UNIT – I
Elementary set theory, finite, countable and uncountable sets, Real number system, supremum, infimum, Sequences and series, convergence, limsup, liminf, Bolzano Weierstrass theorem, Heine Borel theorem, Continuity, uniform continuity, differentiability, mean value theorem, Sequences and series of functions, uniform convergence, Riemann sums and Riemann integral, Improper Integrals, Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue, measure, Lebesgue integral, Functions of several variables, directional derivative, partial derivative, derivative as a, linear transformation, Metric spaces, compactness, connectedness. Normed Linear Spaces. Spaces of, Continuous functions as examples.


UNIT – II
Algebra of complex numbers, the complex plane, polynomials, Power series, transcendental functions such as exponential, trigonometric and hyperbolic, functions, Analytic functions, Cauchy-Riemann equations, Contour integral, Cauchy’s theorem, Cauchy’s integral formula, Liouville’s theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem, Taylor series, Laurent series, calculus of residues.

Permutations, combinations, pigeon-hole principle, inclusion-exclusion, principle, derangements, Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder, Theorem, Euler’s Ø-function, primitive roots, Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley’s theorem, class equations, Sylow theorems, Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain, Polynomial rings and irreducibility criteria, Fields, finite fields, field extensions.
UNIT – III

Existence and Uniqueness of solutions of initial value problems for first order ordinary, differential equations, singular solutions of first order ODEs, system of first order ODEs, General theory of homogenous and non-homogeneous linear ODEs, variation of, parameters, Sturm-Liouville boundary value problem, Green’s function. Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs, Classification of second order PDEs, General solution of higher order PDEs with, constant coefficients, Method of separation of variables for Laplace.


Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.

Generalized coordinates, Lagrange’s equations, Hamilton’s canonical equations, Hamilton’s principle and principle of least action, Two-dimensional motion of rigid bodies, Euler’s dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

UNIT – IV

Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate); expectation and moments. Independent random variables, marginal and conditional distributions. Characteristic functions. Probability inequalities (Chebyshev, Markov, Jensen). Modes of convergence, weak and strong laws of large numbers, Central Limit theorems (i.i.d. case).

Standard discrete and continuous univariate distributions. Sampling distributions. Standard errors and asymptotic distributions, distribution of order statistics and range. Methods of

Linear programming problem. Simplex methods, duality. Elementary queuing and inventory models.

UNIT – V

Programming and programming language concepts, Operating systems, process management, memory management, UNIX, Shell programming, system administration, software engineering, System investigations, Programming in PASCAL – control structure, array and records, subprograms, pointers, files and sets

C Programming, Data types, operator and expressions, Decision Structure, Control structure, Union and Bit fields

System analysis, feasibility study, System design and control, Quality assurance, MIS, building a management information system, Introductory Multimedia, Microprocessor and assembly language programming, data processing through COBOL.

Database management systems, concepts, models and implementation, file organization, conventional DBMS. RDBMS and DDBMS. Relational model, SQL, Distributed databases, Object Oriented DBMS Relational Model, Client / Server Database.