

Paper X: Applied Mathematics

I. Vector Analysis:

Scalar field, Quotient of a scalar field, geometrical meaning, Directional Derivatives, Vector field, Divergence and curl of a vector field. Solenoidal and irrotational fields. Expression for $\nabla\Phi$, $\text{div } f$ and $\text{curl } f$ (Cartesian co-ordinates), vector identities, Greens theorem in the plane with proof and its applications, Gauss divergence theorem (Statement only), Stoke's theorem (Statement only), examples based on them. **22Hrs**

II Calculus of Variation:

Introduction, Functionals, Euler's equations, solutions of Euler's equation. Geodesics. Isoperimetric problems, several dependent variables, functionals involving higher order derivatives. **15Hrs**

III Partial Differential Equation (PDE-II):

Solution of second order linear partial differential equations in two variables with constant Coefficients by finding complimentary function and particular integral, canonical forms for parabolic, elliptic and hyperbolic equations, solution by separation of variables. Solutions of one-dimensional heat and wave equations and two dimensional Laplace equation by the method of separation of variables. **15Hrs**

Note: Internal Marks-30

References:

1. Murry. R. Spiegel: Vector analysis (Schaum's Outline series).
2. Spain.B: Vector analysis.(D. Van Nostrand Company, London, 1967)
3. Stophenson.G: An Introduction to Partial Differential Equations (ELBS).
4. Ian N. Sneddan: Elements of Partial Differential Equations, McGraw Hill.
5. M.D Raisinghania: Advanced Differential Equations (S.Chand & Co).
6. B.S Grewal: Higher Engineering Mathematics (Khanna Publishers).
7. K.Shankar Rao: Introduction to Partial Differential Equations (PHI Pvt Ltd, New Delhi)