

Paper IV: Advanced Calculus

I. Differentiability:

Rolle's Theorem, Lagrange's and Cauchy's mean value theorem. Taylor theorem with Lagrange's form of the remainder. Taylors and Maclaurins series problems on transcendental functions. Indeterminate forms, L'Hospital's rules. **15 Hrs**

II. Integral Calculus:

Reduction formulae for the function: $\sin^n x$, $\cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\operatorname{cosec}^n x$, $\sin^m x \cos^m x$
Application of integration to find area bounded by the curve, surface area, length of an arc & volumes of solids of revolution for standard curves in Cartesian and polar forms. **12 Hrs**

III. Line and multiple integrals:

Definition of line integrals, basic properties. Examples on evaluation of the integrals. Definition of double integral: evaluation of double integrals (i) under given limits (ii) in regions bounded by given curve. Change of variables. Surface areas as double integrals, definition of a triple integral and evaluation of volume as triple integrals. **15 Hrs**

IV. Gamma and Beta functions:

Gamma and Beta functions, connection between two functions, application to evaluation of integrals. **10 Hrs**

Note: Internal Marks: 25

References:

1. D.C.Pavate: Modern College Calculus. (Macmillan and Company Limited).
2. Shanti Narayan: Integral calculus (S Chand & Company Limited).
3. Murry R.Spigel: Advanced calculus (Schaum's Outline Series).
4. Rudraiah et al: College Mathematics Vol-I (Sapna Book House, Bangalore).
5. Sokoilnikoff I S: Advanced Calculus (McGraw Hill).