

# Syllabus

## **Unit 1 Calculus**

**Teaching hours: 7**

Evaluation of definite and improper integrals, Beta and Gamma functions and their properties, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

## **Unit 2 Infinite Series**

**Teaching hours: 7**

Convergence of series, tests for convergence, power series, Taylor's and Maclaurin's series. Series for exponential, trigonometric and logarithmic functions.

## **Unit 3 Multivariable Calculus: Differentiation**

**Teaching hours: 7**

Limit, continuity and partial derivatives, total derivative and chain rule, Euler's theorem, Taylor's series in two variables, Tangent plane and normal line, Maxima, minima and saddle points Method of Lagrange multipliers.

## **Unit 4 Multivariable Calculus: Integration**

**Teaching hours: 9**

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities).

## **Unit 5 Ordinary Differential Equations**

**Teaching hours: 10**

Second order linear differential equations with constant coefficients, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

## **Unit 6 Partial Differential Equations: First Order**

**Teaching hours: 5**

First order partial differential equations, solutions of first order linear and non-linear PDEs.