

Department of Mathematics
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S. Y. B. Sc. (Principal)

Calculus and Differential Equations: Paper – II

Effective from June 2000

Unit 1: Domain and range of a function of several variables, Limit, Continuity and Partial derivatives, Equality of mixed partial derivatives of order two, Differentiability, Mean value theorem, Total differentials, Approximation, Chain rule, Euler's theorem on homogeneous function and its converse, Implicit differentiation.

Unit 2: Jacobian formulas, Taylor's theorem, Maxima-Minima, Lagrange's method of undetermined multipliers, Tangent plane and normal line to a surface, Tangent line to a space curve, Envelopes of plane curves and of family of surfaces, Directional derivatives, Gradient, Curl, Divergence.

Unit 3: Integrated integrals and double integral, Change of order, Evaluation by using transformations, Applications to area and volume, Line integrals, Green's theorem (proof for special regions), Path independence of line integrals, Surface integrals, Stoke's theorem and its applications, Triple integrals, Gauss' theorem and its applications.

Unit 4: System of linear differential equations with constant coefficients and their applications, Simultaneous differential equations of the first order and first degree, Methods of solutions of $dx/P=dy/Q=dz/R$, Pfaffian differential equation, method of Solutions, First order partial differential equation, Linear partial differential equations of first order. Laplace transform, Inverse Laplace transform and its applications to linear differential equations.

Reference Books:

1. Zafar Ahsan, *Differential Equations and their applications*, Prentice Hall of India.
2. Tom Apostol, *Calculus Volume II*, Wiley Eastern Ltd.
3. T. Amarnath, *An elementary course in partial differential equations*, Narosa Publ. Co.
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley and Sons Inc.
5. Louis Leithold, *The Calculus with Analytic Geometry* (6th Ed.), Harper – Collins Publishers.
6. Shanti Narayan, *Differential Calculus*, S. Chand & Co. Ltd.
7. A. E. Taylor, *Advanced Calculus*, Xerox College Publishing.
8. G. B. Thomas J.r & R.L. Finney, *Calculus & Analytic Geometry*, Addison Wesley Publications.
9. David V. Widder, *Advanced Calculus*, Prentice-Hall of India Pvt. Ltd.