

B.Sc –Ist Semester -I

Mathematics

Paper 101

Infinite Series and Trigonometry

UNIT –I :

Sequence and its convergence (basic ideas), Convergence of Infinite series, Comparison test, root, test, ratio test, rabbi's test, logarithmic test.

UNIT –II:

Cauchy's condensation test, De Morgan and Bertrand test, higher logarithmic ratio test, alternating series, Leibnitz test, absolute and conditionally convergence, convergence modulo M relation, equivalence relations and partitions.

UNIT –III:

Definition of group with example and simple properties, Permutation groups, Subgroups, Centre and normalizer.

UNIT –IV:

Cyclic groups, Cosset decomposition, Lagrange's theorem and its consequences.

B.Sc –Ist Semester -II

Mathematics

Paper 102

Calculus-I

UNIT –I :

E-S divination of the limit of a function, continuous functions and classification of discontinuities. Chain rule of differentiability Rolle's Theorem. First and second mean value theorem, Taylor's theorem Lagrange's and Cauchy's forms of remainders.

UNIT –II:

Successive differentiation, Leibnitz's theorem, Expansion of functions in Maclaurian's and Taylor's series.

UNIT –III:

Indeterminate forms, Partial differentiation and Euler's theorem, Envelope and Evolutes.

UNIT –IV:

Jacobians, Maxima and Minima for functions two variables, Tangents and Normal's (polar forms only), Curvature, Asymptotes.

B.Sc –I Semester –III

Mathematics

Paper 103

[Vector Calculus & Analytical Geometry of two Dimensions]

UNIT –I :

Vector differentiations and integration, Gradient, divergence, curl and their properties.

UNIT –II:

Line integrals, Theorems of Gauss, green and Stokes and problems based on them.

UNIT –III:

General equation of second degree. Tracing of Conics.

UNIT –IV:

Confocal Conics, Polar equation of Conic.

B.Sc –II Semester –IV

Mathematics

Paper 201

Modern Algebra

UNIT –I :

Homomorphism and Isomorphism of group, Cayley's theorem, Normal subgroup, Quotient group, Fundamental theorem of Homomorphism, Conjugacy relation class equation. Direct product.

UNIT –II:

Introduction of rings, subrings, Integral domain and Field, characteristics of rings. Homomorphism of rings, Ideals, Quotient ring.

UNIT –III:

Complex functions and separation into real and imaginary parts, Exponential direct and inverse trigonometry and hyperbolic functions.

UNIT –IV:

Logarithmic functions, Gregory's series, Summation of series.

B.Sc –II Semester –V

Mathematics

Paper 202

Calculus-II

UNIT –I :

Test for Concavity and Convexity, points of inflexion, multiple points, Tracing of curves in Cartesian and polar co-ordinates.

UNIT –II:

Reduction formulae, Beta and Gamma functions.

UNIT –III:

Quadrature, Rectification, volume and surface of solids of revolution, Pappus theorem. .

UNIT –IV:

Double and triple integrals, change of order of integration. Dirichlet's and Liouville's integral formulae.

B.Sc –II Semester –VI

Mathematics

Paper 203

[Analytical Solid Geometry]

UNIT –I :

Plane straight line.

UNIT –II:

Sphere, cone and cylinder.

UNIT –III:

Central Conicoids, tangent plane and normal to a Conicoid, Pole and Polar, Conjugate diameters.

UNIT –IV:

Generating lines, Plane section of Central conicoids (Central plane sections and non-central plane sections).

B.Sc –III Semester

Mathematics

Paper 301

[Matrices]

UNIT –I :

Symmetric and skew symmetric matrices, Hermitian and skew Hermitian matrices, Orthogonal and unitary matrices, Triangular and diagonal matrices.

UNIT –II:

Rank of matrices, Elementary transformations Echelon and normal forms, Inverse of a matrix by elementary transformations.

UNIT –III:

Characteristics equation. Eigen values and Eigen vectors of a matrix. Cayley's Hamilton's theorem and its use in finding inverse of a matrix.

UNIT –IV:

Application of matrix to solve a system of linear (homogeneous and non homogeneous) equations, consistency and general solution. Diagonalization of square matrices with distinct eigen values, Quadratic forms.

B.Sc –III Semester
Mathematics
Paper 302
Differential Equations

UNIT –I :

Degree and order of a differential equation. Equation of first order and first degree. Equation in which variables are separable, homogeneous equations, Linear equations and equations reducible to linear form exact differential equations.

UNIT –II:

First order higher degree equation solvable for x, y, p . Clairaut's form. Singular solutions, Orthogonal constant coefficients.

UNIT –III:

Homogeneous linear ordinary differential equations Ordinary simultaneous differential equation.

UNIT –IV:

Linear differential equations of Second order. Transformation of the equation by changing the dependent variable/ the independent variable. Method of variation of parameters.

B.Sc –IIIrd Semester

Mathematics

Paper 303

Statics

UNIT –I :

Centre of gravity.

UNIT –II:

Common Catenary, Virtual Work.

UNIT –III:

Forces on three dimensions, Poinsot's Central axis, Wrenches.

UNIT –IV:

Null line and Null plane, Stable and unstable equilibrium.

B.Sc –IV Semester

Mathematics

Paper 401

Statics

UNIT –I :

Vector space and their elementary properties, Subspace, Linear dependence and Independence, basis and dimensions, Direct sum, Quotient space.

UNIT –II:

Linear transformation and their algebra Range and null space, rank and nullity. Matrix representation of linear transformations, change of basis.

UNIT –III:

Linear functional, Dual space, Bi-dual space, natural isomorphism, Annihilators, Bilinear and quadratic forms.

UNIT –IV:

Inner product space, Cauchy-Schwarz's, inequality, Bessel's inequality and orthogonality.

B.Sc –IV Semester

Mathematics

Paper 402

Partial differential equations and Integral transforms

UNIT –I :

Series solutions of second order differential equations, Legendre and Bessel functions (p_n and j_n only) and their properties.

UNIT –II:

Order, degree and formation of partial differential equations, Partial differential equations of the first order, Lagrange's equations, Charpit's general method, linear partial differential equations with constant coefficients, partial differential equations of the second order, Monge's method.

UNIT –III:

The concept of transform, Integral transforms and Kernel, Linearity property of transforms Laplace transforms, Inverse Laplace transforms. Convolution theorem, application of Laplace transforms to solve ordinary differential equations.

UNIT –IV:

Fourier transform (finite and infinite), Fourier integral, Applications of Fourier transform to boundary value problems, Fourier series.

B.Sc –IV Semester

Mathematics

Paper 403

Dynamics

UNIT –I :

Velocities and accelerations along radial and transverse directions and along tangential and normal directions.

UNIT –II:

Simple harmonic motion, Elastic strings.

UNIT –III:

Circular and cycloidal motion in vertical plane Motion in resisting medium.

UNIT –IV:

Central orbits, Kepler's laws of Motion.

B.Sc –V Semester

Mathematics

Paper 501

Real Analysis

UNIT –I :

Axiomatic study of real numbers, completeness property in \mathbb{R} , Archimedean property, countable and uncountable sets, neighbourhood, Interior points, limit points, open and closed sets, derived sets, Dense sets, perfect sets, Bolzano-Weierstrass theorem.

UNIT –II:

Sequence of real numbers, subsequence, Bounded and monotonic sequences, convergent sequences, Cauchy's theorem on limit, Cauchy sequence, Cauchy's general principles of convergence, uniform convergence of sequences.

UNIT –III:

Series of functions, Weierstrass M-test, Abel's and Dirichlet's tests, Sequential continuity. Boundedness and intermediate value properties of continuous functions, uniform continuity, meaning of sign of derivative, Darboux theorem.

UNIT –IV:

Limit of continuity of functions of two variables, Taylor's theorem for functions of two variables, Maxima and Minima of functions of three variable Lagrange's method of undetermined multiplier's.

B.Sc –V Semester

Mathematics

Paper 502

Complex Analysis –I

UNIT –I :

Functions of a complex variables, concept of Limit, continuity and differentiability of complex functions, Analytic functions, Cauchy's Riemann equations (Cartesian and polar forms), and Harmonic functions.

UNIT –II:

Orthogonal system, Power series as an analytics function.

UNIT –III:

Elementary functions, mapping by elementary functions, linear and bilinear transformations, Fixed points, Cross ratio.

UNIT –IV:

Inverse points and critical points, conformal transformations.

B.Sc –Vth Semester

Mathematics

Paper 503

[Programming in 'C' and numeric analysis]

UNIT –I :

Programmer's model of a Computer, Algorithms, Flow charts, Data types, Arithmetic and input/output instructions decisions control structures, Decision statements –logical and conditional operators, loop case control structures.

UNIT –II:

Solution of Equation: Bisection, Secant Regula Falsi, Newton's Raphom's method.

UNIT –III:

Shift operator, Forward and backward difference operators and their relationships, fundamental theorem of difference calculus, Interpolation, Newton –Gregory's forward and backward interpolation formula.

Lagrange interpolation, Divided difference, Interpolation Formulas using differences.

UNIT –IV:

Numerical differentiations, Numerical integration General quadratic formula, Trapezoidal and Simpson's rule, cote's formula, Gauss Quadrature formula.

B.Sc –V Semester

Mathematics

Paper 504

Probability Theory

UNIT –I :

Three definitions of probability (Mathematical Empirical & Axiomatic). Dependent, independent and Compound events.

Addition and multiplication theorem of probability, conditionally probability, Baye's theorem.

UNIT –II:

Random variables and their properties, Discrete and Continuous random variables and their probability distribution, Cumulative distribution functions and their properties, joint probability distribution of two random variables.

UNIT –III:

Mathematical expectations, Mean variance. Moment generating functions, properties of moment generating function, Additional theorem and multiplication theorem of expectation.

UNIT –IV:

Binomial distribution, Poisson distribution and normal distribution and its properties.

B.Sc –VI Semester

Mathematics

Paper 601

Riemann Integral and Matrix Space

UNIT –I :

Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, mean value theorem of integral calculus.

UNIT –II:

Improper integrals and their convergence, Comparison test, M-test, Abel's test, Dirichlet's test, Integral as a function of a parameter and its differentiability and integrability.

UNIT –III:

Definition and examples of metric space, Neighbourhoods, interior points, Limit points, open and closed sets.

UNIT –IV:

Subspace, convergent and Cauchy sequences, Completeness, centre's intersection theorem.

B.Sc –VI Semester

Mathematics

Paper 602

Complex Analysis II

UNIT –I :

Complex integration, line integral, Cauchy's fundamental theorem, Cauchy's integral formula.

UNIT –II:

Morera's theorem, Liouville theorem, maximum modulus theorem. Taylor's and Laurent series.

UNIT –III:

Singularities and zeroes of an analytic function, Rouché's theorem, Fundamental theorem of algebra, analytic continuation.

UNIT –IV:

Residue theorem and its applications to the evaluation of definite integrals, argument principle.

B.Sc –VI Semester

Mathematics

Paper 603

Numerical Analysis

UNIT –I :

Linear equations: Direct Method for solving system of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition). Iterative methods (Jacobi and Gauss –Seidel)

UNIT –II:

The algebraic Eigen value problem: Jacobi's method, Given's method, Householder's method, Power method, QR method Eigen value problems.

UNIT –III:

Numerical solutions of first order differential equation Picard's method, Euler's method. Runge-Kutta method, Milne's method. Adams-Bashforth method and Adams –Moulton method.

UNIT –IV:

Approximation: Different types of approximation least square polynomial approximation, Polynomial approximation using orthogonal polynomials, rational functions.

B.Sc –VI Semester

Mathematics

Paper 604

Linear Programming & Optimization

UNIT –I :

The linear programming problems, Graphical solution, Conical & standard forms of L.P.P.

UNIT –II:

Concave and Convex function, solution of L.P.P. by simplex method.

UNIT –III:

Artificial variable techniques, the big M method two phase method.

UNIT –IV:

Concept of duality, fundamental properties & duality. Dual Simplex method.

B.Sc –I Semester -I

Mathematics

Paper 1

Infinite Series and Trigonometry

UNIT –I :

Sequence and its convergence (basic ideas), convergence of infinite series, comparison test, root, test, ratio test, Rabbi's test, logarithmic test.

UNIT –II:

Cauchy's condensation test, De Morgan and Bertrand test, higher logarithmic ratio test, Alternating series, Leibnitz test, absolute and conditionally convergence, convergence modulo M relation, equivalence relations and partitions.

UNIT –III:

Complex functions and separation into real and imaginary parts. Exponential direct and inverse trigonometric functions, hyperbolic functions.

UNIT –IV:

Logarithmic functions, Gregory's series, Summation of Series.

B.Sc –II Semester –IV

Mathematics

Paper 1

Modern Algebra

UNIT –I :

Definition of group with examples and Simple properties, Permutation groups, subgroups, Centre and normalizer.

UNIT –II:

Cyclic groups, Cosset decomposition. Lagrange's theorem and its consequences.

UNIT –III:

Homomorphism and Isomorphism of group, Cayley's theorem, normal subgroup, quotient group, Fundamental theorem of Homomorphism, Conjugacy relation class equation, Direct product.

UNIT –IV:

Introduction of rings, Subrings, integral domain and field, characteristics of rings. Homomorphism of rings, Ideals, Quotient ring.