

## **Calculus and Linear Algebra**

### **Module I: Sequences and Series.**

Indeterminate forms and L'Hospital's rule ; Definition of sequences and series; Convergence of sequence and infinite series, Tests for convergence of infinite series-Comparison test, Ratio test, Root test, Raabe's, Logarithmic test; convergence of Alternating series (Leibnitz's test), absolute convergence.

### **Module II: Power Series.**

Taylor's and Maclaurin's theorems with remainders, Power series, Taylor's Series, Maclaurin's series, series for exponential, trigonometric, hyperbolic and logarithmic functions. Leibnitz formula for derivative of product of two functions.

### **Module III: Multivariable Calculus.**

Functions of several variables; Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Radius of curvature, Circle of curvature, evolutes and involutes.

### **Module IV: Fourier Series.**

Periodic functions, Trigonometric series, Fourier series, Euler Formula, Even and Odd functions, Fourier series for Even and Odd functions, Functions having arbitrary period, Fourier series of functions having arbitrary period, Half range expansions, Half range sine and cosine series.

## **Module V: Matrices.**

The rank of a matrix, Solution of System of linear equations-

Homogeneous and nonhomogeneous;

Hermitian, skew -Hermitian and Unitary matrices; Eigen values and Eigen

vectors; Cayley Hamilton theorem; Diagonalisation of matrices;

Quadratic forms; Orthogonal

Transformation.

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