NPTEL Video Course - Mathematics - NOC:Advanced Engineering Mathematics (2023)

Subject Co-ordinator - Prof. H S Mahato

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

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

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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
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