

B.Sc.(I.T.) MATHEMATICS SYLLABUS

PAPER-1.3 MATHEMATICS –I

TOTAL MARKS: 100

In-Semester: 25 & End-Semester: 75

Unit 1:

Marks: 10

Systems of linear equations, equivalence under elementary row operations, Gaussian elimination, matrix of coefficients, row reduced echelon matrix, computations, solutions, matrix multiplication, invertible matrices, calculation of inverse by elementary row operation, eigenvalue and eigenvector.

Unit 2:

Marks: 25

Sample spaces, events as subsets, probability axioms, simple theorems, finite sample spaces and equi-probable measure as special cases, binomial coefficients and counting techniques applied to probability problems, conditional probability, independent events, Bayes' formula.

Random variables (discrete and continuous), probability functions, density and distribution functions, special distributions (binomial, hyper-geometric, Poisson, uniform, exponential, normal) mean and variance, Chebychev inequality, independent random variables, functions of random variables and their distributions

Unit 3:

Marks: 10

Vector Calculus: Differentiation of a vector point function, Tangent and normal vectors, Directional derivatives, Gradient Divergence and Curl, Green's, Gauss' and Stokes' Theorems (statement only) with applications.

Unit 4:

Marks: 15

Sets and functions, Groups, Semi-groups and monoids, Cyclic semi-graphs and sub-monoids, Subgroups and Cosets, Congruence relation Semi groups. Morphisms. Normal subgroups, Structure of cyclic group permutation groups, dihedral groups. Elementary applications in code theory.

Unit 5:

Marks: 15

Ordinary differential equations of the 1st order, exactness and integrating factors, variation of parameters, Picard's iteration method. Ordinary linear differential equation of n-th order, solutions of homogeneous and non-homogeneous equations. Operator method, Methods of undetermined coefficients and variations of parameters, systems of differential equations, Phase plane, Critical points, Stability.

Books:

1. A Text Book of Matrices by Shanti Narayan, S. Chand .
2. Vector Calculus by Schaum Out Line Series
3. Differential Equations by Frank Ayers, Mc. Graw Hill
4. Differential Equations by S. C. Ross, John Wiley and Sons
5. Algebra by Michel Artin, Prentice Hall
6. A Text Book on Dynamics by M. Ray, S. chand
7. Dynamics of a Particle by S. L. Loney, Mc. Millam India Ltd.
8. Operation Research by J. K. Sharma, Mc. Millam India Ltd

PAPER-2.2 MATHEMATICS-II

TOTAL MARKS: 100

In-Semester: 25 & End-Semester: 75

Unit 1:

Marks: 10

Rings and Boolean Algebra: Rings, Sub-rings, morphism of rings, ideals and quotient rings, Euclidean domains, Integral domains and fields, Boolean Algebra – direct product, Morphisms, Boolean, sub-algebra Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.

Unit 2:

Marks: 10

Vector spaces abstractly defined, Example, linear dependence & independence. Bases and subspaces. Dimension of linear space.

Linear mappings, kernel and image of a map. Rank of a map, linear maps on a vector space, Choice of basis in vector base.

Unit 3:

Marks: 25

Basic concepts Graph isomorphism, Sub-graph, Degree, Walk, Path, Cycle, Trees, Spanning trees, Cut vertices and cut edges, Connectivity, Euler tours and Hamiltonian cycles. Matching, perfect matching. Colour of a graph, Vertex colouring, Chromatic polynomial, edge colouring. Planer and non-planer graphs, Euler's formula, Kuratowski's theorem. Test a planarity, four colour theorems. Directed graphs, Tournaments, Networks, Max Flow, Mincut theorem. Graphs and vector space. Graph enumeration, Polya's counting theorem, Graph algorithms, shortest path Minimal spanning tree, Fundamental circuit, Isomorphism.

Unit 4:

Marks: 15

Basic combinational numbers. Recurrence, generating functions. Multi-nomials, Counting Principles. Polya's theorem. Inclusions and exclusion principle. Block design and error correcting codes Hadamard matrix. Finite geometries.

Unit 5:

Marks: 15

Partial Differential equation: 1st order PDE. Second order partial differential equation with constant coefficients and their classification. Solution of one dimensional wave and diffusion equations, Laplaces equations of two dimensions

Books:

1. Boolean Algebra and its application by J. Eldon Whitesitt, Addison Welley.
2. Discrete Mathematical Structure by G. Sankar Rao, New Age
3. Digital Computer Fundamental by Thomas C. Bartee, Mc. Graw Hill
4. Linear Algebra by Hoffman and Kunjee.
5. Linear Algebra Geometric Approach by S. Kumeresan, Prentice Hall
6. Graph Theory by Narasingh Deo, Prentice Hall
7. Theory and Problems of Combinatorics by C. Vasudeva, New Age
8. Advanced Differential Equation by M. D. Raisinghania
9. Partial Differential Equation by I.A.N N Snedon, Mc. Graw Hill

PAPER-3.5 MATHEMATICS-III

TOTAL MARKS: 100

In-Semester: 25 & End-Semester: 75

Unit 1:

Marks:10

Power series, radius of convergence, Power series methods for solutions of ordinary differential equations. Legendre's equations and Legendre's polynomial. Bessel equations and Bessel functions of first and second kinds Orthogonal sets. If functions, Sturm-Liouville problems, Orthogonality of Bessel's functions and Legendre's polynomials.

Unit 2:

Marks:10

Laplace transforms, Inverse transform, shifting on the s and t axes, convolutions, partial fractions, Fourier series, half range expansions. Approximation by trigonometric polynomial. Fourier integrals. Transform techniques in differential equations.

Unit 3:

Marks 10

Metric Space: Definition and examples, Open sets, Closed sets, Convergence, completeness and Baire's Theorem, Euclidean and Unitary spaces.

Unit 4:

Marks 25

Topological Spaces: Definition and examples, Bases and Sub-bases, Weak topologies, Fuzzy sets and examples, Brief overview of crisp set; the notation of fuzziness; what, why and when to apply fuzzy set; operations on fuzzy sets; fuzzy numbers.

Crisp relations, fuzzy relations, operations on fuzzy relations

Unit 5:

Marks 20

General LPP, Formulation of LPP, Graphical Method, Limitation of Graphical Method, Solution of GLPP, Simplex Method, Some Definitions and Notations, Simplex Algorithm, Optimization Problems, Transportation .

Books:

1. Differential Equation by Frank Ayers, Mc. Graw Hill
2. Mathematical Physics by Ghatak, Goyal et al , Mc. Millan
3. Introduction to Topology and Modern Analysis, by G. F. Simmons, Mc. Graw Hill
4. Linear Programming by Hardy
5. Fuzzy Set Theory and its application, by H. J. Zimmermann, Boston
6. Fuzzy Sets and Fuzzy Logic and application, by G. J. Klir, Bo Yuan, Prentice Hall