecture 40 - Explosion and Prevention

Lecture 41 - Fire Prevention Practices

Lecture 42 - Industrial Hygiene control

Lecture 43 - Chemical Risk Analysis

Lecture 44 - Chemical Risk Analysis - II

Lecture 45 - CEI - Examples

Lecture 46 - QRA Application

Lecture 47 - Hazard Identification Practices

Lecture 48 - Risk in Marine Systems - I

Lecture 49 - Risk in Marine Systems - II

Lecture 50 - Safety measures in design and operation

Lecture 51 - Safety measures in design and operation - II

Lecture 52 - Safety factors for confined spaces - I

Lecture 53 - Safety practices for confined spaces - II

Lecture 54 - Safety practices for Fire protection

Lecture 55 - Process safety management

NPTEL : NOC:Offshore Structures Under Special Loads Including Fire Resistance (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction

Lecture 2 - Novelty of fixed platforms

Lecture 3 - Novelty of compliant platforms

Lecture 4 - Novelty of floating platforms

Lecture 5 - New generation offshore platforms - I

Lecture 6 - New generation offshore platforms - II

Lecture 7 - Offshore Triceratops

Lecture 8 - Offshore Regasification platforms

Lecture 9 - Environmental loads - I

Lecture 10 - Environmental loads - II

Lecture 11 - Wind loads

Lecture 12 - Ice loads - I

Lecture 13 - Ice loads - II

Lecture 14 - Response spectrum - I

Lecture 15 - Response spectrum - II

Lecture 16 - Uncertainties

Lecture 17 - Earthquake loads - I

Lecture 18 - Earthquake loads - II

Lecture 19 - Earthquake loads - III

Lecture 20 - General design requirements

Lecture 21 - Impact and Non-impact wave loads - I

Lecture 22 - Impact and Non-impact wave loads - II

Lecture 23 - Unsymmetrical bending - I

Lecture 24 - Unsymmetrical bending - II

Lecture 25 - Unsymmetrical bending - III

Lecture 26 - Shear centre - I

Lecture 27 - Shear centre - II

Lecture 28 - Shear centre - III

Lecture 29 - Shear centre - IV

Lecture 30 - Curved beams - I

Lecture 31 - Curved beams - II

Lecture 32 - Curved beams - III

Lecture 33 - Curved beams - IV

Lecture 34 - Curved beams - V

Lecture 35 - Rings and chain links - I

Lecture 36 - Rings and chain links - II

Lecture 37 - Marine risers

Lecture 38 - Marine risers under VIM

Lecture 39 - Fire safety overview

Lecture 40 - Explosion - I

Lecture 41 - Explosion and fire protection - I

Lecture 42 - Explosion and fire protection - II

Lecture 43 - Blast Resistance - I

Lecture 44 - Blast Resistance - II

Lecture 45 - Blast Resistance - III

Lecture 46 - Blast Resistance - IV

Lecture 47 - Material Strength - I

Lecture 48 - Material Strength - II

Lecture 49 - Material Strength - III

Lecture 50 - Fire resistant design overview

Lecture 51 - Types of fire

Lecture 52 - Design Approach - I

Lecture 53 - Design Approach - II

NPTEL : NOC:Computer Methods Of Structural Analysis of Offshore Structures (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction to structural analysis - Part 1

Lecture 2 - Introduction to structural analysis - Part 2

Lecture 3 - System of linear equations - Part 1

Lecture 4 - System of linear equations - Part 2

Lecture 5 - Matrices - Part 1

Lecture 6 - Matrices - Part 2

Lecture 7 - Beam Element 1 - Part 1

Lecture 8 - Beam Element 1 - Part 2

Lecture 9 - Beam Element 2 - Part 1

Lecture 10 - Beam Element 2 - Part 2

Lecture 11 - Stiffness matrix of beam element - Part 1

Lecture 12 - Stiffness matrix of beam element - Part 2

Lecture 13 - Stiffness method of analysis of planar orthogonal structures - Part 1

Lecture 14 - Stiffness method of analysis of planar orthogonal structures - Part 2

Lecture 15 - Example on continuous beam - Part 1

Lecture 16 - Example on continuous beam - Part 2

Lecture 17 - Example - II - Part 1

Lecture 18 - Example - II - Part 2

Lecture 19 - Example - II (Continued...)

Lecture 20 - Example - III - Part 1

Lecture 21 - Example - III - Part 2

Lecture 22 - Planar non-orthogonal frame - Part 1

Lecture 23 - Planar non-orthogonal frame - Part 2

Lecture 24 - Non-orthogonal structures - II

Lecture 25 - Planar non-orthogonal frame

Lecture 26 - Non-orthogonal structures - III - Part 1

Lecture 27 - Non-orthogonal structures - III - Part 2

Lecture 28 - Example problem: planar non-orthogonal structure - Part 1

Lecture 29 - Example problem: planar non-orthogonal structure - Part 2

Lecture 30 - Planar non-orthogonal frame using computer code - Part 1

Lecture 31 - Planar non-orthogonal frame using computer code - Part 2

Lecture 32 - Planar non-orthogonal frame - Example 3 - Part 1

Lecture 33 - Planar non-orthogonal frame - Example 3 - Part 2

Lecture 34 - Planar truss system

Lecture 35 - Planar truss system examples - Part 1

Lecture 36 - Planar truss system examples - Part 2

Lecture 37 - 3D structures - analysis by stiffness method - Part 1

Lecture 38 - 3D structures - analysis by stiffness method - Part 2

Lecture 39 - 3D structures - transformation matrix - Part 1

Lecture 40 - 3D structures - transformation matrix - Part 2

Lecture 41 - Y-Z-X transformation for 3d analysis :

Lecture 42 - Z-Y-X transformation for 3d analysis - Part 1

Lecture 43 - Z-Y-X transformation for 3d analysis - Part 2

Lecture 44 - Analysis of space frames - Example 1 - Part 1

Lecture 45 - Analysis of space frames - Example 1 - Part 2

Lecture 46 - Analysis of space frames - Example 1 - Part 3

Lecture 47 - Analysis of space frame structures

Lecture 48 - 3d analysis of space frames - Example 1 - Part 1

Lecture 49 - 3d analysis of space frames - Example 1 - Part 2

Lecture 50 - 3d analysis - Example 2 - Part 1

Lecture 51 - 3d analysis - Example 2 - Part 2

Lecture 52 - 3d truss analysis

Lecture 53 - Special elements

Lecture 54 - Non-prismatic members - Part 1

Lecture 55 - Non-prismatic members - Part 2

Lecture 56 - Offshore structures - 1 - Part 1

Lecture 57 - Offshore structures - 1 - Part 2

Lecture 58 - Offshore structures - 2 - Part 1

Lecture 59 - Offshore structures - 2 - Part 2

Lecture 60 - Offshore structures - 3 - Part 1

Lecture 61 - Offshore structures - 3 - Part 2

Lecture 62 - Offshore compliant structures - 1 - Part 1

Lecture 63 - Offshore compliant structures - 1 - Part 2

Lecture 64 - Offshore compliant structures - 2 - Part 1

Lecture 65 - Offshore compliant structures - 2 - Part 2

Lecture 66 - New generation platforms - Part 1

Lecture 67 - New generation platforms - Part 2

Lecture 68 - Environmental loads - 1 - Part 1

Lecture 69 - Environmental loads - 1 - Part 2

Lecture 70 - Wave spectra - Part 1

Lecture 71 - Wave spectra - Part 2

Lecture 72 - Wind loads - Part 1

Lecture 73 - Wind loads - Part 2

Lecture 74 - Wind loads - 2 - Part 1

Lecture 75 - Wind loads - 2 - Part 2

Lecture 76 - Ice load and Earthquake load - Part 1

Lecture 77 - Ice load and Earthquake load - Part 2

Lecture 78 - Dynamic analysis - 1 - Part 1

Lecture 79 - Dynamic analysis - 1 - Part 2

Lecture 80 - Dynamic analysis - 2 - Part 1

Lecture 81 - Dynamic analysis - 2 - Part 2

Lecture 82 - Dynamic analysis - 3 - Part 1

Lecture 83 - Dynamic analysis - 3 - Part 2

Lecture 84 - Computer methods of dynamic analysis - Part 1

Lecture 85 - Computer methods of dynamic analysis - Part 2

Lecture 86 - Damping estimate - Part 1

Lecture 87 - Damping estimate - Part 2

Lecture 88 - Damping estimate - 2 - Part 1

Lecture 89 - Damping estimate - 2 - Part 2

Lecture 90 - Newmark's method - Part 1

Lecture 91 - Newmark's method - Part 2

Lecture 92 - Articulated towers - Part 1

Lecture 93 - Articulated towers - Part 2

Lecture 94 - Tension leg platforms - Part 1

Lecture 95 - Tension leg platforms - Part 2

Lecture 96 - Tension leg platforms - 2 - Part 1

Lecture 97 - Tension leg platforms - 2 - Part 2

Lecture 98 - New generation offshore structures - Part 1

Lecture 99 - New generation offshore structures - Part 2

Lecture 100 - Triceratops-2 - Part 1

Lecture 101 - Triceratops-2 - Part 2

Lecture 102 - Random process - 1 - Part 1

Lecture 103 - Random process - 1 - Part 2

Lecture 104 - Random process - 2 - Part 1

Lecture 105 - Random process - 2 - Part 2

Lecture 106 - Response spectrum - Part 1

Lecture 107 - Response spectrum - Part 2

Lecture 108 - Return period and Stochastic process - Part 1

Lecture 109 - Return period and Stochastic process - Part 2

Lecture 110 - Stochastic modelling - Part 1

Lecture 111 - Stochastic modelling - Part 2

Lecture 112 - Fatigue damage - 1 - Part 1

Lecture 113 - Fatigue damage - 1 - Part 2

Lecture 114 - Fatigue damage - 2 - Part 1

Lecture 115 - Fatigue damage - 2 - Part 2

Lecture 116 - Fatigue estimate of offshore platform - Part 1

Lecture 117 - Fatigue estimate of offshore platform - Part 2

Lecture 118 - Live Session

NPTEL : NOC:Structural Health Monitoring (Ocean Engineering)

Co-ordinators : Dr. Srinivasan Chandrasekaran

Lecture 1 - Introduction to SHM - Part 1

Lecture 2 - Introduction to SHM - Part 2

Lecture 3 - Necessity of SHM - Part 1

Lecture 4 - Necessity of SHM - Part 2

Lecture 5 - Components of SHM - Part 1

Lecture 6 - Components of SHM - Part 2

Lecture 7 - Challenges in SHM - Part 1

Lecture 8 - Challenges in SHM - Part 2

Lecture 9 - Advantages of SHM - Part 1

Lecture 10 - Advantages of SHM - Part 2

Lecture 11 - Components of SHM process - Part 1

Lecture 12 - Components of SHM process - Part 2

Lecture 13 - SHM issues applied to concrete structures - Part 1

Lecture 14 - SHM issues applied to concrete structures - Part 2

Lecture 15 - Level of uncertainties in SHM process - Part 1

Lecture 16 - Level of uncertainties in SHM process - Part 2

Lecture 17 - Short term and long term Structural Health Monitoring (SHM) - Part 1

Lecture 18 - Short term and long term Structural Health Monitoring (SHM) - Part 2

Lecture 19 - Local and Global Health Monitoring

Lecture 20 - Data Evaluation and Assessment

Lecture 21 - Estimation of Structural Health i.e. Structural Health Monitoring (SHM)

Lecture 22 - Estimation of Structural Health using Static SHM

Lecture 23 - Structural Health Monitoring (SHM) Planning and Management - Part 1

Lecture 24 - Structural Health Monitoring (SHM) Planning and Management - Part 2

Lecture 25 - Vibration based health monitoring scheme - Part 1

Lecture 26 - Vibration based health monitoring scheme - Part 2

Lecture 27 - Structural Health monitoring methods:1 - Part 1

Lecture 28 - Structural Health monitoring methods:1 - Part 2

Lecture 29 - Damage identification using lumped mass and Element modal stiffness - Part 1

Lecture 30 - Damage identification using lumped mass and Element modal stiffness - Part 2

Lecture 31 - Damage identification by visual Inspection method - Part 1

Lecture 32 - Damage identification by visual Inspection method - Part 2

Lecture 33 - Various vibration based method in SHM-1 - Part 1

Lecture 34 - Various vibration based method in SHM-1 - Part 2

Lecture 35 - Comparison of Damage Detection Method - II

Lecture 36 - Damage Detection Method - II

Lecture 37 - Structural Health Monitoring (SHM) and Statistical Pattern Recognition (SPR)

Lecture 38 - Long term SHM (Structural Health Monitoring)

Lecture 39 - Non-Destructive evaluation - I - Part 1

Lecture 40 - Non-Destructive evaluation - I - Part 2

Lecture 41 - Non-Destructive evaluation - II

Lecture 42 - Non-Destructive evaluation - III

Lecture 43 - Crack detection in Composites

Lecture 44 - Various sensor technologies - Part 1

Lecture 45 - Various sensor technologies - Part 2

Lecture 46 - Fibre Optic sensors - Part 1

Lecture 47 - Fibre Optic sensors - Part 2

Lecture 48 - Smart sensing for SHM - Part 1

Lecture 49 - Smart sensing for SHM - Part 2

Lecture 50 - Sensing requirements in special structures

Lecture 51 - The sensor requirements and Data acquisition - Part 1

Lecture 52 - The sensor requirements and Data acquisition - Part 2

Lecture 53 - Acquisition system and Networking for SHM - Part 1

Lecture 54 - Acquisition system and Networking for SHM - Part 2

Lecture 55 - Wireless Sensor Networking (WSN) - Part 1

Lecture 56 - Wireless Sensor Networking (WSN) - Part 2

Lecture 57 - SHM layout design of offshore structures

Lecture 58 - Vibration Based damage detection

Lecture 59 - SHM design - Part 1

Lecture 60 - SHM design - Part 2

Lecture 61 - Artificial Intelligence (AI) in structural health monitoring (SHM)

Lecture 62 - Plausibility of errors in SHM

Lecture 63 - Artificial Neural Network (ANN) in the SHM process.

Lecture 64 - Damage detection

Lecture 65 - Application of SHM in Infrastructure Engieering - Part 1

Lecture 66 - Application of SHM in Infrastructure Engieering - Part 2

Lecture 67 - Design of sensor layout for SHM - Part 1

Lecture 68 - Design of sensor layout for SHM - Part 2

Lecture 69 - SHM applied to BSLRP - Part 1

Lecture 70 - SHM applied to BSLRP - Part 2

Lecture 71 - SHM design for BSLRP - Part 1

Lecture 72 - SHM design for BSLRP - Part 2

Lecture 73 - SHM design-2 for BSLRP - Part 1

Lecture 74 - SHM design-2 for BSLRP - Part 2

Lecture 75 - SHM design by experimental investigations for lab scale model of TLP-I - Part 1

Lecture 76 - SHM design by experimental investigations for lab scale model of TLP-I - Part 2

Lecture 77 - SHM design by experimental investigations for lab scale model of TLP-II - Part 1

Lecture 78 - SHM design by experimental investigations for lab scale model of TLP-II - Part 2

Lecture 79 - Structural Health Monitoring (SHM) of lab scale model of TLP-III - Part 1

Lecture 80 - Structural Health Monitoring (SHM) of lab scale model of TLP-III - Part 2

Lecture 81 - Structural Health Monitoring (SHM) of lab scale model of TLP-IV - Part 1

Lecture 82 - Structural Health Monitoring (SHM) of lab scale model of TLP-IV - Part 2

Lecture 83 - Future Scope of SHM - Part 1

Lecture 84 - Future Scope of SHM - Part 2

NPTEL : NOC:Advanced Design of Steel Structures (Ocean Engineering)

Co-ordinators : Prof. Srinivasan Chandrasekaran

Lecture 1 - Form-dominant design - I

Lecture 2 - Form-dominant design - II

Lecture 3 - Failure theories - 1

Lecture 4 - Failure theories - 2

Lecture 5 - Failure theories - 3

Lecture 6 - Material properties - 1

Lecture 7 - Material properties - 2

Lecture 8 - Material properties - 3

Lecture 9 - FGM

Lecture 10 - FGM for marine application - 1

Lecture 11 - FGM for marine application - 2

Lecture 12 - Design methods - 1

Lecture 13 - Design methods - 2

Lecture 14 - Load combinations

Lecture 15 - Dynamic material strength

Lecture 16 - Material properties variations

Lecture 17 - Plastic design - 1

Lecture 18 - Plastic design - 2

Lecture 19 - Plastic design - 3

Lecture 20 - Shape factor examples

Lecture 21 - Plastic analysis - 1

Lecture 22 - Plastic analysis - 2

Lecture 23 - Plastic design - 1

Lecture 24 - Plastic design - 2

Lecture 25 - Plastic design - 2

Lecture 26 - Structural Stability

Lecture 27 - EulerÃ¢â‚¬â„¢s load

Lecture 28 - Rotation coefficients for stability functions

Lecture 29 - Stability functions - 1

Lecture 30 - Stability functions - 2

Lecture 31 - Stability functions - 3

Lecture 32 - Buckling and stability

Lecture 33 - Critical buckling load- Numerical examples

Lecture 34 - Stability problems- numerical examples

Lecture 35 - Stability of shells

Lecture 36 - Unsymmetric bending - 1

Lecture 37 - Unsymmetric bending - example problems

Lecture 38 - Shear center - 1

Lecture 39 - Shear center - 2

Lecture 40 - Shear center - 3

Lecture 41 - Curved section

Lecture 42 - Shear center for curved sections

Lecture 43 - Shear center for unsymmetric section

Lecture 44 - Curved beam - 1

Lecture 45 - Curved beam with large curvature - 1

Lecture 46 - Curved beam with large curvature - 2

Lecture 47 - Modified area factor for curved section

Lecture 48 - M factor for curved beams

Lecture 49 - Crane hook

Lecture 50 - Thin-walled section

Lecture 51 - Open thin-walled section

Lecture 52 - Lateral torsional buckling

Lecture 53 - Design for LTB-1

Lecture 54 - Design check for LTB-2

Lecture 55 - LTB example problem

Lecture 56 - Ice loads

Lecture 57 - Ice spectrum

Lecture 58 - Blast resistant design - 1

Lecture 59 - Blast resistant design - 2

Lecture 60 - Blast-resistant design - 3

Lecture 61 - Blast-resistant design - 4

Lecture 62 - Fire-resistant design - 1

Lecture 63 - Fire-resistant design - 2

Lecture 64 - Analysis under impact loads

NPTEL : Marine Instrumentation - Laboratory (Ocean Engineering)

Co-ordinators : Prof. Tharun

Lecture 1 - Oscilloscope, Function Generator and Tilt meter

Lecture 2 - Strain Gauges and Load Cells

Lecture 3 - Wheatstone Bridge Circuit and RC Circuits on a Breadboard Design and Testing of Wheat - 1

Lecture 4 - Wheatstone Bridge Circuit and RC Circuits on a Breadboard Passive Low Pass RC Filter - 2

Lecture 5 - Wheatstone Bridge Circuit and RC Circuits on a Breadboard Rc High Pass Filter Lab - 3

Lecture 6 - Opamps, Differentiator and Integrator Circuits Design and Testing Integrator and Differ - 1

Lecture 7 - Opamps, Differentiator and Integrator Circuits Design and Testing Integrated and Differ - 2

NPTEL : NOC:Surface Facilities for Oil and Gas Handling (Ocean Engineering)

Co-ordinators : Prof. Abdus Samad

Lecture 1 - Introduction to Oil and Gas - 1

Lecture 2 - Introduction to Oil and Gas - 2

Lecture 3 - Drilling and Completion - 1

Lecture 4 - Drilling and Completion - 2

Lecture 5 - Well Completion

Lecture 6 - Basics of Surface Facilities

Lecture 7 - Fluid Properties

Lecture 8 - Introduction to Separators - 1

Lecture 9 - Introduction to Seprataors - 2

Lecture 10 - Flow Control - 1

Lecture 11 - Flow Control - 2

Lecture 12 - Principle of Separation - 1

Lecture 13 - Principle of Separation - 2

Lecture 14 - Heat calculations for separation

Lecture 15 - Fluid Properties and Two-Phase Separator - 1

Lecture 16 - Fluid Properties and Two-Phase Separator - 2

Lecture 17 - Introduction to Separators

Lecture 18 - Horizontal Separator and Sizing - 1

Lecture 19 - Horizontal Separator and Sizing - 2

Lecture 20 - Horizontal Separator and Sizing: Numerical

Lecture 21 - Three Phase Separation - 1

Lecture 22 - Three Phase Separation - 2

Lecture 23 - Vertical Separator Sizing - 1

Lecture 24 - Vertical Separator Sizing - 2

Lecture 25 - Horizontal and Vertical Separator: Numerical

Lecture 26 - Heater Treater - 1

Lecture 27 - Heater Treater - 2

Lecture 28 - Gunbarrel

Lecture 29 - Gunbarrel: Numericals

Lecture 30 - Heat Calculation - 1

Lecture 31 - Heat Calculation - 2

Lecture 32 - Introduction to Electrostatic Treater - 1

Lecture 33 - Introduction to Electrostatic Treater - 2

Lecture 34 - Heater Treater and Gunbarrel - 1

Lecture 35 - Heater Treater and Gunbarrel - 2

Lecture 36 - Heater Treater and Gunbarrel: Numerical - Part 1

Lecture 37 - Heater Treater and Gunbarrel: Numerical - Part 2

Lecture 38 - Desalting of Crude Oil - 1

Lecture 39 - Desalting of Crude Oil - 2

Lecture 40 - Water Treatment - 1

Lecture 41 - Water Treatment - 2

Lecture 42 - Produced Water Treatment - 1

Lecture 43 - Produced Water Treatment - 2

Lecture 44 - Produced Water Treatment - 3

Lecture 45 - Produced Water Treament: Numerical

Lecture 46 - Natural Gas Processing - 1

Lecture 47 - Natural Gas Processing - 2

Lecture 48 - Acid Gas Treating

Lecture 49 - Amine System for Gas Sweetening - 1

Lecture 50 - Amine System for Gas Sweetening - 2

Lecture 51 - Gas Dehydration

Lecture 52 - Crude Oil Storage Facilities - 1

Lecture 53 - Crude Oil Storage Facilities - 2

Lecture 54 - Crude Oil Storage Facilities - 3

Lecture 55 - Flow Measurement Techniques - 1

Lecture 56 - Flow Measurement Techniques - 2

Lecture 57 - Heat Transfer Mechanisms

Lecture 58 - Thermodynamic Laws

Lecture 59 - Introduction to Heat Exchanger - 1

Lecture 60 - Introduction to Heat Exchanger - 2

Lecture 61 - Introduction to Heat Exchanger - 3

Lecture 62 - Introduction to Heat Exchanger - 4

Lecture 63 - Pressure Vessel - 1

Lecture 64 - Pressure Vessel - 2

Lecture 65 - Pressure Vessel - 3

Lecture 66 - Wall Thickness Criteria

Lecture 67 - Introduction to Pumps - 1

Lecture 68 - Introduction to Pumps - 2

Lecture 69 - Introduction to Pumps - 3

Lecture 70 - Introduction to Reciprocating Pumps

Lecture 71 - Introduction to Compressor

Lecture 72 - Introduction to IC/CI Engine - 1

Lecture 73 - Introduction to IC/CI Engine - 2

NPTEL : NOC:Marine Engineering (Ocean Engineering)

Co-ordinators : Prof. Abdus Samad

Lecture 1 - Course Overview

Lecture 2 - Basics of Thermodynamics

Lecture 3 - Work and Heat transfer

Lecture 4 - Second law of thermodynamics

Lecture 5 - Reversible Heat Engine

Lecture 6 - Basic mode of heat transfer

Lecture 7 - Conduction

Lecture 8 - Convection

Lecture 9 - Radiation

Lecture 10 - Concept of Resistance

Lecture 11 - Heat flow through pipes and walls

Lecture 12 - Heat Exchangers

Lecture 13 - Fins

Lecture 14 - LMTD

Lecture 15 - Pumps and its types

Lecture 16 - Centrifugal pump

Lecture 17 - Characteristic curves of pumps

Lecture 18 - Cavitation

Lecture 19 - Positive displacement pump

Lecture 20 - Pumps in series/parallel

Lecture 21 - Compressors

Lecture 22 - Intercooler

Lecture 23 - Rankine cycle

Lecture 24 - Injectors and Pumps

Lecture 25 - Numerical problem

Lecture 26 - Boilers

Lecture 27 - Fouling and Scaling

Lecture 28 - Fuel and method of firing

Lecture 29 - Boiler efficiency

Lecture 30 - Turbine Basics

Lecture 31 - Turbine aerodynamics

Lecture 32 - Cascade view and Meridional view

Lecture 33 - Impulse and Reaction Turbine

Lecture 34 - Steam Turbine

Lecture 35 - Regenerative thermal power plant

Lecture 36 - Mollier diagram

Lecture 37 - IC Engines

Lecture 38 - Otto/Diesel Cycle

Lecture 39 - Components of IC engines - Part 1

Lecture 40 - Components of IC engines - Part 2

Lecture 41 - Fuel Injection/Scavenging

Lecture 42 - IC engine: Numerical problems

Lecture 43 - IC Engine - Fuel

Lecture 44 - Marine Fuel and Properties

Lecture 45 - Combustion

Lecture 46 - Fuel Oil properties

Lecture 47 - Lubrication/Cooling

Lecture 48 - IC engine-Numerical Problems

Lecture 49 - Gas turbine - Basics

Lecture 50 - Gas turbine - Basics (Continued...)

Lecture 51 - Gas turbine, formula, calculations

Lecture 52 - Gas turbine: Regeneration, Reheat, Intercooling

Lecture 53 - Numerical Problems

Lecture 54 - Binary cycle/Rankine-Brayton cycle

Lecture 55 - Numerical problems

Lecture 56 - HVAC- Heating, ventilation, and air conditioning

Lecture 57 - Refrigerants

Lecture 58 - Vapor compression Reffrigeration system

Lecture 59 - HVAC - VCRC components

Lecture 60 - HVAC - Psychrometric

Lecture 61 - HVAC - Numerical problems

Lecture 62 - Fire Fighting Machinery

Lecture 63 - Desalination

Lecture 64 - Energy recovery device (ERD)

Lecture 65 - Desalination/Fire fighting/Numerical problems

Lecture 66 - Numerical problems

Lecture 67 - Steering gear/propeller/rudder/incin

Lecture 68 - Power transmission system, shafting, bearing, gear, lubrication, Electric propulsion

Lecture 69 - Stern Tube Bearings and Misalignment

Lecture 70 - Shaft

Lecture 71 - Shaft Design

Lecture 72 - Gears

Lecture 73 - Seals and Bearings

Lecture 74 - Oil water separation, electrical systems

Lecture 75 - Bilge water flocculant

Lecture 76 - Gravity OWS

Lecture 77 - Centrifuge

Lecture 78 - Membrane Technologies

Lecture 79 - Electrical systems

Lecture 80 - Motor

NPTEL : Electromagnetic Theory (Prof. D.K. Ghosh) (Physics)

Co-ordinators : Prof. D.K. Ghosh

Lecture 1 - Scalar field and its Gradient

Lecture 2 - Line and Surface Integrals

Lecture 3 - Divergence and Curl of Vector Fields

Lecture 4 - Conservative Field, Stoke's Theorem

Lecture 5 - Laplacian

Lecture 6 - Electric Field Potential

Lecture 7 - Gauss's Law, Potential

Lecture 8 - Electric Field and Potential

Lecture 9 - Potential and Potential Energy - I

Lecture 10 - Potential and Potential Energy - II

Lecture 11 - Potential and Potential Energy - III

Lecture 12 - Coefficients of Potential and Capacitance

Lecture 13 - Poission and Laplace Equation

Lecture 14 - Solutions of Laplace Equation - I

Lecture 15 - Solutions of Laplace Equation - II

Lecture 16 - Solutions of Laplace Equation - III

Lecture 17 - Special Techniques - I

Lecture 18 - Special Techniques - II

Lecture 19 - Special Techniques - III

Lecture 20 - Dielectrics - I

Lecture 21 - Dielectrics - II

Lecture 22 - Dielectrics - III

Lecture 23 - Equation of Continuity

Lecture 24 - a) Force between current loops b) Magnetic Vector Potential

Lecture 25 - Magnetic Vector Potential

Lecture 26 - Boundary Conditions

Lecture 27 - Magnetized Material

Lecture 28 - Magentostatics (Continued...), Time Varying Field (Introduction)

Lecture 29 - Faraday's Law and Inductance

Lecture 30 - Maxwell's Equations

Lecture 31 - Maxwell's Equations and Conservation Laws

Lecture 32 - Conservation Laws

Lecture 33 - a) Angular Momentum Conservation b) Electromagnetic Waves

Lecture 34 - Electromagnetic Waves

Lecture 35 - Propagation of Electromagnetic Waves in a metal

Lecture 36 - Waveguides - I

Lecture 37 - Waveguides - II

Lecture 38 - Resonating Cavity

Lecture 39 - Radiation - I

Lecture 40 - Radiation - II

NPTEL : Special Theory of Relativity (Physics)

Co-ordinators : Prof. Shiva Prasad

Lecture 1 - Problem with Classical Physics

Lecture 2 - Michelson-Morley Experiment

Lecture 3 - Postulates of Special Theory of Relativity and Galilean Transformation

Lecture 4 - Look out for a New Transformation

Lecture 5 - Lorentz Transformation

Lecture 6 - Length Contraction and Time Dilation

Lecture 7 - Examples of Length Contraction and Time Dilation

Lecture 8 - Velocity Transformation and Examples

Lecture 9 - A Three Event Problem

Lecture 10 - A Problem involving Light and Concept of Casuality

Lecture 11 - Problems involving Casuality and Need to Redefine Momentum

Lecture 12 - Minikowski Space and Four Vectors

Lecture 13 - Proper Time a Four Scalar

Lecture 14 - Velocity Four Vector

Lecture 15 - Momentum Energy Four Vector

Lecture 16 - Relook at Collision Problems

Lecture 17 - Zero Rest Mass Particle and Photon

Lecture 18 - Doppler Effect in Light

Lecture 19 - Example in C-Frame

Lecture 20 - Force in Relativity

Lecture 21 - Force Four-Vector

Lecture 22 - Electric & Magnetic Field Transformation

Lecture 23 - Example of EM Field Transformation

Lecture 24 - Current Density Four Vector and Maxwell Equation

NPTEL : NOC:Quantum Information and Computing (Physics)

Co-ordinators : Prof.Dipan Ghosh

Lecture 1 - Why Quantum Computing?

Lecture 2 - Postulates of Quantum Mechanics - I

Lecture 3 - Postulates of Quantum Mechanics - II

Lecture 4 - Qubit - The smallest unit

Lecture 5 - Qubit - Bloch sphere representation

Lecture 6 - Multiple Qubit States and Quantum Gates

Lecture 7 - Quantum Gates

Lecture 8 - Quantum Circuts

Lecture 9 - No-Cloning Theorem and Quantum Teleportation

Lecture 10 - Super Dense Coding

Lecture 11 - Density Matrix - I

Lecture 12 - Density Matrix - II

Lecture 13 - Bloch Sphere and Density Matrix

Lecture 14 - Measurement Postulates - I

Lecture 15 - Measurement Postulates - II

Lecture 16 - Simple Algorithms-Deutsch Algorithm

Lecture 17 - Deutsch-Josza and Bernstein - Vazirani Algorithms

Lecture 18 - Simon Problem

Lecture 19 - Grover's Search Algorithm - I

Lecture 20 - Grover's Search Algorithm - II

Lecture 21 - Grover's Search Algorithm - III

Lecture 22 - Grover's Search Algorithm - IV

Lecture 23 - Quantum Fourier Transform

Lecture 24 - Period Finding and QFT

Lecture 25 - Implementing QFT

Lecture 26 - Implementing QFT-3 qubits (and more)

Lecture 27 - Shor's Factorization Algorithm

Lecture 28 - Shor's Factorization Algorithm-Implementation

Lecture 29 - Shor's Algorithm-Continued Fraction

Lecture 30 - Quantum Error Correction - I

Lecture 31 - Quantum Error Correction - II Three Qubit Code

Lecture 32 - Quantum Error Correction - III Shor's 9 Qubit Code - I

Lecture 33 - Quantum Error Correction - IV Shor's 9 Qubit Code - II

Lecture 34 - Classical Information Theory

Lecture 35 - Shannon Entropy

Lecture 36 - Shannon's Noiseless Coding Theorem

Lecture 37 - Ven Neumann Entropy

Lecture 38 - EPR and Bell's Inequalities - I

Lecture 39 - EPR and Bell's Inequalities - II

Lecture 40 - EPR and Bell's Inequalities - III

Lecture 41 - Cryptography-RSA Algorithm - I

Lecture 42 - Cryptography-RSA Algorithm - II

Lecture 43 - Quantum Cryptography - I

Lecture 44 - Quantum Cryptography - II

Lecture 45 - Experimental Aspects of Quantum Computing - I

Lecture 46 - Experimental Aspects of Quantum Computing - II

NPTEL : NOC:Theory of Groups for Physics Applications (Physics)

Co-ordinators : Prof. Urjit A. Yajnik

Lecture 1 - Introduction

Lecture 2 - Algebraic Preliminaries

Lecture 3 - Basic Group Concepts and Low Order Groups - I

Lecture 4 - Basic Group Concepts and Low Order Groups - II

Lecture 5 - Lagrange's Theorem and Cayley's Theorem - I

Lecture 6 - Lagrange's Theorem and Cayley's Theorem - II

Lecture 7 - Factor Group Conjugacy Classes - I

Lecture 8 - Factor Group Conjugacy Classes - II

Lecture 9 - Cycle Structures and Molecular Notation - I

Lecture 10 - Cycle Structures and Molecular Notation - II

Lecture 11 - Cycle Structures and Classification - I

Lecture 12 - Cycle Structures and Classification - II

Lecture 13 - Point Group Notation and Factor Group - I

Lecture 14 - Point Group Notation and Factor Group - II

Lecture 15 - Representation Theory - I

Lecture 16 - Representation Theory - II

Lecture 17 - Representation Theory - III

Lecture 18 - Representation Theory - IV

Lecture 19 - Schur's Lemma and Orthogonality Theorem - I

Lecture 20 - Schur's Lemma and Orthogonality Theorem - II

Lecture 21 - Orthogonality For Characters - I

Lecture 22 - Orthogonality For Characters - II

Lecture 23 - Character Tables and Molecular Applications - I

Lecture 24 - Character Tables and Molecular Applications - II

Lecture 25 - Preliminaries About The Continuum - I

Lecture 26 - Preliminaries About The Continuum - II

Lecture 27 - Classical Groups - I

Lecture 28 - Classical Groups - II

Lecture 29 - Classical Groups-Topology - I

Lecture 30 - Classical Groups-Topology - II

Lecture 31 - SO(3) And Matrix Exponent - I

Lecture 32 - SO(3) And Matrix Exponent - II

Lecture 33 - Generators, Discussion Of Lie's Theorems - I

Lecture 34 - Generators, Discussion Of Lie's Theorems - II

Lecture 35 - Group Algebras; SO(3)-SU(2) Correspondence - I

Lecture 36 - Group Algebras; SO(3)-SU(2) Correspondence - II

Lecture 37 - SO(3), SU(2) Representations - I

Lecture 38 - SO(3), SU(2) Representations - II

Lecture 39 - Representation On Function Spaces - I

Lecture 40 - Representation On Function Spaces - II

Lecture 41 - Lorentz Boosts, SO(3,1) Algebra - I

Lecture 42 - Lorentz Boosts, SO(3,1) Algebra - II

Lecture 43 - Representation Of Lorentz Group And Clifford Algebra - I

Lecture 44 - Representation Of Lorentz Group And Clifford Algebra - II

Lecture 45 - SU(3) And Lie's Classification - I

Lecture 46 - SU(3) And Lie's Classification - II

Lecture 47 - Fundamental Symmetries Of Physics - I

Lecture 48 - Fundamental Symmetries Of Physics - II

NPTEL : NOC:Quantum Mechanics-I (Physics)

Co-ordinators : Prof. Ramadevi

Lecture 1 - Introduction to Quantum Mechanics - I

Lecture 2 - Introduction to Quantum Mechanics - II

Lecture 3 - Review of Particle in Box, Potential Well, Barrier, Harmonic Oscillator - I

Lecture 4 - Review of Particle in Box, Potential Well, Barrier, Harmonic Oscillator - II

Lecture 5 - Tutorial 1 - Part I

Lecture 6 - Tutorial 1 - Part II

Lecture 7 - Bound States - I

Lecture 8 - Bound States - II

Lecture 9 - Conditions and Solutions for one Dimensional Bound States - I

Lecture 10 - Conditions and Solutions for one Dimensional Bound States - II

Lecture 11 - Tutorial 2

Lecture 12 - Linear Vector Space (LVS) - I

Lecture 13 - Linear Vector Space (LVS) - II

Lecture 14 - Linear Vector Space (LVS) - III

Lecture 15 - Basis for Operators and States in LVS - I

Lecture 16 - Basis for Operators and States in LVS - II

Lecture 17 - Tutorial 3 - Part I

Lecture 18 - Tutorial 3 - Part II

Lecture 19 - Function Spaces - I

Lecture 20 - Function Spaces - II

Lecture 21 - Postulates of Quantum Mechanics - I

Lecture 22 - Postulates of Quantum Mechanics - II

Lecture 23 - Tutorial 4 - Part I

Lecture 24 - Tutorial 4 - Part II

Lecture 25 - Classical vs Quantum Mechanics - I

Lecture 26 - Classical vs Quantum Mechanics - II

Lecture 27 - Compatible vs Incompatible Observable - I

Lecture 28 - Compatible vs Incompatible Observable - II

Lecture 29 - Tutorial 5 - Part I

Lecture 30 - Tutorial 5 - Part II

Lecture 31 - Tutorial 5 - Part III

Lecture 32 - Schrodinger and Heisenberg Pictures - I

Lecture 33 - Schrodinger and Heisenberg Pictures - II

Lecture 34 - Solutions to other Coupled Potential Energies - I

Lecture 35 - Solutions to other Coupled Potential Energies - II

Lecture 36 - Tutorial 6 - Part I

Lecture 37 - Tutorial 6 - Part II

Lecture 38 - Hydrogen Atom and Wave Functions, Angular Momentum Operators, Identical Particles - I

Lecture 39 - Hydrogen Atom and Wave Functions, Angular Momentum Operators, Identical Particles - II

Lecture 40 - Identical Particles and Quantum Computer - I

Lecture 41 - Identical Particles and Quantum Computer - II

Lecture 42 - Tutorial 7 - Part I

Lecture 43 - Tutorial 7 - Part II

Lecture 44 - Harmonic Oscillator - I

Lecture 45 - Harmonic Oscillator - II

Lecture 46 - Ladder Operators - I

Lecture 47 - Ladder Operators - II

Lecture 48 - Tutorial 8 - Part I

Lecture 49 - Tutorial 8 - Part II

Lecture 50 - Stern-Gerlach Experiment - I

Lecture 51 - Stern-Gerlach Experiment - II

Lecture 52 - Oscillator Algebra

Lecture 53 - Tutorial 9 - Part I

Lecture 54 - Tutorial 9 - Part II

Lecture 55 - Angular Momentum - I

Lecture 56 - Angular Momentum - II

Lecture 57 - Rotations Groups - I

Lecture 58 - Rotations Groups - II

Lecture 59 - Tutorial 10 - Part I

Lecture 60 - Tutorial 10 - Part II

Lecture 61 - Addition of Angular Momentum - I

Lecture 62 - Addition of Angular Momentum - II

Lecture 63 - Clebsch-Gordan Coe cients - I

Lecture 64 - Clebsch-Gordan Coe cients - II

Lecture 65 - Tutorial 11 - Part I

Lecture 66 - Tutorial 11 - Part II

Lecture 67 - Clebsch-Gordan Coe cients - III

Lecture 68 - Tensor Operators and Wigner-Eckart Theorem - I

Lecture 69 - Tensor Operators and Wigner-Eckart Theorem - II

Lecture 70 - Tensor Operators and Wigner-Eckart Theorem - III

Lecture 71 - Tutorial 12

NPTEL : NOC:Path Integral and Functional Methods in Quantum Field Theory (Physics)

Co-ordinators : Prof. Urjit A. Yajnik

Lecture 1 - Quantum Theory Fundamental Quantisation - I

Lecture 2 - Quantum Theory Fundamental Quantisation - II

Lecture 3 - Path Integral Formulation - I

Lecture 4 - Path Integral Formulation - II

Lecture 5 - Path Integral Formulation - III

Lecture 6 - Path Integral Formulation - IV

Lecture 7 - Correlation Functions - I

Lecture 8 - Correlation Functions - II

Lecture 9 - Generating Functional, Forced Harmonic Oscillator - I

Lecture 10 - Generating Functional, Forced Harmonic Oscillator - II

Lecture 11 - Generating Function in Field Theory - I

Lecture 12 - Generating Function in Field Theory - II

Lecture 13 - Effective Potential - I

Lecture 14 - Effective Potential - II

Lecture 15 - Effective Potential - III

Lecture 16 - Effective Potential - IV

Lecture 17 - Asymptotic Theory - I

Lecture 18 - Asymptotic Theory - II

Lecture 19 - Asymptotic Condition Kallen-Lehmann representation - I

Lecture 20 - Asymptotic Condition Kallen-Lehmann representation - II

Lecture 21 - Gauge Invariance - Minimal Coupling

Lecture 22 - Gauge Invariance - Geometric Picture

Lecture 23 - Gauge Invariance - Abelian Case

Lecture 24 - Gauge Invariance - Non-abelian case

Lecture 25 - Yang Mills Theory - Coupling to Matter

Lecture 26 - Yang Mills Theory - Physical Content

Lecture 27 - Yang Mills Theory Constraint Dynamics - I

Lecture 28 - Yang Mills Theory Constraint Dynamics - II

Lecture 29 - Gauge Fixing and Faddeev Popov Ghosts - I

Lecture 30 - Gauge Fixing and Faddeev Popov Ghosts - II

Lecture 31 - Topological Vacuum of Yang Mills Theories - I

Lecture 32 - Topological Vacuum of Yang Mills Theories - II

NPTEL : NOC:Physics of Biological Systems (Physics)

Co-ordinators : Prof. Mithun Mitra

Lecture 1 - Introduction

Lecture 2 - DNA packing and structure

Lecture 3 - Shape and function

Lecture 4 - Numbers and sizes

Lecture 5 - Spatial scales and System variation

Lecture 6 - Timescales in Biology

Lecture 7 - Random walks and Passive diffusion

Lecture 8 - Random walks to model Biology

Lecture 9 - Derivation of FRAP equations

Lecture 10 - Drift-diffusion equations

Lecture 11 - Solutions of the drift-diffusion equations

Lecture 12 - The cell signaling problem

Lecture 13 - Cell Signalling and Capture Probability of absorbing sphere

Lecture 14 - Capture probability of reflecting sphere

Lecture 15 - Mean capture time

Lecture 16 - Introduction to fluids, viscosity and reynolds number

Lecture 17 - Introduction to the navier stokes equation

Lecture 18 - Understanding reynolds number

Lecture 19 - Life at low reynolds number

Lecture 20 - Various phenomena at low reynolds number

Lecture 21 - Bacterial flagellar motion

Lecture 22 - Rotating flagellum

Lecture 23 - Energy and equilibrium

Lecture 24 - Binding problems

Lecture 25 - Transcription and translation

Lecture 26 - Internal states of macromolecules

Lecture 27 - Protein modification problem

Lecture 28 - Haemoglobin-Oxygen binding problem

Lecture 29 - Freely jointed polymer model

Lecture 30 - Entropic springs and persistence length

Lecture 31 - Freely rotating chain model and radius of gyration

Lecture 32 - The hierarchical chromatin packing model

Lecture 33 - FISH and DNA looping

Lecture 34 - Nucleosomes as barriers, Hi-C, and contact probabilities

Lecture 35 - Deriving the full force extension curve

Lecture 36 - Random walk models for proteins

Lecture 37 - Hydrophobic polar protein model

Lecture 38 - Diffusion in crowded environments

Lecture 39 - Depletion interactions

Lecture 40 - Examples and implications of depletion interactions

Lecture 41 - Introduction to Biological dynamics

Lecture 42 - Introduction to rate equations

Lecture 43 - Separation of timescales in enzyme kinetics

Lecture 44 - Structure and treadmilling of actins and microtubules

Lecture 45 - Average length of polymers in equilibrium

Lecture 46 - Growth rate of polymers

Lecture 47 - Dynamic treadmilling in microtubules

Lecture 48 - Introduction to molecular motors

Lecture 49 - Force generation by molecular motors

Lecture 50 - Models of motor motion

Lecture 51 - molecular motors

Lecture 52 - Free energies of motor for stepping

Lecture 53 - Two state models

Lecture 54 - cooperative transport of cargo

Lecture 55 - Cytoskeleton as a motor

Lecture 56 - translocation ratchet

Lecture 57 - Spatial pattern in biology

Lecture 58 - Some common spatial patterns in biology

Lecture 59 - reaction diffusion and spatial pattern

Lecture 60 - Pattern formation in reaction diffusion system with stability

Lecture 61 - Condition for destablization in pattern formation

Lecture 62 - Schnakenberg kinetics

NPTEL : NOC:Group Theory Methods in Physics (Physics)

Co-ordinators : Prof. Ramadevi

Lecture 1 - Introduction - I

Lecture 2 - Introduction - II

Lecture 3 - Normal subgroup, Coset, Conjugate group

Lecture 4 - Factor group, Homomorphism, Isomorphism

Lecture 5 - Factor group, Homomorphism, Isomorphism

Lecture 6 - Conjugacy Classes

Lecture 7 - Permutation Groups

Lecture 8 - Cycle Structure

Lecture 9 - Cycle Structure (Continued...)

Lecture 10 - Young Diagram and Molecular Symmetry

Lecture 11 - Point Groups

Lecture 12 - Symmetries of Molecules, Schoenflies Notation

Lecture 13 - Symmetries of Molecules, Stereographic Projection

Lecture 14 - Examples of Molecular Symmetries and Proof of Cayley Theorem

Lecture 15 - Matrix Representation of Groups - I

Lecture 16 - Matrix Representation of Groups - II

Lecture 17 - Reducible and Irreducible Representation - I

Lecture 18 - Reducible and Irreducible Representation - II

Lecture 19 - Great Orthogonality Theorem and Character Table - I

Lecture 20 - Great Orthogonality Theorem and Character Table - II

Lecture 21 - Mulliken Notation, Character Table and Basis

Lecture 22 - Tensor Product of Representation

Lecture 23 - Tensor Product and Projection Operator - I

Lecture 24 - Tensor Product and Projection Operator - II

Lecture 25 - Tensor Product and Projection Operator with an example

Lecture 26 - Binary Basis and Observables

Lecture 27 - Selection Rules

Lecture 28 - Selection Rules and Molecular Vibrations

Lecture 29 - Molecular vibration normal modes: Classical Mechanics approach

Lecture 30 - Molecular vibration normal modes: Group Theory approach

Lecture 31 - Molecular vibration modes using projection operator

Lecture 32 - Vibrational representation of character

Lecture 33 - Infrared Spectra and Raman Spectra

Lecture 34 - Introduction to continuous group

Lecture 35 - Generators of translational and rotational transformation

Lecture 36 - Generators of Lorentz transformation

Lecture 37 - Introduction to O(3) and SO(3) group

Lecture 38 - SO(n) and Lorentz group

Lecture 39 - Generalised orthogonal group and Lie algebra

Lecture 40 - Subalgebra of Lie algebra

Lecture 41 - gl(2,C) and sl(2,C) group

Lecture 42 - U(n) and SU(n) group

Lecture 43 - Symplectic group

Lecture 44 - SU(2) and SU(3) groups

Lecture 45 - Rank, weight and weight vector

Lecture 46 - Weight vector, root vector, comparison between SU(2) and SU(3) algebra

Lecture 47 - Root diagram, simple roots, adjoint representation

Lecture 48 - SU(2) sub-algebra, Dynkin diagrams

Lecture 49 - Fundamental weights, Young diagrams, dimension of irreducible representation

Lecture 50 - Young diagrams and tensor products

Lecture 51 - Tensor product, Wigner - Eckart theorem

Lecture 52 - Tensor product of irreducible representation 1: Composite objects from fundamental particles

Lecture 53 - Tensor product of irreducible representation 2: Decimet and octet diagrams in the Quark Model

Lecture 54 - Clebsch - Gordan coefficients

Lecture 55 - 1) Quadrupole moment tensor (Wigner-Eckart theorem) 2) Decimet Baryon wavefunction

Lecture 56 - Higher dimensional multiplets in the quark model

Lecture 57 - Symmetry breaking in continuous groups

Lecture 58 - Dynamical symmetry in hydrogen atom: SO(4) algebra

Lecture 59 - Hydrogen atom energy spectrum and degeneracy using Runge-Lenz vector

NPTEL : NOC:Neutron Scattering for Condensed Matter Studies (Physics)

Co-ordinators : Prof. Saibal Basu

Lecture 1 - Neutrons as Probe of Condensed Matter

Lecture 2 - Sources for thermal neutrons used in neutron scattering

Lecture 3

Lecture 4 - Calculating Neutron Scattering cross-section

Lecture 5

Lecture 6 - Scattering theory and introducing dynamics in the formalism

Lecture 7 - Scattering theory and introducing dynamics in the formalism

Lecture 8 - Scattering theory and introducing dynamics in the formalism

Lecture 9 - Scattering law's correlation with double-Fourier transform of real space correlation function

Lecture 10 - Scattering law's correlation with double-Fourier transform of real space correlation function

Lecture 11 - Correlation function to resolution and accessible(Q,Ãâ€°). Introducing experimental facilities

Lecture 12 - Correlation function to resolution and accessible(Q,Ãâ€°). Introducing experimental facilities

Lecture 13 - Correlation function to resolution and accessible(Q,Ãâ€°). Introducing experimental facilities

Lecture 14 - Correlation function to resolution and accessible(Q,Ãâ€°). Introducing experimental facilities

Lecture 15 - Introducing resolution and components of neutron scattering facilities.

Lecture 16 - Introducing resolution and components of neutron scattering facilities.

Lecture 17 - Continue with neutron scattering set up and its components like collimators, filters, detectors etc

Lecture 18 - Continue with neutron scattering set up and its components like collimators, filters, detectors etc

Lecture 19 - Describe the operation of various kinds of neutron detectors

Lecture 20 - Describe the operation of various kinds of neutron detectors

Lecture 21 - Introducing neutron choppers, velocity selectors and polarizers, some important components of beam tailoring devices

Lecture 22 - Introducing neutron choppers, velocity selectors and polarizers, some important components of beam tailoring devices

Lecture 23 - Neutron polarizers and spin-flippers

Lecture 24 - Neutron polarizers and spin-flippers

Lecture 25 - Diffraction at various length scales at a reactor and at a spallation neutron source

Lecture 26 - Diffraction at various length scales at a reactor and at a spallation neutron source

Lecture 27 - Application of neutron crystallography

Lecture 28 - Application of neutron crystallography

Lecture 29 - Magnetism in solids

Lecture 30 - Magnetism in solids

Lecture 31 - Magnetic interaction in solids and magnetic neutron diffarction

Lecture 32 - Magnetic interaction in solids and magnetic neutron diffarction

Lecture 33 - Magnetic interaction in solids and magnetic neutron diffarction

Lecture 34 - Magnetic neutron diffraction

Lecture 35 - Magnetic neutron diffraction

Lecture 36 - Neutron diffraction from liquid and amorphous systems

Lecture 37 - Neutron diffraction from liquid and amorphous systems

Lecture 38 - Small Angle Neutron Scattering (SANS) for mesoscopic structure

Lecture 39 - Small Angle Neutron Scattering (SANS) for mesoscopic structure

Lecture 40 - Small Angle Neutron Scattering (SANS) for mesoscopic structure

Lecture 41 - Small Angle Neutron Scattering (SANS) for mesoscopic structure

Lecture 42 - SANS for soft condensed matter

Lecture 43 - SANS for soft condensed matter

Lecture 44 - SANS for polymers, biological systems, nanoparticle aggregates, rocks, Superconducting vortex lattice

Lecture 45 - SANS for polymers, biological systems, nanoparticle aggregates, rocks, Superconducting vortex lattice

Lecture 46 - Neutron reflectometry for thin films

Lecture 47 - Neutron reflectometry for thin films

Lecture 48 - Neutron reflectometry for thin films

Lecture 49 - Details formalism to evaluate specular neutron reflectivity and comparison with x-ray reflectometry

Lecture 50 - Details formalism to evaluate specular neutron reflectivity and comparison with x-ray reflectometry

Lecture 51 - Neutron reflectometry data analysis and reflectometers at various sources

Lecture 52 - Neutron reflectometry data analysis and reflectometers at various sources

Lecture 53 - Neutron reflectometry data analysis and reflectometers at various sources

Lecture 54 - Examples of PNR with and without spin analysis and introduction to off-specular reflectometry

Lecture 55 - Examples of PNR with and without spin analysis and introduction to off-specular reflectometry

Lecture 56 - Examples of PNR with and without spin analysis and introduction to off-specular reflectometry

Lecture 57 - Off-specular neutron reflectometry and introduction to inelastic neutron scattering

Lecture 58 - Off-specular neutron reflectometry and introduction to inelastic neutron scattering

Lecture 59 - Off-specular neutron reflectometry and introduction to inelastic neutron scattering

Lecture 60 - Phonon measurements with neutrons

Lecture 61 - Phonon measurements with neutrons

Lecture 62 - Phonon measurements; single crystals

Lecture 63

Lecture 64 - Phonon: Density of States measurements

Lecture 65 - Stochastic dynamics with neutrons

Lecture 66 - Stochastic motion and various types of diffusion

Lecture 67 - Stochastic motion and various types of diffusion

Lecture 68 - Spin echo spectrometer, Summary of the course

Lecture 69 - Spin echo spectrometer, Summary of the course

NPTEL : NOC:Accelerator Physics (Physics)

Co-ordinators : Prof. Rajni Pande, Prof. Amalendu Sharma, Prof. Pitamber Singh

Lecture 1 - Why accelerators

Lecture 2 - Accelerator as a microscope

Lecture 3 - Charging and Discharging of capacitors

Lecture 4 - Charging and Discharging of capacitors (Continued...)

Lecture 5 - Introduction to DC accelerators

Lecture 6 - Cockcroft Walton Accelerator (1929)

Lecture 7 - Van-de-Graaff accelerator and Tandem and Pelletron accelerators

Lecture 8 - Van-de-Graaff accelerator and Tandem and Pelletron accelerators

Lecture 9 - Voltage measurement and stabilisation

Lecture 10 - Voltage measurement and stabilisation

Lecture 11 - Beam energy calibration/measurement

Lecture 12 - Beam energy calibration/measurement

Lecture 13 - Beam focussing using electrostatic and magnetic lenses and beam optics

Lecture 14 - Beam focussing using electrostatic and magnetic lenses and beam optics

Lecture 15 - Beam focussing using electrostatic and magnetic lenses and beam optics

Lecture 16 - Ion Sources

Lecture 17 - Ion Sources

Lecture 18 - Introduction and Basic concepts of linear accelerators

Lecture 19 - Introduction and Basic concepts of linear accelerators

Lecture 20 - RF Acceleration - 1

Lecture 21 - RF Acceleration - 1

Lecture 22 - RF Acceleration - 2

Lecture 23 - RF Acceleration - 2

Lecture 24 - RF Acceleration - 3 - Waveguides and cavities

Lecture 25 - RF Acceleration - 3 - Waveguides and cavities

Lecture 26 - Accelerating structures - Pillbox cavity and DTL

Lecture 27 - Accelerating structures - Pillbox cavity and DTL

Lecture 28 - Accelerating structures - Travelling wave linacs and periodic accelerating structures

Lecture 29 - Accelerating structures - Travelling wave linacs and periodic accelerating structures

Lecture 30 - Superconducting cavities

Lecture 31 - Superconducting cavities

Lecture 32 - Transverse Dynamics - 1

Lecture 33 - Transverse Dynamics - 1

Lecture 34 - Transverse Dynamics - 2

Lecture 35 - Transverse Dynamics - 2

Lecture 36 - Transverse Dynamics - 3

Lecture 37 - Transverse Dynamics - 3

Lecture 38 - Longitudinal Dynamics - 1

Lecture 39 - Longitudinal Dynamics - 1

Lecture 40 - Longitudinal Dynamics - 2

Lecture 41 - Longitudinal Dynamics - 2

Lecture 42 - Radio Frequency Quadrupole

Lecture 43 - Radio Frequency Quadrupole

Lecture 44 - Cyclic accelerators: Some basic principles

Lecture 45 - Cyclic accelerators: Some basic principles

Lecture 46 - About the cyclotron

Lecture 47 - About the cyclotron

Lecture 48 - Microtron

Lecture 49 - Equation of motion, Focusing

Lecture 50 - Equation of motion, Focusing

Lecture 51 - Strong focusing, Edge focusing, AG principle

Lecture 52 - Strong focusing, Edge focusing, AG principle

Lecture 53 - Matrix methods

Lecture 54 - Matrix methods

Lecture 55 - Hill's equation and parameterization - 1

Lecture 56 - Hill's equation and parameterization - 1

Lecture 57 - Hill's equation and parameterization - 2

Lecture 58 - Hill's equation and parameterization - 2

Lecture 59 - Hill's equation and parameterization - 3

Lecture 60 - Hill's equation and parameterization - 3

Lecture 61

Lecture 62

Lecture 63

Lecture 64

Lecture 65

Lecture 66

Lecture 67 - Proton synchrotron for spallation source

Lecture 68 - Proton synchrotron for spallation source

Lecture 69 - Colliders

Lecture 70 - Colliders

Lecture 71 - Laser Plasma accelerators and Accelerator Driven Systems (ADS)

Lecture 72 - Laser Plasma accelerators and Accelerator Driven Systems (ADS)

NPTEL : Electronics (Physics)

Co-ordinators : Prof. D.C. Dube

Lecture 1 - p-n diode

Lecture 2 - p-n Junction/Diode (Continued...)

Lecture 3 - p-n diode (Continued...)

Lecture 4 - Diode Application

Lecture 5 - Transistors

Lecture 6 - Reverse - bias (Continued...)

Lecture 7 - Transistors (Continued...)

Lecture 8 - Transistors (Continued...)

Lecture 9 - Biasing a transistor unit 2 (Continued...)

Lecture 10 - Biasing of transistor

Lecture 11 - H and R Parameters and their use in small amplifiers

Lecture 12 - Small signal amplifiers analysis using H - Parameters

Lecture 13 - Small signal amplifiers analysis using R - Parameters

Lecture 14 - R - analysis (Continued...)

Lecture 15 - Common Collector(CC) amplifier (Continued...)

Lecture 16 - Feedback in amplifiers, Feedback Configurations and multi stage amplifiers

Lecture 17 - Reduction in non-linear distortion

Lecture 18 - Input/Output impedances in negative feedback amplifiers (Continued...)

Lecture 19 - RC Coupled Amplifiers

Lecture 20 - RC Coupled Amplifiers (Continued...)

Lecture 21 - RC Coupled Amplifiers (Continued...)

Lecture 22 - FETs ans MOSFET

Lecture 23 - FETs ans MOSFET (Continued...)

Lecture 24 - Depletion - MOSFET

Lecture 25 - Drain and transfer characteristic of E - MOSFET

Lecture 26 - Self Bias (Continued...) Design Procedure

Lecture 27 - FET/MOSFET Amplifiers and their Analysis

Lecture 28 - CMOS Inverter

Lecture 29 - CMOS Inverter (Continued...)

Lecture 30 - Power Amplifier

Lecture 31 - Power Amplifier (Continued...)

Lecture 32 - Power Amplifier (Continued...)

Lecture 33 - Power Amplifier (Continued...)

Lecture 34 - Differential and Operational Amplifier

Lecture 35 - Differential and Operational Amplifier (Continued...) dc and ac analysis

Lecture 36 - Differential and Operational Amplifier dc and ac analysis (Continued...)

Lecture 37 - Operational Amplifiers

Lecture 38 - Operational amplifiers in open loop (Continued...)

Lecture 39 - Summing Amplifiers

Lecture 40 - Frequency response of an intigration

Lecture 41 - Filters

Lecture 42 - Specification of OP Amplifiers

NPTEL : Plasma Physics: Fundamentals and Applications (Physics)

Co-ordinators : Prof. Vijayshri, Prof. V.K. Tripathi

Lecture 1 - Introduction to Plasmas

Lecture 2 - Plasma Response to fields: Fluid Equations

Lecture 3 - DC Conductivity and Negative Differential Conductivity

Lecture 4 - RF Conductivity of Plasma

Lecture 5 - RF Conductivity of Plasma (Continued...)

Lecture 6 - Hall Effect, Cowling Effect and Cyclotron Resonance Heating

Lecture 7 - Electromagnetic Wave Propagation in Plasma

Lecture 8 - Electromagnetic Wave Propagation in Plasma (Continued...)

Lecture 9 - Electromagnetic Wave Propagation Inhomogeneous Plasma

Lecture 10 - Electrostatic Waves in Plasmas

Lecture 11 - Energy Flow with an Electrostatic Wave

Lecture 12 - Two Stream Instability

Lecture 13 - Relativistic electron Beam- Plasma Interaction

Lecture 14 - Cerenkov Free Electron Laser

Lecture 15 - Free Electron Laser

Lecture 16 - Free Electron Laser: Energy gain

Lecture 17 - Free Electron Laser: Wiggler Tapering and Compton Regime Operation

Lecture 18 - Weibel Instability

Lecture 19 - Rayleigh Taylor Instability

Lecture 20 - Single Particle Motion in Static Magnetic and Electric Fields

Lecture 21 - Plasma Physics Grad B and Curvature Drifts

Lecture 22 - Adiabatic Invariance of Magnetic Moment and Mirror confinement

Lecture 23 - Mirror machine

Lecture 24 - Thermonuclear fusion

Lecture 25 - Tokamak

Lecture 26 - Tokamak operation

Lecture 27 - Auxiliary heating and current drive in tokamak

Lecture 28 - Electromagnetic waves propagation in magnetise plasma

Lecture 29 - Longitudinal electromagnetic wave propagation cutoffs, resonances and faraday rotation

Lecture 30 - Electromagnetic propagation at oblique angles to magnetic field in a plasma

Lecture 31 - Low frequency EM waves magnetized plasma

Lecture 32 - Electrostatic waves in magnetized plasma

Lecture 33 - Ion acoustic, ion cyclotron and magneto sonic waves in magnetized plasma

Lecture 34 - VIasov theory of plasma waves

Lecture 35 - Landau damping and growth of waves

Lecture 36 - Landau damping and growth of waves (Continued...)

Lecture 37 - Anomalous resistivity in a plasma

Lecture 38 - Diffusion in plasma

Lecture 39 - Diffusion in magnetized plasma

Lecture 40 - Surface plasma wave

Lecture 41 - Laser interaction with plasmas embedded with clusters

Lecture 42 - Current trends and epilogue

NPTEL : Quantum Electronics (Physics)

Co-ordinators : Prof. K. Thyagarajan

Lecture 1 - Introduction

Lecture 2 - Anisotropic Media

Lecture 3 - Anisotropic Media (Continued...)

Lecture 4 - Anisotropic Media (Continued...)

Lecture 5 - Nonlinear optical effects and nonlinear polarization

Lecture 6 - Non - Linear Optics (Continued...)

Lecture 7 - Non - Linear Optics (Continued...)

Lecture 8 - Non - Linear Optics (Continued...)

Lecture 9 - Non - Linear Optics (Continued...)

Lecture 10 - Non - Linear Optics - Quasi Phase Matching

Lecture 11 - Non - Linear Optics

Lecture 12 - Non Linear Optics (Continued...)

Lecture 13 - Non Linear Optics (Continued...)

Lecture 14 - Non Linear Optics (Continued...)

Lecture 15 - Non Linear Optics (Continued...)

Lecture 16 - Non Linear Optics (Continued...)

Lecture 17 - Non Linear Optics (Continued...)

Lecture 18 - Non Linear Optics (Continued...)

Lecture 19 - Non Linear Optics (Continued...)

Lecture 20 - Third Order Non - Linear Effects

Lecture 21 - Third Order Non - Linear Effects (Continued...)

Lecture 22 - Third Order Non - Linear Effects (Continued...)

Lecture 23 - Third Order Non - Linear Effects (Continued...)

Lecture 24 - Review of Quantum Mechanics

Lecture 25 - Review of Quantum Mechanics (Continued...)

Lecture 26 - Review of Quantum Mechanics (Continued...)

Lecture 27 - Quantization of EM Field

Lecture 28 - Quantization of EM Field (Continued...)

Lecture 29 - Quantization of EM Field (Continued...)

Lecture 30 - Quantum States of EM Field

Lecture 31 - Quantum States of EM Field (Continued...)

Lecture 32 - Quantization of EM Field (Continued...)

Lecture 33 - Quantization of EM Field (Continued...)

Lecture 34 - Quantization of EM Field (Continued...)

Lecture 35 - Quantization of EM Field (Continued...)

Lecture 36 - Quantization of EM Field (Continued...)

Lecture 37 - Beam Splitter

Lecture 38 - Beam Splitter (Continued...)

Lecture 39 - Beam Splitter and Balanced Homodyning

Lecture 40 - Balanced Homodyning

Lecture 41 - Quantum Picture of Parametric Down Conversion

Lecture 42 - Questions

NPTEL : Quantum Mechanics and Applications (Physics)

Co-ordinators : Prof. Ajoy Ghatak

Lecture 1 - Basic Quantum Mechanics I: Wave Particle Duality

Lecture 2 - Basic Quantum Mechanics II: The Schrodinger Equation and The Dirac Delta Function

Lecture 3 - Dirac Delta Function & Fourier Transforms

Lecture 4 - The Free Particle

Lecture 5 - Physical Interpretation of The Wave Function

Lecture 6 - Expectation Values & The Uncertainty Principle

Lecture 7 - The Free Particle (Continued...)

Lecture 8 - Interference Experiment & The Particle in a Box Problem

Lecture 9 - On Eigen Values and Eigen Functions of the 1 Dimensional Schrodinger Equation

Lecture 10 - Linear Harmonic Oscillator

Lecture 11 - Linear Harmonic Oscillator (Continued...1)

Lecture 12 - Linear Harmonic Oscillator (Continued...2)

Lecture 13 - Linear Harmonic Oscillator (Continued...3)

Lecture 14 - Tunneling through a Barrier

Lecture 15 - The 1-Dimensional Potential Wall & Particle in a Box

Lecture 16 - Particle in a Box and Density of States

Lecture 17 - The Angular Momentum Problem

Lecture 18 - The Angular Momentum Problem (Continued...)

Lecture 19 - The Hydrogen Atom Problem

Lecture 20 - The Two Body Problem

Lecture 21 - TheTwo Body Problem: The Hydrogen atom, The Deutron and The Diatomic Molecule

Lecture 22 - Two Body Problem: The Diatomic molecule (Continued...) and the 3 Dimensional Oscillator

Lecture 23 - 3d Oscillator & Dirac's Bra and Ket Algebra

Lecture 24 - Diracâ€™s Bra and Ket Algebra

Lecture 25 - Diracâ€™s Bra and Ket Algebra : The Linear Harmonic Oscillator

Lecture 26 - The Linear Harmonic Oscillator using Bra and Ket Algebra (Continued...)

Lecture 27 - The Linear Harmonic Oscillator: Coherent State and Relationship with the Classical Oscillator

Lecture 28 - Coherent State and Relationship with the Classical Oscillator

Lecture 29 - Angular Momentum Problem using Operator Algebra

Lecture 30 - Angular Momentum Problem (Continued...)

Lecture 31 - Pauli Spin Matrices and The Stern Gerlach Experiment

Lecture 32 - The Larmor Precession and NMR Spherical Harmonics using Operator Algebra

Lecture 33 - Addition of Angular Momentum: Clebsch Gordon Coefficient

Lecture 34 - Clebsch Gordon Coefficients

Lecture 35 - The JWKB Approximation

Lecture 36 - The JWKB Approximation: Use of Connection Formulae to solve Eigen value Problems.

Lecture 37 - The JWKB Approximation: Use of Connection Formulae to calculate Tunneling Probability.

Lecture 38 - The JWKB Approximation: Tunneling Probability Calculations and Applications.

Lecture 39 - The JWKB Approximation: Justification of the Connection Formulae

Lecture 40 - Time Independent Perturbation Theory

Lecture 41 - Time Independent Perturbation Theory (Continued...1)

Lecture 42 - Time Independent Perturbation Theory (Continued...2)

NPTEL : Semiconductor Optoelectronics (Physics)

Co-ordinators : Prof. M.R. Shenoy

Lecture 1 - Context and Scope of the Course

Lecture 2 - Energy Bands in Solids

Lecture 3 - E-K Diagram

Lecture 4 - The Density of States

Lecture 5 - The Density of States (Continued...)

Lecture 6 - The Density of states in a Quantum well Structure

Lecture 7 - Occupation Probability and Carrier Concentration

Lecture 8 - Carrier Concentration and Fermi Level

Lecture 9 - Quasi Fermi Levels

Lecture 10 - Semiconductor Materials

Lecture 11 - Semiconductor Hetrostructures-Lattice-Matched Layers

Lecture 12 - Strained -Layer Epitaxy and Quantum Well Structures

Lecture 13 - Bandgap Engineering

Lecture 14 - Hetrostructure p-n junctions

Lecture 15 - Schottky Junction and Ohmic Contacts

Lecture 16 - Fabrication of Heterostructure Devices

Lecture 17 - Interaction od Photons with Electrons and Holes in a Semiconductor

Lecture 18 - Optical Joint Density of States

Lecture 19 - Rates of Emission and Absorption

Lecture 20 - Amplication by Stimulated Emission

Lecture 21 - The Semiconductor (Laser) Amplifier

Lecture 22 - Absorption Spectrum of Semiconductor

Lecture 23 - Gain and Absorption Spectrum of Quantum Well Structures

Lecture 24 - Electro-absorption Modulator

Lecture 25 - Electro-absorption Modulator - II Device Configuration

Lecture 26 - Mid-Term Revision Question and Discussion

Lecture 27 - Part - III Semiconductor Light Sources

Lecture 28 - Light Emitting Diode-I Device Structure and Parameters

Lecture 29 - Light Emitting Diode-II Device Chracteristics

Lecture 30 - Light Emitting Diode-III Output Characteristics

Lecture 31 - Light Emitting Diode-IV Modulation Bandwidth

Lecture 32 - Light Emitting Diode-V materials and Applications

Lecture 33 - Laser Basics

Lecture 34 - Semiconductor Laser-I Device Structure

Lecture 35 - Semiconductor Laser-II Output Characteristics

Lecture 36 - Semiconductor Laser-III Single Frequency Lasers

Lecture 37 - Vertical Cavity Surface Emitting Laser (VCSEL)

Lecture 38 - Quantum Well Laser

Lecture 39 - Practical Laser Diodes and Handling

Lecture 40 - General Characteristics of Photodetectors

Lecture 41 - Responsivity and Impulse Response

Lecture 42 - Photoconductors

Lecture 43 - Semiconductor Photo-Diodes

Lecture 44 - Semiconductor Photo-Diodes-II : APD

Lecture 45 - Other Photodectors

Lecture 46 - Photonic Integrated Circuits

NPTEL : NOC:Semiconductor Optoelectronics (Physics)

Co-ordinators : Prof. M. R. Shenoy

Lecture 1 - Context, Scope and Contents of the Course

Lecture 2 - Energy Bands in Solids

Lecture 3 - E-k Diagram - The Band Structure

Lecture 4 - The Density of States

Lecture 5 - The Density of States Ï(k), Ï(E)

Lecture 6 - Density of States in a Quantum Well Structure

Lecture 7 - Occupation Probability and Carrier Concentration

Lecture 8 - Carrier Concentration and Fermi Level

Lecture 9 - Quasi Fermi Levels

Lecture 10 - Semiconductor Materials

Lecture 11 - Semiconductor Heterostructures-Lattice-Matched Layers

Lecture 12 - Strained-Layer Epitaxy and Quantum Well Structures

Lecture 13 - Bandgap Engineering

Lecture 14 - Heterostructure p-n junctions

Lecture 15 - Schottky Junctions and Ohmic Contacts

Lecture 16 - Fabrication of Heterostructure Devices

Lecture 17 - Interaction of Photons with Electrons and Holes in a Semiconductor

Lecture 18 - Optical Joint Density of States, and Probabilities of Emission and Absorption

Lecture 19 - Rates of Emission and Absorption

Lecture 20 - Amplification by Stimulated Emission

Lecture 21 - The Semiconductor (Laser) Amplifier

Lecture 22 - Absorption Spectrum of Semiconductors

Lecture 23 - Gain and Absorption Spectrum of Quantum Well Structures

Lecture 24 - Electro-absorption Modulator-I Principle of Operation

Lecture 25 - Electro-absorption Modulator-II Device Configuration

Lecture 26 - Injuction Electroluminescence

Lecture 27 - Light emitting diode-1 Device structure and parameters

Lecture 28 - Light emitting diode-II Device Characteristics

Lecture 29 - Light emitting diode-III Output Characteristics

Lecture 30 - Light emitting diode-IV Modulation Bandwidth

Lecture 31 - Light emitting diode-V Material and Applications

Lecture 32 - Laser Basics

Lecture 33 - Semiconductor Laser-I Device Structure

Lecture 34 - Semiconductor Laser-II Output Characteristics

Lecture 35 - Semiconductor Laser-III Single Frequency Lasers

Lecture 36 - Vertical cavity Surface Emitting Laser (VCSEL)

Lecture 37 - Quantum Well Laser

Lecture 38 - Practical Laser Diodes and Handling

Lecture 39 - General Characteristics of Photodetectors

Lecture 40 - Responsivity and Impulse Response

Lecture 41 - Photoconductors

Lecture 42 - Semiconductor Photo-Diodes-I: PIN Diode

Lecture 43 - Semiconductor Photo-Diodes-II: APD

Lecture 44 - Other Photodetectors

Lecture 45 - Photonic Integrated Circuits

NPTEL : NOC:Introduction to LASER (Physics)

Co-ordinators : Unknown

Lecture 1 - General Introduction, Scope and Contents

Lecture 2 - Interaction of Radiation with Matter

Lecture 3 - The Einstein Coefficients

Lecture 4 - Atomic Lineshape Function, g(Î½)

Lecture 5 - Amplification by Stimulated Emission

Lecture 6 - Line Broadening Mechanisms - 1

Lecture 7 - Line Broadening Mechanisms - 2

Lecture 8 - Laser Rate Equations: 2-Level System

Lecture 9 - Laser Rate Equations: 3-Level System

Lecture 10 - Laser Rate Equations: 4-Level System

Lecture 11 - Laser Amplifiers

Lecture 12 - Er-Doped Fiber Amplifier

Lecture 13 - Resonance Frequencies

Lecture 14 - Spectral Response of an Optical Resonator

Lecture 15 - Resonator Loss and Cavity Lifetime

Lecture 16 - Spherical Mirror Resonators

Lecture 17 - Resonator Stability Condition

Lecture 18 - Ray Paths in Spherical Mirror Resonators

Lecture 19 - Tranverse Modes of a Spherical Mirror Resonator

Lecture 20 - Gaussian Mode of the Spherical Mirror Resonator

Lecture 21 - Longitudinal Modes of a Spherical Mirror Resonator

Lecture 22 - Laser Oscillations and The Threshold Condition

Lecture 23 - Spectral Hole Burning

Lecture 24 - Variation of Laser Power around Threshold

Lecture 25 - Optimum Output Coupling

Lecture 26 - Laser Output Characteristics

Lecture 27 - Laser Beam Properties

Lecture 28 - Ultimate Linewidth of a Laser

Lecture 29 - Pulsed Lasers

Lecture 30 - Q-Switching

Lecture 31 - Mode Locking

Lecture 32 - Methods of Mode Locking

Lecture 33 - Some Common Lasers

Lecture 34 - Fiber Lasers

Lecture 35 - Semiconductor Lasers

Lecture 36 - Lasers and Laser Amplifiers in Optical Fiber Communication

Lecture 37 - Lasers in Nonlinear Optics

Lecture 38 - Laser Safety

NPTEL : NOC:Nuclear and Particle Physics (Physics)

Co-ordinators : Dr. P. Poulose

Lecture 1 - Introduction

Lecture 2 - Nuclear Properties

Lecture 3 - Properties of Nuclear Force

Lecture 4 - Deuteron

Lecture 5 - Nucleons Scattering

Lecture 6 - Nuclear Models - I

Lecture 7 - Nuclear Models - II

Lecture 8 - Radioactive Decay - General Properties

Lecture 9 - Nuclear Alpha Decay

Lecture 10 - Nuclear Beta decay

Lecture 11 - Beta-decay details

Lecture 12 - Gamma decay

Lecture 13 - Nuclear Scattering - Preliminaries

Lecture 14 - Types of Reactions

Lecture 15 - Particle Accelerators - I

Lecture 16 - Particle Accelerators - II

Lecture 17 - Detectors

Lecture 18 - Elementary Particles - Introduction and Overview

Lecture 19 - Quark Model - I

Lecture 20 - Quark Model - II

Lecture 21 - Quark Model - III

Lecture 22 - Structure of the Hadron - Nucleus

Lecture 23 - Structure of the Hadron - Proton

Lecture 24 - Deep Inelastic Scattering

Lecture 25 - Relativistic Kinematics

Lecture 26 - Klein-Gordon Equation

Lecture 27 - Interaction of charged scalar with EM field

Lecture 28 - Relativistic Electrodynamics

Lecture 29 - Quantum Electrodynamics

Lecture 30 - Interaction between charged scalars

Lecture 31 - Dirac Equation - 1

Lecture 32 - Dirac Equation - 2

Lecture 33 - Interacting charged fermions - 1

Lecture 34 - Interacting charged fermions - 2

Lecture 35 - Interacting charged fermions - 3

Lecture 36 - Scattering Cross Section Revisited - 1

Lecture 37 - Scattering Cross Section Revisited - 2

Lecture 38 - Weak Interactions - 1

Lecture 39 - Weak Interactions - 2

Lecture 40 - Lagrangian Framework

Lecture 41 - Gauge Symmetry - U(1)

Lecture 42 - Electroweak Theory - 1

Lecture 43 - Electroweak Theory - 2

Lecture 44 - SSB and the Higgs Mechanism

NPTEL : NOC:Advanced Condensed Matter Physics (Physics)

Co-ordinators : Dr. Saurabh Basu

Lecture 1 - Propagators - I

Lecture 2 - Propagators - II

Lecture 3 - Second quantization - I

Lecture 4 - Second quantization - II

Lecture 5 - Second quantized Hamiltonian

Lecture 6 - Tight Binding Hamiltonian, Hubbard model

Lecture 7 - Magnetism

Lecture 8 - Singlet and Triplet State: Magnetic Hamiltonian

Lecture 9 - Antiferromagnetism in Hubbard model

Lecture 10 - Green's function and representations in quantum mechanics

Lecture 11 - S matrix and free electron Green's function

Lecture 12 - Wick's theorem and normal ordering

Lecture 13 - Green's function and Feynman diagrams

Lecture 14 - Feynman diagram

Lecture 15 - phonon Green' function and Hartree Fock approaximation

Lecture 16 - Finite temperature Green's function and Matsubara frequencies

Lecture 17 - Dyson's equation and disorder in electronic systems

Lecture 18 - Introduction to electrodynamics, Meissner effect

Lecture 19 - London penetration depth, Type I and II superconductors

Lecture 20 - Cooper's problem, BCS gap equation

Lecture 21 - BCS theory, Transition temperature

Lecture 22 - Ginzburg Landau Theory, Coherence length and penetration depth

Lecture 23 - Quantum Hall Effect

Lecture 24 - Spin Hall effect, 2D topological insulator

Lecture 25 - Bose-Einstein condensation

NPTEL : NOC:Advanced Quantum Mechanics with Applications (Physics)

Co-ordinators : Dr. Saurabh Basu

Lecture 1 - Introduction, Postulates of Quantum Mechanics

Lecture 2 - Stern Gerlach Experiment, Spin Quantization, Young's Double Slit Experiment

Lecture 3 - The Mathematical Formalism of Quantum Mechanics, Uncertainty Principle

Lecture 4 - The Density Matrix Formalism, Expectation values of Operators

Lecture 5 - Qunatum Harmonic Oscillator, Creation and annihilation Operators

Lecture 6 - Coherent States and their Properties

Lecture 7 - Applications of Coherent States, squeezed states

Lecture 8 - Symmetries and Conservational Principles in Quantum Mechanics

Lecture 9 - Rotation Operator and Invariance of Angular Momentum, Parity

Lecture 10 - Spherically Symmetric System and Applications to quantum dots

Lecture 11 - Spin Angular Momentum, Addition of Angular Momentum, Clebsch gordan coefficients

Lecture 12 - Magnetic Hamiltonian, Heisenberg Model

Lecture 13 - Nuclear Magnetic Resonance (NMR)

Lecture 14 - Applications of NMR, time evolution of Magnetic Moments

Lecture 15 - Introduction to Quantum Computing

Lecture 16 - Qubits,EPR Paradox

Lecture 17 - Quantum Entanglement (QE)

Lecture 18 - Teleportation, Quantum Teleportation for one spin

Lecture 19 - Entangled state for two spins

Lecture 20 - Quantum Gates, Walsh Hadamard Transportation, No cloning theorem

Lecture 21 - Perturbation Theory

Lecture 22 - Stark Effect: First order in ground state

Lecture 23 - Stark Effect: Second order in ground state

Lecture 24 - Variational method, Variation of constants, Upper bound on ground state energy

Lecture 25 - Application of Variational method,Hydrogen,Helium atom,Comparison with perturbation theory

Lecture 26 - WKB Approximation, Bohr Sommerfeld quantization condition

Lecture 27 - Summary of Approximation methods, Time dependent Perturbation Theory

Lecture 28 - Time dependent Perturbation Theory, Fermi's Golden rule, Einstein's A and B coefficients

Lecture 29 - Scattering Theory

Lecture 30 - Linear Response Theory: Derivation of Kubo formula

Lecture 31 - Quantum Dynamics: Two level system

Lecture 32 - Examples

Lecture 33 - Interaction of Radiation with matter, Landau levels

NPTEL : NOC:A Brief Course on Superconductivity (Physics)

Co-ordinators : Dr. Saurabh Basu

Lecture 1 - Historical introduction of superconductivity

Lecture 2 - Meissner effect, Electrodynamics of Superconductors, coherence length and penetration depth

Lecture 3 - Electron Pairing, Basics of BCS Theory

Lecture 4 - BCS ground state, variational calculation, expression for Tc

Lecture 5 - Order parameter, Free energy functional, Ginzburg-Landau (GL) Theory, GL equations

Lecture 6 - London Equations, Flux quantization

Lecture 7 - Thermodynamic properties of superconductors, specific heat

Lecture 8 - Experimental determination of Superconducting properties

Lecture 9 - Unconventional Superconductivity, Uemura plot, High-Tc superconductivity, d-wave pairing, ARPES

Lecture 10 - Singlet and triplet states of two s =1/2, magnetic Hamiltonian

Lecture 11 - t-J model, discrete symmetry groups, example square lattice

Lecture 12 - Cuprate Superconductors, electron vs hole doped superconductors

Lecture 13 - Non-Fermi Liquid Theory, Adiabatic continuity

Lecture 14 - Quasiparticle lifetime, breakdown of Fermi Liquid Theory in cuprate superconductors

Lecture 15 - Josephson junctions, Josephson equations

Lecture 16 - Numerical Differentiation

Lecture 17 - Richardson's extrapolation

NPTEL : NOC:Introduction to Statistical Mechanics (Physics)

Co-ordinators : Prof.Girish S. Setlur

Lecture 1 - Prerequisites and Introduction

Lecture 2 - Combinatorics and Entropy

Lecture 3 - Method of steepest descent

Lecture 4 - Bose and Fermi gases

Lecture 5 - Maxwell Boltzmann distribution

Lecture 6 - Thermodynamic potentials

Lecture 7 - Legendre transformation

Lecture 8 - Specific heats of quantum gases

Lecture 9 - Low and high temperature equations of state

Lecture 10 - Chandrasekhar Limit

Lecture 11 - Radiation thermodynamics

Lecture 12 - Thermodyamics of black holes

Lecture 13 - Van der Waals fluid

Lecture 14 - Landau Diamagnetism

Lecture 15 - Relations between ensembles and Pauli paramagnetism

Lecture 16 - Ferromagnetism

Lecture 17 - Correlations and Mean Field

Lecture 18 - Theories of Specific Heat of Solids

Lecture 19 - Tutorial - I

Lecture 20 - Tutorial - II

Lecture 21 - Tutorial - III

Lecture 22 - Tutorial - IV

Lecture 23 - Tutorial - V

Lecture 24 - RG method Ising model

Lecture 25 - Introduction to Second Quantisation: Harmonic Oscillator

Lecture 26 - Quantum Theory of EM Field - I

Lecture 27 - Quantum Theory of EM Field - II

Lecture 28 - Creation and Annihilation in Fock Space - I

Lecture 29 - Creation and Annihilation in Fock Space - II

Lecture 30 - Green functions in many particle systems

Lecture 31 - Second quantised hamiltonians

Lecture 32 - Current algebra

NPTEL : NOC:Numerical Methods and Simulation Techniques for Scientists and Engineers (Physics)

Co-ordinators : Dr. Saurabh Basu

Lecture 1 - Error analysis and estimates, significant digits, convergence

Lecture 2 - Roots of Non-linear equations, Bisection method

Lecture 3 - Newton Raphson method, Secant method

Lecture 4 - Newton Raphson Method

Lecture 5 - Newton Raphson Method (example), Curve fitting and interpolation of data

Lecture 6 - Newtonâ€™s interpolation formula, statistical interpolation of data

Lecture 7 - Linear and Polynomial regression

Lecture 8 - Numerical differentiation

Lecture 9 - Numerical differentiation, Error analysis

Lecture 10 - Numerical integration, Trapezoidal rule

Lecture 11 - Simpsonâ€™s 1/3rd rule

Lecture 12 - Simpsonâ€™s 1/3rd rule, Gaussian integration

Lecture 13 - Ordinary Differential equations

Lecture 14 - Solution of differential equation, Taylor series and Euler method

Lecture 15 - Heunâ€™s method

Lecture 16 - Runge Kutta method

Lecture 17 - Examples of differential equation: Heat conduction equation

Lecture 18 - Introduction to Monte Carlo technique

Lecture 19 - Details of the Monte Carlo method

Lecture 20 - Importance sampling

Lecture 21 - Applications: Ising model

Lecture 22 - Introduction to Molecular Dynamics

Lecture 23 - Verlet algorithm

Lecture 24 - Applications of Molecular dynamics

NPTEL : NOC:Theoretical Mechanics (Physics)

Co-ordinators : Dr. Charudatt Y. Kadolkar

Lecture 1 - Introduction, Constraints

Lecture 2 - Generalized Coordinates, Configuration Space

Lecture 3 - Principle of Virtual Work

Lecture 4 - D'Alembert's Principle

Lecture 5 - Lagrange's Equations

Lecture 6 - Hamilton's Principle

Lecture 7 - Variational Calculus, Lagrange's Equations

Lecture 8 - Conservation Laws and Symmetries

Lecture 9 - Velocity Dependent Potentials, Non-holonomic Constraints

Lecture 10 - An Example: Hoop on a ramp

Lecture 11 - Phase Space

Lecture 12 - Legendre Transforms

Lecture 13 - Hamilton's Equations

Lecture 14 - Conservation Laws, Routh's procedure

Lecture 15 - An Example:Bead on Spinning Ring

Lecture 16 - Canonical Transformations

Lecture 17 - Symplectic Condition

Lecture 18 - Canonical Invariants, Harmonic Oscillator

Lecture 19 - Poisson Bracket Formulation

Lecture 20 - Infinitesimal Canonical Transformations

Lecture 21 - Symmetry Groups of Mechanical Systems

Lecture 22 - Hamilton Jacobi Theory

Lecture 23 - Action-Angle Variables

Lecture 24 - Separation of Variables and Examples

Lecture 25 - Continuous Systems and Fields

Lecture 26 - The Stress-Energy Tensor

Lecture 27 - Hamiltonian Formulation

NPTEL : NOC:Solar Energy Engineering and Technology (Physics)

Co-ordinators : Prof. Pankaj Kalita

Lecture 1 - Energy Scenarios

Lecture 2 - Overview of solar energy conversion devices and applications

Lecture 3 - Physics of propagation of solar radiation from the sun to the earth

Lecture 4 - Solar radiation and sunshine measuring instruments

Lecture 5 - Geometry, angles and measurement - I

Lecture 6 - Geometry, angles and measurement - II

Lecture 7 - Estimation of radiation under different climatic conditions

Lecture 8 - Estimation of radiation in horizontal and inclined surface

Lecture 9 - Fundamentals of PV cells

Lecture 10 - Semiconductor physics

Lecture 11 - Performance characterization of PV cells

Lecture 12 - Photovoltaic modules and arrays

Lecture 13 - Components of standalone PV system

Lecture 14 - Design of standalone PV system

Lecture 15 - Functioning and components of PV system

Lecture 16 - Design of a grid connected PV system

Lecture 17 - Performance analysis of a grid connected PV system

Lecture 18 - Basics of thermal collectors

Lecture 19 - Basics of heat transfer

Lecture 20 - Solar collector losses and loss estimation

Lecture 21 - Analysis of flat plate collector

Lecture 22 - Influence of various parameters on the performance of LFPC

Lecture 23 - Testing and application of LFPC

Lecture 24 - Basics and performance analysis of solar air heaters

Lecture 25 - Testing and application of solar air heaters

Lecture 26 - Fundamentals of concentrating collectors

Lecture 27 - Concentrating collector technologies and working principle

Lecture 28 - Tutorial: Concentrating Collector

Lecture 29 - Sensible heat, latent heat and thermochemical energy storage

Lecture 30 - Solar pond

Lecture 31 - Tutorial: Solar pond power plant design

Lecture 32 - Emerging technologies

Lecture 33 - Solar energy applications in cooking, desalination, refrigeration and electricity generation

Lecture 34 - Tutorial: COP of VARS and performance analysis of PVT collector

NPTEL : NOC:Quantum Technology and Quantum Phenomena in Macroscopic Systems (Physics)

Co-ordinators : Prof. Amarendra Kumar Sarma

Lecture 1 - Introduction and Basic Quantum Mechanics

Lecture 2 - Problem Solving Session - 1

Lecture 3 - Two-level System - I

Lecture 4 - Bloch Sphere: Supplementary Lectuer - I

Lecture 5 - Two-level Systems - II

Lecture 6 - Two-level Systems - III

Lecture 7 - Dressed States;Introduction to Density Matrix

Lecture 8 - Problem Solving Session - 2

Lecture 9 - Density-matrix formalism

Lecture 10 - Quantum Harmonic Oscillators

Lecture 11 - Quantization of Electromagnetic Radiation

Lecture 12 - Quantization of Standing EM Waves;Quantum States of Radiation Fields - I

Lecture 13 - Problem Solving Session - 3

Lecture 14 - Quantum States of Radiation Fields-II: Squeezed States

Lecture 15 - Problem Solving Session - 4

Lecture 16 - Introduction and Basics of Superconductivity

Lecture 17 - Cooper Pair Box as TLS;Introduction to Transmission Line

Lecture 18 - Quantization of Transmission Line - I

Lecture 19 - Quantization of Transmission Line - II

Lecture 20 - The Jaynes Cummings Model - I

Lecture 21 - Problem Solving Session - 5

Lecture 22 - The Jaynes Cummings Model - II

Lecture 23 - Josephson Junctions - I

Lecture 24 - Josephson Junctions - II

Lecture 25 - Problem Solving Session - 6

Lecture 26 - Transmon;Introduction to Dissipation in Quantum Systems

Lecture 27 - Quantum Master Equation

Lecture 28 - Pure dephasing and Dissipative Bloch Equations

Lecture 29 - Derivation of Fermi-Golden Rule

Lecture 30 - Introduction to Cavity Optomechanics;Fabry-Perot Cavity

Lecture 31 - Cavity Optomechanics: Basic Physics - I

Lecture 32 - Problem Solving Session - 7

Lecture 33 - Cavity Optomechanics: Basic Physics - II

Lecture 34 - Classical Regime - I

Lecture 35 - Classical Regime - II; Classical Langevin Equation

Lecture 36 - Problem Solving Session - 8

Lecture 37 - Langevin Equation

Lecture 38 - Quantum Langevin Noise

Lecture 39 - Problem Solving Session - 9

Lecture 40 - Input-Output Relation

Lecture 41 - Cavity Quantum Optomechanics

Lecture 42 - Linearized Cavity Optomechanics; Ground state cooling

Lecture 43 - Normal-Mode Splitting

Lecture 44 - Quantum Optomechanics: Squeezed States

NPTEL : NOC:Dynamics of Classical and Quantum Fields (Physics)

Co-ordinators : Prof. Girish S. Setlur

Lecture 1 - Introduction

Lecture 2 - Lagrangian Formalism

Lecture 3 - Hamiltonian Mechanics

Lecture 4 - Flows and Symmetries

Lecture 5 - Examples of Continuum Systems

Lecture 6 - Symmetries and Noether's Theorem

Lecture 7 - Dynamical Symmetries

Lecture 8 - Symmetries in Field Theories

Lecture 9 - The Relativistic Electromagnetic Field

Lecture 10 - Stress-Energy (Energy-Momentum) Tensor

Lecture 11 - Green's Theorem and Green's Functions

Lecture 12 - Diffraction Theory

Lecture 13 - Introduction to Elasticity Theory

Lecture 14 - Solution of the rubber band problem

Lecture 15 - The Stress Function Method

Lecture 16 - Strain Energy

Lecture 17 - The Euler Equation

Lecture 18 - Bernoulli's Principle

Lecture 19 - Matter, Momentum and Energy Transport

Lecture 20 - Stokes' Drag - I

Lecture 21 - Stokes' Drag - II

Lecture 22 - Towards Quantum Fields

Lecture 23 - Right and Left Movers

Lecture 24 - Functional Integration - I

Lecture 25 - Functional Integration - II

Lecture 26 - Perturbation theory

Lecture 27 - Quantum Mechanics using Lagrangians

Lecture 28 - Path Integrals - Formalism

Lecture 29 - Path Integrals - Free particles

Lecture 30 - Path Integrals - Harmonic oscillator

Lecture 31 - Creation and annihilation operators - Excitations

Lecture 32 - Creation and annihilation operators - Photons

Lecture 33 - Creation and annihilation operators - Many-body physics

Lecture 34 - Particle and Hole Green functions

Lecture 35 - Current Algebra

Lecture 36 - Tight Binding Models - I

Lecture 37 - Tight Binding Models - II

Lecture 38 - Order Parameters

Lecture 39 - Schrieffer Wolff Transformation

Lecture 40 - Matsubara Green functions - I

Lecture 41 - Matsubara Green functions - II

Lecture 42 - Self Energy and Spectral Functions

Lecture 43 - S-Matrix Perturbation Theory

Lecture 44 - Keldysh Contour

Lecture 45 - Bosonic Coherent States

Lecture 46 - Fermionic Coherent States

Lecture 47 - Nonlocal particle hole operators - Bosons

Lecture 48 - Nonlocal particle hole operators - Fermions

NPTEL : NOC:Quantum Hall Effects (Physics)

Co-ordinators : Prof. Saurabh Basu

Lecture 1 - Conductance in Nanostructures

Lecture 2 - S-Matrix, Reflection and Transmission

Lecture 3 - Introduction to Classical and Quantum Hall Effect

Lecture 4 - Quantum Hall Effect

Lecture 5 - Landau Levels

Lecture 6 - Degenracy of Landau levels

Lecture 7 - Shubnikov de Haas Oscillations

Lecture 8 - Kubo Formula

Lecture 9 - Symmetric gauge

Lecture 10 - Tight binding model, Hofstadter Butterfly

Lecture 11 - Topological Invariant, Chern number

Lecture 12 - Electronic structure of Graphene

Lecture 13 - Low energy Dispersion

Lecture 14 - Dirac Hamiltonian, Hofstadter Butterfly

Lecture 15 - QHE, Landau Levels

Lecture 16 - Properties of Spin angular Momentum, Spin Hall Effect

Lecture 17 - Quantum spin Hall insulator, Kene-Mele Model

Lecture 18 - Kene-Mele Model

Lecture 19 - Landau gauge in fractional quantum Hall effect

Lecture 20 - Laughlin States, Properties

Lecture 21 - Plasma analogy

Lecture 22 - Composite Fermions, Hierarchy

NPTEL : NOC:Quantum Entanglement: Fundamentals, Measures and Applications (Physics)

Co-ordinators : Prof. Amarendra Kumar Sarma

Lecture 1 - Introduction

Lecture 2 - Review of Quantum Mechanics

Lecture 3 - Mathematical Tools: Density Matrix - Part 1

Lecture 4 - Mathematical Tools: Density Matrix - Part 2

Lecture 5 - Problem solving session - 1

Lecture 6 - Basic Technical Introduction to Quantum Entanglement

Lecture 7 - Schmidt Decomposition Method

Lecture 8 - The EPR Paradox and Bell Inequalities

Lecture 9 - Problem solving session - 2

Lecture 10 - Quantum Measurements

Lecture 11 - Properties of Quantum Entanglement

Lecture 12 - Quantum Entanglement Measures - I

Lecture 13 - Problem solving session - 3

Lecture 14 - Quantum Entanglement Measures - II

Lecture 15 - Applications of Quantum Entanglement - I

Lecture 16 - Applications of Quantum Entanglement - II

Lecture 17 - Problem solving session - 4

NPTEL : NOC:Topology and Condensed Matter Physics (Physics)

Co-ordinators : Prof. Saurabh Basu

Lecture 1 - Introduction to Topology

Lecture 2 - Topological invariant, Berry phase

Lecture 3 - Second quantization

Lecture 4 - Ten Fold Classification

Lecture 5 - Symmetries and SSH - model

Lecture 6 - SSH - model, Introduction to superconductivity

Lecture 7 - Kitaev model

Lecture 8 - Introduction to Classical and Quantum Hall effect

Lecture 9 - Quantum Hall Effect

Lecture 10 - Landau Levels

Lecture 11 - Properties of Landau Levels

Lecture 12 - Edge modes of Landau levels, Incompressibility of Quantum Hall States

Lecture 13 - Kubo formula

Lecture 14 - Hall quantization and Topological invariant

Lecture 15 - Electronic structure of Graphene

Lecture 16 - Symmetries and QHE in Graphene

Lecture 17 - Haldane model

Lecture 18 - Anomalous quantum Hall effect in Haldane model

Lecture 19 - Introduction of spin Hall effect

Lecture 20 - Spin current, quantum spin Hall effect

Lecture 21 - Quantum spin Hall insulator, Kane Mele model

Lecture 22 - Kane Mele model with Rashba spin-orbit coupling, spin Hall conductivity

Lecture 23 - Symmetric gauge in FQHE

Lecture 24 - Laughlin States

Lecture 25 - Plasma analogy

Lecture 26 - Composite Fermions, Hierarchy picture

Lecture 27 - Topological Consideration of FQHE

Lecture 28 - 3D Topological Insulators

NPTEL : NOC:Statistical Physics of Non-Interacting and Interacting Systems (Physics)

Co-ordinators : Prof. Saurabh Basu

Lecture 1 - Review of Thermodynamics

Lecture 2 - Laws of Thermodynamics, Entropy

Lecture 3 - Maxwell's relations, velocity distribution

Lecture 4 - Thermodynamic Potentials

Lecture 5 - Binomial expansion, Random Walk

Lecture 6 - Ensemble Theory, Micro and Macrostates and Liouvilles's Theorem

Lecture 7 - Ergodic Hypothesis, Phase Space

Lecture 8 - Microcanonical Ensemble and Its Applications

Lecture 9 - Canonical Ensemble, Parition Function, Central Limit Theorem

Lecture 10 - Applications of Canonical Ensemble

Lecture 11 - Bounded System, Negative Temparature, Specific Heat of Solids

Lecture 12 - Virial Theorem, Grand Canonical Distribution

Lecture 13 - Grand Canonical Distribution, Photon Gas

Lecture 14 - Canonical Ensemble, Parition Function, Central Limit Theorem

Lecture 15 - Applications of Canonical Ensemble

Lecture 16 - Bounded System, Negative Temparature, Specific Heat of Solids

Lecture 17 - Virial Theorem, Grand Canonical Distribution

Lecture 18 - Grand Canonical Distribution, Photon Gas

Lecture 19 - Quantum Statistical Mechanics, Indistinguishability of Particles, Ensembles

Lecture 20 - Density Matrix, Exchange Statistics, Bosons and Fermions

Lecture 21 - MB, BE, FD Statistics

Lecture 22 - Bose Statistics, Bose Einstein Condensation

Lecture 23 - Properties of BEC, Phase Transition

Lecture 24 - Experimental Aspects of BEC, Black Body Radiation, Phonons

Lecture 25 - FD Statistics, Properties of Fermi Systems

Lecture 26 - Bethe Ansatz

Lecture 27 - Cluster expansion, Critical Isotherms

Lecture 28 - Virial Coefficients, Equation of State for real gases

Lecture 29 - de Haas-van Alphen effect

Lecture 30 - Black Hole Thermodynamics

NPTEL : Nuclear Physics: Fundamentals and Applications (Physics)

Co-ordinators : Prof. H.C. Verma

Lecture 1 - Brief Overview of the course

Lecture 2 - Nuclear Size

Lecture 3 - Nuclear Size (Continued...)

Lecture 4 - Nuclear Size (Continued...)

Lecture 5 - Semi empirical Mass Formula

Lecture 6 - Semi empirical Mass Formula (Continued...)

Lecture 7 - Semi empirical Mass Formula (Continued...)

Lecture 8 - Semi empirical Mass Formula (Continued...)

Lecture 9 - Semi empirical Mass Formula (Continued...)

Lecture 10 - How are Neutron stars bound

Lecture 11 - Deuteron

Lecture 12 - Deuteron (Continued...)

Lecture 13 - Deuteron (Continued...)

Lecture 14 - Scattering of nucleons

Lecture 15 - Low energy n-p scattering

Lecture 16 - Theories of nuclear forces

Lecture 17 - Shell model

Lecture 18 - Shell model (Continued...)

Lecture 19 - Shell model (Continued...)

Lecture 20 - Shell model (Continued...)

Lecture 21 - Shell model (Continued...)

Lecture 22 - Collective models

Lecture 23 - Vibrational and Rotational levels

Lecture 24 - Radioactivity, Alpha Decay

Lecture 25 - Alpha decay (Continued...)

Lecture 26 - Beta decay

Lecture 27 - Beta decay (Continued...)

Lecture 28 - Beta decay (Continued...)

Lecture 29 - Gamma decay

Lecture 30 - Nuclear Reactions

Lecture 31 - Nuclear reaction (Continued...)

Lecture 32 - Nuclear reaction (Continued...)

Lecture 33 - Nuclear Fission basics

Lecture 34 - Nuclear fission of uranium

Lecture 35 - Nuclear Fission Reactor

Lecture 36 - Nuclear Energy Programme of India

Lecture 37 - Nuclear Fusion

Lecture 38 - Nuclear fusion (Continued...)

Lecture 39 - Thermonuclear fusion reactors

Lecture 40 - Fusion reactions in Stars and stellar neutrinos

Lecture 41 - Nucleosynthesis of elements in Stars

Lecture 42 - Mossbauer Spectroscopy

Lecture 43 - RBS, PIXE, NAA, Summary

NPTEL : NOC:Introduction to Electromagnetism (Physics)

Co-ordinators : Prof. Manoj K Harbola

Lecture 1 - Coloumb's Law

Lecture 2 - Coloumb's Force due to several Point charges

Lecture 3 - Force due to distribution of Charges

Lecture 4 - What is an Electric Field?

Lecture 5 - Electric Field due to a Charged Distribution

Lecture 6 - Helmholtz's Theorem for Electric Field

Lecture 7 - Divergence of a Field

Lecture 8 - Divergence of Electric Field & Gauss's Law

Lecture 9 - Curl Of a Field - I

Lecture 10 - Curl of a Field - II & Stokes' Theorem

Lecture 11 - Line surface area & volume elements in Cartesian & Cylindrical Coordinates

Lecture 12 - Line surface area & volume elements in Spherical Polar Coordinates

Lecture 13 - Examples of application of the divergence and stokes' theorems

Lecture 14 - Electrostatic Potential

Lecture 15 - Electric field as the gradient of electrostatic potential

Lecture 16 - Laplace's and Poisson's equations for electrostatic potential

Lecture 17 - Elecrostatic potential due to a charge distribution - I; a line charge of finite length

Lecture 18 - Elecrostatic potential due to a charge distribution - II;a ring and a spherical shell of charge

Lecture 19 - Uniqueness of the solution of Laplace's and Poisson's equations

Lecture 20 - Method of images I: point charge in front of a grounded metallic plane - I

Lecture 21 - Method of imagesII: point charge in front of a grounded metallic plane and grounded metal sphere

Lecture 22 - Laplaces equations in some other physical phenomena

Lecture 23 - Energy of a charge distribution - I

Lecture 24 - Energy of a charge distribution - II An example

Lecture 25 - Energy of a charge distribution - III Energy density in terms of electric field

Lecture 26 - Electric field and potential in a conductor

Lecture 27 - Reciprocity theorem for conductors - I

Lecture 28 - Reciprocity theorem for conductors - II

Lecture 29 - Electric polarization and bound charges - I

Lecture 30 - Electric polarization and bound charges - II

Lecture 31 - Electric Displacement

Lecture 32 - Elecrostatics in presence of Dielectric Materials - I

Lecture 33 - Elecrostatics in presence of Dielectric Materials - II

Lecture 34 - Introduction to Magnetostatics; The BiO-Savart law

Lecture 35 - Divergence and curl of Magnetic Field

Lecture 36 - Amperes law for Magnetic Fields

Lecture 37 - Vector Potential for Magnetic Fields

Lecture 38 - Calculation of Vector Potential for a given magnetic field

Lecture 39 - Equation for the Vector Potentialin terms of current density

Lecture 40 - Vector potential from Current Densities - I

Lecture 41 - Vector potential from Current Densities - II

Lecture 42 - Magnetic Materials - I

Lecture 43 - Magnetic Materials - II Bound Current Densities

Lecture 44 - The Auxiliary Field - H

Lecture 45 - Solving for Magnetic Field of a magnet - I

Lecture 46 - Solving for Magnetic Field of a magnet in presence of Magnetic Materials

Lecture 47 - Faradays Law

Lecture 48 - Induced Electric field due to changing Magnetic Field

Lecture 49 - Demonstrations on faradays law, Lenzs law and Nonconservative nature of Induced electric field

Lecture 50 - Energy stord in a magnetic Field-I

Lecture 51 - Energy stord in a magnetic Field-I;solved examples

Lecture 52 - Displacement Current

Lecture 53 - Quasistatic approximation

Lecture 54 - Energy transport by electromagnetic fields; The Poynting Vector

Lecture 55 - The Poynting Vector;solved examples

Lecture 56 - Linear Momentum and Angular Momentum carried by Electromagnetic Fields

Lecture 57

Lecture 58

Lecture 59

Lecture 60

Lecture 61

Lecture 62

Lecture 63

Lecture 64

Lecture 65

Lecture 66 - Solution Assignment 1 - Problems 1 to 3

Lecture 67 - Solution Assignment 1 - Problems 4 to 9

Lecture 68 - Solution Assignment 2 - Problems 1 to 4

Lecture 69 - Solution Assignment 2 - Problems 5 to 11

Lecture 70 - Solution Assignment 3 - Problems 1 to 5

Lecture 71 - Solution Assignment 3 - Problems 6 to 10

Lecture 72 - Solution Assignment 4- Problems 1 to 5

Lecture 73 - Solution Assignment 4- Problems 6 to 10

Lecture 74 - Solution Assignment 5- Problems 6 to 11

Lecture 75 - Solution Assignment 5- Problems 1to 5

Lecture 76 - Solution Assignment 6- Problems 1 to 4

Lecture 77 - Solution Assignment 6- Problems 5 to 8

Lecture 78 - Solution Problem Set 7

NPTEL : NOC:Engineering Mechanics (Physics)

Co-ordinators : Prof. Manoj K Harbola

Lecture 1 - Introduction to Vectors

Lecture 2 - Addition and subtraction of vectors

Lecture 3 - Multiplying vectors

Lecture 4 - Introduction to vectors: solved examples - I

Lecture 5 - Transformation of vectors under rotation

Lecture 6 - Vector products and their geometric interpretation

Lecture 7 - Vector Product: Kronecker Delta and Levi-Civita symbols - I

Lecture 8 - Vector Product: Kronecker Delta and Levi-Civita symbols - II

Lecture 9 - Introduction to vectors: solved examples - II

Lecture 10 - Equilibrium of rigid bodies Â– Forces and torques

Lecture 11 - Calculating torques and couple moments - I

Lecture 12 - Calculating torques and couple moments - II

Lecture 13 - Finding a force and a couple equivalent to an applied force

Lecture 14 - Different elements and associated forces and torques - I

Lecture 15 - Different elements and associated forces and torques - II

Lecture 16 - Solved examples; equilibrium of bodies Â– I

Lecture 17 - Solved examples; equilibrium of bodies Â– II

Lecture 18 - Forces in different geometric configuration

Lecture 19 - Plane trusses I - building a truss and condition for it to be statically determinate

Lecture 20 - Plane trusses II - calculating forces in a simple truss and different types of trusses

Lecture 21 - Plane trusses III - calculating forces in a simple truss by method of joints

Lecture 22 - Plane trusses IV- Solved examples for calculating forces in a simple truss by method of joints

Lecture 23 - Plane trusses V - Solved examples for calculating forces in a simple truss by method of joints

Lecture 24 - Plane trusses VI - method of sections for calculating forces in a simple truss

Lecture 25 - Dry friction I - introduction with an example

Lecture 26 - Dry friction II - a solved example

Lecture 27 - Dry friction III - Dry thrust bearing and belt friction with demonstration

Lecture 28 - Dry friction IV - Screw friction and rolling friction

Lecture 29 - Dry friction V - Solved examples

Lecture 30 - Properties of plane surfaces I - First moment and centroid of an area

Lecture 31 - Properties of plane surfaces II - Centroid of an area made by joining several plane surfaces

Lecture 32 - Properties of plane surfaces III - Centroid of a distributed force and its relation with centre of gravity

Lecture 33 - Properties of plane surfaces IV - solved examples of calculation of first moment and centroid of distributed forces

Lecture 34 - Properties of plane surfaces V- Second moment and product of an area and radius of gyration

Lecture 35 - Properties of plane surfaces VI - Parallel axis transfer theorem for second moment and product of an area

Lecture 36 - Properties of plane surfaces VII - transformation of second moment and product of an area under rotation of coordinate axes

Lecture 37 - Properties of plane surfaces VIII - second moment and product of an area, solved examples

Lecture 38 - Method of virtual work I - degrees of freedom, constraints and constraint forces

Lecture 39 - Method of virtual work II - virtual displacement, virtual work and equilibrium condition in terms of virtual work

Lecture 40 - Method of virtual work III - solved examples

Lecture 41 - Motion of a particle in a plane in terms of planar polar coordinates

Lecture 42 - Planar polar coordinates: solved examples

Lecture 43 - Description of motion in cylindrical and spherical coordinate systems

Lecture 44 - Using planar polar, cylindrical and spherical coordinate systems: solved examples

Lecture 45 - Motion with constraints, constraint forces and free body diagram

Lecture 46 - Motion with constraints Â– solved examples

Lecture 47 - Motion with dry friction Â– solved examples

Lecture 48 - Motion with drag Â– solved examples

Lecture 49 - Equation of motion in terms of linear momentum and the principle of conservation of linear momentum

Lecture 50 - Linear momentum and centre of mass

Lecture 51 - Momentum transfer, impulse and force due to a stream of particles hitting an object

Lecture 52 - Momentum and the variable mass problem

Lecture 53 - Linear momentum Â– solved examples

Lecture 54 - Work and energy I - work energy theorem; conservative and non-conservative force fields

Lecture 55 - Work and energy II - Definition of potential energy for conservative forces; total mechanical energy and the principle of conservation of energy

Lecture 56 - Work and energy III - Two solved examples using conservation principles

Lecture 57 - Work and energy IV Â– Further discussion on potential energy

Lecture 58 - Work and energy V - Solved examples

Lecture 59 - Work and energy VI Â– Applying conservation principles to solve a collision problem

Lecture 60 - Work and energy VII - Solved examples

Lecture 61 - Rigid body motion I - degrees of freedom and number of variables required to describe motion of a rigid body

Lecture 62 - Rigid body motion II - Equation of motion for a single particle in terms of angular momentum and torque; motion of a conical pendulum

Lecture 63 - Rigid body motion III - Conservation of angular momentum; angular momentum for a collection of particles

Lecture 64 - Rigid body motion IV - applying angular momentum conservation, a solved example

Lecture 65 - Rigid body motion V (fixed axis rotation) - some demonstrations of conservation of angular momentum about fixed axis

Lecture 66 - Rigid body motion VI (fixed axis rotation) - Some more demonstrations and related problems

Lecture 67 - Rigid body motion VII (fixed axis rotation) - Kinetic energy and moment of inertia for fixed axis rotation and some solved examples

Lecture 68 - Rigid body motion VIII (fixed axis rotation) - solved examples for calculating moment of inertia and conservation of angular momentum

Lecture 69 - Rigid body motion IX (fixed axis rotation) - solved examples

Lecture 70 - Rigid body motion X - rotation and translation with axis moving parallel to itself

Lecture 71 - Rigid body motion XI - solved examples for rotation and translation with axis moving parallel to itself

Lecture 72 - Rigid-body dynamics XII - Some demonstrations on general motion of rigid bodies

Lecture 73 - Rigid-body dynamics XIII - Infinitesimal angles as vector quantities and change of a vector when rotated by an infinitesimal angle

Lecture 74 - Rigid-body dynamics XIV - Angular velocity and the rate of change of a rotating vector; relating change in angular velocity to an applied torque

Lecture 75 - Rigid-body dynamics XV - Relationship between angular momentum and angular velocity Â– the moment of inertia tensor and the principal axes

Lecture 76 - Rigid-body dynamics XVI - Solved examples

Lecture 77 - Rigid body motion XVII Â– A review of the relation between angular momentum and angular velocity, moment of inertia tensor and the principal axes Edit Lesson

Lecture 78 - Rigid body motion XVIII- Solved examples for calculating rate of change of angular momentum and torque when angular velocity and angular momentum are not parallel

Lecture 79 - Rigid body dynamics XIX - understanding demonstrations shown earlier using equation of motion

Lecture 80 - Rigid body dynamics XX - understanding demonstrations shown earlier using equation of motion (Euler equations)

Lecture 81 - Rigid body dynamics XXI - Euler equations, solved examples

Lecture 82 - Simple harmonic motion I - expanding potential energy about the equilibrium point and the corresponding force

Lecture 83 - Simple harmonic motion II - solving the equation of motion with given initial conditions

Lecture 84 - Simple harmonic motion III - solved examples

Lecture 85 - Simple harmonic motion IV - representing simple harmonic motion on a phasor diagram; energy of an oscillator

Lecture 86 - Simple harmonic motion V - solved examples

Lecture 87 - Simple harmonic motion VI - solving the equation of motion with constant friction in the system

Lecture 88 - Simple harmonic motion VII - harmonic oscillator with velocity-dependent damping (heavy damping)

Lecture 89 - Simple harmonic motion VIII - harmonic oscillator with velocity-dependent damping (critical damping)

Lecture 90 - Simple harmonic motion IX - solved examples

Lecture 91 - Simple harmonic motion X - harmonic oscillator with velocity-dependent damping (light damping)

Lecture 92 - Simple harmonic motion XI - solved examples

Lecture 93 - Simple harmonic motion XII - oscillations of an un-damped harmonic oscillator subjected to an oscillatory force

Lecture 94 - Simple harmonic motion XIII - oscillations of a forced damped harmonic oscillator - I

Lecture 95 - Simple harmonic oscillator XIV - oscillations of a forced damped harmonic oscillator - II

Lecture 96 - Simple harmonic oscillator XV - Energy and power in a forced damped harmonic oscillator

Lecture 97 - Simple harmonic oscillator XVI - Solved examples

Lecture 98 - Equation of motion in a uniformly accelerating frame

Lecture 99 - Motion described in a uniformly accelerating frame; solved examples - I

Lecture 100 - Motion described in a uniformly accelerating frame; solved examples - II

NPTEL : NOC:Computational Science and Engineering Using Python (Physics)

Co-ordinators : Prof. Mahendra Verma

Lecture 1 - Lecture 1 - About Computers

Lecture 2 - Lecture 2 - Python: Variables and Assignments

Lecture 3 - Lecture 3 - Python: Numpy arrays

Lecture 4 - Lecture 4 - Python: Control structures

Lecture 5 - Lecture 5A - Python packages; Programming

Lecture 6 - Lecture 5B - Some suggestions on programming

Lecture 7 - Lecture 6 - Plotting in Python

Lecture 8 - Lecture 7 - Errors and Nondimensionalization

Lecture 9 - Lecture 8 - Data I/O and Mayavi

Lecture 10 - Lecture 9 - Lagrange interpolation

Lecture 11 - Lecture 10 - Interpolation II: 2D, splines

Lecture 12 - Lecture 11 - Integration I: Newton-Cotes

Lecture 13 - Lecture 12 - Integration II: Gaussian quadrature

Lecture 14 - Lecture 13 - Gaussian quadrature continued

Lecture 15 - Lecture 14 - Numerical Differentiation

Lecture 16 - Lecture 15 - ODE solvers

Lecture 17 - Lecture 16 - ODE solvers continued

Lecture 18 - Lecture 17 - Fourier transform

Lecture 19 - Lecture 18 - PDE solver: Diffusion equation in spectral method

Lecture 20 - Lecture 19A - PDE solver: Diffusion equation using finite difference

Lecture 21 - Lecture 19B - PDE solver: Wave equation using finite difference

Lecture 22 - Lecture 20 - Linear algebra: Ax = b solver

Lecture 23 - Lecture 21 - Summary

NPTEL : NOC:Introductory Quantum Mechanics (Physics)

Co-ordinators : Prof. Manoj K Harbola

Lecture 1 - Black Body Radiation I - Relevant Definitions and Black Body as cavity

Lecture 2 - Black Body Radiation II - Intensity of radiation in terms of energy density

Lecture 3 - Black Body Radiation III - Spectral energy density and radiation pressure inside a black body radiation

Lecture 4 - Black Body Radiation IV - Stephen's Boltzman law

Lecture 5 - Black Body Radiation V - Wein's Displacement law and analysis for spectral density

Lecture 6 - Black Body Radiation VI - Wein's distribution law and rayleigh - Jeans distribution law

Lecture 7 - Black Body Radiation VII - Quantum Hypothesis and plank's distribution Formula

Lecture 8 - Radiation as a collection of particles called photons

Lecture 9 - Quantum Hypothesis and specific heat of soilds

Lecture 10 - Bohr's Model of hydrogen spectrum

Lecture 11 - Wilson Sommerfeld quantum condition I - Harmonic oscillator and particle in a box

Lecture 12 - Wilson Sommerfeld quantum condition II - Particle moving in a coulomb potential in a plane and related quantum numbers

Lecture 13 - Wilson Sommerfeld quantum condition III - Particle moving in a coulomb potential in 3D and related quantum numbers

Lecture 14 - Quantum conditions and atomic structure, electron spin and Pauli exclusion principle

Lecture 15 - Interaction of atoms with radiation : Eienstien's A and B coefficients

Lecture 16 - Stimulated emmision and amplification of light in a LASER

Lecture 17 - Brief description of a LASER

Lecture 18 - Introduction to the correspondence principle

Lecture 19 - General nature of the correspondence principle

Lecture 20 - Selection rules (for transitions) through the correspondence principle

Lecture 21 - Applications of the correspondence principle : Einstiens A coefficient for the harmonic oscillator and the selection rules for atomic transitions

Lecture 22 - Heisenberg's formulations of quantum mechanics : expressing kinetic variables as matrices

Lecture 23 - Heisenberg's formulation of quantum mechanics : the quantum condition

Lecture 24 - Heisenberg's formulation of the quantum mechanics : Application to harmonic oscillator

Lecture 25 - Brief introduction to matrix mechanics and the quantum condition in matrix form

Lecture 26 - Introduction to waves and wave equation

Lecture 27 - Sationary waves eigen values and eigen functions

Lecture 28 - Matter waves and their experimental detection

Lecture 29 - Represenating a moving paticle by a wave packet

Lecture 30 - Stationary-state Schrodinger equation and its solution for a particle in a box

Lecture 31 - Solution of the stationary-state Schrodinger equation for a simple harmonic oscillator

Lecture 32 - Equivalance of Heisenberg and the Schrodinger formulations : Mathematical preliminaries

Lecture 33 - Equivalance of Heisenberg and Schrodinger formulations : The x and p operators and the quantum condition

Lecture 34 - Born interpretation of the wavefunction and expectation values of x and p operators

Lecture 35 - Uncertainty principle and its simple applications

Lecture 36 - Time dependent Schrodinger equation the probability current density and the continuity equation for the probability density

Lecture 37 - Ehrenfest theorem for the expectation values of x and p operators

Lecture 38 - Solution of Schrodinger equation for a particle in one and two delta function potentials

Lecture 39 - Solution of Schrodinger equation for a particle in a finite well

Lecture 40 - Numerical solution of a one dimensional Schrodinger equation for bound states - I

Lecture 41 - Numerical solution of a one dimensional Schrodinger equation for bound states - II

Lecture 42 - Reflection and transmission of particles across a potential barrier

Lecture 43 - Quantum-tunneling and its examples

Lecture 44 - Solution of the Schrodinger for free paticles and periodic boundary conditions

Lecture 45 - Electrons in a metal : Density of states and Fermi energy

Lecture 46 - Schrodinger equation for particles in spherically symmetric potential, angular momentum operator

Lecture 47 - Angular momentum operator and its eigenfunctions

Lecture 48 - Equation for radial component of the wavefunction in spherically symmteric potentials and general properties of its solution

Lecture 49 - Solution for radial component of the wavefunction for the hydrogen atom

Lecture 50 - Numerical solution for the radial component of wavefunction for spherically symmetric potentials

Lecture 51 - Solution of the Schrodinger equation for one dimensional periodic potential : Bloch's theorem

Lecture 52 - Kroning-Penny model and energy bands

Lecture 53 - Kroning-Penny model with periodic Dirac delta function and energy bands

Lecture 54 - Discussion on bands

Lecture 55 - Summary of the course

NPTEL : NOC:Introduction to Solid State Physics (Physics)

Co-ordinators : Prof. Satyajit Banerjee

Lecture 1 - Introduction to Drude's theory of electrons in a metal - Part 1

Lecture 2 - Introduction to Drude's theory of electrons in a metal - Part 2

Lecture 3 - Postulates of Drude's theory

Lecture 4 - Calculating electrical conductivity of metal using Drude's theory of electrons in metal - Part 1

Lecture 5 - Calculating the electrical conductivity of metal using Drude's Model - Part 2

Lecture 6 - Introduction to Hall effect in Metals - Part 1

Lecture 7 - Introduction to Hall effect in metals - Part 2

Lecture 8 - Introduction to Hall effect in metals - Part 3

Lecture 9 - Understanding thermal conductivity of a metal using Drude's model - Part 1

Lecture 10 - Understanding thermal conductivity of a metal using Drude's model - Part 2

Lecture 11 - Introduction to Sommerfeld's Theory of electrons in a metal - Part 1

Lecture 12 - Introduction to Sommerfeld's Theory of electrons in a metal - Part 2

Lecture 13 - Introduction to Sommerfeld's Theory of electrons in a metal - Part 3

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19 - Electronic Contribution to the Specific heat of a Solid - Part 1

Lecture 20 - Electronic Contribution to the Specific heat of a Solid - Part 2

Lecture 21 - Electronic Contribution to the Specific heat of a Solid - Part 3

Lecture 22 - Electronic Contribution to the Specific heat of a Solid - Part 4

Lecture 23 - Understanding Thermal conductivity of Metals

Lecture 24 - Introduction to Magnetism in Metal - Part 1

Lecture 25 - Introduction to Magnetism in Metal - Part 2

Lecture 26

Lecture 27 - Introduction to crystals and bonding in crystals

Lecture 28 - Understanding crystal structure using Bravais Lattice

Lecture 29 - Bravais Lattice Types - Part 1

Lecture 30 - Bravais Lattice Types - Part 2

Lecture 31 - Introduction to different crystal types - Part 1

Lecture 32 - Introduction to different crystal types - Part 2

Lecture 33 - Indexing crystal planes

Lecture 34 - Scattering of X rays from crystals - Part 1

Lecture 35 - Scattering of X rays from crystals - Part 2

Lecture 36 - Reciprocal lattice vectors - Part 1

Lecture 37 - Reciprocal lattice vectors - Part 2

Lecture 38 - Reciprocal lattice vectors and Laue's condition for diffraction of waves in crystals - Part 1

Lecture 39 - Reciprocal lattice vectors and Laue's condition for diffraction of waves in crystals - Part 2

Lecture 40 - Reciprocal lattice vectors, Laue's condition and Bragg's law for diffraction of waves by a crystal

Lecture 41 - Wave equation in a continuous medium and generalization to a discrete medium

Lecture 42 - Derivation of wave equation for motion of atoms in a crystal

Lecture 43 - Solution of the wave equation for a crystal and the relation between frequency Ãâ€° and wavevector k

Lecture 44 - Group velocity of waves and speed of sound in a crystal

Lecture 45 - Waves in a crystal considering interaction among atoms beyond their nearest neighbours

Lecture 46 - Normal modes in a crystal : Phonons and their momenta and energy

Lecture 47 - Experimental determination of Phonon dispersion curves

Lecture 48 - Lattice with two atom basis: Optical Phonons

Lecture 49 - Displacement of the atoms for the acoustic and optical Phonons

Lecture 50 - Density of states of phonons

Lecture 51 - Calculating the density of states of Phonons: The Einstein's and the Debye's Models

Lecture 52 - Average energy of Phonons at Temperature T

Lecture 53 - Debye's Model of specific heat of crystals

Lecture 54 - Anharmonic effects in crystals: thermal expansion and Umkclapp processes

Lecture 55 - Going beyond free electron model: Periodic crystal potential and Bloch's theorem for the wavefunction

Lecture 56 - Applying perturbation theory to free electron wavefunctions and nearly free electron model

Lecture 57 - Applying perturbation theory to free electron wavefunctions and creation of energy gap at zone boundaries

Lecture 58 - Mixing of plane waves to get Bloch Wavefunction - I

Lecture 59 - Mixing of plane waves to get Bloch Wavefunction - II

Lecture 60 - Equivalence of wave vectors k and k+G and reduced zone scheme

Lecture 61 - Applying periodic boundary condition to Bloch wavefunction and counting the number of states

Lecture 62 - Band theory of metals, insulators and semiconductors

Lecture 63 - Kronig- Penney model

Lecture 64 - Bloch wavefunction as a linear combination of atomic orbitals: Tight Binding Model- I

Lecture 65 - Tight Binding Model - II

Lecture 66 - Semiclassical dynamics of a particle in a band and Bloch oscillations

Lecture 67 - Experimental observations of Bloch oscillations

Lecture 68 - Concept of hole as a current carrier in semiconductors - I

Lecture 69 - Concept of hole as a current carrier in semiconductors - II

Lecture 70 - Calculating carrier density in semiconductors - I

Lecture 71 - Calculating carrier density in semiconductors - II

Lecture 72 - Donor and acceptor energy levels in a semiconductor

Lecture 73 - charge carrier density in n-type and p-type semiconductors

Lecture 74 - Electrical conductivity and hall coefficient in semiconductors

Lecture 75 - Paramagnetism in solids I - Magnetic moment and Lande g factor for atoms

Lecture 76 - Paramagnetism in solids II - temperature dependence of paramagnetic susceptibility and Curie's Law

Lecture 77 - Hund's rule for calculating the total angular momentum J, orbital angular momentum L and spin angular momentum S for an atom

Lecture 78 - Examples of performing paramagnetic susceptibility calculations

Lecture 79 - Diamagnetism in Solids

Lecture 80 - Understanding quenching of orbital angular momentum in transition metal ions

Lecture 81 - Ferromagnetism in solids

Lecture 82 - Introduction to Meissner state of superconductors and levitation

Lecture 83 - Superconducting materials and Type-I and Type-II superconductors

Lecture 84 - London's equation for superconductors

Lecture 85 - Application of London's equation, behavior

Lecture 86 - A qualitative introduction to BCS theory of superconductivity

Lecture 87 - Josephson's effect in superconductors and tunneling current across barriers

NPTEL : NOC:Physics of Turbulence (Physics)

Co-ordinators : Prof. Mahendra Verma

Lecture 1 - The turbulence problem

Lecture 2 - Basic hydrodynamics - Governing equations

Lecture 3 - Basic hydrodynamics - Vorticity

Lecture 4 - Basic hydrodynamics - Quadratic quantities

Lecture 5 - Basic hydrodynamics - Example problems

Lecture 6 - Fourier space representation - Definitions

Lecture 7 - Fourier space representation - Flow equations

Lecture 8 - Fourier space representation - Kinetic energy

Lecture 9 - Fourier space representation - Vorticity, Kinetic Helicity, and Enstrophy

Lecture 10 - Fourier space representation - Examples

Lecture 11 - Fourier space representation - Examples (Continued...)

Lecture 12 - Craya-Herring Basis: Definitions

Lecture 13 - Craya-Herring Basis: Equations of Motion for a Triad

Lecture 14 - Craya-Herring Basis: Equations of Motion for an Anticlockwise Triad

Lecture 15 - Thermal Instability

Lecture 16 - Thermal Instabilities (Continued...)

Lecture 17 - Rotating Convection: Instability and Patterns

Lecture 18 - Magnetoconvection: Instability and Patterns

Lecture 19 - Nonlinear Saturation: Lorenz Equation

Lecture 20 - Patterns, Chaos, and Turbulence

Lecture 21 - Energy Transfers: Mode-to-mode Energy Transfers

Lecture 22 - Energy Transfers: Mode-to-mode Energy Transfers (Continued...)

Lecture 23 - Energy Transfers: Examples

Lecture 24 - Energy Transfers: Spectral Energy Flux and Shell-to-Shell Energy Transfer

Lecture 25 - Energy Transfers: Fluid Simulations using Spectral Method

Lecture 26 - Energy Transfers: Fluid Simulations - Dealiasing

Lecture 27 - Kolmogorov's Theory: Energy Spectrum and Flux

Lecture 28 - Kolmogorov's Theory: Insights and its Verification with Direct Numerical Simulation

Lecture 29 - Kolmogorov's Theory: Spectrum and Flux in inertial-dissipation range

Lecture 30 - Kolmogorov's four-fifth law: Isotropic Tensor and Correlations

Lecture 31 - Kolmogorov's four-fifth law: Derivation

Lecture 32 - Kolmogorov's four-fifth law: Derivation (Final steps)

Lecture 33 - Enstrophy Spectrum and Flux

Lecture 34 - Two-dimensional Turbulence

Lecture 35 - Helical turbulence

Lecture 36 - Flow with a scalar

Lecture 37 - Passive scalar turbulence

Lecture 38 - Stably stratified turbulence

Lecture 39 - Turbulent thermal convection

Lecture 40 - Flow with a vector

Lecture 41 - MHD Turbulence: Formalism

Lecture 42 - MHD Turbulence: Energy Transfers

Lecture 43 - MHD Turbulence: Turbulence Models

Lecture 44 - MHD Turbulence: Dynamo

NPTEL : NOC:Introduction to Astrophysical Fluids (Physics)

Co-ordinators : Prof. Supratik Banerjee

Lecture 1 - General introduction

Lecture 2 - Phase space and Liouville's theorem

Lecture 3 - Collisionless Boltzmann equation

Lecture 4 - Boltzmann equation for collisional system - I

Lecture 5 - Boltzmann equation for collisional system - II

Lecture 6 - Equilibrium distribution function - I

Lecture 7 - Equilibrium distribution function - II

Lecture 8 - Derivation of moment equations - I

Lecture 9 - Derivation of moment equations - II

Lecture 10 - Application of moment equations in collisionless systems

Lecture 11 - Derivation of ideal fluid equations

Lecture 12 - Macroscopic forces on an ideal fluid

Lecture 13 - Properties of ideal fluid

Lecture 14 - Kevin's vorticity theorem

Lecture 15 - Conservative form and invariants in ideal fluids

Lecture 16 - Steady flow, streamlines and stream function

Lecture 17 - Departure from Maxwellian distribution

Lecture 18 - Derivation of real fluid equations

Lecture 19 - Hydrostatics: Model of solar corona

Lecture 20 - Stellar/solar wind

Lecture 21 - Accretion disks - I

Lecture 22 - A small digression: Newtonian fluids

Lecture 23 - Accretion disk - II

Lecture 24 - Weak perturbation in a compressible fluid: sound wave

Lecture 25 - Effect of nonlinearity: shocks

Lecture 26 - Supernova explosion and spherical blast waves - I

Lecture 27 - Supernova explosion and spherical blast waves - II

Lecture 28 - de Laval nozzle and extragalactic jets

Lecture 29 - Convective instability and Swarzschild stability criterian

Lecture 30 - Rayleigh Benard convection - I

Lecture 31 - Rayleigh Benard convection - II

Lecture 32 - Jeans instability

Lecture 33 - Waves and instabilities in a two-fluid interface - I

Lecture 34 - Waves and instabilities in a two-fluid interface - II

Lecture 35 - Oscillations of stars

Lecture 36 - Oscillation of stars (Continued...)

Lecture 37 - Rotation in astrofluids and Rayleigh criterion

Lecture 38 - Fluid dynamics in a rotating frame of reference

Lecture 39 - Vorticity theorem in rotating frame and Taylor-Proudman theorem

Lecture 40 - Effect of rotation on a self gravitating mass

Lecture 41 - Effect of rotation in stars

Lecture 42 - Introduction to Plasmas

Lecture 43 - Description of Plasma

Lecture 44 - Kinetic to fluid picture of plasmas

Lecture 45 - MHD fluids: magnetic pressure, magnetic tension and plasma beta

Lecture 46 - Inviscid invariants in MHD

Lecture 47 - Inviscid invariants in MHD (Continued...)

Lecture 48 - Elsasser variables in MHD

Lecture 49 - Linear wave modes in MHD

Lecture 50 - MHD in space plasmas

Lecture 51 - Introduction to turbulence in fluids

Lecture 52 - Richardson-Kolmogorov phenomenology of turbulence

Lecture 53 - Turbulent diffusion

Lecture 54 - Turbulent viscosity

Lecture 55 - Turbulence in MHD fluids

Lecture 56 - Introduction to astrophysical dynamos

Lecture 57 - Anti-dynamo theorem and turbulent dynamos

NPTEL : NOC:Introduction to Electromagnetic Theory (Hindi) (Physics)

Co-ordinators : Prof. Manoj Harbola

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

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Lecture 39

Lecture 40

Lecture 41

Lecture 42

Lecture 43

Lecture 44

Lecture 45

Lecture 46

Lecture 47

Lecture 48

Lecture 49

Lecture 50

Lecture 51

Lecture 52

Lecture 53

NPTEL : NOC:Scientific Computing Using Python (Physics)

Co-ordinators : Prof. Mahendra K. Verma

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

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Lecture 60

Lecture 61

Lecture 62

Lecture 63

Lecture 64

Lecture 65

Lecture 66

Lecture 67

Lecture 68

Lecture 69

Lecture 70

Lecture 71

NPTEL : NOC:Tapestry of Field theory: Classical and Quantum, Equilibrium and Nonequilibrium Perspectives (Physics)

Co-ordinators : Prof. Mahendra K. Verma

Lecture 1 - Introduction to Field Theory and Course

Lecture 2 - Integration using Complex Analysis

Lecture 3 - Cauchy Principal Value Theorem

Lecture 4 - Fourier Transform

Lecture 5 - Green's Function and Examples

Lecture 6 - Green's Function in Fourier Space

Lecture 7 - Fourier Transform, Time Frequency

Lecture 8 - Green's Function for Helmholtz Equation and Wave Equation

Lecture 9 - Green's Function for Diffusion and Schrodinger Equation

Lecture 10 - Dimensional Analysis

Lecture 11 - Functionals - Part 1

Lecture 12 - Lagrangian Formalism - Part 2

Lecture 13 - Relativistic Fields

Lecture 14 - Hamiltonian Formalism

Lecture 15 - Principle of Least Action

Lecture 16 - Relativistic Fields and Hamiltonian Formalism

Lecture 17 - Noether's Theorem and Symmetries

Lecture 18 - Review of Quantum Mechanics

Lecture 19 - Second Quantization

Lecture 20 - Field Operators

Lecture 21 - Fock Space and Vaccum Energy

Lecture 22 - Quantization of Bosons and Fermions

Lecture 23 - Examples

Lecture 24 - Free Fermi Gas

Lecture 25 - Propagators and Perturbations

Lecture 26 - Relativistic Quantum Field Theory

Lecture 27 - Feynman Propagator

Lecture 28 - Review of Statistical Mechanics (Partition Function)

Lecture 29 - Feynman Path Integral

Lecture 30 - Diagrammatic Field Theory (Wick's Theorem)

Lecture 31 - Wick's Theorem (Continued...)

Lecture 32 - Diagrammatic Perturbation Theory

Lecture 33 - Green's Function and Correlation Function

Lecture 34 - Feynman Diagrams

Lecture 35 - Phase Transition and Landau Theory

Lecture 36 - Failure of Landau's Theory

Lecture 37 - Scale Invariance

Lecture 38 - Renormalization Group - Preliminary

Lecture 39 - RG Steps

Lecture 40 - Pertubative Calculations

Lecture 41 - RG Fixed Points

Lecture 42 - Relevent and Irrelevant Variables

Lecture 43 - Behaviour Near Critical Points

Lecture 44 - Computing Critical Exponents

Lecture 45 - Mass and Charge Renormalization, Running Coupling const: Î¦4 Theory

Lecture 46 - Charge and Mass Renormalization: QED and QCD

Lecture 47 - Breaking a Continuous Symmetry (Goldstone Mode)

Lecture 48 - Covariant Electrodynamics (Gauge Interactions)

Lecture 49 - Higgs Mechanism

Lecture 50 - Introduction to Non-Equilibrium Field Theory (Langevin Equation)

Lecture 51 - Fluctuation Dissipation Theorem

Lecture 52 - Kolgomorov's Theory of Turbulence

Lecture 53 - Equilibrium and Non Equilibrium Solution of Navier Stokes

Lecture 54 - Energy Flux in Navier Stokes Equation

Lecture 55 - RG Analysis of Field Theory of Turbulence

Lecture 56 - Renormalized Viscosity and Discussion

Lecture 57 - Renormalization of the Coupling Constant for the Shell Model

Lecture 58 - Flux Computation for the Shell Model of Turbulence

Lecture 59 - Renormalization Group Analysis of Navier Stokes Equation

Lecture 60 - Flux Computation for the Navier Stokes Equation

Lecture 61 - Functional Form of a Dynamical Equation

Lecture 62 - Surface Growth Phenomena: Introduction

Lecture 63 - Surface Growth Phenomena: EW Equation

Lecture 64 - Surface Growth Phenomena: KPZ Equation

Lecture 65 - Surface Growth Phenomena: KPZ Equation (Continued...)

Lecture 66 - RG Procedure for KPZ Equation

Lecture 67 - Noise Renormalization

Lecture 68 - Fixed Point Solution

Lecture 69 - Weak Turbulence Theory using Examples

Lecture 70 - Weak Turbulence Applications (Rotating Turbulence, Internal and Surface Gravity Waves)

Lecture 71 - Nonlinear Schodinger Equation

Lecture 72 - Field Theory of Passive Scalar Turbulence

Lecture 73 - Course Summary

NPTEL : NOC:Coherence and Quantum Entanglement (Physics)

Co-ordinators : Prof. Anand Kumar Jha

Lecture 1 - Main differences between classical and quantum mechanics

Lecture 2 - Introduction to Coherence and Stochastic Processes

Lecture 3 - The Joint Probability Function used in Classical Optics: The Correlation Functions

Lecture 4 - Second-order Coherence Theory (Temporal)

Lecture 5 - Quantifying the Temporal Correlations

Lecture 6 - Second-order Coherence Theory (Spatial); Spatial Correlations

Lecture 7 - Quantifying the Spatial Correlations

Lecture 8 - Second-order Coherence Theory (Angular); Angular Correlations

Lecture 9 - Second-order Coherence Theory (Polarization)

Lecture 10 - Degree of Polarization

Lecture 11 - Coherent Mode Representation of Optical Fields

Lecture 12 - Review of Quantum Mechanics

Lecture 13 - Quantum Mechanical Correlation Functions

Lecture 14 - Basics of Nonlinear Optics

Lecture 15 - Two-Photon State Produced by Parametric Down-Conversion

Lecture 16 - Coherence and Quantum Entanglement

Lecture 17 - Temporal Two-Photon Interference

Lecture 18 - Some example of Two-Photon Interference Effects

Lecture 19 - Spatial Two-Photon Interference

Lecture 20 - Quantum Measurements

Lecture 21 - Can the Quantum Mechanical Description of Physical Reality be Considered Complete ?

Lecture 22 - Hidden Variable Interpretation of Quantum Mechanics

Lecture 23 - Bell Inequalities

Lecture 24 - Entanglement Verification

Lecture 25 - Entanglement Quantification and Connection Between Coherence and Entanglement

Lecture 26 - 84 Quantum Cryptography

Lecture 27 - Quantum Teleportation

NPTEL : NOC:Classical Motion of a Single Particle (Physics)

Co-ordinators : Prof. Supratik Banerjee

Lecture 1 - Introduction and Newton's laws of motion

Lecture 2 - From dynamics to Kinematics

Lecture 3 - Equations of dynamics and constants of motion

Lecture 4 - Constants of motion (Continued...), Wrok-energy theorem and conservative forces

Lecture 5 - Dynamics under constants and central forces

Lecture 6 - Derivation of gradient form from zero curl condition

Lecture 7 - Concept of equilibrium

Lecture 8 - Terminal velocity, stable and unstable equilibria

Lecture 9 - Stable and unstable equilibria in more than one dimensions

Lecture 10 - Motion in one-dimensional potential

Lecture 11 - Solving equations of motion in one dimension

Lecture 12 - Calculation of Work Done in a Force Field

Lecture 13 - Central forces, Velocity and Acceleration in Plane Polar Coordinates

Lecture 14 - Dynamics and Trajectories Under a Central Force

Lecture 15 - Equation For Trajectories Under a Central Force (Continued...) : Binet Equation

Lecture 16 - Trajectory of a Particle Under Attractive Inverse-Square Force Law

Lecture 17 - Energy Diagram in an Effective One-Dimensional Motion

Lecture 18 - Two Interesting Problems On the motion Under Central Forces

Lecture 19 - Motion Under an Attractive Inverse-Square Force

Lecture 20 - Motion Under an Attractive Inverse-Square Force (Continued...)

Lecture 21 - Trajectories Under Attractive Inverse-Square Force, Laws of Kepler

Lecture 22 - Laplace Runge-Lenz Vector

Lecture 23 - Simple harmonic oscillators

Lecture 24 - Two examples of simple harmonic oscillation

Lecture 25 - Forced harmonic oscillator

Lecture 26 - Forced harmonic oscillator at resonance

Lecture 27 - Damped harmonic oscillator

Lecture 28 - Nature of motion under a harmonic potential

Lecture 29 - Comparison among three types of damped oscillation

Lecture 30 - Forced harmonic oscillator with damping

Lecture 31 - A problem on damped harmonic oscillator

Lecture 32 - Beats

Lecture 33 - Motion of a particle in electric and magnetic fields

Lecture 34 - E X B drift

Lecture 35 - Inertial frames of reference, Galilean transformation

Lecture 36 - Non-inertial frames of reference, pseudo forces

Lecture 37 - Motion of a particle in a rotating frame of reference

Lecture 38 - Motion of a particle relative to an observer on earth

Lecture 39 - Motion of a particle under various constraints

Lecture 40 - Principle of Virtual work, D'Alembert's principle

Lecture 41 - Lagrange's equation of first kind

Lecture 42 - Solving problems using Lagrange's equation of first kind

Lecture 43 - Generalized Coordinates and Generalized Velocities

Lecture 44 - Knetic Energy and Acceleration in Terms of Generalized Coordinates

Lecture 45 - Generalized Momentum and Generalized Force; Derivation of Euler-Lagrange Equation

Lecture 46 - Euler Lagrange Equation, Cyclic Coordinates and Other Properties

Lecture 47 - Properties of Euler-Lagrange equations (Continued...)

Lecture 48 - Lagrangian of various oscillating systems

Lecture 49 - Problem solving using Euler-Lagrange equations

Lecture 50 - Concept of Phase Space

Lecture 51 - Phase space trajectories and fixed points

Lecture 52 - Stability of fixed points

Lecture 53 - Different types of fixed points

Lecture 54 - Fixed points and their stability for mechanical systems

Lecture 55 - Linear two-dimensional phase space dynamics

Lecture 56 - Linear two-dimensional phase space dynamics (Continued...)

Lecture 57 - Concept of limit cycles

Lecture 58 - Lorenz equations and introduction to chaos

NPTEL : Astrophysics and Cosmology (Physics)

Co-ordinators : Prof. S. Bharadwaj

Lecture 1 - Introduction

Lecture 2 - Keplers Law

Lecture 3 - The Solar System

Lecture 4 - The Solar System (Continued...)

Lecture 5 - Binary Systems

Lecture 6 - Binary Systems (Continued...)

Lecture 7 - Tidal Forces and the Earth Moon System

Lecture 8 - Fluid Mechanics

Lecture 9 - Hydrostatics and the Solar Wind

Lecture 10 - Radiative Transfer

Lecture 11 - Radiative Transfer (Continued...)

Lecture 12 - Thermal Radiation

Lecture 13 - Thermal Radiation and the Sun

Lecture 14 - Virial Theorem and Its Application to Stars

Lecture 15 - Stars: Magnitudes and the H-R Diagram

Lecture 16 - Stellar Physics - I

Lecture 17 - Stellar Physics - II

Lecture 18 - Stellar Physics - III

Lecture 19 - Stellar Physics - IV

Lecture 20 - Stellar Physics - V

Lecture 21 - White Dwarfs

Lecture 22 - White Dwarfs and Neutron Stars

Lecture 23 - Galaxies

Lecture 24 - Galaxies and the Expanding Universe

Lecture 25 - The Expanding Universe

Lecture 26 - Dynamics of the Expanding Universe

Lecture 27 - Dynamics of the Expanding Universe (Continued...)

Lecture 28 - The Expanding Universe and the Cosmological Metric

Lecture 29 - The Cosmological Space - Time

Lecture 30 - Distances

Lecture 31 - Distances (Continued...)

Lecture 32 - Distances and the Hubble Parameter

Lecture 33 - Distances, the Hubble Parameter and Dark Energy (Continued...)

Lecture 34 - CMBR and Thermal History

Lecture 35 - CMBR and Thermal History (Continued...1)

Lecture 36 - CMBR and Thermal History (Continued...2)

Lecture 37 - Thermal History, Expansion Rate and Neutrino Mass

Lecture 38 - Thermal History: Neutrino Mass, Nucleosynthesis

Lecture 39 - Big Bang Nucleosynthesis

Lecture 40 - Big Bang Nucleosynthesis (Continued...)

NPTEL : NOC:Mathematics Methods in Physics - I (Physics)

Co-ordinators : Prof. Samudra Roy

Lecture 1 - Set, Group, Field, Ring

Lecture 2 - Vector Space

Lecture 3 - Span, Linear combination of vectors

Lecture 4 - Linearly dependent and independent vector, Basis

Lecture 5 - Dual Space

Lecture 6 - Inner Product

Lecture 7 - Schwarz Inequality

Lecture 8 - Inner product space, Gram-Schmidt Ortho-normalization

Lecture 9 - Projection operator

Lecture 10 - Transformation of Basis

Lecture 11 - Transformation of Basis (Continued...)

Lecture 12 - Unitary transformation, Similarity Transformation

Lecture 13 - Eigen Value, Eigen Vectors

Lecture 14 - Normal Matrix

Lecture 15 - Diagonalization of a Matrix

Lecture 16 - Hermitian Matrix

Lecture 17 - Rank of a Matrix

Lecture 18 - Cayley - Hamilton Theorem, Function space

Lecture 19 - Metric Space, Linearly dependent - independent functions

Lecture 20 - Linearly dependent â€“independent functions (Continued...), Inner Product of functions

Lecture 21 - Orthogonal functions

Lecture 22 - Delta Function, Completeness

Lecture 23 - Fourier

Lecture 24 - Fourier Series (Continued...)

Lecture 25 - Parseval Theorem, Fourier Transform

Lecture 26 - Parseval Relation, Convolution Theorem

Lecture 27 - Polynomial space, Legendre Polynomial

Lecture 28 - Monomial Basis, Factorial Basis, Legendre Basis

Lecture 29 - Complex Numbers

Lecture 30 - Geometrical interpretation of complex numbers

Lecture 31 - de Moivreâ€™s Theorem

Lecture 32 - Roots of a complex number

Lecture 33 - Set of complex no, Stereographic projection

Lecture 34 - Complex Function, Concept of Limit

Lecture 35 - Derivative of Complex Function, Cauchy-Riemann Equation

Lecture 36 - Analytic Function

Lecture 37 - Harmonic Conjugate

Lecture 38 - Polar form of Cauchy-Riemann Equation

Lecture 39 - Multi-valued function and Branches

Lecture 40 - Complex Line Integration, Contour, Regions

Lecture 41 - Complex Line Integration (Continued...)

Lecture 42 - Cauchy-Goursat Theorem

Lecture 43 - Application of Cauchy-Goursat Theorem

Lecture 44 - Cauchyâ€™s Integral Formula

Lecture 45 - Cauchyâ€™s Integral Formula (Continued...)

Lecture 46 - Series and Sequence

Lecture 47 - Series and Sequence (Continued...)

Lecture 48 - Circle and radius of convergence

Lecture 49 - Taylor Series

Lecture 50 - Classification of singularity

Lecture 51 - Laurent Series, Singularity

Lecture 52 - Laurent series expansion

Lecture 53 - Laurent series expansion (Continued...), Concept of Residue

Lecture 54 - Classification of Residue

Lecture 55 - Calculation of Residue for quotient from

Lecture 56 - Cauchyâ€™s Residue Theorem

Lecture 57 - Cauchyâ€™s Residue Theorem (Continued...)

Lecture 58 - Real Integration using Cauchyâ€™s Residue Theorem

Lecture 59 - Real Integration using Cauchyâ€™s Residue Theorem (Continued...)

Lecture 60 - Real Integration using Cauchyâ€™s Residue Theorem (Continued...)

NPTEL : NOC:Classical Mechanics - from Newtonian to Lagrangian Formulation (Physics)

Co-ordinators : Prof. Debamalya Banerjee

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6 - Systems with variable mass - 3

Lecture 7 - Systems with variable mass - 4

Lecture 8 - Central force - 1

Lecture 9 - Central force - 2

Lecture 10 - Central force - 3

Lecture 11 - Central force - 4

Lecture 12 - Central force - 5

Lecture 13 - Central force - 6

Lecture 14 - Central force - 7

Lecture 15 - Central force - 8

Lecture 16 - Central force - 9

Lecture 17 - Central force - 10

Lecture 18 - Central force - 11

Lecture 19 - Central force - 12

Lecture 20 - Central force - 13

Lecture 21 - Central force - 14

Lecture 22 - Central force - 15

Lecture 23 - Mooring Co-ordinate Systems - 1

Lecture 24 - Mooring Co-ordinate Systems - 2

Lecture 25 - Mooring Co-ordinate Systems - 3

Lecture 26 - Mooring Co-ordinate Systems - 4

Lecture 27 - Rigid body dynamics - 1

Lecture 28 - Rigid body dynamics - 2

Lecture 29 - Rigid body dynamics - 3

Lecture 30 - Rigid body dynamics - 4

Lecture 31 - Rigid body dynamics - 5

Lecture 32 - Rigid body dynamics - 6

Lecture 33 - Rigid body dynamics - 7

Lecture 34 - Rigid body dynamics - 8

Lecture 35 - Rigid body dynamics - 9

Lecture 36 - Rigid body dynamics - 10

Lecture 37 - Rigid body dynamics - 11

Lecture 38 - Rigid body dynamics - 12

Lecture 39 - Rigid body dynamics - 13

Lecture 40 - Rigid body dynamics - 14

Lecture 41 - Rigid body dynamics - 15

Lecture 42 - Rigid body dynamics - 16

Lecture 43 - Lagrangian Formulation - 1

Lecture 44 - Lagrangian Formulation - 2

Lecture 45 - Lagrangian Formulation - 3

Lecture 46 - Lagrangian Formulation - 4

Lecture 47 - Lagrangian Formulation - 5

Lecture 48 - Lagrangian Formulation - 6

Lecture 49 - Lagrangian Formulation - 7

Lecture 50 - Lagrangian Formulation - 8

Lecture 51 - Lagrangian Formulation - 9

Lecture 52 - Lagrangian Formulation - 10

Lecture 53 - Small oscillation - 1

Lecture 54 - Small oscillation - 2

Lecture 55 - Small oscillation - 3

Lecture 56 - Small oscillation - 4

Lecture 57 - Small oscillation - 5

Lecture 58 - Small oscillation - 6

Lecture 59 - Small oscillation - 7

Lecture 60 - Small oscillation - 8

NPTEL : NOC:Solid State Physics (Physics)

Co-ordinators : Prof. Amal Kumar Das

Lecture 1 - Atom to Solid Structure

Lecture 2 - Atom to Solid Structure (Continued...)

Lecture 3 - Structure of Solid

Lecture 4 - Structure of Solid (Continued...)

Lecture 5 - Crystal Structure

Lecture 6 - Crystal Structure (Continued...)

Lecture 7 - Crystal Structure (Continued...)

Lecture 8 - Crystal Structure (Continued...)

Lecture 9 - Crystal Structure (Continued...)

Lecture 10 - Crystal Structure (Continued...)

Lecture 11 - Crystal Structure (Continued...)

Lecture 12 - Crystal Structure (Continued...)

Lecture 13 - Crystal Structure (Continued...)

Lecture 14 - Crystal Structure (Continued...)

Lecture 15 - Crystal Structure (Continued...)

Lecture 16 - Crystal Structure (Continued...)

Lecture 17 - Crystal Structure (Continued...)

Lecture 18 - X-ray Diffraction from Crystal

Lecture 19 - X-ray Diffraction from Crystal (Continued...)

Lecture 20 - X-ray Diffraction from Crystal (Continued...)

Lecture 21 - X-ray Diffraction from Crystal (Continued...)

Lecture 22 - X-ray Diffraction from Crystal (Continued...)

Lecture 23 - X-ray Diffraction from Crystal (Continued...)

Lecture 24 - X-ray Diffraction from Crystal (Continued...)

Lecture 25 - Reciprocal Lattice

Lecture 26 - Reciprocal Lattice (Continued...)

Lecture 27 - Reciprocal Lattice (Continued...)

Lecture 28 - Reciprocal Lattice (Continued...)

Lecture 29 - Reciprocal Lattice (Continued...)

Lecture 30 - Intensity of Bragg Diffraction

Lecture 31 - Intensity of Bragg Diffraction (Continued...)

Lecture 32 - Electrical Properties of Metal

Lecture 33 - Electrical Properties of Metal (Continued...)

Lecture 34 - Electrical Properties of Metal (Continued...)

Lecture 35 - Electrical Properties of Metal (Continued...)

Lecture 36 - Electrical Properties of Metal (Continued...)

Lecture 37 - Electrical Properties of Metal (Continued...)

Lecture 38 - Electrical Properties of Metal (Continued...)

Lecture 39 - Electrical Properties of Metal (Continued...)

Lecture 40 - Band Theory of Solids

Lecture 41 - Band Theory of Solids (Continued...)

Lecture 42 - Band Theory of Solids (Continued...)

Lecture 43 - Band Theory of Solids (Continued...)

Lecture 44 - Band Theory of Solids (Continued...)

Lecture 45 - Band Theory of Solids (Continued...)

Lecture 46 - Band Theory of Solids (Continued...)

Lecture 47 - Physics of Semiconductor

Lecture 48 - Physics of Semiconductor (Continued...)

Lecture 49 - Physics of Semiconductor

Lecture 50 - Electrical Conduction

Lecture 51 - Electrical Conduction

Lecture 52

Lecture 53

Lecture 54 - Thermal Properties of Solid (Continued...)

Lecture 55 - Thermal Properties of Solid (Continued...)

Lecture 56 - Thermal Properties of Solid (Continued...)

Lecture 57 - Thermal Properties of Solid (Continued...)

Lecture 58 - Magnetic Property of Solid

Lecture 59 - Magnetic Property of Solid (Continued...)

Lecture 60 - Magnetic Property of Solid (Continued...)

Lecture 61 - Magnetic Property of Solid (Continued...)

Lecture 62 - Magnetic Property of Solid (Continued...)

Lecture 63 - Magnetic Property of Solid (Continued...)

Lecture 64 - Magnetic Property of Solid (Continued...)

Lecture 65 - Magnetic Property of Solid (Continued...)

Lecture 66 - Magnetic Property of Solid (Continued...)

Lecture 67 - Magnetic Property of Solid (Continued...)

Lecture 68 - Magnetic Property of Solid (Continued...)

Lecture 69 - Magnetic Property of Solid (Continued...)

Lecture 70 - Magnetic Property of Solid (Continued...)

Lecture 71 - Magnetic Property of Solids (Continued...)

Lecture 72 - Dielectric Properties of Solid

Lecture 73 - Dielectric Properties of Solid (Continued...)

Lecture 74 - Dielectric Properties of Solid (Continued...)

Lecture 75 - Superconductivity

NPTEL : NOC:Atomic and Molecular Physics (Physics)

Co-ordinators : Prof. Amal Kumar Das

Lecture 1 - Experimental observations and theoretical development in discovery of constituents of an atom

Lecture 2 - Experimental observations and theoretical development in discovery of constituents of an atom (Continued...)

Lecture 3 - Experimental observations and theoretical development in discovery of constituents of an atom (Continued...)

Lecture 4 - Experimental observations and theoretical development in discovery of constituents of an atom (Continued...:

Lecture 5 - Experimental observations and theoretical development in discovery of constituents of an atom (Continued...)

Lecture 6 - Structure of an atom

Lecture 7 - Structure of an atom

Lecture 8 - Structure of an atom (Continued...)

Lecture 9 - Atomic structure of an atom

Lecture 10 - Atomic structure of an atom

Lecture 11 - Structure of an atom

Lecture 12 - Atomic structure of an atom

Lecture 13 - Atomic structure of an atom

Lecture 14 - Structure of an atom

Lecture 15 - Structure of an atom

Lecture 16 - Structure of an atom

Lecture 17 - Structure of an atom

Lecture 18 - Structure of an atom

Lecture 19 - Structure of an atom

Lecture 20 - Structure of an atom

Lecture 21 - Atomic spectra

Lecture 22 - Atomic spectra

Lecture 23 - Multielectron atoms

Lecture 24 - Multielectron atoms (Continued...)

Lecture 25 - Multielectron atoms (Continued...)

Lecture 26 - Multielectron atoms (Continued...)

Lecture 27 - Quantum mechanical treatment

Lecture 28 - Quantum mechanical treatment (Continued...)

Lecture 29 - Quantum mechanical treatment of H-like atom

Lecture 30 - Quantum mechanical treatment of H-like atom (Continued...)

Lecture 31 - Quantum mechanical treatment of Hydrogen like atom

Lecture 32 - Quantum mechanical treatment of Hydrogen like atom (Continued...)

Lecture 33 - Quantum mechanical treatment of hydrogen like atom (Continued...)

Lecture 34 - Quantum mechanical treatment of hydrogen like atom (Continued...)

Lecture 35 - Quantum mechanical treatment of hydrogen like atom (Continued...)

Lecture 36 - Quantum Mechanical treatment of Hydrogen like atom (Continued...)

Lecture 37 - Quantum Mechanical treatment of Hydrogen like atom (Continued...)

Lecture 38 - Hydrogen like atom in magnetic field

Lecture 39 - Hydrogen like atom in magnetic field (Continued...)

Lecture 40 - Hydrogen like atom in electric field

Lecture 41 - Physics of molecules

Lecture 42 - Rotation of a molecule

Lecture 43 - Rotation of a molecule (Continued...)

Lecture 44 - Rotation of a molecule (Continued...)

Lecture 45 - Rotation of a molecule (Continued...)

Lecture 46 - Vibration of a molecule

Lecture 47 - Vibration of a molecule (Continued...)

Lecture 48 - Vibration of a molecule (Continued...)

Lecture 49 - Vibration of a molecule (Continued...)

Lecture 50 - Vibration of a molecule (Continued...)

Lecture 51 - Electronic spectra of a molecule

Lecture 52 - Electronic spectra of a molecule (Continued...)

Lecture 53 - Electronic structure of molecules

Lecture 54 - Electronic structure of molecules (Continued...)

Lecture 55 - Electronic structure of a molecule

Lecture 56 - Atomic and Molecular Spectroscopy

Lecture 57 - Raman Spectroscopy

Lecture 58 - Raman Spectroscopy (Continued...)

Lecture 59 - Raman Spectroscopy (Continued...)

Lecture 60 - Resonance spectroscopy

NPTEL : NOC:Modern Optics (Physics)

Co-ordinators : Prof. Partha Roy Choudhuri

Lecture 1 - Maxwells equations and electromagnetic waves

Lecture 2 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 3 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 4 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 5 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 6 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 7 - Maxwells equations and electromagnetic waves (Continued...)

Lecture 8 - Wave propagation in anisotropic media

Lecture 9 - Wave propagation in anisotropic media (Continued...)

Lecture 10 - Wave propagation in anisotropic media (Continued...)

Lecture 11 - Wave propagation in anisotropic media (Continued...)

Lecture 12 - Wave propagation in anisotropic media (Continued...)

Lecture 13 - Wave propagation in layered structures

Lecture 14 - Wave propagation in layered structures (Continued...)

Lecture 15 - Wave propagation in layered structures (Continued...)

Lecture 16 - Wave propagation in layered structures (Continued...)

Lecture 17 - Wave propagation in layered structures (Continued...)

Lecture 18 - Waves in guided structures and modes

Lecture 19 - Waves in guided structures and modes (Continued...)

Lecture 20 - Waves in guided structures and modes (Continued...)

Lecture 21 - Waves in guided structures and modes (Continued...)

Lecture 22 - Waves in guided structures and modes (Continued...)

Lecture 23 - Waves in guided structures and modes (Continued...)

Lecture 24 - Coupling of waves and optical couplers

Lecture 25 - Coupling of waves and optical couplers (Continued...)

Lecture 26 - Coupling of waves and optical couplers (Continued...)

Lecture 27 - Coupling of waves and optical couplers (Continued...)

Lecture 28 - Coupling of waves and optical couplers (Continued...)

Lecture 29 - Electro-optic Effect

Lecture 30 - Electro-optic Effect (Continued...)

Lecture 31 - Electro-optic Effect (Continued...)

Lecture 32 - Electro-optic Effect (Continued...)

Lecture 33 - Electro-optic Effect (Continued...)

Lecture 34 - Electro-optic Modulators and Devices

Lecture 35 - Electro-optic Modulators and Devices (Continued...)

Lecture 36 - Electro-optic Modulators and Devices (Continued...)

Lecture 37 - Electro-optic Modulators and Devices (Continued...)

Lecture 38 - Electro-optic Modulators and Devices (Continued...)

Lecture 39 - Electro-optic Modulators and Devices (Continued...)

Lecture 40 - Electro-optic Modulators and Devices (Continued...)

Lecture 41 - Acousto-optic Effect

Lecture 42 - Acousto-optic Effect (Continued...)

Lecture 43 - Acousto-optic Effect (Continued...)

Lecture 44 - Acousto-optic Effect (Continued...)

Lecture 45 - Acousto-optic Effect (Continued...)

Lecture 46 - Acousto-optic Effect (Continued...)

Lecture 47 - Acousto-optic Effect (Continued...)

Lecture 48 - Acousto-optic Effect (Continued...)

Lecture 49 - Acousto-optic Effect (Continued...)

Lecture 50 - Acousto-optic Effect (Continued...)

Lecture 51 - Acousto-optic Effect (Continued...)

Lecture 52 - Acousto-optic Effect (Continued...)

Lecture 53 - Acousto-optic Effect (Continued...)

Lecture 54 - Acousto-optic Modulators and Devices

Lecture 55 - Acousto-optic Modulators and Devices (Continued...)

Lecture 56 - Acousto-optic Modulators and Devices (Continued...)

Lecture 57 - Acousto-optic Modulators and Devices (Continued...)

Lecture 58 - Magneto-optic Effect

Lecture 59 - Magneto-optic Effect (Continued...)

NPTEL : NOC:Introduction to Non-linear Optics and its Applications (Physics)

Co-ordinators : Prof. Samudra Roy

Lecture 1 - Basic Linear Optics

Lecture 2 - Basic Linear Optics (Continued...)

Lecture 3 - Basic Linear Optics (Continued...)

Lecture 4 - Basic Linear Optics (Continued...)

Lecture 5 - Basic Linear Optics (Continued...)

Lecture 6 - Basic Linear Optics (Continued...)

Lecture 7 - Basic Linear Optics (Continued...)

Lecture 8 - Basic Linear Optics (Continued...)

Lecture 9 - Basic Linear Optics (Continued...)

Lecture 10 - Nonlinear Optics : An Introduction

Lecture 11 - Classical origin of optical nonlinearity

Lecture 12 - Millerâ€™s Rule

Lecture 13 - Second Harmonic Generation (SHG)

Lecture 14 - Optical Rectification, Linear electro-optic effect

Lecture 15 - Sum and Difference frequency generation

Lecture 16 - Nonlinear Maxwellâ€™s equation

Lecture 17 - Theory of SHG

Lecture 18 - Phase matching

Lecture 19 - Phase matching of SHG, Gain band width calculation

Lecture 20 - Manley-Rowe Relation, Energy conservation in SHG,

Lecture 21 - Birefringence phase-matching (BPM),Type I and Type II phase matching

Lecture 22 - Type II phase matching, Symmetry in nonlinear susceptibility

Lecture 23 - Kleinmanâ€™s Symmetry, Neumannâ€™s Principle

Lecture 24 - Neumannâ€™s Principle (Continued...) Centrosymmetric system

Lecture 25 - Matrix form : SHG, SFG, DFG , SHG in KDP Crystal

Lecture 26 - SHG in KDP crystal, Calculation of deff

Lecture 27 - SHG in LiNbO3

Lecture 28 - Quasi phase matching (QPM)

Lecture 29 - Quasi phase matching (QPM) (Continued...), Periodic d function

Lecture 30 - 1st, 2nd, 3rd order QPM, SHG under depleted pump

Lecture 31 - Realistic calculation of SHG, 3 wave interaction

Lecture 32 - 3 wave interaction, Equation for pump, signal and idler wave, Non-collinear phase matching

Lecture 33 - Manley-Rowe Relation (3 wave mixing), Parametric down conversion

Lecture 34 - Parametric down conversion (Continued...), Optical Parametric Amplification (OPA)

Lecture 35 - Optical Parametric Amplification (OPA), Difference frequency generation under OPA

Lecture 36 - Sum frequency generation under OPA

Lecture 37 - OPA under non-phase matching condition, Expression of gain

Lecture 38 - Optical parametric Oscillator (OPO), Singly resonant oscillator

Lecture 39 - Doubly Resonant Oscillator (DRO)

Lecture 40 - Doubly Resonant Oscillator (DRO) (Continued...)

Lecture 41 - 3rd order nonlinear effect

Lecture 42 - Optical Kerr effect and Self-focusing, Symmetry in 3rd order susceptibility

Lecture 43 - Symmetry in 3rd order susceptibility (Continued...), Self Phase Modulation (SPM)

Lecture 44 - Self Phase Modulation (Continued...), Frequency Shift

Lecture 45 - Third Harmonic Generation(3HG), Energy conservation

Lecture 46 - Third Harmonic Generation (Continued...)

Lecture 47 - Third Harmonic Generation (Continued...), Cross Phase Modulation (XPM)

Lecture 48 - Cross Phase Modulation (Continued...), Nonlinear Absorption

Lecture 49 - Four Wave Mixing

Lecture 50 - Four Wave mixing (Continued...)

Lecture 51 - Parametric Amplification under FWM

Lecture 52 - Parametric Amplification under FWM (Continued...)

Lecture 53 - Optical Phase Conjugation

Lecture 54 - Raman Scattering

Lecture 55 - Stimulated Raman Scattering

Lecture 56 - Raman Amplification

Lecture 57 - Raman Amplification (Continued...)

Lecture 58 - Linear pulse propagation

Lecture 59 - Nonlinear Pulse propagation

Lecture 60 - Optical Soliton

NPTEL : NOC:Upstream LNG Technology (Physics)

Co-ordinators : Prof. Pavitra Sandilya

Lecture 1 - Introduction

Lecture 2 - Concentration

Lecture 3 - Sources and Process Overview of Natural Gas

Lecture 4 - Pure Component Phase Behavior

Lecture 5 - Mixture Phase Behavior

Lecture 6 - Phase Behaviour of Natural Gas

Lecture 7 - Dew Point and Bubble Point Calculations

Lecture 8 - Vapor Liquid Equilibrium

Lecture 9 - Problems on Vapor Pressure, Gibb's Phase Rule, Dew Point Bubble Point Temperatures

Lecture 10 - Thermophysical Properties of Natural Gas - I

Lecture 11 - Thermophysical Properties of Natural Gas - II

Lecture 12 - Thermodynamic and Chemical Properties

Lecture 13 - Combustion Properties

Lecture 14 - Flow in Natural Gas Systems

Lecture 15 - Flow Measurement In Natural Gas - I

Lecture 16 - Flow Measurement In Natural Gas - II

Lecture 17 - Temperature and Quality Measurement in Natural Gas Systems

Lecture 18 - Pressure measurement in natural gas systems

Lecture 19 - Tutorial on the estimation of thermophysical properties

Lecture 20 - Tutorial on the combustion and thermodynamic properties of natural gas

Lecture 21 - Tutorial on fluid mechanics

Lecture 22 - Tutorial on flow and pressure measurement in natural gas systems

Lecture 23 - Tutorial on temperature and quality measurement in natural gas

Lecture 24 - Heat transfer in natural gas systems

Lecture 25 - Tutorial on heat transfer in natural gas systems

Lecture 26 - Heat exchangers in natural gas systems

Lecture 27 - Analysis of heat exchangers in natural gas systems

Lecture 28 - Tutorial on heat exchanger analysis

Lecture 29 - Equillibrium vapour-liquid separation

Lecture 30 - Equillibrium in multicomponent systems

Lecture 31 - Separation by distillation

Lecture 32 - Design of distillation column

Lecture 33 - Equillibrium fluid solid separation

Lecture 34 - Membrane separation in natural gas systems

Lecture 35 - Estimation of water content in natural gas

Lecture 36 - Multistage single component equillibrium separation

Lecture 37 - Tutorial on vapour liquid separation

Lecture 38 - Tutorial on ideal binary distillation

Lecture 39 - Tutorial on equillibrium gas- solid separation

Lecture 40 - Tutorial on membrane gas separation

Lecture 41 - Dehydration of natural gas

Lecture 42 - Natural gas Processing - hydrate removal

Lecture 43 - Acid gas removal in natural gas system - I

Lecture 44 - Acid gas removal in natural gas system - II

Lecture 45 - Nitrogen removal in natural gas system - I

Lecture 46 - Nitrogen removal in natural gas system - II

Lecture 47 - Compression in natural gas systems

Lecture 48 - Compressors used in natural gas systems

Lecture 49 - Tutorial on hydrate removal

Lecture 50 - Multicomponent distillation column design: Approximate method

Lecture 51 - Sulfur recovery in natural gas systems - I

Lecture 52 - Tutorial on compression

Lecture 53 - Pigging

Lecture 54 - Sulfur recovery in natural gas systems - II

Lecture 55 - Trace components in natural gas

Lecture 56 - Helium recovery, upgradation and purification

Lecture 57 - Fundamentals of absorption and stripping for natural gas processing

Lecture 58 - Tutorial on absorption and stripping

Lecture 59 - Gas liquid separation in natural gas systems - I

Lecture 60 - Gas liquid separation in natural gas systems - II

Lecture 61 - Tutorial on equillibrium in multicomponent systems

Lecture 62 - Tutorial on multicomponent distillation - I

Lecture 63 - Tutorial on multicomponent distillation - II

Lecture 64 - Pumps in natural gas systems - I

Lecture 65 - Pumps in natural gas systems - II

Lecture 66 - Pumps in natural gas systems - III

Lecture 67 - Tutorial on pumps - I

Lecture 68 - Tutorial on pumps - II

Lecture 69 - Cryogenic refrigeration and liquefaction in natural gas systems - I

Lecture 70 - Cryogenic refrigeration and liquefaction in natural gas systems - II

Lecture 71 - Tutorial on refrigeration - I

Lecture 72 - Tutorial on refrigeration - II

Lecture 73 - Cryogenic refrigeration and liquefaction in natural gas systems - III

Lecture 74 - Cryogenic refrigeration and liquefaction in natural gas systems - IV

Lecture 75 - Cryogenic refrigeration and liquefaction in natural gas systems - V

Lecture 76 - Tutorial on refrigeration - III

Lecture 77 - Tutorial on refrigeration and liquefaction - IV

Lecture 78 - Tutorial on refrigeration and liquefaction - V

Lecture 79 - Hydrocarbon recovery in natural gas system - I

Lecture 80 - Hydrocarbon recovery in natural gas system - II

Lecture 81 - Hydrocarbon recovery in natural gas system - III

Lecture 82 - Tutorial on hydrocarbon recovery in natural gas

Lecture 83 - Piping in natural gas systems - I

Lecture 84 - Piping in natural gas systems - II

Lecture 85 - Tutorial on piping in natural gas systems - I

Lecture 86 - Tutorial on piping in natural gas systems - II

NPTEL : NOC:Experimental Physics-I (Physics)

Co-ordinators : Prof. Amal Kumar Das

Lecture 1 - Introduction

Lecture 2 - Basic tools and apparatus

Lecture 3 - Basic tools and apparatus (Continued...)

Lecture 4 - Basic tools and apparatus (Continued...)

Lecture 5 - Basic tools and apparatus (Continued...)

Lecture 6 - Basic tools and apparatus (Continued...)

Lecture 7 - Basic components

Lecture 8 - Basic apparatus

Lecture 9 - Basic apparatus (Continued...)

Lecture 10 - Basic analysis

Lecture 11 - Basics analysis (Continued...)

Lecture 12 - Basics analysis (Continued...)

Lecture 13 - Basics analysis (Continued...)

Lecture 14 - Basics analysis (Continued...)

Lecture 15 - Basics analysis (Continued...)

Lecture 16 - Basics analysis (Continued...)

Lecture 17 - Basics analysis (Continued...)

Lecture 18 - Basics analysis (Continued...)

Lecture 19 - Basics analysis (Continued...)

Lecture 20 - Determination of Young's modulus

Lecture 21 - Demonstration on the experiment of Young's modulus of mettalic bar and data collection

Lecture 22 - Calculate the value of young's modulus of given metallic bar form the recorded datas

Lecture 23 - Experimental demonstration to calculate the spring constant of a given spring

Lecture 24 - Calculate the value of calculate the spring constant of a given spring form the recorded datas

Lecture 25 - Theory regarding Moment of inertia of a flywheel

Lecture 26 - Experimental demonstration to calculate the moment of inertia of a given flywheel

Lecture 27 - How to calculate the value of moment of inertia of a flywheelform the recorded data

Lecture 28 - Theory regarding surface tension of the liquid

Lecture 29 - Demonstration on the experiment of surface tension and data collection

Lecture 30 - How to calculate the value of surface tension of water from the recorded data

Lecture 31 - Theory regarding viscosity of liquid

Lecture 32 - Demonstration on the experiment of viscosity

Lecture 33 - Data analysis of recorded data on viscosity

Lecture 34 - Forced Oscillations Pohls pendulum

Lecture 35 - Coupled Pendulum

Lecture 36 - Demonstration on the experiment of compound pendulum

Lecture 37 - Theory regarding compound pendulum has been discussed

Lecture 38 - Experimental demonstration on the standing Waves on a String has been shown clearly how to determine the linear mass density of the string.

Lecture 39 - Linear expansion of metal

Lecture 40 - Expt. to study linear expansion

Lecture 41 - Determine the coefficient of thermal conductivity of a bad conductor

Lecture 42 - Determination of electrical equivalent of heat

Lecture 43 - Determination of specific heat of the given solid metals using Dulong-Petit's law

Lecture 44 - Determination of the calibration curve of a given (Type K chromelÃ¢â‚¬â€œalumel) thermocouple and hence determination of Seebeck coefficient

Lecture 45 - Theorey and Demonstartion Platinum Resistance thermometer

Lecture 46 - Experiment on Platinum Resistance thermometer

Lecture 47 - To study the current-voltage relationship of an L-R circuit

Lecture 48 - To study the variation in current and voltage in a series LCR circuit

Lecture 49 - Sensitivity of Blastic Galvanometer

Lecture 50 - Expt. for Sensitivity of Blastic Galvanometer

Lecture 51 - Theory on RC Circuit

Lecture 52 - Expt. on RC Circuit

Lecture 53 - Theory regarding the magnetic field along the axis of a circular coil

Lecture 54 - Experiment regarding the magnetic field along the axis of a circular coil

Lecture 55 - Study the induced e.m.f of inductance coil

Lecture 56 - Mutual inductance

Lecture 57 - Theory regarding permeability of air

Lecture 58 - Experiment to determination the permeability of air

Lecture 59 - Devices around us

Lecture 60 - Devices around us (Continued...)

NPTEL : NOC:Experimental Physics-II (Physics)

Co-ordinators : Prof. Amal Kumar Das

Lecture 1 - Introduction

Lecture 2 - Summary of Experimental Physics - I

Lecture 3 - Summary of Experimental Physics - I (Continued...)

Lecture 4 - Summary of Experimental Physics - I (Continued...)

Lecture 5 - Summary of Experimental Physics - I (Continued...)

Lecture 6 - Basic analysis

Lecture 7 - Basic analysis (Continued...)

Lecture 8 - Basic components

Lecture 9 - Basic components (Continued...)

Lecture 10 - Basic components (Continued...)

Lecture 11 - Basic idea on mirros and lenses and their applications

Lecture 12 - Determination of focal length of concave mirror

Lecture 13 - Determination of focal length of concave mirror (Continued...)

Lecture 14 - Determination of focal length of convex mirror

Lecture 15 - Determination of focal length of convex lens

Lecture 16 - Determination of focal length of concave lens

Lecture 17 - Determination of focal length of convex lens by diplacement method

Lecture 18 - Applications of mirrors and lenses

Lecture 19 - Determination of refractive index of liquid using travelling microscope

Lecture 20 - Basic discussion on spectrometer and prism

Lecture 21 - Basic discussion on spectrometer and prism (Continued...)

Lecture 22 - Basic discussion on spectrometer and prism (Continued...)

Lecture 23 - Schuster's method

Lecture 24 - Discussion on angle of the prism, angular dispersion and dispersive power of given prism

Lecture 25 - Determination of the angle of prism

Lecture 26 - Determination of the angle of minimum deviation for a given prism and hence to determine the refractive index of the given prism

Lecture 27 - Discussion on the angle of incidence and corresponding deviation of light through a prism and determination of the angle of minimum deviation for a given prism from the plot of the angle of incidence versus deviation.

Lecture 28 - Determination of the angle of minimum deviation from (i-D) plot for a given prism and hence to determine the refractive index of the given prism.

Lecture 29 - Determination of the calibration plot of deviation versus wavelength for a given prism and hence determination of the wavelength of the unknown light source using the calibration plot

Lecture 30 - Determination of the dispersive power, Cauchy constant and resolving power of a given prism.

Lecture 31 - Interference Phenomena

Lecture 32 - Interference Phenomena (Continued...)

Lecture 33 - Interference Phenomena (Continued...)

Lecture 34 - Bi-prism

Lecture 35 - Bi-prism (Continued...)

Lecture 36 - Interference phenomena by Newton ring (Theory)

Lecture 37 - Interference phenomena by Newton ring (Experiment)

Lecture 38 - Michelson interferometer (Theory)

Lecture 39 - Michelson interferometer (Experiment)

Lecture 40 - Theory of diffraction

Lecture 41 - Theory of diffraction (Continued...)

Lecture 42 - Theory of diffraction (Continued...)

Lecture 43 - Single slit diffraction

Lecture 44 - Double slit diffraction

Lecture 45 - Plane transmission grating

Lecture 46 - Plane transmission grating (Continued...)

Lecture 47 - Theory of polarization

Lecture 48 - Theory of polarization (Continued...)

Lecture 49 - Experiment for Verification of Malus law

Lecture 50 - Experiment for brewester

Lecture 51 - Experiment for Brewester angle

Lecture 52 - Experiment on e-ray and o-ray

Lecture 53 - Polarimeter

Lecture 54 - Zone-plate Theory

Lecture 55 - Zone-plate Experiment

Lecture 56 - Theory of Photoelectric Effect

Lecture 57 - Experiment on Photoelectric Effect

Lecture 58 - Thomson experiment to determine the specific charge of an electron (e/m)

Lecture 59 - Frank-Hertz Experiment

Lecture 60 - Experiment on Rydberg constant

Lecture 61 - Experiment on Rydberg constant (Continued...)

NPTEL : NOC:Experimental Physics-III (Physics)

Co-ordinators : Prof. Amal Kumar Das

Lecture 1 - Basic Tools and Instruments in the Laboratory

Lecture 2 - Basic Tools and Instruments in the Laboratory (Continued...)

Lecture 3 - Cathode Ray Oscilloscope (CRO)

Lecture 4 - Cathode Ray Oscilloscope (CRO) (Continued...)

Lecture 5 - Electro Magnet and Constant Current Power Supply

Lecture 6 - Electro Magnet and Constant Current Power Supply (Continued...)

Lecture 7 - Electro Magnet and Constant Current Power Supply (Continued...)

Lecture 8 - Gaussmeter/Teslameter

Lecture 9 - Gaussmeter/Teslameter (Continued...)

Lecture 10 - Lock in Amplifier

Lecture 11 - Lock in Amplifier (Continued...)

Lecture 12 - Measurement of magneto resistance

Lecture 13 - Magneto resistance for Semiconductor

Lecture 14 - Hall Effect

Lecture 15 - Hall Effect as a function of magnetic Field

Lecture 16 - Hall Effect as a function of temperature

Lecture 17 - To study the variation of resistivity of metal and semiconductor at low temperature region (Continued...)

Lecture 18 - To study the variation of resistivity of metal and semiconductor at low temperature region (Continued...)

Lecture 19 - Measurement of magnetisation of ferromagnetic material

Lecture 20 - Measurement of magnetisation of ferromagnetic material (Continued...)

Lecture 21 - Susceptibility of paramagnetic substance by Quincke's tube method

Lecture 22 - Experiment of Quincke's Tube Method

Lecture 23 - Susceptibility of paramagnetic substance by Gouy's method

Lecture 24 - Dielectric constant of solid

Lecture 25 - Dielectric constant of non-conducting liquid

Lecture 26 - P-E Loop of Ferroelectric Material

Lecture 27 - Measurement of Ionic Conductivity

Lecture 28 - Measurement of Ionic Conductivity (Continued...)

Lecture 29 - Electron Spin Resonance (ESR)

Lecture 30 - Electron Spin Resonance (ESR) Experiment

Lecture 31 - Superconductivity

Lecture 32 - Superconductivity (Continued...)

Lecture 33 - Superconductivity (Continued...)

Lecture 34 - Nuclear g-factor

Lecture 35 - Nuclear g-factor (Continued...)

Lecture 36 - P-N Junction

Lecture 37 - P-N Junction (Continued...)

Lecture 38 - P-N Junction (Continued...)

Lecture 39 - Zeeman Effect

Lecture 40 - Zeeman Effect (Continued...)

Lecture 41 - Zeeman Effect (Continued...)

Lecture 42 - Sodium Yellow Doublet

Lecture 43 - Sodium Yellow Doublet (Continued...)

Lecture 44 - Study of Absorption Spectrum of Iodine Vapour

Lecture 45 - Study of Absorption Spectrum of Iodine Vapour (Continued...)

Lecture 46 - Study of Absorption Spectrum of Iodine Vapour (Continued...)

Lecture 47 - Determination of Wavelength of Spectral Lines using Constant Deviation Spectrometer

Lecture 48 - Determination of Wavelength of Spectral Lines using Constant Deviation Spectrometer (Continued...)

Lecture 49 - Photoelastic Property of Materials

Lecture 50 - Photoelastic Property of Materials (Continued...)

Lecture 51 - Photoelastic Property of Materials (Continued...)

Lecture 52 - Faraday Effect

Lecture 53 - Faraday Effect (Continued...)

Lecture 54 - Electron Diffraction

Lecture 55 - Electron Diffraction (Continued...)

Lecture 56 - Determination of Velocity of Light in Free Space

Lecture 57 - Determination of Velocity of Light in Free Space (Continued...)

Lecture 58 - X-Ray Diffraction and Crystal Structure

Lecture 59 - X-Ray Diffraction and Crystal Structure (Continued...)

Lecture 60 - X-Ray Diffraction and Crystal Structure (Continued...)

Lecture 61 - X-Ray Diffraction and Crystal Structure (Continued...)

Lecture 62

NPTEL : NOC:Electronic Theory of Solids (Physics)

Co-ordinators : Prof. Arghya Taraphder

Lecture 1 - Free electrons: Drude Theory

Lecture 2 - Weidemann Franz Law

Lecture 3 - Drude Model continued: Hall Effect

Lecture 4 - Schrodinger Equation: Boundary Conditions

Lecture 5 - Density of States

Lecture 6 - Properties of Degenerate Fermi Gas

Lecture 7 - Statistics Fermi-Dirac distribution and Maxwell-Boltzmann Distribution: comparison and Specific Heat

Lecture 8 - Sommerfeld Expansion and Band Formation: Temperature dependent densities, Chemical Potential, Specific Heat

Lecture 9 - Bonding and Band Formation: N=2 solid Molecular Orbitals, Linear combinations of Atomic Orbitals (LCAO)

Lecture 10 - Variational Method: Molecular Orbitals, Bonding and anti-bonding Orbitals

Lecture 11 - Bonding and Band Formation (LCAO)

Lecture 12 - Bonding and Band Formation (LCAO) (Continued...)

Lecture 13 - Bloch's Theorem

Lecture 14 - Proof of Bloch's Theorem

Lecture 15 - N atoms Solid

Lecture 16 - Brillouin Zones

Lecture 17 - Tight binding: lattice with a basis

Lecture 18 - Fermi Surfaces

Lecture 19 - Lattice with basis:Energy Spectrum

Lecture 20 - Energy spectrum (Continued...)

Lecture 21 - Graphene and Fermi Surfaces

Lecture 22 - Fermi Surfaces Instabilities

Lecture 23 - Low Dimensional Systems

Lecture 24 - Integer Quantum Hall Effect (IQHE)

Lecture 25 - Integer Quantum Hall Effect (Continued...)

Lecture 26 - Electron in a Strong Magnetic Field and IQHE

Lecture 27 - Spintronics: Introduction and Applications

Lecture 28 - Magnetism

Lecture 29 - Magnetism: Quantum Theory

Lecture 30 - Hund's Rule

Lecture 31 - Curie's Law and Van Vleck Paramagnetism

Lecture 32 - Curie's law for any J, Susceptibility

Lecture 33 - Susceptibility and Thermal Properties

Lecture 34 - Adiabatic Demagnetisation

Lecture 35 - Pauli Paramagnetism

Lecture 36 - Paramagnetism of metals

Lecture 37 - Exchange interaction for 2 electrons

Lecture 38 - Exchange interactions of different types

Lecture 39 - Magnetic Order

Lecture 40 - Magnetic Order of different types and Heisenberg model

Lecture 41 - Ising Model

Lecture 42 - Mean Field Theory

Lecture 43 - Spontaneous magnetisation and 1D Ising Model

Lecture 44 - Symmetries of Ising model, Exact Solution

Lecture 45 - Ferromagnetic Heisenberg Model

Lecture 46 - Ground State and Magnons/Excitations

Lecture 47 - Superconductivity

Lecture 48 - London Equation

Lecture 49 - Meisner Effect from London Equation

Lecture 50 - Cooper problem

Lecture 51 - Instability of the Fermi Surface

Lecture 52 - BCS Theory Introduction

Lecture 53 - BCS Theory, Excitation Spectrum

Lecture 54 - BCS

Lecture 55 - Tunneling and Ginzberg Landau Theory

Lecture 56 - Electrodynamics of Superconductivity

Lecture 57 - Type II superconductors

Lecture 58 - Josephson junction

Lecture 59 - Vortices, SQUID, Quantum Supremacy and Qubits

Lecture 60 - Topological state of matter, XY Model, Topological Insulators

NPTEL : NOC:Physics of Linear and Nonlinear Optical Waveguides (Physics)

Co-ordinators : Prof. Samudra Roy

Lecture 1 - Wave Equation, Maxwellâ€™s equation, Plane wave

Lecture 2 - EM wave in vacuum, Poynting vector, Maxwellâ€™s equation in Dielectric Medium

Lecture 3 - Poynting Vector, Maxwellâ€™s equation in dielectric medium (Continued...)

Lecture 4 - Total Internal reflection, Evanescent wave

Lecture 5 - Step-index fiber (SIF), Light guidance in SIF

Lecture 6 - Light guidance in SIF (Skew Ray), V-Parameter, Discrete Ray

Lecture 7 - Cutoff wavelength, Fiber characteristics

Lecture 8 - Fiber Loss, dB units, Dispersion

Lecture 9 - Dispersion, Ray Path constant

Lecture 10 - Ray path constant, Ray equation

Lecture 11 - Ray equation (Continued...)

Lecture 12 - Ray transit time

Lecture 13 - Ray transit time (Continued...)

Lecture 14 - Material dispersion

Lecture 15 - Material dispersion (Continued...)

Lecture 16 - Material Dispersion (Continued...), Dispersion Coefficient

Lecture 17 - Pulse Broadening

Lecture 18 - Pulse Propagation in Dispersive Medium

Lecture 19 - Pulse Propagation in Dispersive Medium (Continued...)

Lecture 20 - Concept of Modes

Lecture 21 - TE and TM Modes

Lecture 22 - TE and TM Modes (Continued...)

Lecture 23 - Modes in Slab waveguide

Lecture 24 - Modes in Slab waveguide (Continued...)

Lecture 25 - Modes in Slab waveguide (Continued...)

Lecture 26 - Modes in Slab Waveguide (Continued...)

Lecture 27 - Waveguide Dispersion

Lecture 28 - Physical Understanding of Modes

Lecture 29 - Power Associated with a Modes

Lecture 30 - Modes in an Optical Fiber

Lecture 31 - Modes in an optical fiber (Continued...)

Lecture 32 - Modes in an optical fiber (Continued...)

Lecture 33 - LPlm mode structure

Lecture 34 - Optical fiber mode morphology (Continued...)

Lecture 35 - Effective area of mode, Fiber optics components

Lecture 36 - Directional Coupler

Lecture 37 - Coupled Mode Theory

Lecture 38 - Coupled Mode Theory (Continued...)

Lecture 39 - 3 dB power splitter

Lecture 40 - Working principle of WDM coupler

Lecture 41 - Fiber Bragg Grating

Lecture 42 - Fiber Bragg Grating (Continued...)

Lecture 43 - Reflectivity Calculation

Lecture 44 - Reflectivity Calculation (Continued...)

Lecture 45 - Reflectivity calculation of FBG (Continued...)

Lecture 46 - Reflectivity calculation of FBG (Continued...)

Lecture 47 - Reflectivity calculation of FBG (Continued...)

Lecture 48 - Bandwidth of reflectivity

Lecture 49 - Basic nonlinear optics

Lecture 50 - Frequency mixing, Optical Kerr effect

Lecture 51 - Optical Kerr effect (Continued...)

Lecture 52 - Self Phase Modulation

Lecture 53 - Self Phase Modulation (Continued...)

Lecture 54 - Self Phase Modulation (Continued...)

Lecture 55 - Pulse propagation in nonlinear waveguide

Lecture 56 - Pulse propagation in nonlinear waveguide (Continued...)

Lecture 57 - Pulse propagation in nonlinear dispersive waveguide

Lecture 58 - Pulse propagation in nonlinear dispersive waveguide (Continued...)

Lecture 59 - Concept of optical soliton

Lecture 60 - Concept of optical soliton (Continued...)

NPTEL : NOC:Physics of Renewable Energy Systems (Physics)

Co-ordinators : Prof. Amreesh Chandra

Lecture 1 - Introduction and relevance of the course

Lecture 2 - Energy sources

Lecture 3 - Solar Radiation

Lecture 4 - Solar Photovoltaic Systems

Lecture 5 - Origin of Band Structure and Energy Band Gap

Lecture 6 - Basics of Semiconductors

Lecture 7 - Construction of Solar Cells

Lecture 8 - Characterization of Solar Cells and Future Direction

Lecture 9 - Solar Heaters

Lecture 10 - Introduction to Wind Energy

Lecture 11 - Continuity Equation and its applications

Lecture 12 - Betz Criteria for extracting wind power

Lecture 13 - Wind turbines and their operation

Lecture 14 - Materials Aspects and future direction

Lecture 15 - Introduction to Hydroelectric Power

Lecture 16 - Hydroelectric Power Station and Turbines

Lecture 17 - Wave power and converters

Lecture 18 - Introduction to Tidal Power

Lecture 19 - Tidal Power and Geothermal Energy

Lecture 20 - Introduction to Energy Storage Systems

Lecture 21 - Thermal Energy Storage

Lecture 22 - Basics of Mechanical Energy Storage

Lecture 23 - Pumped Hydroelectric to Flywheels (Mechanical Energy Storage Systems)

Lecture 24 - Introduction to Li-ion battery

Lecture 25 - Characteristics and Parameters of Li-ion batteries

Lecture 26 - Cathode Materials for Li-ion batteries

Lecture 27 - Anode Materials for Li-ion batteries

Lecture 28 - Electrolytes and Separators for Li-batteries

Lecture 29 - From battery to supercapacitors

Lecture 30 - Construction, development and classification of Supercapacitors

Lecture 31 - Electric double layer capacitors (EDLCs)

Lecture 32 - Pseudocapacitors

Lecture 33 - Electrochemical Techniques for Supercapacitors and Batteries

Lecture 34 - From material to a supercapacitor device

Lecture 35 - Effect of temperature on supercapacitor performance

Lecture 36 - Effect of external magnetic field and frequency on supercapacitors

Lecture 37 - Introduction to Fuel Cells

Lecture 38 - Explanation of Fuel cell systems

Lecture 39 - Microbial Fuel Cells

Lecture 40 - Nanotechnology and Nanomaterials for Energy Applications

Lecture 41 - Synthesis of nanomaterials

Lecture 42 - Carbon- and metal-oxide based nanomaterials

Lecture 43 - Nanocatalysts

Lecture 44 - Characterization techniques for solid materials

Lecture 45 - X-ray diffraction method

Lecture 46 - UV-Visible Spectroscopy

Lecture 47 - Fourier Transform Infrared Spectroscopy

Lecture 48 - SEM, TEM and XPS

Lecture 49 - Particle size and zeta potential analysis

Lecture 50 - BET analysis

Lecture 51 - Electrochemical Impedance Spectroscopy

NPTEL : NOC:Thermal Physics (Physics)

Co-ordinators : Prof. Debamalya Banerjee

Lecture 1 - Foundation of kinetic theory of gasses

Lecture 2 - Maxwell's law for speed distribution of gas molecules

Lecture 3 - Average speeds in an ideal gas assembly

Lecture 4 - Principle of equipartition of energy

Lecture 5 - Maxwell's law for energy distribution of gas molecules

Lecture 6 - The mean free path of a gas assembly

Lecture 7 - Expression for mean free path

Lecture 8 - Experimental determination of mean free path

Lecture 9 - Pressure an molecular flux from mean free path

Lecture 10 - Problems on mean free path

Lecture 11 - Transport in fluids: introduction

Lecture 12 - Viscosity: transport of momentum

Lecture 13 - Thermal conductivity: trasnport of thermal energy

Lecture 14 - Diffusion coefficient: transport of mass

Lecture 15 - Molecular effusion: theory and applications

Lecture 16 - Brownian motion: concept, features, theory of fluctuation

Lecture 17 - Brownian motion: mean square displacement and vertical distribution of particles

Lecture 18 - Perrin's experiment on Brownian motion - Part 1

Lecture 19 - Perrin's experiment on Brownian motion - Part 2

Lecture 20 - Problems on Brownian motion, Rotational brownian motion

Lecture 21 - Specific heat of solids: Dulong-Petit law and Einstein theory

Lecture 22 - Limitaion of Einstein theory of specific heat

Lecture 23 - Debye theory of specific heat

Lecture 24 - Behavior of real gasses

Lecture 25 - Van der Waals equation of state

Lecture 26 - Critical parameters from Van der Waal's equation

Lecture 27 - Determination of Van der Waals' constants and Boyle temperature

Lecture 28 - Other equations of state

Lecture 29 - Measurement of temperature: Celcius scale, ideal gas scale, absolute zero

Lecture 30 - The platinum resistance thermometer

Lecture 31 - Basic concepts of classical thermodynamics

Lecture 32 - Basic concepts of classical thermodynamics (Continued...)

Lecture 33 - First law of thermodynamics

Lecture 34 - General description of work done and specific heat

Lecture 35 - General discussion on Heat conduction and elastic properties

Lecture 36 - Cyclic processes

Lecture 37 - The reversible heat engine: Carnot cycle

Lecture 38 - Refrigarator and Carnot Theorem

Lecture 39 - 2nd law and Clausius theorem

Lecture 40 - Concept of Entropy and mathematical form of 2nd law

Lecture 41 - The entropy principle

Lecture 42 - Efficiency of a cycle from T-S diagram

Lecture 43 - The Otto cycle

Lecture 44 - The Diesel cycle

Lecture 45 - Entropy and available energy

Lecture 46 - Thermodynamic relations

Lecture 47 - Application of thermodynamic relation

Lecture 48 - The free energy functions

Lecture 49 - Condition for thermodynamic equilibri

Lecture 50 - Thermodynamics of chemical reaction

Lecture 51 - Equilibruim between phases: The Clapeyron equation

Lecture 52 - 1st order phase transion along liquid-vapor equilibrium

Lecture 53 - Phase diagram and triple point

Lecture 54 - The 2nd latent heat equation

Lecture 55 - Gibbs phase rule and basics of second order phase transion

Lecture 56 - Basic concepts of radiation

Lecture 57 - Diffused radiation and Kirchhoff's law

Lecture 58 - Cavity radiation as a thermodynamic system: Stefan-Boltzmann law

Lecture 59 - Thermodynamics of cavity radiation

Lecture 60 - 3rd law of thermodynamics

NPTEL : NOC:Concepts in Magnetism and Superconductivity (Physics)

Co-ordinators : Prof. A Taraphder

Lecture 1 - Introduction: Magnetism and superconductivity as macroscopic quantum phenomena

Lecture 2 - Bohr magneton, BvL theorem

Lecture 3 - An electron in a magnetic field, magnetism of isolated atoms

Lecture 4 - Magnetism of isolated atoms (Continued...), Diamagnetism

Lecture 5 - Magnetism of atoms-dia and paramagnetic susceptibilities. Hund's rules,Van Vleck paramagnetism

Lecture 6 - Van Vleck paramagnetism (Continued...), Paramagnetism

Lecture 7 - Curie's law for arbitrary J, adiabatic demagnetization

Lecture 8 - Paramagnetism of conduction electrons - Pauli paramagnetism

Lecture 9 - Ions in a solid: crystal field, orbital quenching, Jahn-Teller effect

Lecture 10 - Jahn-Teller effect (Continued...), Magnetic resonance techniques NMR, ESR

Lecture 11 - Resonance techniques (Continued...), Recapitulation and overview

Lecture 12 - Recapitulation, interacting moments and long range order, dipolar exchange

Lecture 13 - Interacting moments, 2-electron system, origin of exchange and spin Hamiltonian

Lecture 14 - Spin Hamiltonian, Heisenberg model, Exchange interactions: direct

Lecture 15 - GMR, spin model and mean-field theory, Ising model

Lecture 16 - Ising model and its properties

Lecture 17 - Ising model and its properties (Continued...), absence of LRO in d=1, mean-field theory

Lecture 18 - Ising model recap, applications, exact solutions

Lecture 19 - Exact solution of Ising model in d=1, exact results in d=2. Mermin-Wagner theorem

Lecture 20 - Recap - Exact solution of Ising model. Mermin-Wagner theorem on the absence

Lecture 21 - Ferromagnetic Heisenberg model ground state

Lecture 22 - Ferromagnetic Heisenberg model, spin-waves and magnons

Lecture 23 - Antiferromagnetic Heisenberg model, AF magnetic structures

Lecture 24 - AF magnetic structures, susceptibility and excitations

Lecture 25 - Antiferromagnets and frustration, spin glass

Lecture 26 - Superconductivity: discovery, properties

Lecture 27 - Superconductivity: Meissner effect, London Equation

Lecture 28 - Electron-phonon interaction, Cooper problem

Lecture 29 - Cooper problem, setting up the BCS theory

Lecture 30 - BCS wave function, the Superconducting state and calculations of various properties

Lecture 31 - BCS theory (Continued...), energy gap, transition temperature

Lecture 32 - Consequences of BCS theory, gap vs T, Transition temperature, specific heat, tunnelling

Lecture 33 - Transition temperature, specific heat, tunnelling

Lecture 34 - Andreev reflection, Ginzburg-Landau Theory and electrodynamics of superconductors

Lecture 35 - Ginzburg-Landau theory, coherence length and Type I and II superconductors

Lecture 36 - Flux lattice, Flux quantization, Josephson junctions

Lecture 37 - Josephson effect and Josephson junctions

Lecture 38 - SQUID, Quantum computers and Josephson junction Qubits

Lecture 39 - High-Temperature Superconductivity: an enduring enigma

Lecture 40 - Overview and conclusion

NPTEL : NOC:Foundations of Classical Electrodynamics (Physics)

Co-ordinators : Prof. Samudra Roy

Lecture 1 - Vector analysis, Scalar and vector fields, vector identities

Lecture 2 - Vector Analysis (Continued...)

Lecture 3 - Use of Levi-Civita Symbol, Coordinate system

Lecture 4 - Coordinate system, Orthogonal Transformation

Lecture 5 - Spherical Coordinate system, Line, surface and volume element

Lecture 6 - Line, surface and volume element (Continued...)

Lecture 7 - Line, surface and volume integral

Lecture 8 - Differential calculus, Gradient

Lecture 9 - Gradient operator, Concept of divergence

Lecture 10 - Divergence operator, Divergence Theorem

Lecture 11 - Curl operator, Stokes Theorem

Lecture 12 - Gradient, Divergence and Curl (A recap), Vector identities

Lecture 13 - Curvilinear coordinate system

Lecture 14 - Curvilinear coordinate system (Continued...)

Lecture 15 - Curvilinear coordinate system (Continued...)

Lecture 16 - Delta Function

Lecture 17 - Delta Function (Continued...)

Lecture 18 - Helmholtz's Theorem

Lecture 19 - Helmholtz's Theorem(Recap), Tutorial

Lecture 20 - Tutorial (Continued...)

Lecture 21 - Concept of charge, Charge density

Lecture 22 - Coulomb's Law

Lecture 23 - Coulomb's Law (Continued...), Charge distribution

Lecture 24 - Charge distribution problem, Gauss's Law

Lecture 25 - Topics More on Gauss's Law

Lecture 26 - Application of Gauss's Law

Lecture 27 - Electrostatic potential

Lecture 28 - Electrostatic potential (Continued...)

Lecture 29 - Electrostatic energy

Lecture 30 - Electrostatic energy (Continued...)

Lecture 31 - Electrostatic energy calculation

Lecture 32 - Electrostatic dipole

Lecture 33 - Electric dipole (Continued...)

Lecture 34 - Multipole expansion

Lecture 35 - Monopole and Dipole moment

Lecture 36 - Quadrupole moment

Lecture 37 - Dipole and Quadrupole moment (Continued...)

Lecture 38 - Conductor

Lecture 39 - Conductor (Continued...)

Lecture 40 - Boundary condition

Lecture 41 - Electrostatic pressure, Capacitor

Lecture 42 - Energy of the Capacitor, Dielectric

Lecture 43 - Dielectric (Continued...)

Lecture 44 - Displacement Vector

Lecture 45 - Electrostatic boundary value problem

Lecture 46 - Electrostatic boundary value problem (Continued...)

Lecture 47 - Electrostatic boundary value problem (Continued...), Image method

Lecture 48 - Image method (Continued...)

Lecture 49 - Charge particle in magnetic field

Lecture 50 - Biot-Savart Law

Lecture 51 - Application of Biot-Savart Law

Lecture 52 - Ampere's Law

Lecture 53 - Application of Ampere's Law

Lecture 54 - Magnetic vector potential

Lecture 55 - Magnetic vector potential (Continued...)

Lecture 56 - Magnetic dipole moment

Lecture 57 - Magnetic dipole moment (Continued...)

Lecture 58 - Torque and potential energy of magnetic dipole, Magnetization

Lecture 59 - Bound Current

Lecture 60 - Magnetic materials

Lecture 61 - Electromagnetic Induction

Lecture 62 - Self and mutual inductance

Lecture 63 - Wave equation, Maxwellâ€™s Equation

Lecture 64 - Maxwells Equation (Continued...)

Lecture 65 - Maxwells Equation: a complete overview

Lecture 66 - Maxwells Equation: a complete overview (Continued...)

Lecture 67 - Lorentz Gauge, Maxwell's wave equation

Lecture 68 - Maxwell's wave equation (Coninued...)

Lecture 69 - Maxwell's Equation in matter

Lecture 70 - Maxwell's Equation in matter (Continued...)

Lecture 71 - Tutorial 2 (Electrostatic)

Lecture 72 - Tutorial 3 (Magnetostatic)

Lecture 73 - Tutorial 4 (Magnetostatic and EM Wave)

NPTEL : NOC:Physics of Functional Materials and Devices (Physics)

Co-ordinators : Prof. Amreesh Chandra

Lecture 1 - Introduction to solid state materials - From conventional to functional

Lecture 2 - Ceramics and Composites - I

Lecture 3 - Ceramics and Composites - II

Lecture 4 - Polymers

Lecture 5 - Introduction to Nanomaterials and functionality

Lecture 6 - Synthesis protocols - I

Lecture 7 - Synthesis protocols - II

Lecture 8 - Synthesis protocols - III

Lecture 9 - Crystal structure - I

Lecture 10 - Crystal structure - II

Lecture 11 - Crystal structure - III

Lecture 12 - Crystal imperfections

Lecture 13 - Alloys and Melts

Lecture 14 - Theory of Solids

Lecture 15 - Nearlly free electron model

Lecture 16 - Bonds in molecules and solids

Lecture 17 - Transformations kinetics and reaction rates

Lecture 18 - Themodynamics

Lecture 19 - Phase and phase transitions

Lecture 20 - Diffusion and various properties

Lecture 21 - Mechanical properties of solids

Lecture 22 - Thermal Properties of Solids

Lecture 23 - Negative and Zero Expansion Ceramics

Lecture 24 - Heat Capacity

Lecture 25 - Thermogravimetric (TGA) analysis

Lecture 26 - Introduction to magnetism and Magnetic properties of solids

Lecture 27 - From magnetic to multiferroic materials

Lecture 28 - Magnetic materials and their applications

Lecture 29 - Magnetism at nanoscale

Lecture 30 - GMR materials

Lecture 31 - CMR materials

Lecture 32 - Ferrofluids

Lecture 33 - Spintronics and devices

Lecture 34 - Introduction to the basic properties of liquids and melts

Lecture 35 - Heat capacity and diffusion of liquids and melts

Lecture 36 - Viscosity, electric and thermal conduction of liquids and melts

Lecture 37 - Sensors

Lecture 38 - Electrochemical Sensors

Lecture 39 - Introduction to energy storage devices and basics of supercapacitors

Lecture 40 - Supercapacitors - II

Lecture 41 - Magnetic supercapacitors

Lecture 42 - Battery - I

Lecture 43 - Battery - II

Lecture 44 - Solar Cells - I

Lecture 45 - Solar Cells - II

Lecture 46 - X-ray Diffraction (XRD)

Lecture 47 - Fourier Transform Infrared Spectroscopy

Lecture 48 - UV- Vis Spectroscopy

Lecture 49 - Scanning and Transmission Electron Microscopy

Lecture 50 - Summary

NPTEL : NOC:Fundamentals of Attosecond Science and Technology (FAST) (Physics)

Co-ordinators : Prof. Sivarama Krishnan

Lecture 1 - Introduction to waves, 1D wave equation and its solutions

Lecture 2 - 1D Light waves

Lecture 3 - Characteristics of light waves - amplitude, absolute phase, wavelenght and frequency

Lecture 4 - Phase, Phase velocity and Phase delay

Lecture 5 - Complex notation for the description light waves and superposition

Lecture 6 - Maxwell's equations to the 3D wave equation and its solutions

Lecture 7 - Recap of Week 1

Lecture 8 - 3D wave equation and plane waves

Lecture 9 - Complex notation for Electric fields, Superposition and interference

Lecture 10 - Fabry-Perot inteferometer and it transmittance

Lecture 11 - Physical interpretation of FP transmittance

Lecture 12 - Recap of Fabry-Perot modes

Lecture 13 - Free spectral range of a Fabry-Perot etalon

Lecture 14 - Resonator modes and optical pulses - insight

Lecture 15 - Table - Top Coherent and Incoherent Imaging

Lecture 16 - Recap of Etalon free spectral range

Lecture 17 - Line width and finesse of an etalon

Lecture 18 - Actual resonator modes

Lecture 19 - Resonator configurations and stability

Lecture 20 - Recap of optical resonators

Lecture 21 - Introduction of light pulses

Lecture 22 - Complex amplitude, Gaussian pulse

Lecture 23 - Recap of light pulses

Lecture 24 - Introduction of Fourier Transforms

Lecture 25 - Tutorial 1

Lecture 26 - Motivating Fourier Transforms

Lecture 27 - Fourier Transform Properties

Lecture 28 - Frequency domain electric field

Lecture 29 - Recap of Fourier transform properties

Lecture 30 - Frequency domain description of pulses

Lecture 31 - Spectral Phase

Lecture 32 - Recap of spectral phase

Lecture 33 - Instantaneous Frequency and group delay

Lecture 34 - Phase wrapping, blanking, and Tayor series expansion

Lecture 35 - Recap of instantaneous frequency, phase wrapping, and phase blanking

Lecture 36 - Frequency domain phase expansion, group delay dispersion

Lecture 37 - Absolute Phase

Lecture 38 - Recap of concepts + discussion

Lecture 39 - Absolute Phase (revisited)

Lecture 40 - Carrier envelope phase, frequency comb

Lecture 41 - Discussion

Lecture 42 - Recap of concepts

Lecture 43 - First order phase

Lecture 44 - Second order phase

Lecture 45 - Recap of first order and second order phase

Lecture 46 - Chirped pulse: Instantaneous frequency and Fourier transform

Lecture 47 - Group delay, nonlinearly chirped pulse

Lecture 48 - Recap of chirped pulses

Lecture 49 - Quadratic chirp pulses

Lecture 50 - Higher order spectral phase

Lecture 51 - Recap and discussion on higher order phase

Lecture 52 - Relative importance of intensity and phase

Lecture 53 - Pulse propagation through a medium

Lecture 54 - Recap of pulse propagation and pulse length

Lecture 55 - Discussion of RMS pulse width and uncertainty principle

Lecture 56 - Time-bandwidth product

Lecture 57 - Recap of previous module

Lecture 58 - Introduction of Lorentz Oscillator Model

Lecture 59 - Effect of matter on light

Lecture 60 - Recap of Lorentz oscillator, Polarization tensor

Lecture 61 - Dynamics of electrons in the Lorentz oscillator

Lecture 62 - Solving the inhomogeneous wave equation

Lecture 63 - Inhomogeneous wave equation, absorption coefficient, refractive index

Lecture 64 - Nonlinear response of matter

Lecture 65 - Origin of nonlinear optical effects

Lecture 66 - Wave equation in an inert gas

Lecture 67 - Perturbation theory and second harmonics

Lecture 68 - Numerical simulation strategy

Lecture 69 - Atoms in the presence of fields

Lecture 70 - Ionization models

Lecture 71 - Attosecond pulse generation and metrology

Lecture 72 - Nonlinear optics review

Lecture 73 - Nonlinear response of matter to light

Lecture 74 - Sum and difference frequency generation

Lecture 75 - Recap of sum and difference frequency generation, second harmonic generation

Lecture 76 - Generalized nonlinear effects, conservation laws in SHG

Lecture 77 - Phase matching in SHG, polarization dependent refractive index

NPTEL : NOC:Wave Optics (Physics)

Co-ordinators : Prof. Samudra Roy

Lecture 1 - Introduction

Lecture 2 - Introduction (Continued...)

Lecture 3 - Concept of wave, Wave Equation

Lecture 4 - Plane wave, Spherical wave

Lecture 5 - Maxwell's wave equation, Poynting Vector

Lecture 6 - Superposition of waves

Lecture 7 - Superposition of wave (Complex method)

Lecture 8 - Random and coherent sourse, standing wave formation

Lecture 9 - Group and Phase velocity

Lecture 10 - Material Dispersion

Lecture 11 - Material Dispersion (Continued...)

Lecture 12 - Concept of Coherence

Lecture 13 - Concept of Coherence (Continued...)

Lecture 14 - Concept of Coherence (Continued...)

Lecture 15 - Concept of Coherence (Continued...)

Lecture 16 - Two beam interference

Lecture 17 - Young's double slit experiment

Lecture 18 - Youngâ€™s double slit experiment (Continued...)

Lecture 19 - Interference by division of amplitude

Lecture 20 - Interference by division of amplitude (Continued...)

Lecture 21 - Newton's Ring

Lecture 22 - Newtonâ€™s Ring (Continued...)

Lecture 23 - Newtonâ€™s Ring (Continued...)

Lecture 24 - Optical Interferometers

Lecture 25 - Michelson Interferometer

Lecture 26 - Multiple beam interference

Lecture 27 - Febry-Perot Interferometer

Lecture 28 - Febry-Perot Interferometer (Continued...)

Lecture 29 - Resolving power of Fabry-Perot interferometer

Lecture 30 - Diffraction of Light

Lecture 31 - Huygenâ€™s Theory

Lecture 32 - Fraunhofer Diffraction

Lecture 33 - Single-slit Diffraction

Lecture 34 - Single-slit Diffraction (Continued...)

Lecture 35 - Doubleâ€“Slit Diffraction

Lecture 36 - Multiâ€“Slit Diffraction

Lecture 37 - Multi-Slit Diffraction (Continued...)

Lecture 38 - Grating spectra

Lecture 39 - Grating spectra (Continued...)

Lecture 40 - Resolving power of grating

Lecture 41 - Fraunhofer diffraction for a circular aperture

Lecture 42 - Fraunhofer diffraction for a rectangular aperture

Lecture 43 - Fresnel Diffraction

Lecture 44 - Fresnelâ€™s half period zone

Lecture 45 - Fresnelâ€™s half period zone (Continued...)

Lecture 46 - Zone Plate

Lecture 47 - Fresnelâ€™s diffraction from an aperture

Lecture 48 - Fresnelâ€™s diffraction for a circular aperture

Lecture 49 - Fresnelâ€™s diffraction for a rectangular aperture

Lecture 50 - Fresnelâ€™s diffraction for a rectangular aperture (Continued...)

Lecture 51 - Fresnelâ€™s diffraction for semi-infinite opaque screen

Lecture 52 - Polarization of light (Basic concept)

Lecture 53 - Circularly polarized light

Lecture 54 - Matrix treatment of polarization

Lecture 55 - Jones Matrix for polarization

Lecture 56 - Jones Matrix for polarization (Continued...)

Lecture 57 - Jones Matrix for polarization (Continued...)

Lecture 58 - Jones Matrix for polarization (Continued...)

Lecture 59 - Jones matrix for polarization (Continued...)

Lecture 60 - Production of polarized light

Lecture 61 - Production of polarized light (Continued...)

Lecture 62 - Birefrigent Crystal

Lecture 63 - Birefrigent Crystal (Continued...)

Lecture 64 - Index Ellipsoid

Lecture 65 - Analyzing Polarised Light

Lecture 66 - Babinet Compensator

NPTEL : Special Topics in Atomic Physics (Physics)

Co-ordinators : Prof. P.C. Deshmukh

Lecture 1 - Introductory lecture about this course

Lecture 2 - Quantum Mechanics and Symmetry of the Hydrogen Atom

Lecture 3 - Hydrogen atom: Rotational and Dynamical Symmetry of the 1/r Potential

Lecture 4 - Hydrogen atom: Dynamical Symmetry of the 1/r Potential

Lecture 5 - Degeneracy of the Hydrogen Atom: SO(4)

Lecture 6 - Wavefunctions of the Hydrogen Atom

Lecture 7 - Angular Momentum in Quantum Mechanics

Lecture 8 - Angular Momentum in Quantum Mechanics: half-odd-integer and integer quantum numbers: SU(2) & SO(3)

Lecture 9 - Angular Momentum in Quantum Mechanics: Addition Theorem for Spherical Harmonics - Coupling of Angular Momenta

Lecture 10 - Angular Momentum in Quantum Mechanics Dimensionality of the Direct-Product (Composite) Vector Space CGC recursion relations

Lecture 11 - Angular Momentum in Quantum Mechanics CGC matrix, Wigner D Rotation Matrix, Irreducible Tensor Operators

Lecture 12 - Angular Momentum in Quantum Mechanics - more on ITO, and the Wigner-Eckart Theorem

Lecture 13 - Angular Momentum in Quantum Mechanics Wigner-Eckart Theorem - 2

Lecture 14 - Relativistic Quantum Mechanics of the Hydrogen Atom - 1

Lecture 15 - Relativistic Quantum Mechanics of the Hydrogen Atom - 2

Lecture 16 - Relativistic Quantum Mechanics of the Hydrogen Atom - PAULI Equation - Foldy - Wouthysen Transformations - 1

Lecture 17 - Relativistic Quantum Mechanics of the Hydrogen Atom - Foldy - Wouthysen Transformations - 2

Lecture 18 - Relativistic Quantum Mechanics of the Hydrogen Atom - Foldy - Wouthysen Transformations - 3

Lecture 19 - Relativistic Quantum Mechanics of the Hydrogen Atom - Spherical Symmetry of the Coulomb Potential

Lecture 20 - Hartree-Fock Self-Consistent Field formalism - 1

Lecture 21 - Hartree-Fock Self-Consistent Field formalism - 2

Lecture 22 - Hartree-Fock Self-Consistent Field formalism - 3

Lecture 23 - Hartree-Fock Self-Consistent Field formalism - 4

Lecture 24 - Hartree-Fock Self-Consistent Field formalism - 5

Lecture 25 - Perturbative treatment of relativistic effectsâ€¦ Schrodinger's and Dirac QM

Lecture 26 - Perturbative treatment of relativistic effectsâ€¦ Schrodinger's and Dirac QM

Lecture 27 - Probing the atom - Collisions and Spectroscopy - boundary conditions - 1

Lecture 28 - Atomic Probes - Collisions and Spectroscopy - boundary conditions - 2

Lecture 29 - Atomic Probes - Collisions and Spectroscopy - Scattering phase shifts and boundary conditions

Lecture 30 - Atomic Probes - Time reversal symmetry - applications in atomic collisions and photoionization processes

Lecture 31 - Atomic Photoionization cross sections, angular distributions of photoelectrons - 1

Lecture 32 - Atomic Photoionization cross sections, angular distributions of photoelectrons - 2

Lecture 33 - Atomic Photoionization cross sections, angular distributions of photoelectrons - 3

Lecture 34 - Atomic Photoionization cross sections, angular distributions of photoelectrons - 4

Lecture 35 - Atomic Photoionization cross sections, angular distributions of photoelectrons Cooper Zare Formula

Lecture 36 - Stark- Zeeman Spectroscopy - Stark effect

Lecture 37 - Stark- Zeeman Spectroscopy - Stark effect on n=2 excited state of the H atom Zeeman effect

Lecture 38 - Stark- Zeeman Spectroscopy - Normal, Anomalous Zeeman effect; Paschen- Back effect

Lecture 39 - Stark- Zeeman Spectroscopy - Anomalous Zeeman effect

Lecture 40 - Zeeman effect Fine structure, Hyperfine structure - Elemental, rudimentary introduction to Laser Cooling, BEC, Atomic Clock / Attosecond metrology

NPTEL : Classical Field Theory (Physics)

Co-ordinators : Prof. Suresh Govindarajan

Lecture 1 - What is Classical Field Theory?

Lecture 2 - Symmetries and Invariances - I

Lecture 3 - Symmetries and Invariances - II

Lecture 4 - Group Theory in Physics - I

Lecture 5 - Group Theory in Physics - II

Lecture 6 - Finite Groups - I

Lecture 7 - Finite Groups - II

Lecture 8 - Basics of CFT - I

Lecture 9 - Basics of CFT - II

Lecture 10 - Basics of CFT - III

Lecture 11 - Green Functions - I

Lecture 12 - Green Functions - II

Lecture 13 - Noether's Theorem - I

Lecture 14 - Noether's Theorem - II

Lecture 15 - Kink Soliton

Lecture 16 - Hidden Symmetry

Lecture 17 - Local Symmetries

Lecture 18 - The Abelian Higgs model

Lecture 19 - Lie Algebras - I

Lecture 20 - Lie Algebras - II

Lecture 21 - Magnetic Vortices - I

Lecture 22 - Magnetic Vortices - II

Lecture 23 - Non-abelian gauge theories - I

Lecture 24 - Non-abelian gauge theories - II

Lecture 25 - Irreps of Lie algebras - I

Lecture 26 - Irreps of Lie algebras - II

Lecture 27 - The Standard Model - I

Lecture 28 - The Standard Model - II

Lecture 29 - Irreps of the Lorentz/Poincare algebras

Lecture 30 - The Dirac mononpole

Lecture 31 - The 't Hooft-Polaykov monopole

Lecture 32 - Revisiting Derrickâ€™s Theorem

Lecture 33 - The Julia-Zee dyon

Lecture 34 - Instantons - I

Lecture 35 - Instantons - II

Lecture 36 - Instantons - III

Lecture 37 - Instantons - IV

Lecture 38 - Dualities

Lecture 39 - Geometrization of Field Theory

NPTEL : Topics in Nonlinear Dynamics (Physics)

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Overview

Lecture 2 - Critical points of a dynamical system

Lecture 3 - Two-dimensional flows

Lecture 4 - Stable and unstable manifolds

Lecture 5 - Hamiltonian dynamics - Part I

Lecture 6 - Hamiltonian dynamics - Part II

Lecture 7 - Hamiltonian dynamics - Part III

Lecture 8 - Hamiltonian dynamics - Part IV

Lecture 9 - Hamiltonian dynamics - Part V

Lecture 10 - Elementary bifurcations

Lecture 11 - Limit cycles

Lecture 12 - PoincarÂ´e index

Lecture 13 - Illustrative examples

Lecture 14 - Quiz 1. Questions and answers

Lecture 15 - Bead on a rotating hoop

Lecture 16 - Types of dynamical behaviour

Lecture 17 - Discrete time dynamics - Part I

Lecture 18 - Discrete time dynamics - Part II

Lecture 19 - Discrete time dynamics - Part III

Lecture 20 - Discrete time dynamics - Part IV

Lecture 21 - Coarse-grained dynamics in phase space - Part I

Lecture 22 - Coarse-grained dynamics in phase space - Part II & Stochastic dynamics - Part I

Lecture 23 - Stochastic dynamics - Part II

Lecture 24 - Stochastic dynamics - Part III

Lecture 25 - Coarse-grained dynamics in phase space - Part IV & Stochastic dynamics - Part IV

Lecture 26 - Discrete time dynamics - Part V

Lecture 27 - Quiz 2. Questions and answers

Lecture 28 - Stochastic dynamics - Part V

Lecture 29 - Stochastic dynamics - Part VI

NPTEL : Condensed Matter Physics (Physics)

Co-ordinators : Prof. G. Rangarajan

Lecture 1 - Principles of Condensed Matter Physics

Lecture 2 - Symmetry in Perfect Solids

Lecture 3 - Symmetry in Perfect Solids (Continued...)

Lecture 4 - Symmetry in Perfect Solids - Worked Examples

Lecture 5 - Diffraction Methods For Crystal Structures

Lecture 6 - Diffraction Methods For Crystal Structures (Continued...)

Lecture 7 - Diffraction Methods For Crystal Structures - Worked Examples

Lecture 8 - Physical Properties of Crystals

Lecture 9 - Physical Properties of Crystals (Continued...)

Lecture 10 - Physical Properties of Crystals - Worked Examples

Lecture 11 - Cohesion in Solids

Lecture 12 - Cohesion in Solids - Worked Examples

Lecture 13 - The Free Electron Theory of Metals

Lecture 14 - The Free Electron Theory of Metals - Worked Examples

Lecture 15 - The Free Electron Theory of Metals - Electrical Conductivity

Lecture 16 - The Free Electron Theory of Metals - Electrical Conductivity - Worked Examples

Lecture 17 - Thermal Conductivity of Metals

Lecture 18 - Thermal Conductivity of Metals - Worked Examples

Lecture 19 - The Concept of Phonons

Lecture 20 - Debye Theory of Specific Heat, Lattice Vibrations

Lecture 21 - Debye Theory of Specific Heat, Lattice Vibrations - Worked Examples

Lecture 22 - Lattice Vibrations (Continued) Phonon thermal conductivity

Lecture 23 - Lattice Vibrations (Continued) Phonon Thermal Conductivity - Worked Examples

Lecture 24 - Anharmonicity and Thermal Expansion

Lecture 25 - Dielectric (Insulating) Solids

Lecture 26 - Dispersion and Absorption of Electromagnetic Waves in Dielectric Media, Ferro-and Antiferroelectrics

Lecture 27 - Optical Properties of Metals; Ionic Polarization in Alkali Halides; Piezoelectricity

Lecture 28 - Dielectric Solids - Worked Examples

Lecture 29 - Dia - and Paramagnetism

Lecture 30 - Paramagnetism of Transition Metal and Rare Earth Ions

Lecture 31 - Quenching of Orbital Angular Momentum; Ferromagnetism

Lecture 32 - Exchange Interactions, Magnetic Order, Neutron Diffraction

Lecture 33 - Hysteresis and Magnetic Domains; Spin Waves and Magnons

Lecture 34 - Magnetic Resonance

Lecture 35 - Magnetism and Magnetic Resonance - Worked Examples

Lecture 36 - Magnetism - Worked Examples (Continued...)

Lecture 37 - Pauli Paramagnetism and Landau Diamagnetism

Lecture 38 - Band Magnetism; Itinerant Electrons; Stoner Model

Lecture 39 - Superconductivity - Perfect Electrical Conductivity and Perfect Diamagnetism

Lecture 40 - Type I and Type II Superconductors

Lecture 41 - Ginsburg - Landau Theory, Flux Quantization

Lecture 42 - Cooper Pairs

Lecture 43 - Microscopic (BCS) Theory of Superconductivity

Lecture 44 - BCS Theory (Continued...): Josephson Tunneling: Quantum Interference

Lecture 45 - Josephson Effect (Continued...); High Temperature Superconductors

Lecture 46 - Superconductors - Worked Examples

Lecture 47 - Energy Bands in Solids

Lecture 48 - Electron Dynamics in a Periodic Solid

Lecture 49 - Semiconductors

Lecture 50 - Semiconductors (Continued...)

Lecture 51 - Semiconductors - Worked Examples

Lecture 52 - Defects in Solids - Point Defects

Lecture 53 - Point Defects in Solids - Worked Examples

Lecture 54 - Defects in Solids - Line and Surface Defects

Lecture 55 - Dislocations in Solids - Worked Examples

Lecture 56 - Quantum Fluids and Quantum Solids

Lecture 57 - Quantum Liquids and Quantum Solids - Worked Examples

Lecture 58 - Epilogue

NPTEL : Quantum Field Theory (Physics)

Co-ordinators : Dr. Prasanta Tripathy

Lecture 1 - Introduction

Lecture 2 - Introduction to Classical Field Theory

Lecture 3 - Quantization of Real Scalar Field - I

Lecture 4 - Quantization of Real Scalar Field - II

Lecture 5 - Quantization of Real Scalar Field - III

Lecture 6 - Quantization of Real Scalar Field - IV

Lecture 7 - Quantization of Complex Scalar Field

Lecture 8 - Interacting Field Theory - I

Lecture 9 - Interacting Field Theory - II

Lecture 10 - Interacting Field Theory - III

Lecture 11 - Interacting Field Theory - IV

Lecture 12 - Interacting Field Theory - V

Lecture 13 - Interacting Field Theory - VI

Lecture 14 - Interacting Field Theory - VII

Lecture 15 - Quantuzation of Electromagnetic Field - I

Lecture 16 - Quantuzation of Electromagnetic Field - II

Lecture 17 - Fermion Quantization - I

Lecture 18 - Fermion Quantization - II

Lecture 19 - Fermion Quantization - III

Lecture 20 - Fermion Quantization - IV

Lecture 21 - Fermion Quantization - V

Lecture 22 - Fermion Quantization - VI

Lecture 23 - The S-Matrix Expansion in QED - I

Lecture 24 - The S-Matrix Expansion in QED - II

Lecture 25 - Feynman Rules in QED - I

Lecture 26 - Feynman Rules in QED - II

Lecture 27 - Compton Scattering - I

Lecture 28 - Compton Scattering - II

Lecture 29 - Compton Scattering - III

Lecture 30 - Moller Scattering - I

Lecture 31 - Moller Scattering - II

Lecture 32 - Vertex Correction - I

Lecture 33 - Vertex Correction - II

Lecture 34 - Vertex Correction - III

Lecture 35 - Vertex Correction - IV

Lecture 36 - Electron Selfenergy

Lecture 37 - Photon Selfenergy - I

Lecture 38 - Photon Selfenergy - II

NPTEL : Quantum Mechanics I (Physics)

Co-ordinators : Prof. S. Lakshmi Bala

Lecture 1 - Quantum Mechanics â€“ An Introduction

Lecture 2 - Linear Vector Spaces - I

Lecture 3 - Linear Vector Spaces - II: The two-level atom

Lecture 4 - Linear Vector Spaces - III: The three-level atom

Lecture 5 - Postulates of Quantum Mechanics - I

Lecture 6 - Postulates of Quantum Mechanics - II

Lecture 7 - The Uncertainty Principle

Lecture 8 - The Linear Harmonic Oscillator

Lecture 9 - Introducing Quantum Optics

Lecture 10 - An Interesting Quantum Superposition: The Coherent State

Lecture 11 - The Displacement and Squeezing Operators

Lecture 12 - Exercises in Finite Dimensional Linear Vector Spaces

Lecture 13 - Exercises on Angular Momentum Operators and their algebra

Lecture 14 - Exercises on Quantum Expectation Values

Lecture 15 - Composite Systems

Lecture 16 - The Quantum Beam Splitter

Lecture 17 - Addition of Angular Momenta - I

Lecture 18 - Addition of Angular Momenta - II

Lecture 19 - Addition of Angular Momenta - III

Lecture 20 - Infinite Dimensional Linear Vector Spaces

Lecture 21 - Square-Integrable Functions

Lecture 22 - Ingredients of Wave Mechanics

Lecture 23 - The Schrodinger equation

Lecture 24 - Wave Mechanics of the Simple Harmonic Oscillator

Lecture 25 - One-Dimensional Square Well Potential: The Bound State Problem

Lecture 26 - The Square Well and the Square Potential Barrier

Lecture 27 - The Particle in a one-dimensional Box

Lecture 28 - A Charged Particle in a Uniform Magnetic Field

Lecture 29 - The Wavefunction: Its Single-valuedness and its Phase

Lecture 30 - The Central Potential

Lecture 31 - The Spherical Harmonics

Lecture 32 - Central Potential: The Radial Equation

Lecture 33 - Illustrative Exercises - I

Lecture 34 - Illustrative Exercises - II

Lecture 35 - Ehrenfest's Theorem

Lecture 36 - Perturbation Theory - I

Lecture 37 - Perturbation Theory - II

Lecture 38 - Perturbation Theory - III

Lecture 39 - Perturbation Theory - IV

Lecture 40 - Time-dependent Hamiltonians

Lecture 41 - The Jaynes-Cummings model

NPTEL : Special Topics in Classical Mechanics (Physics)

Co-ordinators : Prof. P.C. Deshmukh

Lecture 1 - Course Overview

Lecture 2 - Equations of Motion (i)

Lecture 3 - Equations of Motion (ii)

Lecture 4 - Equations of Motion (iii)

Lecture 5 - Equations of Motion (iv)

Lecture 6 - Equations of Motion (v)

Lecture 7 - Oscillators, Resonances, Waves (i)

Lecture 8 - Oscillators, Resonances, Waves (ii)

Lecture 9 - Oscillators, Resonances, Waves (iii)

Lecture 10 - Oscillators, Resonances, Waves (iv)

Lecture 11 - Polar Coordinates (i)

Lecture 12 - Polar Coordinates (ii)

Lecture 13 - Dynamical Symmetry in the Kepler Problem (i)

Lecture 14 - Dynamical Symmetry in the Kepler Problem (ii)

Lecture 15 - Real Effects of Pseudo-Forces (i)

Lecture 16 - Real Effects of Pseudo-Forces (ii)

Lecture 17 - Real Effects of Pseudo-Forces (iii)

Lecture 18 - Real Effects of Pseudo-Forces (iv)

Lecture 19 - Special Theory of Relativity (i)

Lecture 20 - Special Theory of Relativity (ii)

Lecture 21 - Special Theory of Relativity (iii)

Lecture 22 - Special Theory of Relativity (iv)

Lecture 23 - Potentials Gradients Fields (i)

Lecture 24 - Potentials Gradients Fields (ii)

Lecture 25 - Potentials Gradients Fields (iii)

Lecture 26 - Gauss Law Eq of continuity (i)

Lecture 27 - Gauss Law Eq of continuity (ii)

Lecture 28 - Gauss Law Eq of continuity (iii)

Lecture 29 - Fluid Flow Bernoulli Principle (i)

Lecture 30 - Fluid Flow Bernoulli Principle (ii)

Lecture 31 - Classical Electrodynamics (i)

Lecture 32 - Classical Electrodynamics (ii)

Lecture 33 - Classical Electrodynamics (iii)

Lecture 34 - Classical Electrodynamics (iv)

Lecture 35 - Chaotic Dynamical Systems (i)

Lecture 36 - Chaotic Dynamical Systems (ii)

Lecture 37 - Chaotic Dynamical Systems (iii)

Lecture 38 - Chaotic Dynamical Systems (iv)

Lecture 39 - Chaotic Dynamical Systems (v)

Lecture 40 - The Scope and Limitations of Classical Mechanics

NPTEL : Special, Select Topics in the Theory of Atomic Collisions and Spectroscopy (Physics)

Co-ordinators : Prof. P.C. Deshmukh

Lecture 1 - Introduction to the STiTACS course

Lecture 2 - Quantum Theory of collisions

Lecture 3 - Quantum Theory of collisions: optical Theorem

Lecture 4 - Quantum Theory of collisions: Optical Theorem (Continued...)

Lecture 5 - Quantum Theory of collisions: Differential scattering cross section

Lecture 6 - Quantum Theory of collisions: Differential scattering cross section, Partial wave analysis

Lecture 7 - Quantum Theory of collisions: Optical Theorem Â– Unitarity of the Scattering Operator

Lecture 8 - Quantum Theory of collisions: Reciprocity Theorem, Phase shift analysis

Lecture 9 - Quantum Theory of collisions: More on Phase shift analysis

Lecture 10 - Quantum Theory of collisions: resonant condition in the l th partial wave.

Lecture 11 - Quantum Theory of collisions: LevinsonÂ's theorem

Lecture 12 - Quantum Theory of collisions: LevinsonÂ's theorem (Continued...)

Lecture 13 - Many body theory, electron correlations

Lecture 14 - Second Quantization Creation, Destruction and Number operators

Lecture 15 - Many-particle Hamiltonian & Schrodinger Equation in 2nd Quantization

Lecture 16 - Many-electron problem in quantum mechanics

Lecture 17 - Hartree-Fock Self-Consistent-Field

Lecture 18 - Exchange, Statistical, Fermi-Dirac correlations

Lecture 19 - Limitations of the Hartree-Fock Self-Consistent-Field formalism

Lecture 20 - Many-Body formalism, II Quantization

Lecture 21 - Density fluctuations in an electron gas

Lecture 22 - Bohm-Pines approach to Random Phase Approximation

Lecture 23 - Bohm-Pines approach to Random Phase Approximation (Continued...)

Lecture 24 - Bohm-Pines approach to Random Phase Approximation (Continued...)

Lecture 25 - Schrodinger, Heisenberg and Dirac Â"picturesÂ" of QM

Lecture 26 - DysonÂ's chronological operator

Lecture 27 - Gell-Mann-Low Theorem

Lecture 28 - Reyleigh-Schrodinger perturbation methods and adiabatic switching

Lecture 29 - Feynman Diagrams

Lecture 30 - I Order Feynman Diagrams

Lecture 31 - II and higher order Feynman Diagrams

Lecture 32 - Linear response of electron correlations

Lecture 33 - Lippman Schwinger equation of potential scattering

Lecture 34 - Born Approximation

Lecture 35 - Coulomb scattering

Lecture 36 - Scattering of partial waves

Lecture 37 - Scattering at high energy

Lecture 38 - Resonances in Quantum Collisions

Lecture 39 - Breit-Wigner Resonances

Lecture 40 - Fano parameterization of Breit-Wigner formula

Lecture 41 - Discrete state embedded in the continuum

Lecture 42 - Resonance life times

Lecture 43 - Wigner-Eisenbud formalism of time-delay in scattering

Lecture 44 - Photoionization and Photoelectron Angular Distributions

Lecture 45 - Ionization and Excitation of Atoms by Fast Charged Particles

Lecture 46 - Photo-absorption by Free and Confined Atoms and Ions: Recent Developments

NPTEL : Selected Topics in Mathematical Physics (Physics)

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Analytic functions of a complex variable - Part I

Lecture 2 - Analytic functions of a complex variable - Part II

Lecture 3 - Calculus of residues - Part I

Lecture 4 - Calculus of residues - Part II

Lecture 5 - Calculus of residues - Part III

Lecture 6 - Calculus of residues - Part IV

Lecture 7 - Linear response; dispersion relations - Part I

Lecture 8 - Linear response; dispersion relations - Part II

Lecture 9 - Analytic continuation and the gamma function - Part I

Lecture 10 - Analytic continuation and the gamma function - Part II

Lecture 11 - MÃ¶bius transformations - Part I

Lecture 12 - MÃ¶bius transformations - Part II

Lecture 13 - MÃ¶bius transformations - Part III

Lecture 14 - Multivalued functions; integral representations - Part I

Lecture 15 - Multivalued functions; integral representations - Part II

Lecture 16 - Multivalued functions; integral representations - Part III

Lecture 17 - Multivalued functions; integral representations - Part IV

Lecture 18 - Laplace transforms - Part I

Lecture 19 - Laplace transforms - Part II

Lecture 20 - Fourier transforms - Part I

Lecture 21 - Fourier transforms - Part II

Lecture 22 - Fourier transforms - Part III

Lecture 23 - Fundamental Green function forÎ”2 - Part I

Lecture 24 - Fundamental Green function forÎ”2 - Part II

Lecture 25 - The diffusion equation - Part I

Lecture 26 - The diffusion equation - Part II

Lecture 27 - The diffusion equation - Part III

Lecture 28 - The diffusion equation - Part IV

Lecture 29 - Green function for (Î”2 + k2); nonrelativistic scattering - Part I

Lecture 30 - Green function for (Î”2 + k2); nonrelativistic scattering - Part II

Lecture 31 - Green function for (Î”2 + k2); nonrelativistic scattering - Part III

Lecture 32 - The wave equation - Part I

Lecture 33 - The wave equation - Part II

Lecture 34 - The rotation group and all that - Part I

Lecture 35 - The rotation group and all that - Part II

Lecture 36 - The rotation group and all that - Part III

NPTEL : Nuclear Reactors and Safety - An Introduction (Physics)

Co-ordinators : Dr.G.Vaidyanathan

Lecture 1 - Energy Sources

Lecture 2 - Nuclear Power Production Cycle

Lecture 3 - Basic Physics of Nuclear Fission

Lecture 4 - Basic Physics of Nuclear Fission (Continued...)

Lecture 5 - Nuclear Reactors

Lecture 6 - Reactors Generation

Lecture 7 - Radiation Sources and Protection

Lecture 8 - Biological Effects of Radiation

Lecture 9 - Safety Principles

Lecture 10 - Safety Principles (Continued...)

Lecture 11 - Safety Approach

Lecture 12 - Risk and Probabilistic safety analysis (PSA)

Lecture 13 - History of Events in Nuclear Power Plants and Radiation facilities

Lecture 14 - Other Events

Lecture 15 - Validation and Dynamic Analysis

Lecture 16 - Validation and Dynamic Analysis (Continued...)

Lecture 17 - Quality Assurance

Lecture 18 - Siting of Nuclear Plants

Lecture 19 - Siting of Nuclear Plants (Continued...)

Lecture 20 - Engineered Safety Systems

Lecture 21 - Engineered Safety Systems (Continued...)

Lecture 22 - Assessment of Radiological Consequences of Incidents

Lecture 23 - Safety Regulation in India

Lecture 24 - Safety Regulation in India (Continued...)

Lecture 25 - Safety Regulation in India (Continued...)

Lecture 26 - Safety Practices in Indian NPPs

Lecture 27 - Safety Practices in Indian NPPs (Continued...)

Lecture 28 - Safety Practices in Indian NPPs (Continued...)

Lecture 29 - Passive Safety

Lecture 30 - Passive Safety (Continued...)

NPTEL : Physical Applications of Stochastic Processes (Physics)

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Discrete probability distributions - Part 1

Lecture 2 - Discrete probability distributions - Part 2

Lecture 3 - Continuous random variables

Lecture 4 - Central Limit Theorem

Lecture 5 - Stable distributions

Lecture 6 - Stochastic processes

Lecture 7 - Markov processes - Part 1

Lecture 8 - Markov processes - Part 2

Lecture 9 - Markov processes - Part 3

Lecture 10 - Birth-and-death processes

Lecture 11 - Continuous Markov processes

Lecture 12 - Langevin dynamics - Part 1

Lecture 13 - Langevin dynamics - Part 2

Lecture 14 - Langevin dynamics - Part 3

Lecture 15 - Langevin dynamics - Part 4

Lecture 16 - ItÂˆo and Fokker-Planck equations for di?usion processes

Lecture 17 - Level-crossing statistics of a continuous random process

Lecture 18 - Diffusion of a charged particle in a magnetic field

Lecture 19 - Power spectrum of noise

Lecture 20 - Elements of linear response theory

Lecture 21 - Random pulse sequences

Lecture 22 - Dichotomous di?usion

Lecture 23 - First passage time (Part 1)

Lecture 24 - First passage time (Part 2)

Lecture 25 - First passage and recurrence in Markov chains

Lecture 26 - Recurrent and transient random walks

Lecture 27 - Non-Markovian random walks

Lecture 28 - Statistical aspects of deterministic dynamics (Part 1)

Lecture 29 - Statistical aspects of deterministic dynamics (Part 2)

NPTEL : NOC:Mechanics, Heat Oscillations and Waves (Physics)

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - The Nature of Physical Laws

Lecture 2 - Fundamental Constants and Dimensional Analysis

Lecture 3 - Dimensional analysis and scaling

Lecture 4 - sketching Elementary Functions

Lecture 5 - The fundamental forces of nature

Lecture 6 - Scalars, Victors and All That

Lecture 7 - Plane Polar Coordinates

Lecture 8 - Vectors In a Plane, Scalars and Pseudoscalars

Lecture 9 - Kinematics In a Plane

Lecture 10 - Vectors in 3-Dimensional Space

Lecture 11 - Vectors in 3-Dimensional space (Continued...)

Lecture 12 - The Finite Rotation Formula, Polar Coordinates in 3-dimensions

Lecture 13 - Cylindrical and Spherical polar coordinates

Lecture 14 - Motion in a circle - Acceleration

Lecture 15 - Newtons laws of motion

Lecture 16 - Conservation Laws and Newtons Equations

Lecture 17 - Conservation of Angular Momentum

Lecture 18 - Two-Body Scattering

Lecture 19 - Two-Body Collision Kinematics

Lecture 20 - Conservative Forces - The Concept of a Potential

Lecture 21 - Central Potential and Central Force

Lecture 22 - The 2-Body Central Force Problem

Lecture 23 - Keplers Laws of Planetary Motion

Lecture 24 - Non-Inertial Forces (Pseudo-forces)

Lecture 25 - More on the Kepler problem; Satellite motion

Lecture 26 - Linear Elasticity of Solids

Lecture 27 - Simple Harmonic Motion

Lecture 28 - Some Physical Examples of Simple Harmonic Motion

Lecture 29 - More on Simple Harmonic Motion

Lecture 30 - Damped Simple Harmonic Motion

Lecture 31 - Wave Motion - Travelling and Standing Waves

Lecture 32 - Wave Motion - Wave Equation, General Solution

Lecture 33 - Fluid Dynamics - Hydrostatic Equilibrium

Lecture 34 - Fluid Dynamics - Equation of Continuity

Lecture 35 - Fluid Flow - Bernoullis Principle

Lecture 36 - Circulation and Vorticity

Lecture 37 - What is Thermodynamics?

Lecture 38 - The Classical Ideal Gas

Lecture 39 - The Laws of Thermodynamics

Lecture 40 - Specific Heat of an Ideal Gas

Lecture 41 - Van der Waals Equation

Lecture 42 - Phase Transitions

Lecture 43 - Summary

NPTEL : Nonequilibrium Statistical Mechanics (Physics)

Co-ordinators : Prof. V. Balakrishnan

Lecture 1 - Recapitulation of equilibrium statistical mechanics

Lecture 2 - The Langevin model (Part 1)

Lecture 3 - The Langevin model (Part 2)

Lecture 4 - The Langevin model (Part 3)

Lecture 5 - The Langevin model (Part 4)

Lecture 6 - Linear response theory (Part 1)

Lecture 7 - Linear response theory (Part 2)

Lecture 8 - Linear response (Part 3)

Lecture 9 - Linear response(Part 4)

Lecture 10 - Linear response (Part 5)

Lecture 11 - Linear response (Part 6)

Lecture 12 - Linear response theory (Part 7)

Lecture 13 - Quiz 1 - Questions and answers

Lecture 14 - Linear response theory (Part 8)

Lecture 15 - Linear response theory (Part 9)

Lecture 16 - The dynamic mobility

Lecture 17 - Fokker-Planck equations (Part 1)

Lecture 18 - Fokker-Planck equations (Part 2)

Lecture 19 - Fokker-Planck equations (Part 3)

Lecture 20 - The generalized Langevin equation (Part 1)

Lecture 21 - The generalized Langevin equation (Part 2)

Lecture 22 - Diffusion in a magnetic field

Lecture 23 - The Boltzmann equation for a dilute gas (Part 1)

Lecture 24 - The Boltzmann equation for a dilute gas (Part 2)

Lecture 25 - The Boltzmann equation for a dilute gas (Part 3)

Lecture 26 - The Boltzmann equation for a dilute gas (Part 4)

Lecture 27 - The Boltzmann equation for a dilute gas (Part 5)

Lecture 28 - Quiz 2 - Questions and answers

Lecture 29 - Critical phenomena (Part 1)

Lecture 30 - Critical phenomena (Part 2)

Lecture 31 - Critical phenomena (Part 3)

Lecture 32 - Critical phenomena (Part 4)

Lecture 33 - Critical phenomena (Part 5)

Lecture 34 - Critical phenomena (Part 6)

Lecture 35 - Critical phenomena (Part 7)

Lecture 36 - The Wiener process (standard Brownian motion)

NPTEL : NOC:Statistical Mechanics (Physics)

Co-ordinators : Prof. Ashwin Joy

Lecture 1 - Discrete Probability

Lecture 2 - Continous Probability

Lecture 3 - Characteristic Function

Lecture 4 - Gausssian Distribution

Lecture 5 - Binomial Distribution

Lecture 6 - Poisson Distribution

Lecture 7 - Central Limit Theorem

Lecture 8 - Many Random Variables

Lecture 9 - Entropy and Probability

Lecture 10 - Entropy Maximization

Lecture 11 - Transformation of Random Variables

Lecture 12 - Tutorial

Lecture 13 - Mathematical Preliminaries - 1

Lecture 14 - Microcanonical Ensemble

Lecture 15 - Two Level System (Microcanonical Ensemble)

Lecture 16 - Classical Ideal Gas (Microcanonical Ensemble)

Lecture 17 - Entropy of Mixing

Lecture 18 - Canonical Ensemble

Lecture 19 - Two Level System (Canonical Ensemble)

Lecture 20 - Classical Ideal Gas (Canonical Ensemble)

Lecture 21 - Gibbs Canonical Ensemble

Lecture 22 - Classical Ideal Gas (Gibbs Canonical Ensemble)

Lecture 23 - N Spins in a Uniform Magnetic Field

Lecture 24 - Grand Canonical Ensemble

Lecture 25 - Ideal Gas (Grand Canonical Ensemble)

Lecture 26 - N Non - Interacting Spins in Constant Magnetic Field

Lecture 27 - Qunatum Statistical Mechanics

Lecture 28 - Statistics of Fermions and Bosons

Lecture 29 - Quantum to Classical Correspondance

Lecture 30 - Vibrations of Solid (Low Temperature)

Lecture 31 - Vibrations of Solid (Continuation)

Lecture 32 - Free Electrons(Fermi Gas) in a Metal

Lecture 33 - Free Electrons(Fermi Gas) in a Metal (Continuation)

Lecture 34 - Problem solving demo - Part 1

Lecture 35 - Problem solving demo - Part 2

NPTEL : NOC:Computational Physics (Physics)

Co-ordinators : Prof. Prasenjit Ghosh

Lecture 1 - Introduction to Fortran - Part 1

Lecture 2 - Introduction to Fortran - Part 2

Lecture 3 - Introduction to Fortran - Part 3

Lecture 4 - Introduction to Fortran - Part 4

Lecture 5 - Introduction to Fortran - Part 5

Lecture 6 - Numerical Integration - Part 1

Lecture 7 - Numerical Integration - Part 2

Lecture 8 - Numerical Integration - Part 3

Lecture 9 - Numerical Integration - Part 4

Lecture 10 - Numerical Integration - Part 5

Lecture 11 - Numerical Integration - Part 6

Lecture 12 - Numerical Integration - Part 7

Lecture 13 - Numerical Integration - Part 8

Lecture 14 - Numerical Integration - Part 9

Lecture 15 - Numerical Integration - Part 10

Lecture 16 - Monte Carlo Simulation Introduction - Part 1

Lecture 17 - Monte Carlo Simulation Introduction - Part 2

Lecture 18 - Implementing the Ising model on computer

Lecture 19 - Periodic Boundary conditions and the Metropolis scheme

Lecture 20 - Testing the simulation and relaxation to equilibrium, finte size effects

Lecture 21 - Monte Carlo Simulation Analysis - Part 1

Lecture 22 - Monte Carlo Simulation Analysis - Part 2

Lecture 23 - Monte Carlo Simulation Analysis: Thermodynamic Quantities - Part 1

Lecture 24 - Monte Carlo Simulation Analysis: Thermodynamic Quantities - Part 2

Lecture 25 - Calculating T_c using Binders cumulant; Principle of detailed balance

Lecture 26 - Differential Equations Euler and Runge Kutta - Part 1

Lecture 27 - Differential Equations Euler and Runge Kutta - Part 2

Lecture 28 - Differential Coupled Equation Non Linear Equation - Part 1

Lecture 29 - Differential Coupled Equation Non Linear Equation - Part 2

Lecture 30 - Coupled Differential Equation Visualisation and Making Movie

Lecture 31 - Differential Equations With Specified Boundary Conditions - Part 1

Lecture 32 - Differential Equations With Specified Boundary Conditions - Part 2

Lecture 33 - Partial Differential equations - 1

Lecture 34 - Partial Differential equations - 2

Lecture 35 - Partial Differential equations - 3

Lecture 36 - Differential Equation for Quantum Mechanical Problems: Numerov Algorithm - 1

Lecture 37 - Differential Equation for Quantum Mechanical Problems: Numerov Algorithm - 2

Lecture 38 - Differential Equation for Quantum Mechanical Problems: Numerov Algorithm - 3

Lecture 39 - Differential Equation for Quantum Mechanical Problems: Numerov Algorithm - 4

Lecture 40 - Differential Equation for Quantum Mechanical Problems: Numerov Algorithm - 5

Lecture 41 - Differential Equation for Quantum Mechanical Problems: Variational principle - 1

Lecture 42 - Differential Equation for Quantum Mechanical Problems: Variational principle - 2

Lecture 43 - Differential Equation for Quantum Mechanical Problems: Variational principle - 3

Lecture 44 - Differential Equation for Quantum Mechanical Problems: Variational principle - 4

Lecture 45 - Differential Equation for Quantum Mechanical Problems: Variational principle - 5

Lecture 46 - Molecular Dynamics Introduction - Part 1

Lecture 47 - Molecular Dynamics Introduction - Part 2

Lecture 48 - Molecular Dynamics Details and Algorithm - Part 1

Lecture 49 - Molecular Dynamics Details and Algorithm - Part 2

Lecture 50 - Molecular Dynamics Details and Algorithm - Part 3

Lecture 51 - Molecular Dynamics Analysis - Part 1

Lecture 52 - Molecular Dynamics Analysis - Part 2

Lecture 53 - Molecular Dynamics Neighbours Lists - Part 1

Lecture 54 - Molecular Dynamics Neighbours Lists - Part 2

Lecture 55 - Molecular Dynamics: Calculation Of Themodynamics Quantities

Lecture 56 - Molecular Dynamics Diffusion Constant Calculation - Part 1

Lecture 57 - Molecular Dynamics Diffusion Constant Calculation - Part 2

Lecture 58 - Molecular Dynamics Diffusion Constant Calculation - Part 3

NPTEL : NOC:Waves and Oscillations (Physics)

Co-ordinators : Prof. M. S. Santhanam

Lecture 1 - Simple Harmonic Motion

Lecture 2 - Superposition of Oscillations : Beats

Lecture 3 - Superposition of Oscillations : Beats

Lecture 4 - Superposition of Oscillations : Lissajous Figures

Lecture 5 - Simple Harmonic Motion : Problems

Lecture 6 - Damped oscillator - Part 1

Lecture 7 - Damped oscillator - Part 2

Lecture 8 - Damped oscillator and Q-factor

Lecture 9 - Damped oscillator : Problems

Lecture 10 - Forced oscillator - Part 1

Lecture 11 - Forced oscillator - Part 2

Lecture 12 - Resonances

Lecture 13 - Q-factor of forced oscillator

Lecture 14 - Applications of forced oscillator

Lecture 15 - Forced Oscillator : Problems

Lecture 16 - Coupled Oscillations - Part 1

Lecture 17 - Coupled Oscillations - Part 2

Lecture 18 - Solving for normal modes

Lecture 19 - Coupled oscillations - More examples

Lecture 20 - Coupled oscillator : Problems

Lecture 21 - Coupled Oscillations of Loaded String

Lecture 22 - Solutions for Loaded String

Lecture 23 - Oscillations of Loaded String

Lecture 24 - Continuum Limit of Loaded String

Lecture 25 - Wave equation and its solutions

Lecture 26 - Wave equation - impedance and velocities

Lecture 27 - Standing waves

Lecture 28 - Transverse waves in periodic structures

Lecture 29 - Wave equation : Problems

Lecture 30 - Reflection and transmission of waves

Lecture 31 - Impedance matching

Lecture 32 - Energy of vibrating string

Lecture 33 - Dispersion of waves

Lecture 34 - Bandwidth theorem and problems

Lecture 35 - Longitudnal Waves and Speed of Sound

Lecture 36 - Longitudnal Standing Waves

Lecture 37 - Sound Intensity

Lecture 38 - Longitudnal Waves: Problems

Lecture 39 - Fourier Series - Part 1

Lecture 40 - Fourier Series - Part 2

Lecture 41 - Fourier Series and Energy of Vibrating String

Lecture 42 - Frequency Spectrum and Fourier Transforms

Lecture 43 - Fourier Series : Problems

Lecture 44 - Waves in Optical Systems

Lecture 45 - Waves in Optical Systems: Applying Fermat's Principle

Lecture 46 - Waves in Optical Systems: Thin Lens

Lecture 47 - Waves in Optical Systems: Matrix Method

Lecture 48 - Waves in Optical Systems: Problems

Lecture 49 - Interference: Part 1

Lecture 50 - Interference: Newton's rings

Lecture 51 - Michelson and Fabry-Perot Interferometers

Lecture 52 - Young's Double Slit Experiment

Lecture 53 - Diffraction

Lecture 54 - Beyond Linear Oscillators: Non-linear Pendulum

Lecture 55 - Beyond Linear Oscillators: Forced Oscillator

Lecture 56 - Beyond Linear Oscillators: Chaotic Oscillator

Lecture 57 - Beyond Linear Waves: Solitary Waves

Lecture 58 - Waves in Quantum Mechanics and Summary

NPTEL : NOC:Physics through Computational Thinking (Physics)

Co-ordinators : Prof. Auditya Sharma, Prof. Ambar Jain

Lecture 1 - Introduction to Mathematica, Wolfram language and Wolfram Cloud

Lecture 2 - Technical Prelim 1

Lecture 3 - Plotting Simple Functions

Lecture 4 - Function Behaviour near Extrema

Lecture 5 - Radicals and Logarithms

Lecture 6 - Properties of Functions

Lecture 7 - Vector Fields, Vector and Streamline Plots and Contour Plots

Lecture 8 - Introduction to Non-dimesionalisation

Lecture 9 - Non-dimensionalization and visual thinking

Lecture 10 - Non-dimensionalisation and Parametric Plot

Lecture 11 - Technical Prelim 2: Loops

Lecture 12 - Introduction to Simple Harmonic Oscillator

Lecture 13 - Simple Harmonic Oscillator with a spring mass system

Lecture 14 - More Examples of Simple Harmonic Oscillator

Lecture 15 - Anharmonic Oscillator

Lecture 16 - Introduction to Data Analysis - 1

Lecture 17 - Introduction to Data Analysis - 2

Lecture 18 - Curve fitting

Lecture 19 - Linear superposition of oscillations

Lecture 20 - Technical Prelim 3: Introduction to Calculus Tools

Lecture 21 - Damped Harminic Oscillator: LCR Circuit

Lecture 22 - Solving Initial Value Problem with Mathemtica

Lecture 23 - Damped Harmonic Oscillator: Spring-mass System with Friction

Lecture 24 - Technical Prelim 4: Manipulation of Lists using @, @@, /@ operators

Lecture 25 - Introduction to Euler's Method for Solving Differential Equation

Lecture 26 - Technical Prelim 5: Writing Custom Functions

Lecture 27 - Writing Euler's Method as a custom function

Lecture 28 - Mean Global Error in Euler's method and Application of Euler's method to damped oscillator

Lecture 29 - Improved Euler (RK2) and RK4 Methods for solving ODEs

Lecture 30 - Driven oscillations

Lecture 31 - Driven oscillations using the Improved Euler method

Lecture 32 - Falling Bodies

Lecture 33 - Escape velocity

Lecture 34 - Driven oscillations: Variations

Lecture 35 - Linear systems: Insights from the phase space picture - 1

Lecture 36 - Linear systems: Insights from the phase space picture - 2

Lecture 37 - Linearization - 1

Lecture 38 - Linearization - 2

Lecture 39 - The Monte Carlo Method - 1

Lecture 40 - The Monte Carlo Method - 2

Lecture 41 - The Monte Carlo Method - 3

Lecture 42 - The Monte Carlo Method - 4

Lecture 43 - The Monte Carlo Method - 5

Lecture 44 - Random Walks - 1

Lecture 45 - Random Walks - 2

Lecture 46 - Random Walks - 3

Lecture 47 - Random Walks - 4

Lecture 48 - Random Walks - 5

Lecture 49 - Random Walks - 6

Lecture 50 - Random Walks - 7

NPTEL : NOC:Electromagnetism (Physics)

Co-ordinators : Prof. Nirmal Ganguli

Lecture 1 - Vector algebra

Lecture 2 - Vector algebra in component form

Lecture 3 - Vector triple products

Lecture 4 - Vector differential calculus: Gradient

Lecture 5 - Divergence

Lecture 6 - Curl

Lecture 7 - Tutorial on differential vector calculus

Lecture 8 - More problems on vector differential calculus

Lecture 9 - Vector integral calculus: Line integral

Lecture 10 - Surface integral

Lecture 11 - Volume integral

Lecture 12 - Fundamental theorems of vector calculus: The gradient theorem

Lecture 13 - The divergence theorem (Gauss's theorem)

Lecture 14 - The curl theorem (Stokes' theorem)

Lecture 15 - Curvilinear coordinates: Cartesian vs. Polar

Lecture 16 - Generic curvilinear coordinate systems: Unit vectors and components

Lecture 17 - Differential vector calculus in curvilinear coordinate systems

Lecture 18 - Special curvilinear coordinate systems: Cylindrical and spherical

Lecture 19 - Vector calculus in spherical coordinate system

Lecture 20 - Vector calculus in cylindrical coordinate system

Lecture 21 - Introduction to Dirac delta function

Lecture 22 - Tutorial on vector calculus and curvilinear coordinates

Lecture 23 - Introduction to electrostatics

Lecture 24 - Continuous charge distribution: Line charge

Lecture 25 - Electric field due to a line charge distribution

Lecture 26 - Electric field lines, Flux, Gauss law

Lecture 27 - Application of Gauss law with cylindrical symmetry

Lecture 28 - Application of Gauss law on a flat 2D surface

Lecture 29 - Tutorial on Dirac delta function and electrostatics

Lecture 30 - Tutorial on electrostatics

Lecture 31 - The curl of an electric field

Lecture 32 - Scalar potential

Lecture 33 - Calculation of electric potential from different approaches

Lecture 34 - Boundary conditions on electric field and potential

Lecture 35 - Work and energy of an assembly of point charges

Lecture 36 - General idea of energy in electrostatics

Lecture 37 - Electrostatics with conductors

Lecture 38 - Capacitors

Lecture 39 - Laplace equation

Lecture 40 - Boundary conditions and the uniqueness theorems

Lecture 41 - The method of images

Lecture 42 - Induced charge

Lecture 43 - Force and energy

Lecture 44 - Another example of the method of images

Lecture 45 - Electric dipoles

Lecture 46 - Multipole expansion, continuous charge distriution, and assembly of point charges

Lecture 47 - Electric field due to a dipole

Lecture 48 - Introduction to electric polarization in matter

Lecture 49 - Electric polarization and bound charges

Lecture 50 - Electric displacement vector and Gauss law

Lecture 51 - Boundary conditions on the displacement vector and linear dielectric materials

Lecture 52 - Parallel plate capacitors

Lecture 53 - Energy in dielectric materials

Lecture 54 - Force on dielectric materials

Lecture 55 - Motion of a charged particle in electromagnetic field

Lecture 56 - Work done by a magnetic field

Lecture 57 - Electric current

Lecture 58 - Surface and volume current

Lecture 59 - Biot Savart law

Lecture 60 - Biot Savart law with surface and volume currents

Lecture 61 - A tutorial on currents and magnetic field

Lecture 62 - Straight line current: Curl of the magnetic field

Lecture 63 - Divergence and curl of a generic magnetic field

Lecture 64 - Ampere's law in integral form and its applications

Lecture 65 - Magnetic field in a long solenoid

Lecture 66 - A comparison between electrostatics nad magnetostatics

Lecture 67 - Magnetic vector potential

Lecture 68 - Tutorial on magnetic fields

Lecture 69 - Calculation of vector potential

Lecture 70 - Boundary conditions on magnetic field

Lecture 71 - Magnetic dipole

Lecture 72 - Multipole expansion of the vector potential

Lecture 73 - Magnetism, force and torque on magnetic dipole

Lecture 74 - Fringing magnetic field

Lecture 75 - Magnetization

Lecture 76 - A tutorial on the magnetic dipole moment

Lecture 77 - Ampere's law in magnetized materials

Lecture 78 - Electrodynamics

Lecture 79 - Electromagnetic induction

Lecture 80 - Laws of electromagnetism so far

Lecture 81 - Maxwell's correction to electromagnetism

Lecture 82 - Fictitious discussion about symmetry

Lecture 83 - Maxwell's equations in matter and the boundary conditions

NPTEL : NOC:Introduction to Classical Mechanics (Physics)

Co-ordinators : Prof. Anurag Tripathi

Lecture 1 - Introduction. Symmetries of space and time

Lecture 2 - Generalized coordinates and degrees of freedom

Lecture 3 - Virtual Work

Lecture 4 - Virtual Work (rigid body)

Lecture 5 - d'Alembert Principle

Lecture 6 - Euler Lagrange Equation for a holonomic system

Lecture 7 - Euler Lagrange Equations. Examples

Lecture 8 - Euler Lagrange Equations. Examples (Continued...)

Lecture 9 - Properties of Lagrangian

Lecture 10 - Kinetic term in generalized coordinates

Lecture 11 - Cyclic coordinates

Lecture 12 - Conservation laws - Conservation of Energy

Lecture 13 - Energy Function, Jacobi's Integral

Lecture 14 - Momemtum conservation

Lecture 15 - Matrices and all that

Lecture 16 - Matrices, Forms, and all that

Lecture 17 - Principal axis transformation

Lecture 18 - Small Oscilaltions

Lecture 19 - Oscillations, Normal Coordinates

Lecture 20 - Oscillations, Triatomic molecule

Lecture 21 - Triatomic molecule normal coordinates

Lecture 22 - Coupled pendulums, normal modes

Lecture 23 - Coupled pendulums, Beats

Lecture 24 - Oscillations, General solution

Lecture 25 - Forced oscillations

Lecture 26 - Damped oscillations

Lecture 27 - Forced Damped oscillations

Lecture 28 - one dimensional systems

Lecture 29 - Two-body problem

Lecture 30 - Two-body problem, Kepler's second law

Lecture 31 - Two-body problem, Kepler problem

Lecture 32 - Two-body problem, Conic Sections in Polar Coordinates

Lecture 33 - Two-body problem, Ellipse in polar coordinates

Lecture 34 - Orbits in Kepler Problem

Lecture 35 - Apsidal distances, eccentricity of orbits

Lecture 36 - Kepler's Third law; Laplace-Runge-Lenz vector

Lecture 37 - Rigid Body, degrees of freedom

Lecture 38 - Rigid Body, Transfromation matrix

Lecture 39 - Rigid Body, Euler Angles

Lecture 40 - Parameterization using Euler Angles

Lecture 41 - Rigid Body, Euler's Theorem

Lecture 42 - General motion of a rigid body

Lecture 43 - Moment of Inertia Tensor

Lecture 44 - Principal Moments

Lecture 45 - Langrangian of a rigid body

Lecture 46 - Motion of a free symmetric top

Lecture 47 - Angular velocity using Euler angles

Lecture 48 - Lagrangian of a heavy symmetric top

Lecture 49 - First integrals of a heavy symmetric top

Lecture 50 - Nutation and Precission of a heavy symmetric top

Lecture 51 - Sleeping Top

Lecture 52 - Rotating Frames. Euler Equations

Lecture 53 - Calculus of Variations: Functionals

Lecture 54 - Method of Lagrange Multipliers

Lecture 55 - Calculus of Variations: Condition for extremum

Lecture 56 - Calculus of Variations: Several variables

Lecture 57 - Cartesian Tensors

Lecture 58 - Hamiltonian Mechanics: Hamilton's equations of motion

Lecture 59 - Hamiltonian Mechanics: Liouville's theorem

Lecture 60 - Hamiltonian Mechanics: Poisson Bracket

Lecture 61 - Hamiltonian Mechanics: Canonical Coordinates

Lecture 62 - Hamiltonian Mechanics: Generating Function of Canonical Transformations

Lecture 63 - Hamiltonian Mechanics: Generating functions of the 4 kinds

Lecture 64 - Examples of Generating Functions

Lecture 65 - Harmonic Oscillator (Canonical Transformations)

Lecture 66 - Invariance of Poisson Brackets

Lecture 67 - Normal modes of triatomic molecule using Mathematica

NPTEL : NOC:Fluid Dynamics for Astrophysics (Physics)

Co-ordinators : Prof. Prasad Subramanian

Lecture 1 - Introduction to the course

Lecture 2 - Continuum hypothesis, distribution function and stress-viscosity relation

Lecture 3 - Continuum hypothesis, distribution function and stress-viscosity relation - Recap

Lecture 4 - Fluid Kinematics

Lecture 5 - Fluid Kinematics - Recap

Lecture 6 - Conservation laws: Mass conservation and incomprehensibility

Lecture 7 - Conservation laws: Momentum conservation and Euler equation

Lecture 8 - Conservation laws - Recap

Lecture 9 - Potential flows

Lecture 10 - Bernoulli constant, its applications and voracity equation

Lecture 11 - Recap - Potential flows, Bernoulli constant and its applications

Lecture 12 - Voracity dynamics -- Kelvin's voracity theorem and Magus effect

Lecture 13 - Navier-Stokes equation

Lecture 14 - Navier-Stokes equation (Continued....) and energy equation

Lecture 15 - Energy equation in a conservative form

Lecture 16 - Boundary conditions in Navier-Stokes equation, d'Alembert's paradox

Lecture 17 - Poiseuille flow, deriving viscosity from microscopics

Lecture 18 - Dimensionless numbers -- Mach number, Reynolds number

Lecture 19 - DimDimensionless numbers (Continued...) -- plasma beta, magnetic Reynolds number, Alfven Mach number, Prandl numberensionless numbers -- Mach number, Reynolds number

Lecture 20 - Reynolds number and dynamic similarity

Lecture 21 - Reynolds number recap, Low Re flows, and drag on a sphere (Stokes law)

Lecture 22 - High Re flows -- turbulent drag law, vortex shedding and drag crisis

Lecture 23 - Lift on a body, introduction to compressible flows

Lecture 24 - Compressible flows -- derivation of sound speed and dispersion relation

Lecture 25 - Subsonic and supersonic flows

Lecture 26 - Propagation of sonic information, shock tube problem and piston problem

Lecture 27 - Criterion for neglect of compressibility, method of characteristics

Lecture 28 - Shock thickness

Lecture 29 - Shock thickness recap, shock jump conditions

Lecture 30 - Shock jump conditions (Continued...), transonic 1D flows, converging/diverging channels

Lecture 31 - Coverging/diverging channels, de Laval nozzle and its application to astrophysical jets

Lecture 32 - Spherically symmetric transonic flows

Lecture 33 - Spherically symmetric transonic flows (Continued...)

Lecture 34 - Solar wind : Parker's solution

Lecture 35 - Solar wind : Modifications in Parker's solution

Lecture 36 - Spherical accretion onto a compact object : Eddington luminosity and accretion rate

Lecture 37 - Spherical accretion onto a compact object : Solutions for flow properties

Lecture 38 - Spherical accretion (Continued...), disk accretion--Roche lobe overflow

Lecture 39 - Disk accretion : Mass conservation and vertical hydrostatic equilibrium

Lecture 40 - Disk accretion : Removal of angular momentum, Shakura-Sunyaev viscosity parameter

Lecture 41 - Disk accretion : Viscous dissipation and the energy equation, two-temperature criterion

Lecture 42 - Particle acceleration in astrophysical settings : Shocks and non-thermal energy distribution

Lecture 43 - Particle acceleration in astrophysical settings : Diffusive shock acceleration

Lecture 44 - Spherical blast waves : Bomb explosion and supernova explosion

Lecture 45 - Spherical blast waves : Sedov-Taylor solution

Lecture 46 - Spherical blast waves : Sedov-Taylor solution (Continued....)

Lecture 47 - Magnetohydrodynamics (MHD) : Introduction

Lecture 48 - Magnetohydrodynamics (MHD) : The induction equation

Lecture 49 - Magnetohydrodynamics (MHD) : Currents in MHD, momentum equation and magnetic stress tensor

Lecture 50 - Magnetohydrodynamics (MHD) : Magnetic stresses and magnetic buoyancy

Lecture 51 - Magnetohydrodynamics (MHD) : Plasma beta, force-free fields and potential configurations

Lecture 52 - Magnetohydrodynamics (MHD) : Magnetic flux-freezing

Lecture 53 - Magnetohydrodynamics (MHD) : Magnetic flux-freezing (Continued....), magnetic dynamos

Lecture 54 - Magnetohydrodynamics (MHD) : Dynamo theory

Lecture 55 - Magnetohydrodynamics (MHD) : Waves in MHD - Alfven waves

Lecture 56 - Magnetohydrodynamics (MHD) : Waves in MHD - Alfven waves and magnetosonic waves

Lecture 57 - Magnetohydrodynamics (MHD) : Waves in MHD - Magnetosonic waves

Lecture 58 - Magnetohydrodynamics (MHD) : Shocks in MHD

Lecture 59 - Magnetohydrodynamics (MHD) : Shocks in MHD - Shock jump conditions

Lecture 60 - Non-ideal MHD : Introduction to magnetic reconnection

Lecture 61 - Non-ideal MHD : Magnetic reconnection - The Sweet-Parker model

Lecture 62 - Non-ideal MHD : Magnetic reconnection - The Petscheck model

Lecture 63 - Sun's atmosphere : Solar corona and the coronal heating problem

Lecture 64 - Solar eruptions : Coronal Mass Ejections (CMEs) and solar flares

NPTEL : NOC:Quantum Transport (Physics)

Co-ordinators : Prof. Madhu Thalakulam

Lecture 1 - Introduction

Lecture 2 - Classical and Semi-classical Transport: Overview

Lecture 3 - Quantum Transport Regimes

Lecture 4 - Band-bending and Metal semiconductor Interfaces

Lecture 5 - Semiconductor Heterostructures

Lecture 6 - 2DEG and Electrostatic Gating

Lecture 7 - Device Fabrication - Photolithography

Lecture 8 - Device Fabrication - Electron-beam Lithography

Lecture 9 - Quantum hall Effect - Overview

Lecture 10 - Quantum Hall Effect: Quantization of electron orbitals, Landau levels and Flux quantization

Lecture 11 - Quantum Hall Effect: Lanau level, filling factor and Shubnikov-de-Haas effect

Lecture 12 - Quantum Hall Effect: Edge states and Resistance Quantization

Lecture 13 - Weak Localization

Lecture 14 - Aharonov-Bohm Effect

Lecture 15 - Ballistic 1D transport-Quantum Point contacts

Lecture 16 - Ballistic 1D transport-Current from transmission

Lecture 17 - Ballistic 1D transport-Where is the power dissipation?

Lecture 18 - 0D Transport - Single Electron Tunneling

Lecture 19 - Single Electron Transistors, Coulomb Blockade

Lecture 20 - Quantum Dots, Shell filling, Artificial Atoms

Lecture 21 - Transport on Double Quantum Dots - I

Lecture 22 - Transport on Double Quantum Dots - II

Lecture 23 - Superconductivity-Introduction

Lecture 24 - Superconducting tunnel junctions-Josephson effect - 1

Lecture 25 - Superconducting tunnel junctions-Josephson effect - 2

Lecture 26 - Charge sensing with quantum point contacts

Lecture 27 - Charge sengin with single electron transistors

Lecture 28 - Real-time charge sensing

Lecture 29 - Quantum Electrical Metrology - I

Lecture 30 - Quantum Electrical Metrology - II

Lecture 31 - Qubits - Overview

Lecture 32 - Superconducting qubits

Lecture 33 - Quantum dot qubits

NPTEL : NOC:Statistical Mechanics (2021) (Physics)

Co-ordinators : Prof. Dipanjan Chakraborty

Lecture 1 - Introduction to Thermodynamics

Lecture 2 - Laws of Thermodynamics

Lecture 3 - Second Law of Thermodynamics and Heat Engines

Lecture 4 - Entropy, Clausius Inequality, Thermodynamic Processes and Systems

Lecture 5 - Extensivity of Entropy and Internal Energy, Gibbs Duhem relation

Lecture 6 - Exact and Inexact differentials, Legendre Transformation

Lecture 7 - Free Energy in Thermodynamics

Lecture 8 - Maxwell's relations - Part I

Lecture 9 - Maxwell's relations - Part II

Lecture 10 - Maxwell's relations - Part III

Lecture 11 - Response Functions and manipulating Partial Derivatives

Lecture 12 - Working With Thermodynamics

Lecture 13 - Joule Expansion and Joule Thomson Effect

Lecture 14 - Stability of Thermodynamic Potentials

Lecture 15 - Consequences of Stability of Thermodynamic Potentials

Lecture 16 - Conditions of Equilibrium and Gibbs Phase Rule

Lecture 17 - Introduction to Probability

Lecture 18 - Discrete and Continuous Distributions

Lecture 19 - Central Limit Theorem and Statistical Entropy

Lecture 20 - Classical Probability Density and Liouville Equation

Lecture 21 - Classical Probability Density, Ergodicity and Microcanonical Ensemble

Lecture 22 - Microcanonical Ensemble

Lecture 23 - Examples of Microcanonical Ensemble - Two Level System

Lecture 24 - Examples of Microcanonical Ensemble - Magnetic System and Ideal Gas - Part I

Lecture 25 - Examples of Microcanonical Ensemble - Magnetic System and Ideal Gas - Part II

Lecture 26 - Examples of Microcanonical Ensemble - Ultra-Relativistic Gas

Lecture 27 - Microcanonical Ultrarelativistic Gas and Quantum Solid

Lecture 28 - Microcanonical Excluded Volume

Lecture 29 - Canonical Ensemble

Lecture 30 - Canonical Ensemble Paramagnet

Lecture 31 - Canonical Ensemble Ideal Gas

Lecture 32 - Canonical Ensemble Einstein Solid

Lecture 33 - Grand Canonical Ensemble

Lecture 34 - Grand Canonical Ensemble Ideal Gas - Part I

Lecture 35 - Grand Canonical Ensemble Ideal Gas - Part II

Lecture 36 - MicroCanonical to Canonical - Part I

Lecture 37 - MicroCanonical to Canonical - Part II

Lecture 38 - Interacting System - Part I

Lecture 39 - Interacting System - Part II

Lecture 40 - Van-Der Waals Equation of State

Lecture 41 - Quantum Statistical Mechanics Density Matrix

Lecture 42 - Density Matrix in different Ensembles

Lecture 43 - Free Particle Quantum Canonical Partition Function Free

Lecture 44 - Single Particle Quantum Partition Function Harmonic Oscillator - Part I

Lecture 45 - Single Particle Quantum Partition Function Harmonic Oscillator - Part II

Lecture 46 - Wigner Transformation

Lecture 47 - N-Particle partition function

Lecture 48 - Canonical Formulation of Ideal Gas

Lecture 49 - Grand Canonical Formulation of Ideal Gas

Lecture 50 - High Temperature Expansion

Lecture 51 - Degenerate Fermi Gas

Lecture 52 - Ideal Fermi Gas close to T=0, Chemical Potential and Specific Heat

Lecture 53 - Relativistic Fermi Gas at T=0

Lecture 54 - Ideal Bose Gas

Lecture 55 - Bose-Einstein Condensation

Lecture 56 - Pressure of an Ideal Bose Gas

Lecture 57 - Specific Heat of an Ideal Bose Gas - Part 1

Lecture 58 - Specific Heat of an Ideal Bose Gas - Part 2

Lecture 59 - Bose-Einstein Condensation in a Harmonically Trapped Bose Gas

Lecture 60 - Specific Heat of a Harmonically Trapped Bose Gas

Lecture 61 - General Treatment of a Bose gas - Part 1

Lecture 62 - General Treatment of a Bose gas - Part 2

Lecture 63 - Discontinuity in the Specific Heat of a Bose Gas - Part 1

Lecture 64 - Discontinuity in the Specific Heat of a Bose Gas - Part 2

Lecture 65 - Ultra Relativistic Bose Gas Stefan Boltzmann Law

NPTEL : NOC:Solid State Physics (2021) (Physics)

Co-ordinators : Prof. Nirmal Ganguli

Lecture 1 - What is solid?

Lecture 2 - Bravais lattice

Lecture 3 - Indexing of crystal planes

Lecture 4 - Simple crystal structures

Lecture 5 - Diffraction of waves by crystals

Lecture 6 - Fourier analysis of diffraction

Lecture 7 - Diffraction condition

Lecture 8 - Laue equations and Ewald construction

Lecture 9 - Introduction to Brillouin zone

Lecture 10 - Brillouin zones for bcc and fcc lattice

Lecture 11 - Fourier analysis of the basis and structure factor

Lecture 12 - Atomic form factor

Lecture 13 - Van der Waals attraction

Lecture 14 - Repulsive interaction

Lecture 15 - Equilibrium lattice constant and cohesive energy

Lecture 16 - Ionic crystals

Lecture 17 - Evaluation of the Madelungconstant

Lecture 18 - Covalent crystals: Linearcombination of atomic orbitals

Lecture 19 - Electron tunneling in covalentbonds

Lecture 20 - Metallic bonds

Lecture 21 - The Drude theory of metals

Lecture 22 - Hall effect and magnetoresistance

Lecture 23 - AC electrical conductivity

Lecture 24 - Thermal conductivity

Lecture 25 - Introduction to Sommerfeld theory - I

Lecture 26 - Introduction to Sommerfeld theory - II

Lecture 27 - Electronic states at finite temperature

Lecture 28 - Fermi-Dirac distribution

Lecture 29 - Thermal properties of the free electron gas

Lecture 30 - The Sommerfeld theory for conduction in metals

Lecture 31 - Thermal conductivity

Lecture 32 - One dimensional chain of atoms

Lecture 33 - One dimensional chain of atoms

Lecture 34 - Periodic boundary condition

Lecture 35 - Energy levels in periodic array of quantum wells

Lecture 36 - Tunneling of electrons

Lecture 37 - Reflection and transmission amplitudes and coefficients

Lecture 38 - Transfer matrix for a rectangular barrier

Lecture 39 - Electron tunneling through a periodic potential

Lecture 40 - The tight-binding approximation

Lecture 41 - Tridiagonal matrices and continued fraction

Lecture 42 - Plane-wave basis for nearly free electrons

Lecture 43 - Nearly free electron approximation

Lecture 44 - Dynamical aspects of electrons in band theory

Lecture 45 - Semiconductor crystals

Lecture 46 - Effective mass

Lecture 47 - Carrier concentration

Lecture 48 - Mobility, impurity conductivity, and Fermi surface

Lecture 49 - Vibration of crystals with monatomic basis

Lecture 50 - Analyzing the dispersion relation

Lecture 51 - Phonons with diatomic basis

Lecture 52 - Quantization of elastic waves

Lecture 53 - Phonon heat capacity

Lecture 54 - Phonon density of states

Lecture 55 - Introduction to diamagnetism

Lecture 56 - Issues with the classical theory of diamagnetism

Lecture 57 - Quantum theory of diamagnetism

Lecture 58 - The quantum theory of paramagnetism

Lecture 59 - Rare earth atoms, Hund's rule

Lecture 60 - Crystal field splitting

Lecture 61 - Quenching of orbital angular momentum

Lecture 62 - Paramagnetic susceptibility of conduction electrons

Lecture 63 - Ferromagnetism

Lecture 64 - Antiferromagnetism and ferrimagnetism

Lecture 65 - Introduction to superconductivity

Lecture 66 - Thermodynamics of superconducting transition,London equation

Lecture 67 - BCS theory of superconductivity

Lecture 68 - Flux quantization in a superconducting ring

Lecture 69 - Single particle tunneling and Josephson effect

Lecture 70 - AC Josephson effect and microscopic quantum interference

NPTEL : NOC:Introduction to Quantum Field Theory (Theory of Scalar Fields) (Physics)

Co-ordinators : Prof. Anurag Tripathi

Lecture 1 - Quantum Filed Theory

Lecture 2 - Quantizing Schrodinger Field

Lecture 3 - Quantizing Schrodinger Field (Continued...)

Lecture 4 - Symmetry and normalization of the states

Lecture 5 - A multiparticle system of Bosons

Lecture 6 - Klein-Gordon Equation

Lecture 7 - Quantization of Klein-Gordon Theory

Lecture 8 - Quantization of Klein-Gordon Theory (Continued...)

Lecture 9 - Quantization of Klein-Gordon Theory (Continued...)

Lecture 10 - Quantization of Klein-Gordon Theory (Continued...)

Lecture 11 - Quantization of Klein-Gordon Theory (Continued...)

Lecture 12 - Qunatization of Klein-Gordon Theory (Continued...)

Lecture 13 - Quantization of Klein-Gordon Theory (Continued...)

Lecture 14 - Feynman propagator - 2

Lecture 15 - Feynman propagator - 3

Lecture 16 - Symmetries

Lecture 17 - Lorentz transformations

Lecture 18 - Lorentz transformations (Continued...)

Lecture 19 - Lorentz Group

Lecture 20 - Groups and Generators

Lecture 21 - SU(3) Generators

Lecture 22 - Representation of groups. Poincare group

Lecture 23 - Poincare Algebra

Lecture 24 - Symmetries in Classical Field Theories

Lecture 25 - Symmetries (Continued...)

Lecture 26 - Symmetries (Continued...)

Lecture 27 - Symmetries (Continued...)

Lecture 28 - Noether's theorem: The Proof

Lecture 29 - Noether's theorem (Continued...)

Lecture 30 - Momentum in KG Theory

Lecture 31 - Noether Currents corresponding to Lorentz symmetry

Lecture 32 - Conserved currents and charges due to Lorentz symmetry

Lecture 33 - Conserved charges as symmetry generators

Lecture 34 - Consequences of symmetry

Lecture 35 - A boring world: Scattering in a free theory

Lecture 36 - Phi-4 Theory

Lecture 37 - Phi-4 Theory: Manipulating the ground state

Lecture 38 - Phi-4 Theory: Interaction picture - 1

Lecture 39 - Phi-4 Theory: Interaction picture - 2

Lecture 40 - Phi-4 Theory: Interaction picture (Continued...)

Lecture 41 - Phi-4 Theory: Interaction picture (Continued...)

Lecture 42 - Wick's Theorem

Lecture 43 - Wick's Theorem (Continued...)

Lecture 44 - Feynman Diagrams

Lecture 45 - Feynman Diagrams (Continued...)

Lecture 46 - Momentum space Feynman rules for G(x1,..xN)

Lecture 47 - Feynman rules for G(p1,p2,,,,pN)

Lecture 48 - Feynman rules for G(p1,p2,,,,pN) (Continued...)

Lecture 49 - Cancellation of Bubble diagrams

Lecture 50 - Examples of Feynman Diagrams

Lecture 51 - Survery

NPTEL : NOC:Introduction to Quantum Field Theory (Theory of Scalar Fields) - Part 2 (Physics)

Co-ordinators : Prof. Anurag Tripathi

Lecture 1 - Scattering Matrix

Lecture 2 - Scattering Matrix (Continued...)

Lecture 3 - Scattering Matrix (Continued...)

Lecture 4 - Creating single particle states - 1

Lecture 5 - Creating single particle states - 2

Lecture 6 - Annihilating single particle states

Lecture 7 - Creating Multiparticle States

Lecture 8 - LSZ reduction

Lecture 9 - LSZ reduction (Continued...)

Lecture 10 - S matrix

Lecture 11 - S matrix (Continued...)

Lecture 12 - S matrix (Continued...)

Lecture 13 - Pole and residue of the propagator

Lecture 14 - Kallen-Lehmann spectral representation

Lecture 15 - Kallen-Lehmann spectral representation (Continued...)

Lecture 16 - High Energy Experiment Setup - 1

Lecture 17 - High Energy Experiment Setup - 2

Lecture 18 - Scattering cross-section

Lecture 19 - Differential cross-section

Lecture 20 - 2-2 scattering cross-section

Lecture 21 - Loop diagrams - 1

Lecture 22 - Wick rotated Green's functions

Lecture 23 - UV divergences - Part 1

Lecture 24 - UV divergences - Part 2

Lecture 25 - UV divergences - Part 3

Lecture 26 - Explicit evalutation of Feynman integrals

Lecture 27 - Few more Feynman integrals

Lecture 28 - UV Singularity structure in dimensional regularization

Lecture 29 - Renormalization - Part 1

Lecture 30 - Renormalization - Part 2

Lecture 31 - Renormalization - Part 3

Lecture 32 - Renormalization - Part 4

Lecture 33 - Renormalization - Part 5

Lecture 34 - Renormalization Group Equation - 1

Lecture 35 - Renormalization Group Equation - 2

Lecture 36 - Renormalization Group Equation - 3

Lecture 37 - Solution of Callan Symanzik Equation

Lecture 38 - UV and IR fixed points and Asymptotic Freedom

Lecture 39 - Behaviour near fixed point

NPTEL : NOC:Radio Astronomy (Physics)

Co-ordinators : Prof. Abhirup Datta

Lecture 1 - Introduction to Radio Astronomy

Lecture 2 - Review of Electromagnetism - Part 1

Lecture 3 - Review of Electromagnetism - Part 2

Lecture 4 - Radio Astronomy - Tutorial 1

Lecture 5 - Milestones in Radio Astronomy

Lecture 6 - Radio Astronomy Fundamentals - Part 1

Lecture 7 - Radio Astronomy Fundamentals - Part 2

Lecture 8 - Radiative Transfer - Tutorial 1

Lecture 9 - Fundamentals of Antenna

Lecture 10 - Fundamental of Antenna Theory - Part 1

Lecture 11 - Fundamental of Antenna Theory - Part 2

Lecture 12 - Fundamental of Antenna Theory - Part 3

Lecture 13 - Signal Processing and Receivers

Lecture 14 - Signal Proceeding and Receivers - Part 2

Lecture 15 - Radio Telescopes

Lecture 16 - Single Dish Observations

Lecture 17 - Demonstration of Antenna Design and Simulation - Part 1

Lecture 18 - Demonstration Of Antenna Design and Simulation - Part 2

Lecture 19 - What Have we Learnt so Far? - A Review

Lecture 20 - Demonstration of Antenna Design and Simulation - Part 3

Lecture 21 - Co-ordinate System

Lecture 22 - Radio Interferometers

Lecture 23 - Example Questions

Lecture 24 - Python Crash Course

Lecture 25 - Few Concepts with the help of python as a computational tool

Lecture 26 - Live session

Lecture 27 - Example Questions

Lecture 28 - Radio Interferometry and Aperture Synthesis

Lecture 29 - Introduction to CASA

Lecture 30 - Examples

Lecture 31

Lecture 32

Lecture 33 - Revision

Lecture 34 - Revision

NPTEL : NOC:Foundations of Quantum Theory: Non-Relativistic Approach (Physics)

Co-ordinators : Prof. Sandeep Kumar Goyal, Prof. Kinjalk Lochan

Lecture 1 - Axiomatic Approach to Quantum Mechanics - Part 1

Lecture 2 - Axiomatic Approach to Quantum Mechanics - Part 2

Lecture 3 - Linear Vector Space

Lecture 4 - Linear Operators - Part 1

Lecture 5 - Linear Operators - Part 2

Lecture 6 - Qubits: Introduction

Lecture 7 - Qubits: State Tomography

Lecture 8 - Qubits: Density Operators - Part 1

Lecture 9 - Qubits: Density Operators - Part 2

Lecture 10 - Qubits: Unitary Transformation

Lecture 11 - Qubits: Bloch Sphere

Lecture 12 - Composite Systems: Pure States, Schmidt Decomposition, Operators Acting on Composite Systems - Part 1

Lecture 13 - Composite Systems: Pure States, Schmidt Decomposition, Operators Acting on Composite Systems - Part 2

Lecture 14 - Composite Systems: Density Operators

Lecture 15 - Quantum Maps: Positive Maps

Lecture 16 - Quantum Maps: Completely Positive Maps - Part 1

Lecture 17 - Quantum Maps: Completely Positive Maps - Part 2

Lecture 18 - Measurements: Introduction

Lecture 19 - Measurements: POVM

Lecture 20 - Measurements: Optical Scheme for POVM

Lecture 21 - Measurements: State Discrimination

Lecture 22 - Measurements: Weak Measurements

Lecture 23 - Entanglement: Introduction

Lecture 24 - Entanglement Measures

Lecture 25 - EPR Paradox and Bohrâ€™s Argument, Bohmâ€™s Argument and Merminâ€™s Argument - Part 1

Lecture 26 - EPR Paradox and Bohrâ€™s Argument, Bohmâ€™s Argument and Merminâ€™s Argument - Part 2

Lecture 27 - Hidden Variable Theory, Bell model, Bell Inequality, Bell CHSH Inequality

Lecture 28 - Open Quantum Systems: Introduction - Part 1

Lecture 29 - Open Quantum Systems: Introduction - Part 2

Lecture 30 - Open Quantum Systems: Introduction - Part 3

Lecture 31 - Open Quantum Systems: Optical Master Equation, Thermalization

Lecture 32 - Open Quantum Systems: Solving Master Equaitons

Lecture 33 - Open Quantum Systems: Quantum Trajectory Aproach

Lecture 34 - Open Quanutm Systems: Decoherence

NPTEL : NOC:Fiber Optics (Physics)

Co-ordinators : Prof. Vipul Rastogi

Lecture 1 - Introduction

Lecture 2 - Need for Optical Communication

Lecture 3 - Salient Features of Optical Fiber - I

Lecture 4 - Salient Features of Optical Fiber - II

Lecture 5 - Optical Fiber Fabrication

Lecture 6 - Transmission Characteristics - I

Lecture 7 - Transmission Characteristics - II

Lecture 8 - Transmission Characteristics - III

Lecture 9 - Propagation in Infinitely Extended Dielectric

Lecture 10 - EM Waves in Dielectrics

Lecture 11 - Electromagnetic Analysis of Waveguides - I

Lecture 12 - Electromagnetic Analysis of Waveguides - II

Lecture 13 - Electromagnetic Analysis of Waveguides - III

Lecture 14 - Electromagnetic Analysis of Waveguides - IV

Lecture 15 - Electromagnetic Analysis of Waveguides - V

Lecture 16 - Electromagnetic Analysis of Waveguides - VI

Lecture 17 - Electromagnetic Analysis of Waveguides - VII

Lecture 18 - Electromagnetic Analysis of Waveguides - VIII

Lecture 19 - Optical Fiber Waveguide - I

Lecture 20 - Optical Fiber Waveguide - II

Lecture 21 - Optical Fiber Waveguide - III

Lecture 22 - Optical Fiber Waveguide - IV

Lecture 23 - Optical Fiber Waveguide - V

Lecture 24 - Splice Loss

Lecture 25 - Waveguide Dispersion - I

Lecture 26 - Waveguide Dispersion - II

Lecture 27 - Recap: Propagation Characteristics

Lecture 28 - Optical Fiber Components and Devices - I

Lecture 29 - Optical Fiber Components and Devices - II

Lecture 30 - Optical Fiber Components and Devices - III

Lecture 31 - Optical Fiber Components and Devices - IV

Lecture 32 - Optical Fiber Components and Devices - V

Lecture 33 - Optical Sources and Detectors - I

Lecture 34 - Optical Sources and Detectors - II

Lecture 35 - Optical Sources and Detectors - III

Lecture 36 - Optical Sources and Detectors - IV

Lecture 37 - Optical Sources and Detectors - V

Lecture 38 - System Design Aspects

Lecture 39 - Optical Fiber Measurements

Lecture 40 - Summary and Recent Advances

NPTEL : NOC:Solar Photovoltaics Fundamentals, Technology and Applications (Physics)

Co-ordinators : Prof. Soumitra SataPathi

Lecture 1 - Energy and its Sources

Lecture 2 - Introduction to Solar Energy

Lecture 3 - Introduction of Quantum Mechanics in Solar Photovoltaics - I

Lecture 4 - Introduction of Quantum Mechanics in Solar Photovoltaics - II

Lecture 5 - Introduction of Quantum Mechanics in Solar Photovoltaics - III

Lecture 6 - Band Theory

Lecture 7 - Energy Band Diagram

Lecture 8 - Charge Carrier Dynamics in Semiconductor

Lecture 9 - P-N junction model and Diode working principle

Lecture 10 - Current-Voltage Characteristics of Solar Cell

Lecture 11 - Equivalent Circuits of Solar Cells, Fill Factor

Lecture 12 - Fabrication Process of Semiconductor Grade Silicon

Lecture 13 - Fabrication Process of Single crystalline Silicon

Lecture 14 - Thin Film deposition Techniques

Lecture 15 - Thin Film Solar Cells: Amorphous Silicon

Lecture 16 - Photo Physics of Dye Sensitized Solar Cells

Lecture 17 - Fabrication of Dye Sensitized Solar Cells

Lecture 18 - Design of Novel dyes

Lecture 19 - Design of Electrolytes

Lecture 20 - Quantum Dot Solar Cells

Lecture 21 - Fabrication of Organic Solar Cells

Lecture 22 - Physics of Bulk Hetero Junction (BHJ) Solar Cells

Lecture 23 - Photo Physics of Organic Solar Cells

Lecture 24 - Morphology Optimization of Organic Solar Cells

Lecture 25 - Perovskite Solar Cells

Lecture 26 - Fabrication of Perovskite Solar Cells

Lecture 27 - Photo Physics of Perovskite Solar Cells

Lecture 28 - Stability in Perovskite Solar Cells

Lecture 29 - Morphology Optimization of Perovskite Solar Cells

Lecture 30 - Perovskite Single Crystal Solar Cells

Lecture 31 - Photophysics in Perovskite Single Crystal Solar Cells

Lecture 32 - Applicationss of Perovskite Single Crystal Solar Cells

Lecture 33 - Organic Nano Particles Based Solar Cells

Lecture 34 - Morphology Optimization in Organic Nanoparticle Based Solar Cells

Lecture 35 - Multijunction Tandem Solar Cells

Lecture 36 - Introduction to Characterization Techniques

Lecture 37 - Vacuum Technology in Solar Photovoltaics

Lecture 38 - Introduction of Pressure Gauges

Lecture 39 - Electron Microscopy in Solar Photovoltaics

Lecture 40 - Impedance Spectroscopy

NPTEL : NOC:Introduction to Atmospheric and Space Sciences (Physics)

Co-ordinators : Prof. M V Sunil Krishna

Lecture 1 - An Introduction to the Earth's Atmosphere and Source of Energy - The Sun

Lecture 2 - Primary Source of Energy on the Earth - The Sun

Lecture 3 - Evolution of the Earth's Atmosphere

Lecture 4 - Earth's Second Atmosphere and Rise of Oxygen

Lecture 5 - Atmosphere of Other Planets in Solar System

Lecture 6 - Structure of Earth's Atmosphere

Lecture 7 - Vertical Structure of Atmosphere

Lecture 8 - Characterization of Atmosphere Based on Electrical Properties

Lecture 9 - Coupling of Solar Radiation with the Earth's Atmosphere

Lecture 10 - Forces and Their Classifications

Lecture 11 - Forces - Gravitational Force

Lecture 12 - Forces - Viscous Force

Lecture 13 - Forces - Coriolis Force

Lecture 14 - Coriolis Force and Curvature Effect

Lecture 15 - Hydrostatic Equation

Lecture 16 - Hypsometric Equation

Lecture 17 - Atmospheric Thermodynamics

Lecture 18 - Thermodynamics - Dry Air

Lecture 19 - Thermodynamics - Moist Air

Lecture 20 - Geopotential and Scale Height

Lecture 21 - Specific Heats

Lecture 22 - Air Parcel and Potential Temperature

Lecture 23 - Moisture Parameters

Lecture 24 - Saturation Mixing Ratio and Relative Humidity

Lecture 25 - Pseudo-Adiabatic Processes

Lecture 26 - Convection of Air

Lecture 27 - Atmospheric Stability and Cloud Formation

Lecture 28 - Cloud Formation

Lecture 29 - Cloud Formation and Lifting

Lecture 30 - Cloud Morphology

Lecture 31 - Secondary Cloud Classification and Fog

Lecture 32 - Atmospheric Stability

Lecture 33 - Atmospheric Stability Conditions

Lecture 34 - Stable Unstable and Neutral Atmosphere

Lecture 35 - Cloud Seeding and Precipitation

Lecture 36 - Measuring Precipitation

Lecture 37 - Droplet Growth and Curvature Effect

Lecture 38 - Droplet Growth and Solute Effect

Lecture 39 - Radial Growth of Droplets by Diffusion

Lecture 40 - Radial Growth of Droplets by Diffusion (Continued...)

Lecture 41 - Ionospheric Layers and Photochemistry

Lecture 42 - Ionization Processes

Lecture 43 - Ionospheric Chemical Reactions and Layers

Lecture 44 - Chapman's Theory of Layer Production

Lecture 45 - Chapman's Theory of Layer Production (Continued...)

Lecture 46 - Chapman's Alpha Layer

Lecture 47 - Hydrogen in Ionosphere

Lecture 48 - Debye's Shielding

Lecture 49 - Debye's Shielding and Debye's Potential

Lecture 50 - Debye's Potential (Continued...)

Lecture 51 - Particle Motion in Uniform Electric Field

Lecture 52 - Particle Motion in Uniform Magnetic Field

Lecture 53 - Particle Motion in Uniform Magnetic Field and Guiding Center

Lecture 54 - Particle Motion in Uniform Electric and Magnetic Fields

Lecture 55 - Gradient Magnetic Field

Lecture 56 - Gradient Drift and Curvature Drift

Lecture 57 - Vacuum Drift and Planetary Ring Current

Lecture 58 - Magnetic Mirroring

Lecture 59 - Magnetic Mirroring and Loss Cone

Lecture 60 - Airglow and Aurora

NPTEL : NOC:Optical Sensors (Physics)

Co-ordinators : Prof. Sachin Kumar Srivastava

Lecture 1 - Introduction

Lecture 2 - Sensor Fabrication and Characterization

Lecture 3 - Basic Optics for Optical Sensing - I

Lecture 4 - Basic Optics for Optical Sensing - II

Lecture 5 - Basic Optics for Optical Sensing - III

Lecture 6 - Basic Optics for Optical Sensing - IV

Lecture 7 - Basic Optics for Optical Sensing - V

Lecture 8 - Basic Optics for Optical Sensing - VI

Lecture 9 - Basic Optics for Optical Sensing - VII

Lecture 10 - Plasmons - I

Lecture 11 - Plasmons - II

Lecture 12 - Plasmons - III

Lecture 13 - Plasmons - IV

Lecture 14 - Plasmons - V

Lecture 15 - Plasmons - VI

Lecture 16 - Multiple Optical Sensors of Different Mechanisms

Lecture 17 - Interference based Sensors

Lecture 18 - Interference, Diffraction and Optical Fiber Sensors

Lecture 19 - Review of Biomaterial Optics

Lecture 20 - Terahertz Based Detection and Circular Dichroism

NPTEL : NOC:Advanced Atmospheric Physics (Physics)

Co-ordinators : Prof. M V Sunil Krishna

Lecture 1 - Atmospheric Forces and Dynamics - Part 1

Lecture 2 - Atmospheric Forces and Dynamics - Part 2

Lecture 3 - Total Derivative (Introduction)

Lecture 4 - Total Derivative of a Vector in a Rotating Frame of Reference

Lecture 5 - Momentum Equations and its Vectorial Form in Spherical Polar Coordinates - Part 1

Lecture 6 - Momentum Equations and its Vectorial Form in Spherical Polar Coordinates - Part 2

Lecture 7 - Momentum Equations and its Vectorial Form in Spherical Polar Coordinates - Part 3

Lecture 8 - Total Derivative and Lagrangian

Lecture 9 - Continuity Equation: Eulerian

Lecture 10 - Energy Equations - Part 1

Lecture 11 - Energy Equations - Part 2

Lecture 12 - Scaling analysis - Part 1

Lecture 13 - Scaling analysis - Part 2

Lecture 14 - Scaling Analysis of Governing Equations - Part 1

Lecture 15 - Scaling Analysis of Governing Equations - Part 2

Lecture 16 - Scaling Analysis - Part 3, A Tutorial

Lecture 17 - Scaling Analysis - Part 4, A Tutorial

Lecture 18 - Introduction of Atmospheric Waves - Part 1

Lecture 19 - Introduction of Atmospheric Waves - Part 2

Lecture 20 - Problems based on Total Derivative - Part 1

Lecture 21 - Problems based on Total Derivative - Part 2

Lecture 22 - Shallow Water Gravity Waves - Part 1

Lecture 23 - Shallow Water Gravity Waves - Part 2

Lecture 24 - Acoustic Waves

Lecture 25 - Internal Gravity Waves - Part 1

Lecture 26 - Internal Gravity Waves - Part 2

Lecture 27 - Internal Gravity Waves - Part 3

Lecture 28 - Pressure as a vertical coordinate - Part 1

Lecture 29 - Pressure as a vertical coordinate - Part 2

Lecture 30 - Pressure as a vertical coordinate - Part 3

Lecture 31 - General circulation and global winds

Lecture 32 - Introduction to different types of Fronts

Lecture 33 - Geostrophic winds

Lecture 34 - Natural coordinate and Inertial flows

Lecture 35 - Cyclostrophic winds and Rossby number

Lecture 36 - Gradient winds

Lecture 37 - Thermal winds

Lecture 38 - Problems on thermal winds

Lecture 39 - Ionosphere introduction (Basics)- Part 1

Lecture 40 - Ionosphere introduction (Different layers) - Part 2

Lecture 41 - Ionosphere introduction (Photochemistry) - Part 3

Lecture 42 - Ionosphere introduction (Recombination) - Part 4

Lecture 43 - Composite F layer - Part 1

Lecture 44 - Composite F layer - Part 2

Lecture 45 - Composite F layer H/He ions - Part 3

Lecture 46 - The Sun - Earth Energetics and Aurora

Lecture 47 - Airglows and Aurora

Lecture 48 - Sun's magnetic field, Formation of Aurora, and Solar cycle

Lecture 49 - Sun's internal structure, Prominences

Lecture 50 - Solar wind - Magnetosphere interactions

Lecture 51 - Solar wind interactions with different planets

Lecture 52 - Solar wind properties and its interaction with different planets

Lecture 53 - Static Model of Corona

Lecture 54 - Parker's Theory of Solar Wind Acceleration - Part 1

Lecture 55 - Parker's Theory of Solar Wind Acceleration - Part 2

Lecture 56 - Parker's Theory of Solar Wind Acceleration - Part 3

Lecture 57 - Parker's Theory of Solar Wind Acceleration - Part 4

Lecture 58 - Introduction to Space Weather - Part 1

Lecture 59 - Introduction to Space Weather - Part 2

Lecture 60 - Introduction to Space Weather - Part 3

NPTEL : NOC:Nuclear Astrophysics (Physics)

Co-ordinators : Prof. Anil Kumar Gourishetty

Lecture 1 - Historical Background, Observational Astronomy, Properties of Sun and of Stars

Lecture 2 - Properties of Galaxies and Universe

Lecture 3 - Background of elemental abundance curve

Lecture 4 - Evidences of Nucleosynthesis - I

Lecture 5 - Evidences of Nucleosynthesis - II

Lecture 6 - Evidences of Nucleosynthesis - III and Mass gaps

Lecture 7 - H-R Diagram

Lecture 8 - M-L relation, Hubbleâ€™s Law and Echo of Big Bang

Lecture 9 - Thermonuclear reactions and Reaction cross-section

Lecture 10 - Reaction rate

Lecture 11 - Reaction rate and Neutron induced reactions

Lecture 12 - Gamma induced reactions and Inverse reactions

Lecture 13 - Inverse reactions

Lecture 14 - Inverse reactions and Mean life time of a nuclei

Lecture 15 - Mean life time of a nuclei and Time dependent abundance evolution

Lecture 16 - Non-resonant charged particle induced reactions

Lecture 17 - Astrophysical S-factor and Non-resonant charged particle induced reactions

Lecture 18 - Gamow peak and Electron screening effect

Lecture 19 - Resonant reactions

Lecture 20 - Resonant reactions

Lecture 21 - Neutron induced non-resonant reactions

Lecture 22 - Burning stages of stars and Hydrogen burning

Lecture 23 - pp chain

Lecture 24 - pp chain and CN cycle

Lecture 25 - CNO cycle, Shell model and Gamma decay

Lecture 26 - Formation of 12C

Lecture 27 - Survival of 12C

Lecture 28 - Carbon, Neon, Oxygen and Silicon burning

Lecture 29 - Nucleosynthesis beyond Iron

Lecture 30 - s-, r- and p-process

Lecture 31 - Charged particle and Neutron beams

Lecture 32 - Accelerators and Targets

Lecture 33 - Backing materials and Target preparation

Lecture 34 - Contaminants and Radiation sources

Lecture 35 - Detectors - I

Lecture 36 - Detectors - II

Lecture 37 - Activity method

Lecture 38 - Kinematics - I

Lecture 39 - Kinematics - II

Lecture 40 - Time of flight method and Indirect methods

NPTEL : NOC:Applied Optics (Physics)

Co-ordinators : Prof. Akhilesh Kumar Mishra

Lecture 1 - Course Overview

Lecture 2 - Introduction to Geometrical Optics

Lecture 3 - Ray Theory, Fermat's Principle

Lecture 4 - Refraction from Single Interface

Lecture 5 - Refraction from double interface

Lecture 6 - Matrix method in paraxial optics - I

Lecture 7 - Matrix Method in Paraxial Optics - II

Lecture 8 - Thick and Thin Lenses, Unit Planes

Lecture 9 - Nodal Planes, System of Thin Lenses

Lecture 10 - Problems on Geometrical Optics

Lecture 11 - Concept of Wavefront, Huygens Principle - I

Lecture 12 - Concept of Wavefront, Huygens Principle - II

Lecture 13 - Superposition of Waves

Lecture 14 - Introduction to Polarization, Linear and Circular Polarization

Lecture 15 - Elliptical Polarization

Lecture 16 - Interference of Light Waves, Interference of Polarized Light - I

Lecture 17 - Interference of Light Waves, Interference of Polarized Light - II

Lecture 18 - Young's Double Slit Experiment - I

Lecture 19 - Young's Double Slit Experiment - II

Lecture 20 - Interference with White Light, Displacement of Fringes, Fresnel's Biprism

Lecture 21 - Interference by Division of Amplitude

Lecture 22 - Thin Parallel Films, Wedge Shaped Films

Lecture 23 - Newton's Rings

Lecture 24 - Michelson Interferometer and Its Applications - I

Lecture 25 - Michelson Interferometer and Its Applications - II

Lecture 26 - Multiple Beam Interference

Lecture 27 - Fabry-Perot Interferometer and Etalon - I

Lecture 28 - Fabry-Perot Interferometer and Etalon - II

Lecture 29 - Concept of Coherence - I

Lecture 30 - Concept of Coherence - II

Lecture 31 - Introduction to Diffraction

Lecture 32 - Fraunhofer Diffraction

Lecture 33 - Single Slit Diffraction

Lecture 34 - Double Slit Diffraction

Lecture 35 - Multiple Slit Diffraction

Lecture 36 - Diffraction at a Rectangular Aperture

Lecture 37 - Diffraction at a Circular Aperture

Lecture 38 - Diffraction Grating

Lecture 39 - Grating Spectrum and Resolving Power

Lecture 40 - Fresnel Diffraction

Lecture 41 - Fresnel Half Period Zones

Lecture 42 - Vibration Curve

Lecture 43 - Circular Obstacle, Zone Plates

Lecture 44 - Rectangular Aperture

Lecture 45 - Diffraction of a Plane Wave by a Long Narrow Slit

Lecture 46 - Brewster's Law, Malus' Law

Lecture 47 - Phenomenon of Double Refraction

Lecture 48 - Normal and Oblique Incidence

Lecture 49 - Production of Polarized Light

Lecture 50 - Quarter and Half Wave Plates

Lecture 51 - Analysis of Polarized Light and Optical Activity

Lecture 52 - Plane Wave Propagation in Anisotropic Media - I

Lecture 53 - Plane Wave Propagation in Anisotropic Media - II

Lecture 54 - Antireflecting Coating

Lecture 55 - Basic Concepts of Holography - I

Lecture 56 - Basic Concepts of Holography - II

Lecture 57 - Basic Concepts and Ray Optics Consideration of Optical Fiber

Lecture 58 - Introduction to Lasers - I

Lecture 59 - Introduction to Lasers - II

Lecture 60 - Trifle

NPTEL : NOC:Newtonian Mechanics With Examples (Physics)

Co-ordinators : Prof. Shiladitya Sengupta

Lecture 1 - Scalars vectors, and tensors - basic definitions

Lecture 2 - Scalars, vectors and tensors - most general definition

Lecture 3 - Elementary vector algebra - I (unit vector, dot product)

Lecture 4 - Elementary vector algebra - II (cross product, triple product)

Lecture 5 - Review of Newtonâ€™s laws of motion - tools for analysis

Lecture 6 - Newtonâ€™s laws of motion - third and second law

Lecture 7 - Newtonâ€™s laws of motion - first law

Lecture 8 - Solving mechanics problems - how to draw free body diagram correctly

Lecture 9 - Mechanical equilibrium (statics) using force and torque balance

Lecture 10 - Mechanical equilibrium (statics) using force and torque balance - more examples

Lecture 11 - Mechanical equilibrium of rope like structures, nature of tension force

Lecture 12 - Massless, flexible suspension cable in mechanical equilibrium

Lecture 13 - Massive flexible suspension cable in mechanical equilibrium

Lecture 14 - Mechanical equilibrium of truss (framework) - nature of internal forces

Lecture 15 - Mechanical equilibrium of truss (framework) - examples

Lecture 16 - Mechanical equilibrium of truss - uniqueness of solution, beam with distributed load

Lecture 17 - Mechanical equilibrium of truss - more on beam with distributed load

Lecture 18 - Mechanical equilibrium - more examples, principle of virtual work, constrained motion

Lecture 19 - Mechanical equilibrium: constraints, degrees of freedom, work done by constrained force

Lecture 20 - d'Alembert - Lagrange principle of virtual work - statement and examples

Lecture 21 - Equivalence of principles of force, torque balance and virtual work, stability analysis

Lecture 22 - Mechanical equilibrium: stability analysis, energy diagram technique

Lecture 23 - Friction between solids - Amonton-Coulomb laws, common misconceptions

Lecture 24 - Friction between solids - worked out examples

Lecture 25 - Friction between solid and fluid - drag force

Lecture 26 - Friction examples - projectile motion with drag force, tying a rope

Lecture 27 - Work-energy theorem in one dimension, importance of conservation laws

Lecture 28 - Work-energy theorem in higher dimensions, conservative forces

Lecture 29 - Momentum balance principle, critical review: projectile motion in real-life

Lecture 30 - Projectile motion - effect of lift and thrust force by examples

Lecture 31 - More on rocket motion - comparing effect of thrust in deep space and at lift off

Lecture 32 - Collisions in daily life - application of energy and momentum balance principles

Lecture 33 - Collision at micro-meter, atomic and sub-atomic scales - Brownian motion, Compton effect

Lecture 34 - Concepts necessary for translation and rotation of rigid bodies - centre of mass

Lecture 35 - Centre of mass of composite objects

Lecture 36 - Concepts necessary for translation and rotation of rigid bodies - moment of inertia

Lecture 37 - More on moment of inertia - 3D objects, composite objects, engineering applications

Lecture 38 - Symmetry of mass distribution - product of inertia

Lecture 39 - Determining the principal axes of rotation and moment of inertia about them

Lecture 40 - Example of finding principal axes, introduction to rotation, the angular velocity vector

Lecture 41 - Rotation of rigid bodies - the angular momentum vector

Lecture 42 - Rotation of rigid bodies - torque

Lecture 43 - Translation and rotation of rigid bodies - computing rules

Lecture 44 - Translation and rotation of rigid bodies - examples (rolling, collision with rotation)

NPTEL : NOC:Plasma Physics and Applications (Physics)

Co-ordinators : Prof. M.V. Sunil Krishna

Lecture 1 - Introduction to Plasma - I

Lecture 2 - Introduction to Plasma - II

Lecture 3 - Plasma Oscillations

Lecture 4 - Debye Shielding

Lecture 5 - Debye Potential - I

Lecture 6 - Debye Potential - II

Lecture 7 - Debye Length and Plasma Criteria

Lecture 8 - More Aspects of Debye Shielding

Lecture 9 - Numerical Problems on Debye Shielding - I

Lecture 10 - Plasma as a Gas and Distribution of Velocities

Lecture 11 - Numerical Problems on Debye Shielding - II

Lecture 12 - Single-Particle Motion in Uniform Electric Field

Lecture 13 - Single-Particle Motion in Uniform Magnetic Field - I

Lecture 14 - Single-Particle Motion in Uniform Magnetic Field - II

Lecture 15 - Single-Particle Motion in Uniform Magnetic Field - III

Lecture 16 - Single-Particle Motion Under Uniform Magnetic field - IV

Lecture 17 - Motion in Perpendicular Electric and Magnetic fields - I

Lecture 18 - Motion in Perpendicular Electric and Magnetic fields - II

Lecture 19 - Gradient Drift

Lecture 20 - Gradient and Curvature Drifts

Lecture 21 - Vacuum Drift

Lecture 22 - Numerical Problems on Drifts

Lecture 23 - Magnetic Mirroring - I

Lecture 24 - Magnetic Mirroring - II

Lecture 25 - Magnetic Mirroring - III

Lecture 26 - Magnetic Mirroring - IV

Lecture 27 - Motion in Time Varying Magnetic Field - I

Lecture 28 - Motion in Time Varying Magnetic Field - II

Lecture 29 - Motion in Time Varying Electric field - I

Lecture 30 - Motion in Time Varying Electric field - II

Lecture 31 - Plasma as a Fluid: Equation of Continuity

Lecture 32 - Plasma as a Fluid: Fluid Equation - I

Lecture 33 - Plasma as a Fluid: Fluid Equation - II

Lecture 34 - Plasma as a fluid: Governing Equations

Lecture 35 - MHD Approximation - I

Lecture 36 - MHD Approximation - II

Lecture 37 - Plasma as a fluid: Electric and Magnetic Properties - I

Lecture 38 - Plasma as a fluid: Electric and Magnetic Properties - II

Lecture 39 - Plasma as a fluid: Fluid Drift - I

Lecture 40 - Plasma as a fluid: Fluid Drift - II

Lecture 41 - Magnetic Pressure

Lecture 42 - Wave in Plasma: Perturbation Theory

Lecture 43 - Wave in Plasma: Plasma Oscillation

Lecture 44 - Wave in Plasma: Dispersion Relation

Lecture 45 - Ion Acoustic Wave - I

Lecture 46 - Ion Acoustic Wave - II

Lecture 47 - Ion Acoustic Wave - III

Lecture 48 - Invalidity of Plasma Approximation - I

Lecture 49 - Invalidity of Plasma Approximation - II

Lecture 50 - Electromagnetic Waves in Plasma

Lecture 51 - Collisions and Diffusion in Plasma - I

Lecture 52 - Collisions and Diffusion in Plasma - II

Lecture 53 - Ambipolar Diffusion - I

Lecture 54 - Ambipolar Diffusion - II

Lecture 55 - Diffusion Equation

Lecture 56 - Diffusion in Presence of B - I

Lecture 57 - Diffusion in Presence of B - II

Lecture 58 - Instabilities in Plasma

Lecture 59 - Laser Produced Plasma and Pulsed Laser Deposited (PLD) Thin Film - I

Lecture 60 - Laser Produced Plasma and Pulsed Laser Deposited (PLD) Thin Film - II

Lecture 61 - Surface Modification of Metallic Components by Plasma Nitriding - I

Lecture 62 - Surface Modification of Metallic Components by Plasma Nitriding - II

NPTEL : Relativistic Quantum Mechanics (Physics)

Co-ordinators : Prof. Apoorva D Patel

Lecture 1 - Introduction, The Klein-Gordon equation

Lecture 2 - Particles and antiparticles, Two component framework

Lecture 3 - Coupling to electromagnetism, Solution of the Coulomb problem

Lecture 4 - Bohr-Sommerfeld semiclassical solution of the Coulomb problem, The Dirac equation and the Clifford algebra

Lecture 5 - Dirac matrices, Covariant form of the Dirac equation, Equations of motion, Spin, Free particle solutions

Lecture 6 - Electromagnetic interactions, Gyromagnetic ratio

Lecture 7 - The Hydrogen atom problem, Symmetries, Parity, Separation of variables

Lecture 8 - The Frobenius method solution, Energy levels and wavefunctions

Lecture 9 - Non-relativistic reduction, The Foldy-Wouthuysen transformation

Lecture 10 - Interpretation of relativistic corrections, Reflection from a potential barrier

Lecture 11 - The Klein paradox, Pair creation process and examples

Lecture 12 - Zitterbewegung, Hole theory and antiparticles

Lecture 13 - Charge conjugation symmetry, Chirality, Projection operators, The Weyl equation

Lecture 14 - Weyl and Majorana representations of the Dirac equation, Unitary and antiunitary symmetries

Lecture 15 - Time reversal symmetry, The PCT invariance

Lecture 16 - Arrow of time and particle-antiparticle asymmetry, Band theory for graphene

Lecture 17 - Dirac equation structure of low energy graphene states, Relativistic signatures in graphene properties

Lecture 18 - Groups and symmetries, The Lorentz and Poincare groups

Lecture 19 - Group representations, generators and algebra, Translations, rotations and boosts

Lecture 20 - The spinor representation of SL(2,C), The spin-statistics theorem

Lecture 21 - Finite dimensional representations of the Lorentz group, Euclidean and Galilean groups

Lecture 22 - Classification of one particle states, The little group, Mass, spin and helicity

Lecture 23 - Massive and massless one particle states

Lecture 24 - P and T transformations, Lorentz covariance of spinors

Lecture 25 - Lorentz group classification of Dirac operators, Orthogonality and completeness of Dirac spinors, Projection operators

Lecture 26 - Propagator theory, Non-relativistic case and causality

Lecture 27 - Relativistic case, Particle and antiparticle contributions, Feynman prescription and the propagator

Lecture 28 - Interactions and formal perturbative theory, The S-matrix and Feynman diagrams

Lecture 29 - Trace theorems for products of Dirac matrices

Lecture 30 - Photons and the gauge symmetry

Lecture 31 - Abelian local gauge symmetry, The covariant derivative and invariants

Lecture 32 - Charge quantisation, Photon propagator, Current conservation and polarisations

Lecture 33 - Feynman rules for Quantum Electrodynamics, Nature of perturbative expansion

Lecture 34 - Dyson's analysis of the perturbation series, Singularities of the S-matrix, Elementary QED processes

Lecture 35 - The T-matrix, Coulomb scattering

Lecture 36 - Mott cross-section, Compton scattering

Lecture 37 - Klein-Nishina result for cross-section

Lecture 38 - Photon polarisation sums, Pair production through annihilation

Lecture 39 - Unpolarised and polarised cross-sections

Lecture 40 - Helicity properties, Bound state formation

Lecture 41 - Bound state decay, Non-relativistic potentials

Lecture 42 - Lagrangian formulation of QED, Divergences in Green's functions, Superficially divergent 1-loop diagrams and regularisation

Lecture 43 - Infrared divergences due to massless particles, Renormalisation and finite physical results

Lecture 44 - Symmetry constraints on Green's functions, Furry's theorem, Ward-Takahashi identity, Spontaneous breaking of gauge symmetry and superconductivity

Lecture 45 - Status of QED, Organisation of perturbative expansion, Precision tests

NPTEL : NOC:Control System Design (Physics)

Co-ordinators : Prof. G R Jayanth

Lecture 1 - Introduction

Lecture 2 - Linear Systems

Lecture 3 - Homogeneous linear time invariant ordinary differential equations

Lecture 4 - In-homogeneous linear time invariant ordinary differential equations

Lecture 5 - Fourier transforms - Part 1

Lecture 6 - Fourier transforms - Part 2

Lecture 7 - Laplace transforms - Part 1

Lecture 8 - Laplace transforms - Part 2

Lecture 9 - Introduction to feedback control - Part 1

Lecture 10 - Introduction to feedback control - Part 2

Lecture 11 - Nyquist stability theory - Part 1

Lecture 12 - Nyquist stability theory - Part 2

Lecture 13 - Nyquist stability theory - Part 3

Lecture 14 - Bode plots

Lecture 15 - Steps for performing control design - Part 1

Lecture 16 - Steps for performing control design - Part 2

Lecture 17 - General controllers - Part 1

Lecture 18 - General controllers - Part 2

Lecture 19 - General controllers - Part 3

Lecture 20 - Bode plot-based control design - Part 1

Lecture 21 - Bode plot-based control design - Part 2

Lecture 22 - Introduction to root-locus

Lecture 23 - Control system design using root-locus

Lecture 24 - Control of systems with some known parameters - Part 1

Lecture 25 - Control of systems with some known parameters - Part 2

Lecture 26 - Limitations of 1-degree of freedom control

Lecture 27 - Introduction to 2-degree of freedom control

Lecture 28 - 2-Degree of freedom robust control design for plants with gain uncertainty - Part 1

Lecture 29 - 2-Degree of freedom robust control design for plants with uncertain gain - Part 2

Lecture 30 - 2-Degree of freedom robust control design for plants with uncertain pole

Lecture 31 - 2-Degree of freedom robust control design for plants with multiple uncertainties in their structure

Lecture 32 - Issues connected with 2-Degree of freedom control design using root-locus

Lecture 33 - Introduction to Nichols plot

Lecture 34 - Feedback control design using Nichols plot

Lecture 35 - Robust control design using Quantitative feedback theory - Part 1

Lecture 36 - Robust control design using Quantitative feedback theory - Part 2

Lecture 37 - Tutorial on QFT Toolbox software - Part 1

Lecture 38 - Tutorial on QFT Toolbox software - Part 2

Lecture 39 - Tutorial on QFT Toolbox software - Part 3

Lecture 40 - Fundamental properties of the loop gain - Part 1

Lecture 41 - Fundamental properties of the loop gain - Part 2

Lecture 42 - Ideal Bode Characteristic - Part 1

Lecture 43 - Ideal Bode Characteristic - Part 2

Lecture 44 - Introduction to nonminimum phase systems

Lecture 45 - Fundamental properties of nonminimum phase systems - Part 1

Lecture 46 - Fundamental properties of nonminimum phase systems - Part 2

Lecture 47 - Fundamental properties of unstable systems

Lecture 48 - Consequences of actuator bandwidth limitations while controlling unstable systems

Lecture 49 - Describing functions - Part 1

Lecture 50 - Describing functions - Part 2

NPTEL : NOC:Bonds and Bands in Solids (Physics)

Co-ordinators : S. Ramashesha

Lecture 1 - Born-Oppenheimer approximation

Lecture 2 - Self-consistent field (SCF) method

Lecture 3 - Simple MO Theory of Hydrogen Molecule

Lecture 4 - Blochâ€™s theorem

Lecture 5 - Tight binding approximation

Lecture 6 - Energy band theory - 1

Lecture 7 - Energy band theory - 2

Lecture 8 - Density of states

Lecture 9 - Energy band theory - 3

Lecture 10 - Energy band theory - 4

Lecture 11 - Drudeâ€™s classical free electron model - 1

Lecture 12 - Drudeâ€™s classical free electron model - 2

Lecture 13 - Drudeâ€™s classical free electron model - 3

Lecture 14 - Drudeâ€™s classical free electron model - 4

Lecture 15 - Sommerfeldâ€™s quantum free electron model

Lecture 16 - Specific heat of Fermi gas

Lecture 17 - Energy dispersion relation in a periodic potential - 1

Lecture 18 - Energy dispersion relation in a periodic potential - 2

Lecture 19 - Brief overview of space groups and constant energy surface in 2D

Lecture 20 - Energy band and effective mass

Lecture 21 - Effective mass

Lecture 22 - kâ‹…p perturbation method

Lecture 23 - Revisiting Blochâ€™s theorem and tight binding functions

Lecture 24 - Symmetries in crystal Hamiltonian - 1

Lecture 25 - Symmetries in crystal Hamiltonian - 2

Lecture 26 - Tight binding method - 1

Lecture 27 - Tight binding method - 2

Lecture 28 - Tight binding method - 3

Lecture 29 - Plane wave method

Lecture 30 - Pseudo potential method

Lecture 31 - Cellular method of energy band calculation

Lecture 32 - Muffin tin potential and APW functions

Lecture 33 - Augmented plane wave method of energy band calculation - 1

Lecture 34 - Augmented plane wave method of energy band calculation - 2

Lecture 35 - Greenâ€™s function method of energy band calculation - 1

Lecture 36 - Greenâ€™s function method of energy band calculation - 2

Lecture 37 - Cyclotron resonance technique

Lecture 38 - De Haas-van Alphen effect

Lecture 39 - De Haas-van Alphen effect conclusion.Introduction to point impurity effect on band structure

Lecture 40 - Point impurity in crystal

Lecture 41 - Friedel Oscillations

Lecture 42 - Lindhard dielectric constant

Lecture 43 - Dielectric anomaly. Crystal momentum

Lecture 44 - Spatial and time reversal symmetries in crystals

Lecture 45 - Time reversal symmetry (Continued...)

Lecture 46 - Spin orbit interaction

Lecture 47 - Disordered solids and transport in disordered solids

Lecture 48 - Optical properties of semiconductors

Lecture 49 - Excitonic states in semiconductors

Lecture 50 - Excitonic states in semiconductors (Continued...)

Lecture 51 - Molecular orbital calculation - I

Lecture 52 - Mott-Hubbard transition

Lecture 53 - Hubbard model

Lecture 54 - Electron repulsion and magnetic exchange

Lecture 55 - Beyond on-site electron repulsions;Pariser-Parr-Pople model

Lecture 56 - Electron-hole symmetry and Pairing theorem. Solitons

Lecture 57 - Density waves in 1-d systems and Lattice vibrations - I

Lecture 58 - Lattice vibrations - II

Lecture 59 - Lattice vibrations - III

Lecture 60 - Lattice vibrations - IV

NPTEL : NOC:Advanced NMR Techniques in Solution and Solid-State (Physics)

Co-ordinators : Prof. N. Suryaprakash

Lecture 1 - Introduction to NMR

Lecture 2 - NMR concepts and spin physics - I

Lecture 3 - NMR concepts and spin physics - II

Lecture 4 - Internal interaction parameters and chemical shifts

Lecture 5 - Chemical shifts

Lecture 6 - Scalar couplings

Lecture 7 - Multiplicity patterns of coupled spins and analysis of 1H NMR spectrum

Lecture 8 - Multiplicity pattern and analysis of NMR spectra - II

Lecture 9 - Analysis of NMR spectra and their analysis

Lecture 10 - Heteronuclear NMR

Lecture 11 - Introduction to Fourier series

Lecture 12 - Complex form of Fourier series

Lecture 13 - Fourier theorems

Lecture 14 - Fourier transformation in NMR

Lecture 15 - Pople notation, construction of spin Hamiltonian

Lecture 16 - Quantum mechanical analysis of AX spectra

Lecture 17 - Quantum mechanical analysis of AB spin system

Lecture 18 - Quantum mechanical analysis of coupled spin systems

Lecture 19 - RF pulses and their phases

Lecture 20 - Receiver phase and phase cycling

Lecture 21 - Evolution of chemical shift

Lecture 22 - Evolution of J couplings: polarization transfer

Lecture 23 - selective saturation in homo and heteronuclear spin systems, coupled anddecoupled INEPT

Lecture 24 - INEPT and DEPT

Lecture 25 - Coherence transfer pathway

Lecture 26 - Examples of coherence pathway selection

Lecture 27 - Pulse field gradients - I

Lecture 28 - Pulse field gradients - II

Lecture 29 - Selective excitation, selective inversion

Lecture 30 - Relaxation phenomenon

Lecture 31 - T1 relaxation concepts and measurements

Lecture 32 - Spectral density function and relaxation mechanisms

Lecture 33 - T1 Relaxation mechanisms

Lecture 34 - T1 Relaxation mechanisms and T2 relaxation

Lecture 35 - Measurement of T1 and T2

Lecture 36 - Decoupling and NOE concepts

Lecture 37 - DQ and ZQ relaxation pathways

Lecture 38 - Positive and Negative NOE and spectral density functions

Lecture 39 - NOE and correlation time

Lecture 40 - Product operators

Lecture 41 - Product operator analysis

Lecture 42 - Productor operator analysis of pulse sequences

Lecture 43 - Product operators for two J coupled spins

Lecture 44 - Spin echo sequences

Lecture 45 - Introduction to 2D NMR

Lecture 46 - 2D NMR concepts, 2D experiments

Lecture 47 - 2D COSY experiment

Lecture 48 - 2D COSY and its variants

Lecture 49 - TOCSY Heteronuclear 2D experiments

Lecture 50 - coupled and decoupled HSQC, HMBC, INADEQUATE, 2D Jresolved

Lecture 51 - Introduction to multiple quantum NMR

Lecture 52 - DQ and ZQ of coupled spins

Lecture 53 - MQ and relative signs of couplings

Lecture 54 - MQ and spin system filtering

Lecture 55 - Introduction to solid state NMR

Lecture 56 - CSA and dipolar couplings

Lecture 57 - Magic Angle Spinning

Lecture 58 - WAHUHA and Cross Polarization

Lecture 59 - Cross Polarization

Lecture 60 - CP at high speeds, Side band suppression, TOSS

NPTEL : ACM Summer School on Graph Theory and Graph Algorithms (Special Lecture Series)

Co-ordinators : Dr. N S. Narayanaswamy

Lecture 1 - Introduction to Graph Theory - Part 1

Lecture 2 - Introduction to Graph Theory - Part 2

Lecture 3 - Introduction to Graph Algorithms - Part 1

Lecture 4 - Introduction to Graph Algorithms - Part 2

Lecture 5 - Havel Hakimi Theorem - Part 1

Lecture 6 - Havel Hakimi Theorem - Part 2

Lecture 7 - Havel Hakimi Theorem - Part 3

Lecture 8 - Graph Traversals - Part 1

Lecture 9 - Graph Traversals - Part 2

Lecture 10 - Topological Sort and Mengers Theorem - Part 1

Lecture 11 - Topological Sort and Mengers Theorem - Part 2

Lecture 12 - Topological Sort and Mengers Theorem - Part 3

Lecture 13 - Hamiltonian Graphs - Part 1

Lecture 14 - Hamiltonian Graphs - Part 2

Lecture 15 - Shortest path Algorithms 1 - Part 1

Lecture 16 - Shortest path Algorithms 1 - Part 2

Lecture 17 - Shortest path Algorithms 1 - Part 3

Lecture 18 - Shortest path Algorithms 1 - Part 4

Lecture 19 - Matching in Graphs - Part 1

Lecture 20 - Matching in Graphs - Part 2

Lecture 21 - Some Graph Theoretic Puzzles - Part 1

Lecture 22 - Some Graph Theoretic Puzzles - Part 2

Lecture 23 - Network Flow Algorithms - Part 1

Lecture 24 - Network Flow Algorithms - Part 2

Lecture 25 - Network Flow Algorithms - Part 3

Lecture 26 - Network Flow Algorithms - Part 4

Lecture 27 - Network Flow Algorithms - Part 5

Lecture 28 - Network Flow Algorithms - Part 6

Lecture 29 - Network Flows - Part 1

Lecture 30 - Network Flows - Part 2

Lecture 31 - Network Flows - Part 3

Lecture 32 - Network Flows - Part 4

Lecture 33 - Turanâ€™s and Madrurâ€™s theorem - Part 1

Lecture 34 - Turanâ€™s and Madrurâ€™s theorem - Part 2

Lecture 35 - NP Computations - Part 1

Lecture 36 - NP Computations - Part 2

Lecture 37 - Spectral Graph Theory-I - Part 1

Lecture 38 - Spectral Graph Theory-I - Part 2

Lecture 39 - Spectral Graph Theory-I - Part 3

Lecture 40 - NP Computations II - Part 1

Lecture 41 - NP Computations II - Part 2

Lecture 42 - Graph Coloring - Part 1

Lecture 43 - Graph Coloring - Part 2

Lecture 44 - Spectral Graph Theory-II - Part 1

Lecture 45 - Spectral Graph Theory-II - Part 2

Lecture 46 - NP Computations Reductions - Part 1

Lecture 47 - NP Computations Reductions - Part 2

Lecture 48 - NP Computations Reductions - Part 3

Lecture 49 - Spectral Graph Theory-III - Part 1

Lecture 50 - Planar Graphs - Part 1

Lecture 51 - Planar Graphs - Part 2

Lecture 52 - NP Computations and Approximation Algorithms - Part 1

Lecture 53 - NP Computations and Approximation Algorithms - Part 2

Lecture 54 - Spectral Graph Theory-IV - Part 1

Lecture 55 - Spectral Graph Theory-IV - Part 2

Lecture 56 - Approximation Algorithms I - Part 1

Lecture 57 - Approximation Algorithms I - Part 2

Lecture 58 - Social Network Analysis - Part 1

Lecture 59 - Social Network Analysis - Part 2

Lecture 60 - Spectral Graph Theory-V - Part 1

Lecture 61 - Spectral Graph Theory-V - Part 2

Lecture 62 - Approximation Algorithms II - Part 1

Lecture 63 - Approximation Algorithms II - Part 2

Lecture 64 - Spectral Graph Theory-VI - Part 1

Lecture 65 - Spectral Graph Theory-VI - Part 2

Lecture 66 - RSA Crypto - Part 1

Lecture 67 - RSA Crypto - Part 2

Lecture 68 - Approximation Algorithms III - Part 1

Lecture 69 - Approximation Algorithms III - Part 2

Lecture 70 - Spectral Graph Theory-VII - Part 1

Lecture 71 - Spectral Graph Theory-VII - Part 2

Lecture 72 - Exact Exponential Algorithms - Part 1

Lecture 73 - Exact Exponential Algorithms - Part 2

Lecture 74 - Interconnection Networks - Part 1

Lecture 75 - Interconnection Networks - Part 2

Lecture 76 - Kernelization - Part 1

Lecture 77 - Kernelization - Part 2

Lecture 78 - Kernelization - Part 3

Lecture 79 - Introduction to Parameterized Algorithms - Part 1

Lecture 80 - Introduction to Parameterized Algorithms - Part 2

Lecture 81 - Chardal Graphs - Part 1

Lecture 82 - Chardal Graphs - Part 2

Lecture 83 - Branching - Part 1

Lecture 84 - Branching - Part 2

Lecture 85 - Interval Graphs and Split Graphs - Part 1

Lecture 86 - Interval Graphs and Split Graphs - Part 2

Lecture 87 - Vertex cover linear vertex kernel using LP - Part 1

Lecture 88 - Vertex cover linear vertex kernel using LP - Part 2

Lecture 89 - Comparability Graphs - Part 1

Lecture 90 - Comparability Graphs - Part 2

Lecture 91 - Introduction to Randomized Algorithms and Karger's Min-cut Algorithm - Part 1

Lecture 92 - Introduction to Randomized Algorithms and Karger's Min-cut Algorithm - Part 2

Lecture 93 - Probability Methods to Ramsey Number - Part 2

Lecture 94 - Probability Methods to Ramsey Number - Part 2

Lecture 95 - Color Coding - Part 1

Lecture 96 - Color Coding - Part 2

Lecture 97 - Fast Min-cut Algorithm and its analysis - Part 1

Lecture 98 - Fast Min-cut Algorithm and its analysis - Part 2

Lecture 99 - Box Representations of Graphs - Part 1

Lecture 100 - Box Representations of Graphs - Part 2

Lecture 101 - Hardness for FPT - Part 1

Lecture 102 - Hardness for FPT - Part 2

Lecture 103 - Application of min-cut Algorithm

NPTEL : ACM Summer School in Data Science (Special Lecture Series)

Co-ordinators : Prof. Murugaiyan Amirthalingam

Lecture 1 - Probability - Part 1

Lecture 2 - Probability - Part 2

Lecture 3 - Probability - Part 3

Lecture 4 - Math Foundation - Part 1

Lecture 5 - Math Foundation - Part 2

Lecture 6 - Math Foundation - Part 3

Lecture 7 - Math Foundation 2 - Part 1

Lecture 8 - Math Foundation 2 - Part 2

Lecture 9 - Math Foundation 2 - Part 3

Lecture 10 - Introduction to probability for Data science - Part 1

Lecture 11 - Introduction to probability for Data science - Part 2

Lecture 12 - Introduction to probability for Data science - Part 3

Lecture 13 - Introduction to Statistics for Data science - Part 1

Lecture 14 - Introduction to Statistics for Data science - Part 2

Lecture 15 - Introduction to Statistics for Data science - Part 3

Lecture 16 - Clustering I - Part 1

Lecture 17 - Clustering I - Part 2

Lecture 18 - Clustering I - Part 3

Lecture 19 - Clustering II - Part 1

Lecture 20 - Clustering II - Part 2

Lecture 21 - Clustering II - Part 3

Lecture 22 - Dimensionality Reduction - Part 1

Lecture 23 - Dimensionality Reduction - Part 2

Lecture 24 - Dimensionality Reduction - Part 3

Lecture 25 - Supervised Learning I - Part 1

Lecture 26 - Supervised Learning I - Part 2

Lecture 27 - Supervised Learning I - Part 3

Lecture 28 - Supervised Learning II - Part 1

Lecture 29 - Supervised Learning II - Part 2

Lecture 30 - Supervised Learning II - Part 3

Lecture 31 - Supervised Learning III - Part 1

Lecture 32 - Supervised Learning III - Part 2

Lecture 33 - Supervised Learning III - Part 3

Lecture 34 - Linear Models For Classification - Part 1

Lecture 35 - Linear Models For Classification - Part 2

Lecture 36 - Linear Models For Classification - Part 3

Lecture 37 - Tree Based Methods - Part 1

Lecture 38 - Tree Based Methods - Part 2

Lecture 39 - SVMs - Part 1

Lecture 40 - SVMs - Part 2

Lecture 41 - SVMs - Part 3

Lecture 42 - Ensemble Methods - Part 1

Lecture 43 - Ensemble Methods - Part 2

Lecture 44 - Ensemble Methods - Part 3

Lecture 45 - Learning Theory - Part 1

Lecture 46 - Learning Theory - Part 2

Lecture 47 - Introduction to Probabilistic Modeling - Part 1

Lecture 48 - Introduction to Probabilistic Modeling - Part 2

Lecture 49 - Introduction to Probabilistic Modeling - Part 3

Lecture 50 - Probabilistic/Bayesian Models for Regression - Part 1

Lecture 51 - Probabilistic/Bayesian Models for Regression - Part 2

Lecture 52 - Probabilistic/Bayesian Models for Regression - Part 3

Lecture 53 - Probabilistic Classification, Latent Variable Models - Part 1

Lecture 54 - Probabilistic Classification, Latent Variable Models - Part 2

Lecture 55 - Probabilistic Classification, Latent Variable Models - Part 3

Lecture 56 - Deep Learning I - Part 1

Lecture 57 - Deep Learning I - Part 2

Lecture 58 - Deep Learning I - Part 3

Lecture 59 - Deep Learning II - Part 1

Lecture 60 - Deep Learning II - Part 2

Lecture 61 - Deep Learning II - Part 3

Lecture 62 - Deep Learning III - Part 1

Lecture 63 - Deep Learning III - Part 2

Lecture 64 - Deep Learning III - Part 3

Lecture 65 - Reinforcement learning I - Part 1

Lecture 66 - Reinforcement learning I - Part 2

Lecture 67 - Reinforcement learning II - Part 1

Lecture 68 - Reinforcement learning II - Part 2

Lecture 69 - Map-Reduce and Spark - Part 1

Lecture 70 - Map-Reduce and Spark - Part 2

Lecture 71 - Map-Reduce and Spark - Part 3

Lecture 72 - Scalable Machine Learning - Part 1

Lecture 73 - Scalable Machine Learning - Part 2

NPTEL : Topics in Theoritical Computer Science (Special Lecture Series)

Co-ordinators : Dr. N S. Narayanaswamy

Lecture 1 - Finite Automata

Lecture 2 - TMs, Halting Problems

Lecture 3 - Concurrency

Lecture 4 - Blockchain and Bitcoin

Lecture 5 - Complexity Theory

Lecture 6 - Lower Bounds, Dealing with NP hardness

Lecture 7 - Online and streaming algorithms

Lecture 8 - Zero Knowledge Proofs

Lecture 9 - Verification, Games

NPTEL : Researching Anglo-Indians in India and the Diaspora (Special Lecture Series)

Co-ordinators : Prof. Merin Simi Raj

Lecture 1 - Keynote Address

Lecture 2 - A Synopsis of 'Two Cheers'

Lecture 3 - Higher Education Among Anglo-Indians

Lecture 4 - Perception of trust, risk and intimacy among elderly Anglo-Indians living in Tollygunge home in Kolkata

Lecture 5 - The Daunting Spirit and the Empowering Voice of Eunice De Souza

Lecture 6 - Origin Myth and Anglo-Indian Identity: Exploring the Representation of the History of the Origin of Anglo-Indian community in Hugh and Colleen Gantzers Lyndsale Raj

Lecture 7 - Keynote Address

Lecture 8 - Shame and Guilt in Alison McQueens The Secret Children

Lecture 9 - Re-visiting McCluskieganj: De-hyphenating the Anglo-Indian Consciousness through Vikas Kumar Jhas Novel

Lecture 10 - The Imaging of the Anglo-Indian Woman in Colonialist Literature

Lecture 11 - Expostulating Celluloid Stereotypes: Researching Anglo-Indian Representation in Malayalam Cinema

Lecture 12 - Chutney Mary: Rethinking AI Identity through their Culinary Consumption Culture

Lecture 13 - In Search of a New Home: Anglo-Indians in the Darjeeling Hills, 1900-1947

Lecture 14 - (Re)discovering Anglo-Indians of Visakhapatnam - An Overview

Lecture 15 - Genealogy of Sporting Culture through a Study of Anglo-Indian Institutions of Asansol

Lecture 16 - Keynote Address

Lecture 17 - Crowdsourcing as a Research Tool

Lecture 18 - Researching Community, Writing Cultures: Challenges and Opportunities

Lecture 19 - Revisiting the Anglo-Indian Community: Making and Unmaking of Anglo-Indian Identity in India

Lecture 20 - Minoritizing English: Anglo-Indians as a Linguistic Minority in India

NPTEL : Dravidian Temple Architecture and Construction Techniques (Special Lecture Series)

Co-ordinators : Unknown

Lecture 1 - Introduction to Dravidian Temple Architecture and Construction Techniques - Part 1

Lecture 2 - Introduction to Dravidian Temple Architecture and Construction Techniques - Part 2

Lecture 3 - Introduction to Dravidian Temple Architecture and Construction Techniques - Part 3

Lecture 4 - Introduction to Dravidian Temple Architecture and Construction Techniques - Part 4

Lecture 5 - Introduction to Dravidian Temple Architecture and Construction Techniques - Part 5

Lecture 6 - Naal Kurithal - Part 1

Lecture 7 - Naal Kurithal - Part 2

Lecture 8 - Naal Kurithal - Part 3

Lecture 9 - Naal Kurithal - Part 4

Lecture 10 - Naal Kurithal - Part 5

Lecture 11 - Naal Kurithal - Part 6

Lecture 12 - Ayadhi Calculations - Part 1

Lecture 13 - Ayadhi Calculations - Part 2

Lecture 14 - Ayadhi Calculations - Part 3

Lecture 15 - Ayadhi Calculations - Part 4

Lecture 16 - Ayadhi Calculations - Part 5

Lecture 17 - Ayadhi Calculations - Part 6

Lecture 18 - Ayadhi Calculations - Part 7

Lecture 19 - Ayadhi Calculations - Part 8

Lecture 20 - Ayadhi Calculations - Part 9

Lecture 21 - Ayadhi Calculations - Part 10

Lecture 22 - Ayadhi Calculations - Part 11

Lecture 23 - Alavukal - Part 1

Lecture 24 - Alavukal - Part 2

Lecture 25 - Alavukal - Part 3

Lecture 26 - Alavukal - Part 4

Lecture 27 - Alavukal - Part 5

Lecture 28 - Alavukal - Part 6

Lecture 29 - Dhisai Aridhal - Part 1

Lecture 30 - Dhisai Aridhal - Part 2

Lecture 31 - Dhisai Aridhal - Part 3

Lecture 32 - Dhisai Aridhal - Part 4

Lecture 33 - Dhisai Aridhal - Part 5

Lecture 34 - Site Analysis - Part 1

Lecture 35 - Site Analysis - Part 2

Lecture 36 - Site Analysis - Part 3

Lecture 37 - Site Analysis - Part 4

Lecture 38 - Site Analysis - Part 5

Lecture 39 - Site Analysis - Part 6

Lecture 40 - Site Analysis - Part 7

Lecture 41 - Site Analysis - Part 8

Lecture 42 - Site Analysis - Part 9

Lecture 43 - Formulation of Structure - Part 1

Lecture 44 - Formulation of Structure - Part 2

Lecture 45 - Formulation of Structure - Part 3

Lecture 46 - Formulation of Structure - Part 4

Lecture 47 - Formulation of Structure - Part 5

Lecture 48 - Formulation of Structure - Part 6

Lecture 49 - Formulation of Structure - Part 7

Lecture 50 - Formulation of Structure - Part 8

Lecture 51 - Formulation of Structure - Part 9

Lecture 52 - Formulation of Structure - Part 10

Lecture 53 - Formulation of Structure - Part 11

Lecture 54 - Formulation of Structure - Part 12

Lecture 55 - Formulation of Structure - Part 13

Lecture 56 - Formulation of Structure - Part 14

Lecture 57 - Formulation of Structure - Part 15

Lecture 58 - Formulation of Structure - Part 16

Lecture 59 - Formulation of Structure - Part 17

Lecture 60 - Formulation of Structure - Part 18

Lecture 61 - Formulation of Structure - Part 19

Lecture 62 - Formulation of Structure - Part 20

Lecture 63 - Formulation of Structure - Part 21

Lecture 64 - Formulation of Structure - Part 22

Lecture 65 - Formulation of Structure - Part 23

Lecture 66 - Formulation of Structure - Part 24

Lecture 67 - Formulation of Structure - Part 25

Lecture 68 - Formulation of Structure - Part 26

Lecture 69 - Formulation of Structure - Part 27

Lecture 70 - Formulation of Structure - Part 28

Lecture 71 - Formulation of Structure - Part 29

Lecture 72 - Formulation of Structure - Part 30

Lecture 73 - Formulation of Structure - Part 31

Lecture 74 - Formulation of Structure - Part 32

Lecture 75 - Formulation of Structure - Part 33

Lecture 76 - Formulation of Structure - Part 34

Lecture 77 - Formulation of Structure - Part 35

Lecture 78 - Formulation of Structure - Part 36

Lecture 79 - Formulation of Structure - Part 37

Lecture 80 - Formulation of Structure - Part 38

Lecture 81 - Formulation of Structure - Part 39

Lecture 82 - Formulation of Structure - Part 40

Lecture 83 - Formulation of Structure - Part 41

Lecture 84 - Formulation of Structure - Part 42

Lecture 85 - Formulation of Structure - Part 43

Lecture 86 - Formulation of Structure - Part 44

Lecture 87 - Formulation of Structure - Part 45

Lecture 88 - Formulation of Structure - Part 46

Lecture 89 - Characteristics of a Mandapam - Part 1

Lecture 90 - Characteristics of a Mandapam - Part 2

Lecture 91 - Characteristics of a Mandapam - Part 3

Lecture 92 - Characteristics of a Mandapam - Part 4

Lecture 93 - Characteristics of a Mandapam - Part 5

Lecture 94 - Characteristics of a Mandapam - Part 6

NPTEL : ACM Summer School in Data Science (Bangalore) (Special Lecture Series)

Co-ordinators : Unknown

Lecture 1 - Web Browser Security

Lecture 2 - Trusted Computing

Lecture 3 - Buffer Overflow Vulnerability and Protection Techineques

Lecture 4 - Secure Software Engineering : Secure Design Principles and Coding Practices

Lecture 5 - Challenges and Opportunities with Cloud Security

Lecture 6 - Cognitive Security with Watson

Lecture 7 - IBM MaaS360 Architecture Overview

Lecture 8 - Unified Risk Management Approach

Lecture 9 - Data Encryption and Post Quantum Cryptography (PQC)

Lecture 10 - Network Security - I

Lecture 11 - Network Security - II

Lecture 12 - Network Security - III

Lecture 13 - Network Security - IV

Lecture 14 - Network Security - V

Lecture 15 - Network Security - VI

Lecture 16 - Security: Network and Transport Layers - I

Lecture 17 - Security: Network and Transport Layers - II

Lecture 18 - Security: Network and Transport Layers - III

Lecture 19 - Security Gap Analysis - I

Lecture 20 - Security Gap Analysis - II

NPTEL : ACM Summer School on Algorithmic Game Theory (Special Lecture Series)

Co-ordinators : Prof. Meghana Nasre

Lecture 1 - Introduction to Stable Matchings

Lecture 2 - Men-Optimality of the Men-Proposing Gale-Shapley Algorithm

Lecture 3 - GS: Cheating Strategies for Men

Lecture 4 - GS: Cheating Strategies for Women

Lecture 5 - The Hospital Residents Problem

Lecture 6 - Popular Matchings in the stable marriage problem

Lecture 7 - Popularity in the House Allocation Problem - 1

Lecture 8 - Popularity in the House Allocation Problem - 2

Lecture 9 - Strategic Behavior in Popular Matchings

Lecture 10 - Stable Roommates: Matchings in the Non-bipartite Setting

Lecture 11 - An Introduction to Voting

Lecture 12 - The Game of Trust - Nicky Case's Interactive Essay

Lecture 13 - Arrow's Theorem

Lecture 14 - Gibbard-Satterethwaite Theorem

Lecture 15 - Domain Restrictions and Multiwinner Elections

Lecture 16 - Incentive Design in Crowdsourcing Applications

Lecture 17 - Adversarial Approaches in Deep Learning - Part 1

Lecture 18 - Adversarial Approaches in Deep Learning - Part 2

Lecture 19 - Algorithmic for Computing Market Equilibrium

Lecture 20 - Tournament Fixing and Superkings

Lecture 21 - Tournament Fixing Parameterized by FAS

Lecture 22 - Tournament Fixing with Bribery

Lecture 23 - An Introduction to Cake-Cutting

Lecture 24 - Two Algorithms for Finding Proportional Allocations

Lecture 25 - Envy-Freenes and Approximate EF

Lecture 26 - Sperner's Lemma and Applications

Lecture 27 - Cake Cutting with a Secret Agent

Lecture 28 - Fairness Notions for Indivisible Goods

Lecture 29 - Computing EF1 Allocations: Cycle Trading and Round Robin

Lecture 30 - An Introduction to Rent Division

Lecture 31 - Rent Division and Maximum Weight Matchings

Lecture 32 - Hall's Theorem and Maximin Share

Lecture 33 - Probability Review - Part 1

Lecture 34 - Probability Review - Part 2

Lecture 35 - Predicting Election Outcomes

Lecture 36 - Reservoir Sampling and Preference Elicitation

NPTEL : ACM Summer School on Graph Theory and Graph Algorithms (Dr. N.S. Narayanaswamy) (Special Lecture Series)

Co-ordinators : Dr. N.S. Narayanaswamy

Lecture 1 - Basic Graph theory and Graph Algorithms - Part 1

Lecture 2 - Basic Graph theory and Graph Algorithms - Part 2

Lecture 3 - Basic Graph theory and Graph Algorithms - Part 3

Lecture 4 - Basic Graph theory and Graph Algorithms - Part 4

Lecture 5 - Basic Graph theory and Graph Algorithms - Part 5

Lecture 6 - Geometric Algorithms - Part 1

Lecture 7 - Geometric Algorithms - Part 2

Lecture 8 - Geometric Algorithms - Part 3

Lecture 9 - Geometric Algorithms - Part 4

Lecture 10 - Geometric Algorithms - Part 5

Lecture 11 - Geometric Algorithms - Part 6

Lecture 12 - Introduction to Computational Complexity,P,NP classes

Lecture 13 - NPC Reductions through examples - Part 1

Lecture 14 - NPC Reductions through examples - Part 2

Lecture 15 - NPC Reductions through examples - 3SAT

Lecture 16 - Subset Sum, Knapsack

Lecture 17 - Directed Hamiltonian Path-NPC Reduction

Lecture 18 - Introduction to LPnDuality theorem

Lecture 19 - Design of Approx.algorithms using primal dual scheme - Hitting set

Lecture 20 - Approx Vertex Cover

Lecture 21 - Appox for Min Cost VC, Approx for Min cost Set Cover

Lecture 22 - 2-factor approx for metric TSP, 1.5 Approx christofides Algo

Lecture 23 - knapsack Approx, 1/2 - factor Approx, 1- Îµ Approx: FPTAS

Lecture 24 - Perfect graphs,weak and strong perfect graph conjecture,line graphs,interval graphs

Lecture 25 - Î± perfection of interval graphs,chordal graphs,expansion lemma, proof for weak perfect conjecture - Part 1

Lecture 26 - Î± perfection of interval graphs,chordal graphs,expansion lemma, proof for weak perfect conjecture - Part 2

Lecture 27 - Comparability graph, Permutation graphs, AT-free graphs, Trapezoidal graphs, Circular arc graphs, Boxicity and related concepts

Lecture 28 - Fixed Parameter Algorithms, -VC, Cluster vertex deletion, - Branching

Lecture 29 - Kernelization, -VC, CrownDecomposition, Feedback vertex set, Herative compression, Analysing branching algorithm - Part 1

Lecture 30 - Kernelization, -VC, CrownDecomposition, Feedback vertex set, Herative compression, Analysing branching algorithm -

Part 2

Lecture 31 - Kernelization, -VC, CrownDecomposition, Feedback vertex set, Herative compression, Analysing branching algorithm - Part 3

Lecture 32 - Hardness in Parameterized Complexity - W - hard reductions Exponential algorithms - Part 1

Lecture 33 - Hardness in Parameterized Complexity - W - hard reductions Exponential algorithms - Part 2

NPTEL : ACM Summer School on Compiler Design and Construction (Special Lecture Series)

Co-ordinators : Prof. Subhajit Roy

Lecture 1 - Lattice Theory - Part 1

Lecture 2 - Lattice Theory - Part 2

Lecture 3 - Lattice Theory - Part 3

Lecture 4 - Lattice Theory - Part 4

Lecture 5 - Lattice Theory - Part 5

Lecture 6 - Lattice Theory - Part 6

Lecture 7 - Lattice Theory - Part 7

Lecture 8 - Lattice Theory - Part 8

Lecture 9 - Lattice Theory - Part 9

Lecture 10 - Machine Dependent Optimizations - Part 1

Lecture 11 - Machine Dependent Optimizations - Part 2

Lecture 12 - Machine Dependent Optimizations - Part 3

Lecture 13 - Machine Dependent Optimizations - Part 4

Lecture 14 - Machine Dependent Optimizations - Part 5

Lecture 15 - Machine Dependent Optimizations - Part 6

Lecture 16 - Machine Dependent Optimizations - Part 7

Lecture 17 - Machine Dependent Optimizations - Part 8

Lecture 18 - Machine Dependent Optimizations - Part 9

Lecture 19 - Machine Dependent Optimizations - Part 10

Lecture 20 - Program Execution Environment - Part 1

Lecture 21 - Program Execution Environment - Part 2

Lecture 22 - Program Execution Environment - Part 3

Lecture 23 - Program Execution Environment - Part 4

Lecture 24 - Program Execution Environment - Part 5

Lecture 25 - Program Execution Environment - Part 6

Lecture 26 - Program Execution Environment - Part 7

Lecture 27 - Program Execution Environment - Part 8

Lecture 28 - Optimizing Virtual Function Calls

Lecture 29 - High Level Optimizations - Part 1

Lecture 30 - High Level Optimizations - Part 2

Lecture 31 - High Level Optimizations - Part 3

Lecture 32 - High Level Optimizations - Part 4

Lecture 33 - High Level Optimizations - Part 5

Lecture 34 - High Level Optimizations - Part 6

NPTEL : ACM Summer School on Geometric Algorithms and their Applications (Special Lecture Series)

Co-ordinators : Prof. Arijit Bishnu

Lecture 1 - Introduction to Computational Geometry

Lecture 2 - Convex hull

Lecture 3 - Quick hull

Lecture 4 - Plane sweep algorithm

Lecture 5 - Voronoi Diagram - I

Lecture 6 - Convex Geometry - I

Lecture 7 - Convex Geometry - II

Lecture 8 - Incidence Geometry - I

Lecture 9 - Incidence Geometry - II

Lecture 10 - Plane sweep algorithm

Lecture 11 - Polygon Triangulation

Lecture 12 - Geometric and Abstract Simplicial Complexes

Lecture 13 - Convex Polytopes and Polyhedra

Lecture 14 - Art Gallery Theorem

Lecture 15 - Smallest Enclosing Disc

Lecture 16 - Point Hyperplane Duality

Lecture 17 - Voronoi Diagrams and Delaunay triangulations - I

Lecture 18 - Voronoi Diagrams and Delaunay triangulations - II

Lecture 19 - Point Location

Lecture 20 - Range Searching (KD Tree)

Lecture 21 - Range Searching (Range Tree)

Lecture 22 - Visibility Graph and motion planning

Lecture 23 - Geometric Approximation: The Shifting Strategy, Hochbaum and Mass, 1984

Lecture 24 - Application of incidence geometry in combinatorics

Lecture 25 - Robot motion planning and visibility

Lecture 26 - Reeb Graph Introduction and Morse Theory basics

Lecture 27 - Reeb Graph Properties

Lecture 28 - Reeb Graph Algorithms, Applications

Lecture 29 - Arrangements - I

Lecture 30 - Linear Programming

Lecture 31 - Arrangements - II

Lecture 32 - Zone Theorem and Application

Lecture 33 - Randomized Incremental Construction - I

Lecture 34 - Randomized Incremental Construction - II

Lecture 35 - VC-dimension, Epsilon-nets, LP-based approximation for Geometric Covering

Lecture 36 - Quasi-uniform Sampling for Weighted Covering Problems.

Lecture 37 - Local Search for Packing and Covering

Lecture 38 - PTAS via Local Search - I

NPTEL : ACM Summer School on Algorithmic and Theoretical Aspects of Machine Learning (Special Lecture Series)

Co-ordinators : Meenakshi D'Souza

Lecture 1 - Learning on Finite State Automata and Decision Session - 1

Lecture 2 - Learning on Finite State Automata and Decision Session - 2

Lecture 3 - Learning on Finite State Automata and Decision Session - 3

Lecture 4 - Probability Session - 1

Lecture 5 - Probability Session - 2

Lecture 6 - Probability Session - 3

Lecture 7 - Probability Session - 4

Lecture 8 - Probability Session - 5

Lecture 9 - Probability Session - 6

Lecture 10 - Probability Session - 7

Lecture 11 - Probability Session - 8

Lecture 12 - Probability Session - 9

Lecture 13 - Probability Session - 10

Lecture 14 - Algebra for Machine Learning Session - 1

Lecture 15 - Algebra for Machine Learning Session - 2

Lecture 16 - Algebra for Machine Learning Session - 3

Lecture 17 - Crptography and Machine Learning

Lecture 18 - Neural Networks Session - 1

Lecture 19 - Neural Networks Session - 2

Lecture 20 - Neural Networks Session - 3

Lecture 21 - Neural Networks Session - 4

Lecture 22 - Neural Networks Session - 5

Lecture 23 - Enterprise Applications of ML Session - 1

Lecture 24 - Basic of Algorithm Design Session - 1

Lecture 25 - Basic of Algorithm Design Session - 2

Lecture 26 - Basic of Algorithm Design Session - 3

Lecture 27 - Basic of Algorithm Design Session - 4

Lecture 28 - Introduction to Optimization Session - 1

Lecture 29 - Introduction to Optimization Session - 2

Lecture 30 - Introduction to Reinforcement Learning Session - 1

Lecture 31 - Introduction to Reinforcement Learning Session - 2

Lecture 32 - Introduction to Reinforcement Learning Session - 3

Lecture 33 - Introduction to Reinforcement Learning Session - 4

Lecture 34 - Introduction to Reinforcement Learning Session - 5

Lecture 35 - Introduction to Reinforcement Learning Session - 6

Lecture 36 - Introduction to Reinforcement Learning Session - 7

Lecture 37 - Introduction of Cryptography Session - 1

Lecture 38 - Introduction of Cryptography Session - 2

Lecture 39 - Introduction of Cryptography Session - 3

Lecture 40 - Compressive Sensing Session - 1

Lecture 41 - Compressive Sensing Session - 2

Lecture 42 - Compressive Sensing Session - 3

Lecture 43 - Compressive Sensing Session - 4

Lecture 44 - Compressive Sensing Session - 5

Lecture 45 - Compressive Sensing Session - 6

Lecture 46 - Compressive Sensing Session - 7

Lecture 47 - Compressive Sensing Session - 8

NPTEL : ACM Winter School on Hybrid Cloud (Special Lecture Series)

Co-ordinators : Prof. Sashikumar Ganesan

Lecture 1 - Department Introduction

Lecture 2 - Introduction to Cloud Computing - Part 1

Lecture 3 - Introduction to Cloud Computing - Part 2

Lecture 4 - Cloud IaaS and Virtualization

Lecture 5 - System Virtualization

Lecture 6 - Mechanisms for System Virtualization

Lecture 7 - Containers - Part 1

Lecture 8 - Containers - Part 2

Lecture 9 - AI and Hybrid Cloud

Lecture 10 - Container Orchestration - Part 1

Lecture 11 - Container Orchestration - Part 2

Lecture 12 - Container Orchestration - Part 3

Lecture 13 - Application Devops - Part 1

Lecture 14 - Application Devops - Part 2

Lecture 15 - Application Devops - Part 3

Lecture 16 - Application Devops - Part 4

Lecture 17 - Application Devops - Part 5

Lecture 18 - Application Devops - Part 6

Lecture 19 - Cloud as Destributed System - Part 1

Lecture 20 - Cloud as Destributed System - Part 2

NPTEL : ACM Indian Summer School on Programming Languages: Principles and Practice (Special Lecture Series)

Co-ordinators : Dr. Abhijat Vichare

Lecture 1 - Review of Basic Concepts - Dr. Abhijat Vichare - Session - 1

Lecture 2 - Review of Basic Concepts - Dr. Abhijat Vichare - Session - 2

Lecture 3 - Review of Basic Concepts - Dr. Abhijat Vichare - Session - 3

Lecture 4 - Introduction to Lex and Yacc - Sameera Deshpande - Session - 1

Lecture 5 - Introduction to Lex and Yacc - Sameera Deshpande - Session - 2

Lecture 6 - Hello world, Revisiting the first program we write in c - Siddhesh Poyarekar - Session - 1

Lecture 7 - Compiler as system - Vivek Buzruk - Session - 1

Lecture 8 - Compiler as system - Vivek Buzruk - Session - 2

Lecture 9 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 1

Lecture 10 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 2

Lecture 11 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 3

Lecture 12 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 4

Lecture 13 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 5

Lecture 14 - Introduction to Data Flow Analysis - Prof. Uday Khedker - Session - 6

Lecture 15 - Undefined Behavior Compiler Optimization - Prathamesh K Session - 1

Lecture 16 - Program Semantics - Prof. Subhajit Roy Session - 1

Lecture 17 - Program Semantics - Prof. Subhajit Roy Session - 2

Lecture 18 - Program Semantics - Prof. Subhajit Roy Session - 3

Lecture 19 - Program Semantics - Prof. Subhajit Roy Session - 4

Lecture 20 - Program Semantics - Prof. Subhajit Roy Session - 5

Lecture 21 - Program Semantics - Prof. Subhajit Roy Session - 6

Lecture 22 - Program Semantics - Prof. Subhajit Roy Session - 7

Lecture 23 - Program Semantics - Prof. Subhajit Roy Session - 8

Lecture 24 - Introduction to Optimizations - Prof. V. Krishna N Session - 1

Lecture 25 - Introduction to Optimizations - Prof. V. Krishna N Session - 2

Lecture 26 - Introduction to Optimizations - Prof. V. Krishna N Session - 3

Lecture 27 - Introduction to Optimizations - Prof. V. Krishna N Session - 4

Lecture 28 - Compiler as system - Vivek S. Buzruk Session - 1

Lecture 29 - Compiler as system - Vivek S. Buzruk Session - 2

NPTEL : ACM Winter School 2019 on High Performance Computing (Special Lecture Series)

Co-ordinators : Dr. Mainak Chaudhuri

Lecture 1 - Basics of Computer Architecture and OS

Lecture 2 - An Introduction to High Performence Computing

Lecture 3 - Introduction to OpenMP

Lecture 4 - Advanced OpenMP

Lecture 5 - Introduction to MPI

Lecture 6 - Advanced MPI

Lecture 7 - Supercomputing in India

Lecture 8 - Job Scheduling

Lecture 9 - Introduction to GPU

Lecture 10 - Introduction to Open ACC

Lecture 11 - CPU and GPU Memory

Lecture 12 - Optimizations and GPU Profiling

Lecture 13 - CUDA C

Lecture 14 - HPC Networking - I

Lecture 15 - HPC Networking - II

Lecture 16 - Research in HPS

Lecture 17 - Case Study - Parallel Graph Algorithms

Lecture 18 - Case Study - Solving PDEs at Extreme Scale

NPTEL : Thermodynamics of Materials (Special Lecture Series)

Co-ordinators : Prof. Sir H. K. D. H. Bhadeshia

Lecture 1 - Basic thermodynamic functions: Enthalpy, entropy, configurational entropy, Gibbs free energy

Lecture 2 - State of equilibrium: Chemical potential, activity, equilibrium between solutions

Lecture 3 - Case study: Mechanical alloying, alloying by deformation.

Lecture 4 - Computer calculation of phase diagrams

Lecture 5 - Thermodynamics of irreversible processes: Multiple irreversible processes

Lecture 6 - Quasichemical solutions

NPTEL : ACM India Summer School on Program Execution (Special Lecture Series)

Co-ordinators : Unknown

Lecture 1 - ACM Summer School on Program Execution - Introduction

Lecture 2 - Basics of Architecture - Part 1

Lecture 3 - Basics of Architecture - Part 2

Lecture 4 - Basics of Architecture - Part 3

Lecture 5 - Basics of Architecture - Part 4

Lecture 6 - A Review of Architectural Features for supporting Program Execution - Part 1

Lecture 7 - A Review of Architectural Features for supporting Program Execution - Part 2

Lecture 8 - A Review of Architectural Features for supporting Program Execution - Part 3

Lecture 9 - A Review of Architectural Features for supporting Program Execution - Part 4

Lecture 10 - Review of OS - IPC and beyond - Part 1

Lecture 11 - Review of OS - IPC and beyond - Part 2

Lecture 12 - From Programs to Processess (and threads) - Part 1

Lecture 13 - From Programs to Processess (and threads) - Part 2

Lecture 14 - Network Protocol Fundamentals

Lecture 15 - Web protocols and Web Software - Part 1

Lecture 16 - Web protocols and Web Software - Part 2

Lecture 17 - Storage Systems - Part 1

Lecture 18 - Storage Systems - Part 2

Lecture 19 - Storage Systems - Part 3

Lecture 20 - Basics of High Performance Computing - Part 1

Lecture 21 - Basics of High Performance Computing - Part 2

Lecture 22 - Basics of High Performance Computing - Part 3

Lecture 23 - The Evolution of Linux as an Enterprise Operating System

Lecture 24 - The Hypervisor - Lord of the Rings - Part 1

Lecture 25 - The Hypervisor - Lord of the Rings - Part 2

Lecture 26 - Hands on Lab - Create a VM and Play

Lecture 27 - Containers and Kubernetes Era - Part 1

Lecture 28 - Containers and Kubernetes Era - Part 2

Lecture 29 - Containers and Kubernetes Era - Part 3

Lecture 30 - The Future of Compute - Part 1

Lecture 31 - The Future of Compute - Part 2

NPTEL : ACM India Summer School on Programming Language Analysis and Optimizations (Special Lecture Series)

Co-ordinators : Girish Bharambe

Lecture 1 - Panel Discussion Q and A - Part 1

Lecture 2 - Panel Discussion Q and A - Part 2

Lecture 3 - Runtime and Linkers - Discussion - 1

Lecture 4 - Runtime and Linkers - Discussion - 2

Lecture 5 - Runtime and Linkers - Linkers

Lecture 6 - Runtime and Linkers - Program Execution - Loader

Lecture 7 - Runtime and Linkers - Static Libraries - Dynamic Linking

Lecture 8 - Code Generation and Backend - An Introduction to LLVM Backend

Lecture 9 - Code Generation and Backend - An Introduction to Loop Backend

Lecture 10 - Code Generation and Backend - Code Generation with LLVM - Part 1

Lecture 11 - Code Generation and Backend - Code Generation with LLVM - Part 2

Lecture 12 - Machine Independent Optimizations - High Level Optimizations - 1

Lecture 13 - Machine Independent optimizations - High Level Optimizations - 2

Lecture 14 - Machine Independent optimizations - High Level Optimizations - 3

Lecture 15 - Machine Independent optimizations - High Level Optimizations - 4

Lecture 16 - Machine Independent optimizations - High Level Optimizations - 5

Lecture 17 - Machine Independent optimizations - High Level Optimizations - 6

Lecture 18 - Machine Architecture and Machine Dependent Optimizations - Machine Architecture - 1

Lecture 19 - Machine Architecture and Machine Dependent Optimizations - Machine Architecture - 2

Lecture 20 - Machine Architecture and Machine Dependent Optimizations - Machine Architecture - 3

Lecture 21 - Machine Architecture and Machine Dependent Optimizations - Register Allocation - 1

Lecture 22 - Machine Architecture and Machine Dependent Optimizations - Register Allocation - 2

Lecture 23 - Machine Architecture and Machine Dependent Optimizations - Register Allocation - 3

Lecture 24 - Machine Architecture and Machine Dependent Optimizations - Instruction Scheduling - 1

Lecture 25 - Machine Architecture and Machine Dependent Optimizations - Instruction Scheduling - 2

Lecture 26 - Machine Dependent Optimizations - Dependence Analysis and Loop transformations - 1

Lecture 27 - Machine Dependent Optimizations - Dependence Analysis and Loop transformations - 2

Lecture 28 - Control-Flow Analyses and Static Single Assignment form - Control Flow Analysis - 1

Lecture 29 - Control-Flow Analyses and Static Single Assignment form - Control Flow Analysis - 2

Lecture 30 - Control-Flow Analyses and Static Single Assignment form - Depth First Analysis of Flow Graphs

Lecture 31 - Control-Flow Analyses and Static Single Assignment form - Dominators

Lecture 32 - Control-Flow Analyses and Static Single Assignment form - Natural Loops (for Reducible Flow-Graphs)

Lecture 33 - Control-Flow Analyses and Static Single Assignment form - The Static Single Assignment SSA Form - 1

Lecture 34 - Control-Flow Analyses and Static Single Assignment form - The Static Single Assignment SSA Form - 2

Lecture 35 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I Part 1

Lecture 36 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I Part 2

Lecture 37 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I - Part 3

Lecture 38 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I - Part 4

Lecture 39 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I - Part 5

Lecture 40 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I - Part 6

Lecture 41 - Polyhedral Compilation and Loop Optimizations - Polyhedral Compilation I - Part 7

Lecture 42 - Polyhedral Compilation and Loop Optimizations - Affine Control Loops

Lecture 43 - Polyhedral Compilation and Loop Optimizations - Siplifying Reductions Revised - 1

Lecture 44 - Polyhedral Compilation and Loop Optimizations - Siplifying Reductions Revised - 2

Lecture 45 - Polyhedral Compilation and Loop Optimizations - Siplifying Reductions Revised - 3

Lecture 46 - Polyhedral Compilation and Loop Optimizations - Classical Optimization

Lecture 47 - Polyhedral Compilation and Loop Optimizations - What is Program Analysis

Lecture 48 - Polyhedral Compilation and Loop Optimizations - Live Variable Analysis - 1

Lecture 49 - Polyhedral Compilation and Loop Optimizations - Live Variable Analysis - 2

Lecture 50 - Polyhedral Compilation and Loop Optimizations - Available Expression Analysis

Lecture 51 - Polyhedral Compilation and Loop Optimizations - Common Features of Bit Vector Frameworks

Lecture 52 - Polyhedral Compilation and Loop Optimizations - The Birth of a Compiler - 1

Lecture 53 - Polyhedral Compilation and Loop Optimizations - The Birth of a Compiler - 2

Lecture 54 - Polyhedral Compilation and Loop Optimizations - The Structure of Modern Compiler Modern Challenges

Lecture 55 - Polyhedral Compilation and Loop Optimizations - Conclusion

NPTEL : ACM Summer School on Shape Modelling (Special Lecture Series)

Co-ordinators : Aditya Tatu

Lecture 1 - Linear Algebra and Optimization - 1

Lecture 2 - Linear Algebra and Optimization - 2

Lecture 3 - Linear Algebra and Optimization - 3

Lecture 4 - Linear Algebra and Optimization - 4

Lecture 5 - Curvature - Part 1

Lecture 6 - Curvature - Part 2

Lecture 7 - Curvature - Part 3

Lecture 8 - Introduction To Parametric Curves and Surfaces - 1

Lecture 9 - Introduction To Parametric Curves and Surfaces - 2

Lecture 10 - Introduction To Parametric Curves and Surfaces - 3

Lecture 11 - Introduction To Parametric Curves and Surfaces - 4

Lecture 12 - Introduction To Parametric Curves and Surfaces - 5

Lecture 13 - Introduction To Parametric Curves and Surfaces - 6

Lecture 14 - Introduction To Parametric Curves and Surfaces - 7

Lecture 15 - Introduction To Parametric Curves and Surfaces - 8

Lecture 16 - Introduction To Parametric Curves and Surfaces - 9

Lecture 17 - Implicit Surfaces - Part 1

Lecture 18 - Implicit Surfaces - Part 2

Lecture 19 - Implicit Surfaces - Part 3

Lecture 20 - MeshLab - Part 1

Lecture 21 - MeshLab - Part 2

Lecture 22 - MeshLab - Part 3

Lecture 23 - MeshLab - Part 4

Lecture 24 - Discrete Surface - Part 1

Lecture 25 - Discrete Surface - Part 2

Lecture 26 - Discrete Surface - Part 3

Lecture 27 - Discrete Surface - Part 4

Lecture 28 - Discrete Surface - Part 5

Lecture 29 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 1

Lecture 30 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 2

Lecture 31 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 3

Lecture 32 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 4

Lecture 33 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 5

Lecture 34 - Laplace Beltrami on Manifolds and Meshes with Applications - Part 6

Lecture 35 - Internal Digital R and I - Part 1

Lecture 36 - Internal Digital R and I - Part 2

Lecture 37 - Internal Digital R and I - Part 3

Lecture 38 - Rigid and Non rigid Shape Matching - Part 1

Lecture 39 - Rigid and Non rigid Shape Matching - Part 2

Lecture 40 - Rigid and Non rigid Shape Matching - Part 3

Lecture 41 - Rigid and Non rigid Shape Matching - Part 4

Lecture 42 - Geometric Deep Learning - Part 1

Lecture 43 - Geometric Deep Learning - Part 2

Lecture 44 - Geometric Deep Learning - Part 3

Lecture 45 - Geometric Deep Learning - Part 4

Lecture 46 - Geometric Deep Learning - Part 5

Lecture 47 - Geometric Deep Learning - Frame Works

Lecture 48 - Geometric Deep Learning - Lab 1

Lecture 49 - Geometric Deep Learning - Lab 2

Lecture 50 - Geometric Deep Learning - Lab 3

NPTEL : ACM India Summer School on Shape Modelling (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - ACM India Summer School on Shape Modelling - Introduction

Lecture 2 - Linear Algebra and Optimization Refresher - 1

Lecture 3 - Linear Algebra and Optimization Refresher - 2

Lecture 4 - Linear Algebra and Optimization Refresher - 3

Lecture 5 - Linear Algebra and Optimization Refresher - 4

Lecture 6 - Overview of Python 3 + {Numpy, Scipy, Matplotlib} - Part 1

Lecture 7 - Overview of Python 3 + {Numpy, Scipy, Matplotlib} - Part 2

Lecture 8 - Curves and Surfaces - Part 1

Lecture 9 - Curves and Surfaces - Part 2

Lecture 10 - Curves and Surfaces - Part 3

Lecture 11 - Curves and Surfaces - Part 4

Lecture 12 - Curves and Surfaces - Part 5

Lecture 13 - Curves and Surfaces - Part 6

Lecture 14 - Curves and Surfaces - Part 7

Lecture 15 - Algorithms in Computational Geometry - Part 1

Lecture 16 - Algorithms in Computational Geometry - Part 2

Lecture 17 - Algorithms in Computational Geometry - Part 3

Lecture 18 - Algorithms in Computational Geometry - Part 4

Lecture 19 - Algorithms in Computational Geometry - Part 5

Lecture 20 - Algorithms in Computational Geometry Lab - Part 1

Lecture 21 - Algorithms in Computational Geometry Lab - Part 2

Lecture 22 - Algorithms in Computational Geometry Lab - Part 3

Lecture 23 - Discrete Surfaces - Part 1

Lecture 24 - Discrete Surfaces - Part 2

Lecture 25 - Discrete Surfaces - Part 3

Lecture 26 - Discrete Surfaces - Part 4

Lecture 27 - Discrete Surfaces - Part 5

Lecture 28 - Implicit and Discrete Surfaces

Lecture 29 - Discrete Surfaces - Part Lab - Part 1

Lecture 30 - Discrete Surfaces - Part Lab - Part 2

Lecture 31 - Discrete Laplace Beltrami Operator - Part 1

Lecture 32 - Discrete Laplace Beltrami Operator - Part 2

Lecture 33 - Discrete Laplace Beltrami Operator - Part 3

Lecture 34 - Discrete Laplace Beltrami Operator - Part 4

Lecture 35 - Discrete Laplace Beltrami Operator - Part 5

Lecture 36 - Discrete Laplace Beltrami Operator - Part 6

Lecture 37 - Lab Libigl-Python-Blindings - Part 1

Lecture 38 - Lab Libigl-Python-Blindings - Part 2

Lecture 39 - Procrustes Shape Analysis - Part 1

Lecture 40 - Procrustes Shape Analysis - Part 2

Lecture 41 - Procrustes Shape Analysis - Part 3

Lecture 42 - Procrustes Shape Analysis - Part 4

Lecture 43 - Lab Procrustes Shape Analysis Template - Part 1

Lecture 44 - Lab Procrustes Shape Analysis Template - Part 2

Lecture 45 - Lab Procrustes Shape Analysis Template - Part 3

Lecture 46 - Shape Deformation/Animation, Shape Matching - Part 1

Lecture 47 - Shape Deformation/Animation, Shape Matching - Part 2

Lecture 48 - Shape Deformation/Animation, Shape Matching - Part 3

Lecture 49 - Shape Deformation/Animation, Shape Matching - Part 4

Lecture 50 - Shape Deformation/Animation, Shape Matching - Part 5

Lecture 51 - Geometric Deep Learning - Part 1

Lecture 52 - Geometric Deep Learning - Part 2

Lecture 53 - Geometric Deep Learning - Part 3

Lecture 54 - Geometric Deep Learning - Part 4

Lecture 55 - Geometric Deep Learning - Part 5

Lecture 56 - Geometric Deep Learning - Part 6

Lecture 57 - Topological Descriptors For Data and Shape Analysis - Part 1

Lecture 58 - Topological Descriptors For Data and Shape Analysis - Part 2

Lecture 59 - Topological Descriptors For Data and Shape Analysis - Part 3

Lecture 60 - Topological Descriptors For Data and Shape Analysis - Part 4

Lecture 61 - Panel Discussion On Shape Modelling In Academia and Industry - Part 1

Lecture 62 - Panel Discussion On Shape Modelling In Academia and Industry - Part 2

NPTEL : ACM India Winter School on Topics in Digital Trust (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - ACM Day 1 Session 1

Lecture 2 - ACM Day 1 Session 2 - Part I

Lecture 3 - ACM Day 1 Session 2 - Part II

Lecture 4 - ACM Day 1 Session 3 - Part I

Lecture 5 - ACM Day 1 Session 3 - Part II

Lecture 6 - ACM Day 2 Session 1 - Part I

Lecture 7 - ACM Day 2 Session 1 - Part II

Lecture 8 - ACM Day 2 Session 2 - Part I

Lecture 9 - ACM Day 2 Session 2 - Part II

Lecture 10 - ACM Day 3 Session 1 - Part 1

Lecture 11 - ACM Day 3 Session 1 - Part 2

Lecture 12 - ACM Day 3 Session 2 - Part 1

Lecture 13 - ACM Day 3 Session 2 - Part 2

Lecture 14 - ACM Day 3 Session 3 - Part I

Lecture 15 - ACM Day 3 Session 3 - Part II

Lecture 16 - ACM Day 3 Session 4 - Part I

Lecture 17 - ACM Day 3 Session 4 - Part II

Lecture 18 - ACM Day 4 session 1 - Part I

Lecture 19 - ACM Day 4 session 1 - Part II

Lecture 20 - ACM Day 4 session 2 - Part I

Lecture 21 - ACM Day 4 session 2 - Part II

Lecture 22 - ACM Day 5 session 1 - Part 1

Lecture 23 - ACM Day 5 session 1 - Part 2

Lecture 24 - ACM Day 5 session 2 - Part 1

Lecture 25 - ACM Day 5 session 2 - Part 2

Lecture 26 - ACM Day 6 session 1 - Part 1

Lecture 27 - ACM Day 6 session 1 - Part 2

Lecture 28 - ACM Day 6 session 2 - Part 1

Lecture 29 - ACM Day 6 session 2 - Part 2

Lecture 30 - ACM Day 7 session 1 - Part I

Lecture 31 - ACM Day 7 session 1 - Part II

Lecture 32 - ACM Day 7 Session 2

Lecture 33 - ACM Day 8 Session 1

Lecture 34 - ACM Day 8 Session 2

Lecture 35 - ACM Day 8 Session 3

Lecture 36 - ACM Day 8 Session 4

Lecture 37 - ACM Day 9 Session 1

Lecture 38 - ACM Day 9 Session 2

Lecture 39 - ACM Day 9 Session 3

Lecture 40 - ACM Day 9 Session 4

Lecture 41 - ACM Day 9 Session 5 - Part 1

Lecture 42 - ACM Day 9 Session 5 - Part 2

Lecture 43 - ACM Day 10 Session 1

Lecture 44 - ACM Day 10 Session 2 - Part 1

Lecture 45 - ACM Day 10 Session 2 - Part 2

Lecture 46 - ACM Day 10 Session 3 - Part 1

Lecture 47 - ACM Day 10 Session 3 - Part 2

NPTEL : ACM Winter School on Design, Implementation and Verification of Computer Systems (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - Mathematical Logic - Session 1

Lecture 2 - Mathematical Logic - Session 2

Lecture 3 - Industry Perspectives on Compiler Design

Lecture 4 - Processor Datapath and Introduction to ILP Architecture - Session 1

Lecture 5 - Processor Datapath and Introduction to ILP Architecture - Session 2

Lecture 6 - Instruction Level Parallelism - Session 1

Lecture 7 - Multithreading and Multicores

Lecture 8 - Instruction Level Parallelism - Session 2

Lecture 9 - DRAM Memory Organization

Lecture 10 - Reactive Synthesis: A High-Level Introduction - Session 1

Lecture 11 - Reactive Synthesis: A High-Level Introduction - Session 2

Lecture 12 - Reactive Synthesis: A High-Level Introduction - Session 3

Lecture 13 - Reactive Synthesis: A High-Level Introduction - Session 4

Lecture 14 - Reduced Ordered Binary Dedision Diagrams and And-Inverter Graphs - Session 1

Lecture 15 - Reduced Ordered Binary Dedision Diagrams and And-Inverter Graphs - Session 2

Lecture 16 - Reduced Ordered Binary Dedision Diagrams and And-Inverter Graphs - Session 3

Lecture 17 - Runtime Environments - I

Lecture 18 - Runtime Environments - II

Lecture 19 - Hexagon DSPs in Snapdragon

Lecture 20 - Types and Program Analysis

Lecture 21 - Local and Global Optimizations

Lecture 22 - Introduction to Data-Flow and Control-Flow Analyses

Lecture 23 - Code Generation and Register Allocation

Lecture 24 - The Static Single Assignment Form and Application to Program Optimizations

Lecture 25 - Garbage Collection

Lecture 26 - Program Testing and Verification - Session 1

Lecture 27 - Program Testing and Verification - Session 2

NPTEL : Topics In Theoretical Computer Science (2023) (Special Lecture Series)

Co-ordinators : Prof. Prajakta Nimbhorkar

Lecture 1 - NP-Completeness

Lecture 2 - Hilbert's Tenth Problem

Lecture 3 - SAT Solvers

Lecture 4 - Polynomial Identity Testing

Lecture 5 - Finite Graphs for Infinite Functions

Lecture 6 - A Panorama of Computational Problems

NPTEL : NPTEL Special Lectures Series (Special Lecture Series)

Co-ordinators : Mr. Ravikrishnan .A, Srivastava, Raman .K

Lecture 1 - Microbial Social Networks: From Deep Sea to Outer Space

Lecture 2 - Data-Driven Analysis to Improve Road Safety

Lecture 3 - The Power of Generative AI: AI that can see and talk

Lecture 4 - Astronomical Challenges in Atomic Scale chip Manufacturing

Lecture 5 - Evaluating Fault - Tolerant Schemes for noisy hardware

Lecture 6 - Tighter and Stronger Quantum Speed Limits for General Quantum States

Lecture 7 - Robust, bright photon sources for quantum communication and quantum sensing applications

Lecture 8 - Particle transport problems at different scales: From circulating fluidized beds to dry powder

Lecture 9 - Simulation and Data: 6 Steps from Theory to Impact through Disasters, Engineering and Heritage

Lecture 10 - The Attosecond Worldâ€"there's plenty of time at the bottom

Lecture 11 - Quantum diffusion during cosmic inflation

Lecture 12 - Squashed quantum non-Markovianity: a measure of genuine quantum non-Markovianity in states

Lecture 13 - Gravitational-Wave Astronomy: New discoveries, puzzles and prospects

Lecture 14 - Bounds on the Superconducting Transition Temperature

Lecture 15 - Probing the primordial universe with electromagnetic and gravitational waves

Lecture 16 - Elephants have a bigger brain than humans, so how come they don't study you

Lecture 17 - Investigating quantum speed limits with superconducting qubits

Lecture 18 - Orbital Angular Momentum Entanglement

NPTEL : ACM India Summer School on IoT and Embedded Systems (Special Lecture Series)

Co-ordinators : Prof. Meenakshi DSouza

Lecture 1 - ACM India Summer School on IoT and Embedded Systems - Introduction

Lecture 2 - Embedded Sysyem: An Introduction

Lecture 3 - Introduction to Embedded Sysyems

Lecture 4 - Introduction to IoT

Lecture 5 - AWS IoT: Tutorial and demonstration

Lecture 6 - IoT: Components, operating systems and protocols

Lecture 7 - Arduino programming

Lecture 8 - Arduino programming: Tutorial

Lecture 9 - IoT Applications

Lecture 10 - IoT Applications: Tutorial and demonstration - 1

Lecture 11 - IoT Applications: Tutorial and demonstration - 2

Lecture 12 - Cloud, edge and fog computing for IoT - Part I

Lecture 13 - Cloud, edge and fog computing for IoT - Part II

Lecture 14 - IoT Communication

NPTEL : ACM India Summer School on Algorithms for Data Science (2023) (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - Introduction - ACM India Summer School on Algorithms for Data Science

Lecture 2 - Introducation to Probability

Lecture 3 - Selection Problems

Lecture 4 - Median from Read-Only Memory

Lecture 5 - Majority and Heavy Hitters

Lecture 6 - Introducation to ProbabilityTail inequalities

Lecture 7 - Chernoff Bounds

Lecture 8 - Quickselect and Quicksort

Lecture 9 - Introduction to Randomized Algorithms: Graph Minimum Cut

Lecture 10 - Introduction to Streaming Algorithm and Reservoir Sampling

Lecture 11 - Approximate Counting in Streaming: MORRIS Counter

Lecture 12 - Median of Means Technique Applied to Approximate Counting

Lecture 13 - Counting Distinct Elements in Streaming

Lecture 14 - 2-Universal Hashing and Applications for Derandomizing

Lecture 15 - Approximate Heavy Hitters

Lecture 16 - Frequency Moments

Lecture 17 - Graph Streaming Algorithms

Lecture 18 - Locality Sensitive Hashing - Part 1

Lecture 19 - Locality Sensitive Hashing - Part 2

Lecture 20 - Locality Sensitive Hashing - Part 3

Lecture 21 - Graph Streaming Lower Bounds

Lecture 22 - Bloom Filters

Lecture 23 - Frequent Pattern Mining - Part 1

Lecture 24 - Frequent Pattern Mining - Part 2

Lecture 25 - Is AI ready for The real world?

Lecture 26 - Online Learning and Multiarmed Bandits - Part 1

Lecture 27 - Online Learning and Multiarmed Bandits - Part 2

Lecture 28 - Reinforcement Learning - Part 1

Lecture 29 - Reinforcement Learning - Part 2

Lecture 30 - Singular Value Decomposition - Part 1

Lecture 31 - Singular Value Decomposition - Part 2

Lecture 32 - Graph Centralities

Lecture 33 - Johnson Lindenstrauss Lemma

Lecture 34 - Graph Centralities Clustering and Partition

NPTEL : ACM India Summer School on Cybersecurity for Women (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - Mathamatical Foundation for Cryptography - Part 1

Lecture 2 - Mathamatical Foundation for Cryptography - Part 2

Lecture 3 - Modern Cryptography

Lecture 4 - Modern Cryptography

Lecture 5 - Modern Cryptography - Asymmetric Cryptography

Lecture 6 - Network Security protocols and mechanisms - Part 1

Lecture 7 - Network Security protocols and mechanisms - Part 2

Lecture 8 - IOT Security Protocols - Part 1

Lecture 9 - IOT Security Protocols - Part 2

Lecture 10 - Introduction to Ethical Hacking - Part 1

Lecture 11 - Introduction to Ethical Hacking - Part 2

Lecture 12 - DevSecOps Embedding Security into DevOps - Part 1

Lecture 13 - Web App Security

Lecture 14 - Navigating the privacy landscape

Lecture 15 - Hardware security

Lecture 16 - Introduction to Blockchain

Lecture 17 - Social Engineering and OSINT - Part 1

Lecture 18 - Social Engineering and OSINT - Part 2

Lecture 19 - Cloud Security and Secure Coding Practices - Part 1

Lecture 20 - Cloud Security and Secure Coding Practices - Part 2

Lecture 21 - Career Opportunities, Challenges and Support

Lecture 22 - Quantum Cryptography - Part 1

Lecture 23 - Quantum Cryptography - Part 2

Lecture 24 - AI in cybersecurity

NPTEL : ACM Winter Schools - Cryptography and Cybersecurity (Special Lecture Series)

Co-ordinators : Dr. Aswani Kumar

Lecture 1 - Introduction to Cryptography

Lecture 2 - Classical Ciphers - Part 1

Lecture 3 - Classical Ciphers - Part 2

Lecture 4 - Foundations of Cryptography - Part 1

Lecture 5 - Foundations of Cryptography - Part 2

Lecture 6 - Foundations of Cryptography - Part 3

Lecture 7 - Block and Stream ciphers, Fiestel Networks

Lecture 8 - Data Encryption Standard

Lecture 9 - Cybersecurity - Part 1

Lecture 10 - Cybersecurity - Part 2

Lecture 11 - Enterprise Security - Part 1

Lecture 12 - Enterprise Security - Part 2

Lecture 13 - Advanced Encryption Standard

Lecture 14 - Information Gathering and Social Engineering

Lecture 15 - Cybersecurity : A Practical Approach - Part 1

Lecture 16 - Cybersecurity : A Practical Approach - Part 2

Lecture 17 - Cybersecurity : A Practical Approach - Part 3

Lecture 18 - Cybersecurity : A Practical Approach - Part 4

Lecture 19 - Cybersecurity : A Practical Approach - Part 5

Lecture 20 - Public Key Cryptography

Lecture 21 - Network Security - Firewalls, ACL, NAT, AAA, FTD - Part 1

Lecture 22 - Network Security - Firewalls, ACL, NAT, AAA, FTD - Part 2

Lecture 23 - Network Security - VPN, PKI, Certificates, SSL,SAML - Part 1

Lecture 24 - Network Security - VPN, PKI, Certificates, SSL,SAML - Part 2

Lecture 25 - Virtual Private Networks (VPN)

Lecture 26 - Hash Functions, Digital Signatures and Quantum Cryptography

Lecture 27 - Packets, Protocols and Attacks in Cyberspace - Part 1

Lecture 28 - Packets, Protocols and Attacks in Cyberspace - Part 2

NPTEL : ACM Winter School on Network Science (Special Lecture Series)

Co-ordinators : Prof. Loyimee Gogoi

Lecture 1 - Representing Networks

Lecture 2 - Strategic Network Formation - Session 1

Lecture 3 - Strategic Network Formation - Session 2

Lecture 4 - Strategic Network Formation - Session 3

Lecture 5 - Strategic Network Formation - Session 4

Lecture 6 - Network Visualization - Session 1

Lecture 7 - Network Visualization - Session 2

Lecture 8 - Social Network Analysis

Lecture 9 - Neural Networks - Basics

Lecture 10 - Network Analysis in Telecom

Lecture 11 - Strong and Weak Ties

Lecture 12 - Link Analysis

Lecture 13 - Statistical Mechanics of Complex Networks - Session 1

Lecture 14 - Statistical Mechanics of Complex Networks - Session 2

Lecture 15 - Statistical Mechanics of Complex Networks - Session 3

Lecture 16 - Statistical Mechanics of Complex Networks - Session 4

Lecture 17 - Hate Speech - Session 1

Lecture 18 - Hate Speech - Session 2

Lecture 19 - Dynamics on Networks - Session 1

Lecture 20 - Dynamics on Networks - Session 2

Lecture 21 - Dynamics on Networks - Session 3

Lecture 22 - Dynamics on Networks - Session 4

Lecture 23 - Causal Discovery and Network Science

Lecture 24 - Games and Networks - Session 1

Lecture 25 - Games and Networks - Session 2

NPTEL : ACM Winter School on Recent Trends in AI and ML (Special Lecture Series)

Co-ordinators : Dr. Chandranath Adak

Lecture 1 - NLP Foundation - Part I

Lecture 2 - NLP Foundation - Part II

Lecture 3 - Fundamentals of Machine Learning - Part I

Lecture 4 - Fundamentals of Machine Learning - Part II

Lecture 5 - Artificial Intelligence - An Introduction

Lecture 6 - Logistic Regression and Neural Networks

Lecture 7 - Large Scale SVM Algorithms and Applications

Lecture 8 - Ensemble Deep Learning For Alzheimer's Disease Dianosis

Lecture 9 - From Smart Sensing to Smart Living - The Era of IoT, AI:ML and Data Science

Lecture 10 - Machine Learning - Naive Bayes Classification

Lecture 11 - Cluster Analysis - Basic Concepts and Algorithms

Lecture 12 - Algorithms of Unsupervised Learning

Lecture 13 - Backbone functions of Deep Neural Networks Activation, Loss, Optimization functions

Lecture 14 - Convolutional Neural Networks

Lecture 15 - Reinforcement Learning - Experience, Adapt, Excel - Part I

Lecture 16 - Neoteric Frontiers in cloud, edge and Quantum Computing for Bigdata, IoT and AI Applications

Lecture 17 - Reinforcement Learning - Experience, Adapt, Excel - Part II

Lecture 18 - Economic Impact of New Category Recommendation Evidence from a Randomized Field Experiment

Lecture 19 - Neural Text Generation

Lecture 20 - RL Algorithms

Lecture 21 - An Overview of AI, NLP, ML Research Activities

Lecture 22 - LLMs and Ethics

Lecture 23 - Reinforcement Learning with Human Feedback

Lecture 24 - The LLM Journey

Lecture 25 - Representation Learning for Large Scale Pretrained Models

Lecture 26 - Computer Vision Application

NPTEL : ACM India Pingala Interactions in Computing (PIC) 2024 (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - PIC 2024 Inauguration

Lecture 2 - Exciting Trends in Machine Learning

Lecture 3 - Towards Inclusive and Responsible Language Technologies

Lecture 4 - Chat with Jeffrey Dean and Partha Talukdar

Lecture 5 - Indo-International Collaboration Case Studies - 1

Lecture 6 - Indo-International Collaboration Case Studies - 2

Lecture 7 - Indo-International Collaboration Case Studies - 3

Lecture 8 - Connectivity is the Thing

Lecture 9 - Chat with Robert Metcalfe

Lecture 10 - Bad Algorithms

Lecture 11 - Chat with Saket Saurabh

Lecture 12 - Converting Research to Business

Lecture 13 - Robust Query Processing: Where Geometry Beats ML !

Lecture 14 - Data, More Data, Too Much Data

Lecture 15 - Chat with Jayant Haritsa and Tova Milo

Lecture 16 - Efficient Verification of Compution on Untrusted Platforms

Lecture 17 - Cryptography: the Art of Paradox

Lecture 18 - Chat with Shweta Agrawal and Yael Kalai

Lecture 19 - ACM: Goals, Priorities, Initiatives

Lecture 20 - Valedictory Function

NPTEL : ACM INDIA ARCS 2024 (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - Welcome and Opening Remarks

Lecture 2 - Keynote 1

Lecture 3 - Lightning Talks - Part 1

Lecture 4 - Academia Industry Career Opportunities - Sitare-University

Lecture 5 - Academia Industry Career Opportunities - Flame University

Lecture 6 - Academia Industry Career Opportunities - Processor Research Labs

Lecture 7 - ACMI-W Panel Discussion

Lecture 8 - ACMI-W OCCW-Award

Lecture 9 - ACM-India Activities for PhD-Students

Lecture 10 - Keynote 2

Lecture 11 - Lightning Talks - Part 2

Lecture 12 - ECR Award Talk - Siddharth Barman

Lecture 13 - Doctoral Dissertation Award Talks 1

Lecture 14 - Doctoral Dissertation Award Talks 2

Lecture 15 - ECR Talk 1 - Manas-Thakur

Lecture 16 - ECR Talk 2 - Deeksha-Bhartiya

Lecture 17 - ECR Talk 3 - Shikhar-Patranabais

NPTEL : ACM INDIA Annual Event 2024 (Special Lecture Series)

Co-ordinators : Meenakshi D'Souza, Hirendra Nath Ghosh

Lecture 1 - Inauguration - Meenakshi D'Souza, Hirendra Nath Ghosh

Lecture 2 - ACM: Goals, Priorities, Initiatives - Yannis Ioannidis

Lecture 3 - ACM India at a Glance - Venkatesh Raman

Lecture 4 - Fireside Chat with Robert Metcalfe - Robert Metcalfe, Pravin Bhagwat

Lecture 5 - Human Factors of Formal Methods - Shriram Krishnamurthi

Lecture 6 - ACM India Awards Ceremony 1 - Hemant Pande

Lecture 7 - ACM India Awards Ceremony 2 - Hemant Pande

Lecture 8 - Efficient Verification of Computation on Untrusted Platforms - Yael Kalai

Lecture 9 - The Story of 14Trees - Pravin Bhagwat

NPTEL : ACM INDIA Winter School - Full-Stack Networking (FSN) (Special Lecture Series)

Co-ordinators : Multi-Faculty

Lecture 1 - Introduction to Full-Stack Networking School

Lecture 2 - Linux Netwoking Stack, Evolution of NICs, Evolution of Network packet processors

Lecture 3 - Demo Session 1: Hands on with basic Linux networking commands

Lecture 4 - Demo Session 2: Netfilter and iptables

Lecture 5 - Intro to virtualization containers

Lecture 6 - Demo session 1: Hands on with Docker

Lecture 7 - Demo session 1: Hands on with Containers

Lecture 8 - Demo session 1: Hands on with Kubernetes

Lecture 9 - Container Networking : CNI service mesh, L7 Proxies, Overlay networks

Lecture 10 - Container Networking : AWS, VPC, NAT, gateways

Lecture 11 - Demo Session 1

Lecture 12 - Multicloud

Lecture 13 - Invited talk- Research Career

Lecture 14 - eBPF

Lecture 15 - eBPF for Networking

Lecture 16 - Invited talks: Application Connectivity for the Multi-Cloud Era

Lecture 17 - Application layer networking

Lecture 18 - Invited talk: Performance Measurement and Optimization

Lecture 19 - Invited talk: Chaos Engineering

Lecture 20 - Websockets

Lecture 21 - RPC: Remote Procedure Calls

Lecture 22 - Invited talk: TiHAN Edge cloud testbed with WiFi/5G

Lecture 23 - Demo Session: Application Layer Networking

Lecture 24 - Message Queues

Lecture 25 - Invited talks: Towards Expressive and Performant Service Meshes

Lecture 26 - Advanced HTTP

Lecture 27 - WiFi Tuned

Lecture 28 - Multipath Networking

Lecture 29 - Demo Session - Multipath networking

NPTEL : Theory of Yarn Structures (Textile Engineering)

Co-ordinators : Prof. Bohuslav Neckar

Lecture 1 - Fibers and Yarns : Terms, Definitions and Relations

Lecture 2 - Fibers and Yarns : Terms, Definitions and Relations

Lecture 3 - Compression of Fibrous Assemblies

Lecture 4 - Compression of Fibrous Assemblies (Continued...)

Lecture 5 - Pores Among Fibers

Lecture 6 - Pores Among Fibers (Continued...)

Lecture 7 - Orientation of Fibers

Lecture 8 - Orientation of Fibers (Continued...)

Lecture 9 - Mechanics of Parallel Fiber Bundles

Lecture 10 - Mechanics of Parallel Fiber Bundles (Continued...)

Lecture 11 - Modelling of Internal Yarn Geometry

Lecture 12 - Modelling of Internal Yarn Geometry

Lecture 13 - Relations Among Yarn Count T, Twist Z, Packing Density, And Diameter D

Lecture 14 - Relations Among Yarn Count T, Twist Z, Packing Density, And Diameter D (Continued...)

Lecture 15 - Relations Among Yarn Count T, Twist Z, Packing Density, And Diameter D (Continued...)

Lecture 16 - Relations Among Yarn Count T, Twist Z, Packing Density, And Diameter D (Continued...)

Lecture 17 - Bundle Theory of Yarn Unevenness

Lecture 18 - Bundle Theory of Yarn Unevenness (Continued...)

Lecture 19 - Yarn Strength as a Stochastic Process

Lecture 20 - Yarn Strength as a Stochastic Process (Continued...)

NPTEL : NOC:Science of Clothing Comfort (Textile Engineering)

Co-ordinators : Dr. Apurba Das

Lecture 1 - Science of Clothing Comfort-Outline

Lecture 2 - Understanding Clothing and Clothing Comfort

Lecture 3 - Understanding Clothing and Clothing Comfort (Continued...)

Lecture 4 - Understanding Clothing and Clothing Comfort (Continued...)

Lecture 5 - Psychology and Comfort

Lecture 6 - Psychology and Comfort (Continued...)

Lecture 7 - Psychology and Comfort (Continued...)

Lecture 8 - Psychology and Comfort (Continued...)

Lecture 9 - Neurophysiological Processes in Clothing Comfort

Lecture 10 - Neurophysiological Processes in Clothing Comfort (Continued...)

Lecture 11 - Neurophysiological Processes in Clothing Comfort (Continued...)

Lecture 12 - Neurophysiological Processes in Clothing Comfort (Continued...)

Lecture 13 - Neurophysiological Processes in Clothing Comfort (Continued...)

Lecture 14 - Neurophysiological Processes in Clothing Comfort (Continued...)

Lecture 15 - Tactile Aspects of Clothing Comfort

Lecture 16 - Tactile Aspects of Clothing Comfort (Continued...)

Lecture 17 - Tactile Aspects of Clothing Comfort (Continued...)

Lecture 18 - Tactile Aspects of Clothing Comfort (Continued...)

Lecture 19 - Understanding Clothing and Clothing Comfort (Continued...)

Lecture 20 - Tactile Aspects of Clothing Comfort (Continued...)

Lecture 21 - Tactile Aspects of Clothing Comfort (Continued...)

Lecture 22 - Clothing Comfort Related to Thermal Transmission

Lecture 23 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 24 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 25 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 26 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 27 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 28 - Clothing Comfort Related to Thermal Transmission (Continued...)

Lecture 29 - Moisture Transmission and Clothing Comfort

Lecture 30 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 31 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 32 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 33 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 34 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 35 - Moisture Transmission and Clothing Comfort (Continued...)

Lecture 36 - Combined Heat and Mass Transmission and Clothing Comfort

Lecture 37 - Combined Heat and Mass Transmission and Clothing Comfort (Continued...)

Lecture 38 - Thermo-Physiological Comfort of Functional Clothing

Lecture 39 - Garment Fit and Comfort

Lecture 40 - Garment Fit and Comfort (Continued...)

NPTEL : NOC:Yarn Manufacture-I: Principle of Carding and Drawing (Textile Engineering)

Co-ordinators : Prof. Ravi Chattopadhyay

Lecture 1 - Impurities and Contaminants in Cotton

Lecture 2 - Opening Principle and Opening Devices

Lecture 3 - Cleaning Principle

Lecture 4 - Machines and their Layout

Lecture 5 - Bale Opening Machines

Lecture 6 - Machines in Blow Room - Part II

Lecture 7 - Opening Cleaning Machines - Part II

Lecture 8 - Mixing/Blending

Lecture 9 - Transportation of Tuft

Lecture 10 - Lap formation and Material Flow Regulation

Lecture 11 - Process Performance

Lecture 12 - Introduction

Lecture 13 - Card Feed Zone

Lecture 14 - Carding Zone

Lecture 15 - Analysis of flat action

Lecture 16 - Sliver Formation

Lecture 17 - Package Formation

Lecture 18 - Card Clothing

Lecture 19 - Card Setting, Draft, Production

Lecture 20 - Fibre Configuration and Neps in Card sliver

Lecture 21 - Carding Process

Lecture 22 - Numerical Problems and Solution

Lecture 23 - Introduction and Drafting principle

Lecture 24 - Design Features and operating principle of drawframe

Lecture 25 - Drafting Rolles,Web Condensation and Packaging

Lecture 26 - Drafting Roller Arranegement

Lecture 27 - Drafting Theory,Wave Fromation and Control

Lecture 28 - Drafting Force and Roller Slip

Lecture 29 - Significance of Process Parameters

Lecture 30 - Draft and production Calculation

Lecture 31 - Blending on Drawframe

Lecture 32 - Process Monitoring and Control

Lecture 33 - Drawframe Autoleveller

Lecture 34 - Card Autoleveller

Lecture 35 - Numericals on Drawing

NPTEL : NOC:Evaluations of Textile Materials (Textile Engineering)

Co-ordinators : Dr. Apurba Das

Lecture 1 - Evaluation of Textile Materials - Outline

Lecture 2 - Evaluation of Textile Materials - Outline (Continued...)

Lecture 3 - Sampling Methods and Sample Size

Lecture 4 - Sampling Methods and Sample Size (Continued...)

Lecture 5 - Sampling Methods and Sample Size (Continued....)

Lecture 6 - Sampling Methods and Sample Size: Practical Statistics

Lecture 7 - Sampling Methods and Sample Size: Practical Statistics (Continued...)

Lecture 8 - Sampling Methods and Sample Size: Practical Statistics (Continued...)

Lecture 9 - Evaluation of Fibre Length

Lecture 10 - Evaluation of Fibre Length (Continued...)

Lecture 11 - Evaluation of Fibre Length (Continued...)

Lecture 12 - Evaluation of Fibre Fineness

Lecture 13 - Evaluation of Fibre Fineness - 1

Lecture 14 - Evaluation of Cotton Fibre Maturity

Lecture 15 - Evaluation of Cotton Fibre Properties: (HVI and AFIS)

Lecture 16 - Evaluation of Linear Density of Textile Materials

Lecture 17 - Evaluation of Linear Density of Textile Materials (Continued...)

Lecture 18 - Evaluation of Tensile Properties of Textile Materials

Lecture 19 - Evaluation of Tensile Properties of Textile Materials (Continued...)

Lecture 20 - Evaluation of Tensile Properties of Textile Materials-1 (Continued...)

Lecture 21 - Evaluation of Tensile Properties of Textile Materials-2 (Continued...)

Lecture 22 - Evaluation of Tensile Properties of Textile Materials-3 (Continued...)

Lecture 23 - Evaluation of Tensile Properties of Textile Materials-4 (Continued...)

Lecture 24 - Evaluation of Tensile Properties of Textile Materials-5 (Continued...)

Lecture 25 - Evaluation of Yarn and Fabric Hairiness

Lecture 26 - Evaluation of Yarn and Fabric Hairiness (Continued...)

Lecture 27 - Evaluation of Yarn Twist

Lecture 28 - Evaluation of Yarn Twist (Continued...)

Lecture 29 - Evaluation of Moisture in Textiles

Lecture 30 - Evaluation of Moisture in Textiles (Continued...)

Lecture 31 - Evaluation of Yarn Evenness

Lecture 32 - Evaluation of Yarn Evenness-1 (Continued...)

Lecture 33 - Evaluation of Yarn Evenness-2 (Continued...)

Lecture 34 - Evaluation of Yarn Evenness-3 (Continued...)

Lecture 35 - Evaluation of Yarn Evenness-3 (Continued...)

Lecture 36 - Evaluation of Yarn Evenness-4 (Continued...)

Lecture 37 - Evaluation of Bursting and Tear Strength of Fabrics

Lecture 38 - Evaluation of Pilling and Abrasion Properties of Fabrics

Lecture 39 - Evaluation of Low Stress Mechanical Properties of Textile Materials

Lecture 40 - Evaluation of Low Stress Mechanical Properties of Textile Materials (Continued...)

NPTEL : NOC:Testing of Functional and Technical Textiles (Textile Engineering)

Co-ordinators : Dr. Apurba Das

Lecture 1 - Testing of Low Stress mechanical Properties of Textile Fabrics

Lecture 2 - Testing of Low Stress mechanical Properties of Textile Fabrics (Continued...)

Lecture 3 - Testing of Low Stress mechanical Properties of Textile Fabrics (Continued...)

Lecture 4 - Testing of Transmission Characteristics of Textile Fabrics

Lecture 5 - Testing of Transmission Characteristics of Textile Fabrics (Continued...)

Lecture 6 - Testing of Transmission Characteristics of Textile Fabrics (Continued...)

Lecture 7 - Testing of Transmission Characteristics of Textile Fabrics (Continued...)

Lecture 8 - Testing of Transmission Characteristics of Textile Fabrics (Continued...)

Lecture 9 - Testing of Transmission Characteristics of Textile Fabrics (Continued...)

Lecture 10 - Testing of Fibre Reinforced Composite Materials

Lecture 11 - Testing of Fibre Reinforced Composite Materials (Continued...)

Lecture 12 - Testing of Fibre Reinforced Composite Materials (Continued...)

Lecture 13 - Testing of Fibre Reinforced Composite Materials (Continued...)

Lecture 14 - Testing of Fibre Reinforced Composite Materials (Continued...)

Lecture 15 - Testing of Fibre Fabrics

Lecture 16 - Testing of Fibre Fabrics (Continued...)

Lecture 17 - Testing of Fibre Fabrics (Continued...)

Lecture 18 - Testing of Geotextiles

Lecture 19 - Testing of Geotextiles (Continued...)

Lecture 20 - Testing of Geotextiles (Continued...)

Lecture 21 - Testing of Ballistics Protective Clothing

Lecture 22 - Testing of UV Radiation Protective Textiles

Lecture 23 - Testing of Compression Bandages

Lecture 24 - Testing of Electromagnetic Shielding Textiles

NPTEL : NOC:Theory of Yarn Structure (Textile Engineering)

Co-ordinators : Dr. Dipayan Das

Lecture 1 - The Building Block of Yarns

Lecture 2 - The Building Block of Yarns (Continued...)

Lecture 3 - Basic Characteristics of Yarns

Lecture 4 - Basic Characteristics of Yarns (Continued...)

Lecture 5 - Basic Characteristics of Yarns (Continued...)

Lecture 6 - Relations Among Yarn Count, Twist, and Diameter

Lecture 7 - Relations Among Yarn Count, Twist, and Diameter (Continued...)

Lecture 8 - Helical Model of Fibers in Yarns

Lecture 9 - Helical Model of Fibers in Yarns (Continued...)

Lecture 10 - Helical Model of Fibers in Yarns (Continued...)

Lecture 11 - Helical Model of Fibers in Yarns (Continued...)

Lecture 12 - Mass Irregularity of Yarns

Lecture 13 - Mass Irregularity of Yarns (Continued...)

Lecture 14 - Mass Irregularity of Yarns (Continued...)

Lecture 15 - Mass Irregularity of Yarns (Continued...)

Lecture 16 - Radial Migration of Fibres in Yarns

Lecture 17 - Radial Migration of Fibres in Yarns (Continued...)

Lecture 18 - Radial Migration of Fibres in Yarns (Continued...)

Lecture 19 - Yarn Shrinkage due to Washing

Lecture 20 - Tensile Mechanics of Yarns

Lecture 21 - Tensile Mechanics of Yarns (Continued...)

Lecture 22 - Tensile Mechanics of Yarns (Continued...)

Lecture 23 - Tensile Mechanics of Yarns (Continued...)

Lecture 24 - Tensile Mechanics of Yarns (Continued...)

NPTEL : NOC:Advanced Textile Printing Technology (Textile Engineering)

Co-ordinators : Prof. Kushal Sen

Lecture 1 - Conventional Printing

Lecture 2 - Colourants

Lecture 3 - Dyes and pigments

Lecture 4 - Thickeners

Lecture 5 - Measurement of viscosity

Lecture 6 - Discharge and resist printing

Lecture 7 - Transfer Printing

Lecture 8 - Sublimation Transfer Printing : Paper Printing

Lecture 9 - Sublimation Transfer Printing : Dyes and inks

Lecture 10 - Free path length and mechanism of transfer

Lecture 11 - Transfer Printing Machines and Other Transfer Methods

Lecture 12 - Introduction to Digital Textile Printing

Lecture 13 - Revision and Doubt Clarification Session - 1

Lecture 14 - Digital Textile Printing: Inkjet Technologies

Lecture 15 - Inkjet Technologies: drop-on-demand

Lecture 16 - Revision and Doubt Clarification Session - 2

Lecture 17 - Inkjet Technologies: Machines

Lecture 18 - Inkjet Printing

Lecture 19 - Printing inks

Lecture 20 - Water-based inks

Lecture 21 - Water-based inks (Continued...)

NPTEL : NOC:Textured Yarn Technology (Textile Engineering)

Co-ordinators : Prof. Kushal Sen

Lecture 1 - Introduction to texturing

Lecture 2 - General principles involved in the manufacture of textured yarns

Lecture 3 - General principles involved in the manufacture of textured yarns (Continued...)

Lecture 4 - Bulked yarns

Lecture 5 - Mechanisms of setting and texturing

Lecture 6 - Thermo-mechanical texturing

Lecture 7 - Characterization and optimization

Lecture 8 - Influence of material and process parameters

Lecture 9 - Influence of process parameters

Lecture 10 - Influence of process parameters (Continued...)

Lecture 11 - Revision and clarification of doubts - Session 1

Lecture 12 - Influence of process parameters (Continued...)

Lecture 13 - Draw Texturing

Lecture 14 - Simultaneous draw texturing with POY

Lecture 15 - Draw Texturing (Continued...)

Lecture 16 - Draw Texturing Machines and Process Parameters

Lecture 17 - Draw Texturing : Effect of Process Parameters

Lecture 18 - Draw Texturing : Positorque System

Lecture 19 - Friction Draw Texturing

Lecture 20 - Friction Draw Texturing (Continued...)

Lecture 21 - Air-Jet Texturing

Lecture 22 - Air-Jet Texturing (Continued...)

Lecture 23 - Air-Jet Texturing (Continued...)

Lecture 24 - Air-Jet Texturing : Effect of Process parameters

Lecture 25 - Air-Jet Texturing : Effect of Water parameters

Lecture 26 - Air-Texturing Jets

Lecture 27 - Interlacement: need and jet design

Lecture 28 - Bulked continuous filament yarns

Lecture 29 - Hi-bulk yarns

Lecture 30 - Revision and Clarification of Doubts Session 2

Lecture 31 - Hi-bulk yarns (Continued...)

Lecture 32 - Texturing of spun yarns

Lecture 33 - Texturing of spun yarns (Continued...)

Lecture 34 - Solvent texturing

NPTEL : NOC:Textile Finishing (Textile Engineering)

Co-ordinators : Prof. Kushal Sen

Lecture 1 - Introduction to Finishing

Lecture 2 - Wrinkle Resistant Finishing

Lecture 3 - Wrinkle Resistant Finishing (Continued...)

Lecture 4 - Wrinkle Resistant Finishing : Performance characteristics

Lecture 5 - Catalysis and Catalysts

Lecture 6 - Other Crosslinking agents

Lecture 7 - Non-nitrogenous Agents

Lecture 8 - Control of Formaldehyde Release

Lecture 9 - Stiff and Soft Finishing

Lecture 10 - Soft Finishing (Continued...)

Lecture 11 - Soft Finishing (Continued...)

Lecture 12 - Emulsion Softeners

Lecture 13 - Water Proofing and Water Repellency

Lecture 14 - Water Repellency (Continued...)

Lecture 15 - Water Repellency (Continued...)

Lecture 16 - Waterproof Breathable Textiles

Lecture 17 - Soil Repellency and Soil Release

Lecture 18 - Soil Release Finishing

Lecture 19 - Fire Retardant Finishing

Lecture 20 - Chemistry of Flame Retardants

Lecture 21 - More Flame retardants and evaluation of fire retardancy

Lecture 22 - Antimicrobial Finishing

Lecture 23 - Finishing of Wool

Lecture 24 - Shrink Resistant Wool

Lecture 25 - Wool Setting

Lecture 26 - Mothproofing of Wool

Lecture 27 - Biopolishing

Lecture 28 - Finishing of synthetics

Lecture 29 - Finishing of synthetics : Antistatic Finish

Lecture 30 - Low Liquor Application

Lecture 31 - Waste heat recovery

Lecture 32 - Principles of some Finishing machines

NPTEL : NOC:Principles of Combing, Roving preparation and Ring spinning (Textile Engineering)

Co-ordinators : Prof. Ravi Chattopadhyay

Lecture 1 - Pre-combing operation - Part 1

Lecture 2 - Pre-combing operation - Part 2

Lecture 3 - Introduction to Comber - Part 1

Lecture 4 - Introduction to Comber - Part 2

Lecture 5 - Sequence of Operation

Lecture 6 - Combing Mechanism

Lecture 7 - Timing Diagram

Lecture 8 - Sliver Formation

Lecture 9 - Theoretical Aspects in Combing - Part 1

Lecture 10 - Theoretical Aspects in Combing - Part 2

Lecture 11 - Parameters Influencing Combing Performance

Lecture 12 - Analysis of Drive

Lecture 13 - Calculation of Process Performance Parameters

Lecture 14 - Introduction, Working Principle and Creel

Lecture 15 - Dxrafting Unit - Part 1

Lecture 16 - Dxrafting Unit - Part 2

Lecture 17 - Flyer Twisting

Lecture 18 - Package Formation

Lecture 19 - Bobbin Speed Regulation

Lecture 20 - Building Motion and Drive Analysis

Lecture 21 - Calculation for Change Gears amd Production

Lecture 22 - Introduction and Working Principle

Lecture 23 - Creel and Drafting Unit

Lecture 24 - Twisting Process and Twisting Elements

Lecture 25 - Bobbin Building

Lecture 26 - Spinning Geometry

Lecture 27 - Analysis of Forces on Traveller

Lecture 28 - Analysis of Forces on Ballon

Lecture 29 - Analysis of Drive, Production Calculation

Lecture 30 - End Breaks

NPTEL : NOC:Science and Technology of Weft and Warp Knitting (Textile Engineering)

Co-ordinators : Prof. Bipin Kumar

Lecture 1 - Introduction to Kintting

Lecture 2 - Knitting Glossary

Lecture 3 - Loop Formation in Weft Knitting

Lecture 4 - Lab Demo 1: Analysis of a Weft Knit Fabric

Lecture 5 - Automation in Loop Formation

Lecture 6 - Flat Bed Machine Needle/Cam Interaction

Lecture 7 - Circular Knitting

Lecture 8 - Single Bed Weft Knitting-Flat and Circular M/C

Lecture 9 - Lab Demo 2: Single Flat Bed Machine

Lecture 10 - Lab Demo 3: Single Bed Circular Machine

Lecture 11 - Single Bed Weft Knitting Fabric Curling

Lecture 12 - Weft Knitting Double Flat Beds

Lecture 13 - Weft Knitting Double Circular Beds

Lecture 14 - Weft Knitting V-Bed Machine

Lecture 15 - Analysis of a Double Jersey Fabric

Lecture 16 - Single and Double Jersey Construction

Lecture 17 - Weft Knit Stiches - Loop, Tuck and Float

Lecture 18 - Lab Demo 6 (Part 1) Knitting Notations

Lecture 19 - Lab Demo 6 (Part 2) Knitting Notations

Lecture 20 - Fabric Analysis - Influence of Loop Length

Lecture 21 - Fabric Design - Float and Tuck Formation

Lecture 22 - Fabric Analysis - Influence of Float and Tuck Stitches

Lecture 23 - Fabric Analysis - Shrinkage (Relaxation)

Lecture 24 - Fabric Analysis - Extensibility and Recovery

Lecture 25 - Knitting Calculation - Yarn Selection

Lecture 26 - Knitting Calculation - Production (Circular)

Lecture 27 - Knitting Calculation - Production (Flat)

Lecture 28 - Knitting Calculation - Fabric Calculations

Lecture 29 - Knitting Calculation - Geometrical Modeling

Lecture 30 - Knitting Calculation - Fabric Spirality in Single Jersy (Tubular)

Lecture 31 - Advancement in Knitting Technology

Lecture 32 - Knitting Designs Possibilities

Lecture 33 - Knitting Designs Possibilities - 1

Lecture 34 - Design Software

Lecture 35 - Weft Knitting- Revision

Lecture 36 - Introduction to Warp Knitting

Lecture 37 - Warp Knitting Technology- Loop Formation

Lecture 38 - Swinging and Shogging Motions (Overlap and Underlap)

Lecture 39 - Warp Knit - Structural Identification

Lecture 40 - Warp Knit Fabric Notation - Lapping Diagram and Lapping Plan

Lecture 41 - Warp Knit Structure - Design Principles

Lecture 42 - Single Bar Warp Knit Constructions

Lecture 43 - Double Bar Warp Knit Constructions

Lecture 44 - Lapping Plan Execution - Pattern Disc and Pattern Drum

Lecture 45 - Chain Links Arrangement - Single and Double Bar Constructions

Lecture 46 - Warp Knits : Structure - Property Relationship

Lecture 47 - Warp Knits : Multi-bar Structures and Double Bed Designs

Lecture 48 - Weft and Warp Knitting - Summary

Lecture 49 - Technical Applications of Knitting

Lecture 50 - Technical Applications of Knitting (Continued...)

NPTEL : NOC:Technical Textiles (Textile Engineering)

Co-ordinators : Dr. Apurba Das

Lecture 1 - Introduction to Technical Textiles

Lecture 2 - Introduction to Technical Textiles (Continued...)

Lecture 3 - Textile Reinforced Composites

Lecture 4 - Textile Reinforced Composites (Continued...)

Lecture 5 - Textile Reinforced Composites (Continued...)

Lecture 6 - Textile Reinforced Composites (Continued...)

Lecture 7 - Textile Reinforced Composites (Continued...)

Lecture 8 - Textile Reinforced Composites (Continued...)

Lecture 9 - Textile Reinforced Composites (Continued...)

Lecture 10 - Textile Reinforced Composites (Continued...)

Lecture 11 - Textile Reinforced Composites (Continued...)

Lecture 12 - Textile Reinforced Composites (Continued...)

Lecture 13 - Filter Fabrics

Lecture 14 - Filter Fabrics (Continued...)

Lecture 15 - Filter Fabrics (Continued...)

Lecture 16 - Geotextiles

Lecture 17 - Geotextiles (Continued...)

Lecture 18 - Geotextiles (Continued...)

Lecture 19 - Geotextiles (Continued...)

Lecture 20 - Extreme Cold Protective Clothing

Lecture 21 - Extreme Cold Protective Clothing (Continued...)

Lecture 22 - Extreme Heat Protective Clothing

Lecture 23 - Extreme Heat Protective Clothing (Continued...)

Lecture 24 - Sports Textiles

Lecture 25 - Sports Textiles (Continued...)

Lecture 26 - Sports Textiles (Continued...)

Lecture 27 - Ultraviolet Protective Textiles

Lecture 28 - Ultraviolet Protective Textiles (Continued...)

Lecture 29 - Ultraviolet Protective Textiles (Continued...)

Lecture 30 - Ballistic Protective Textiles

Lecture 31 - Compression Bandage

Lecture 32 - Compression Bandage (Continued...)

Lecture 33 - Compression Bandage (Continued...)

Lecture 34 - Automotive Textiles

Lecture 35 - Textiles in Hygiene

Lecture 36 - Additional Lectuer on Geotextiles

Lecture 37 - Additional Lectuer on Geotextiles (Continued...)

Lecture 38 - Additional Lectuer on Composites

Lecture 39 - Additional Lectuer on Composites (Continued...)

Lecture 40 - Additional Lectuer on Composites (Continued...)

NPTEL : NOC:Textile Product Design and Development (Textile Engineering)

Co-ordinators : Prof. R Chattopadhyay

Lecture 1

Lecture 2

Lecture 3

Lecture 4

Lecture 5

Lecture 6

Lecture 7

Lecture 8

Lecture 9

Lecture 10

Lecture 11

Lecture 12

Lecture 13

Lecture 14

Lecture 15

Lecture 16

Lecture 17

Lecture 18

Lecture 19

Lecture 20

Lecture 21

Lecture 22

Lecture 23

Lecture 24

Lecture 25

Lecture 26

Lecture 27

Lecture 28

Lecture 29

NPTEL : NOC:New Spinning Technologies (Textile Engineering)

Co-ordinators : Prof. R Chattopadhyay

Lecture 1 - New Spinning Technology

Lecture 2 - Sliver Feed Arrangement

Lecture 3 - Principle of Yarn Formation

Lecture 4 - Twist Equation

Lecture 5 - Rotor: Construction, Geometry and Drive

Lecture 6 - Package Formation

Lecture 7 - Significance of Fibre and Process Parameters

Lecture 8 - Rotor Selection

Lecture 9 - Spinning Tension

Lecture 10 - Production and Energy Consumption Calculation

Lecture 11 - Rotor Yarn: Structure, Properties and Application

Lecture 12 - Air Jet Spinning: Introduction

Lecture 13 - High Draft System

Lecture 14 - Yarn Formation Mechanism

Lecture 15 - Structure and Characteristics of Air-Jet Yarn

Lecture 16 - Material and Process Parameters

Lecture 17 - Friction Spinning: Dref-2

Lecture 18 - Dref-3 Friction Spinning

Lecture 19 - Yarn Formation, Structure and Applications

Lecture 20 - Vortex Spinning

Lecture 21 - Influence of Machine and Process Parameters

Lecture 22 - Wrap Spinning

Lecture 23 - Wrap Spinning (Continued...)

Lecture 24 - SIRO Spinning

Lecture 25 - Compact Spinning

Lecture 26 - Spinning by Adhesive and Felting Process

Lecture 27 - Self Twist Spinning

Lecture 28 - Comparitive Analysis Between Spinning Technologies

Lecture 29 - Productivity Enhancement: Limitations

NPTEL : Natural Dyes (Textile Engineering)

Co-ordinators : Dr. Padma S Vankar

Lecture 1 - Natural Dyes

Lecture 2 - Natural Dyes

Lecture 3 - Natural Dyes

Lecture 4 - Natural Dyes

Lecture 5 - Natural Dyes

Lecture 6 - Natural Dyes

Lecture 7 - Natural Dyes

Lecture 8 - Natural Dyes

Lecture 9 - Natural Dyes

Lecture 10 - Natural Dyes

Lecture 11 - Natural Dyes

Lecture 12 - Natural Dyes

Lecture 13 - Natural Dyes

Lecture 14 - Natural Dyes

Lecture 15 - Natural Dyes

Lecture 16 - Natural Dyes

Lecture 17 - Natural Dyes

Lecture 18 - Natural Dyes

Lecture 19 - Natural Dyes

Lecture 20 - Natural Dyes

Lecture 21 - Natural Dyes

Lecture 22 - Natural Dyes

Lecture 23 - Natural Dyes

Lecture 24 - Natural Dyes

Lecture 25 - Natural Dyes

Lecture 26 - Natural Dyes

Lecture 27 - Natural Dyes

Lecture 28 - Natural Dyes

Lecture 29 - Natural Dyes

Lecture 30 - Natural Dyes

Lecture 31 - Natural Dyes

Lecture 32 - Natural Dyes

Lecture 33 - Natural Dyes

Lecture 34 - Natural Dyes

Lecture 35 - Natural Dyes

Lecture 36 - Natural Dyes

Lecture 37 - Natural Dyes

Lecture 38 - Natural Dyes

Lecture 39 - Natural Dyes

Lecture 40 - Natural Dyes