

SYLLABUS

B.A./B.Sc.-I

(PAPER-I, II, III) (SEMESTER-I)

(P.U.)

Special Note : The three papers (Paper I, II, III) shall be of 90 marks, each paper of 30 marks and there will be an overall internal assessment of 10 marks.

PAPER-I (PLANE GEOMETRY)

UNIT-I

Transformation of Axes in Two Dimensions : Shifting of origin, rotation of axes, invariants.

Pair of Straight Lines : Joint equation of pair of straight lines and angle between them, Condition of parallelism and perpendicularity, Joint equation of the angle bisectors, Joint equation of lines joining origin to the intersection of a line and a curve.

Circle : General equation of circle, Circle through intersection of two lines, Tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, angle of intersection and orthogonality, power of a point w.r.t. circle, radical axis, co-axial family of circles, limiting points

UNIT-II

Conic : General equation of a conic, Tangents, normals, chord of contact, pole and polar, pair of tangents from a point, equation of chord in terms of mid-point, diameter. Conjugate diameters of ellipse and hyperbola, special properties of parabola, ellipse and hyperbola, conjugate hyperbola, asymptotes of hyperbola, rectangular hyperbola. Identification of conics in general second degree equations.

PAPER-II (CALCULUS-I)

UNIT-I

Properties of Real Numbers

Order property of real numbers, bounds, l.u.b. and g.l.b. order completeness property of real numbers, Archimedian property of real numbers.

Limits

ϵ - δ definition of the limit of a function, basic properties of limits, infinite limits, indeterminate forms.

Continuity

Continuous functions, types of discontinuities, continuity of composite functions, continuity of $|f(x)|$, sign of a function in a neighborhood of a point of continuity, intermediate value theorem, maximum and minimum value theorem.

UNIT-II

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, their geometric interpretation and applications, Taylor's theorem, Maclaurin's theorem with various form of remainders and their applications.

Hyperbolic, inverse hyperbolic functions of a real variable and their derivatives, successive differentiations, Leibnitz's theorem.

PAPER-III (TRIGONOMETRY AND MATRICES)

UNIT-I

D'Moivre's theorem, application of D'Moivre's theorem including primitive n th root of unity. Expansions of $\sin n\theta$, $\cos n\theta$, $\sin^n \theta$, $\cos^n \theta$ ($n \in \mathbf{N}$). The exponential, logarithmic, direct and inverse circular and hyperbolic functions of a complex variable. Summation of series including Gregory Series.

UNIT-II

Hermitian and skew-Hermitian matrices, linear dependence of row and column vectors, row rank, column rank and rank of a matrix and their equivalence. Theorems on consistency of a system of linear equations (both homogeneous and non-homogeneous). Eigen-values, eigen-vectors and characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding inverse of a matrix. Diagonalization.