

MATHEMATICS - III

1. Vector Calculus

Differentiation of vectors, curves in space, Velocity and acceleration, Relative velocity and acceleration, Scalar and Vector point functions, Vector operator ∇ , ∇ applied to scalar point functions, Gradient, ∇ applied to vector point functions, Divergence and curl, Physical interpretations of $\nabla \cdot \mathbf{F}$ and $\nabla \times \mathbf{F}$, ∇ applied twice to point functions, ∇ applied to products of point functions, integration of vectors, Line integral, Circulation, Work, Surface integral-flux, Green's theorem in the plane, Stoke's theorem, Volume integral, Divergence theorem, Irrotational and solenoidal fields, Green's theorem, Introduction of orthogonal curvilinear coordinates : Cylindrical, Spherical and polar coordinates.

2. Introduction of Partial Differential Equations

Formation of partial differential equations, Solutions of PDEs, Equations solvable by direct integration, Linear equations of first order, Homogeneous linear equations with constant coefficients, Rules for finding the complimentary function, Rules of finding the particular integral, Working procedure to solve homogeneous linear equations of any order, Non-homogeneous linear equations.

3. Applications of Partial Differential Equations

Method of separation of variables, Vibrations of a stretched string-wave equations, One-dimensional and two-dimensional heat flow equations, Solution of Laplace's equation, Laplace's equation in polar coordinates.

4. Integral Transforms

Introduction, Definition, Fourier Integral, Sine and Cosine Integrals, Complex Forms of Fourier Integral, Fourier Transform, Fourier and Cosine Transforms, Finite Fourier Sine and Cosine Transforms. Properties of F - Transforms, Convolution Theorem for F - Transforms, Parseval's Identity for Fourier Transforms, Fourier Transforms of the Derivatives of a Function, Applications to Boundary Value Problems, Using Inverse Fourier Transforms only.

Text Book :

Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Pub. New Delhi, 34th Edition, 1998.

Reference Books :

1. A Text Book on Engineering Mathematics, N. P. Bali Etal, Laxmi Pub. Pvt. Ltd. - New Delhi.
2. Higher Engineering Mathematics, Dr. M. K. Venkataraman, National Pub. and Co. - Madras.
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Pvt. - N. Delhi.