MCA-14-14 DISCRETE MATHEMATICAL STRUCTURES

Maximum marks: 100 (External: 80, Internal: 20) **Time: 3 hours**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

UNIT - I

Set Theory: Basic Set Theory, Operations on Sets, Algebra of sets, Venn Diagrams.

Relations: Binary Relations, Complement of relations, Inverse of relations, Composite relations, Properties, Equivalence, Partial Order and Total order relations.

Functions: Functions on Set, Domain, Co-domain, Representation of Functions, Types, Identity and Inverse Functions, Composition of Functions, Applications

UNIT -II

Propositional Calculus: Propositional logic, Equivalences, Predicates , Quantifiers, Nested Quantifiers, Rules of Inference, Normal Forms, Proofs: Methods, Strategy.

Counting: Pigeonhole Principle, Inclusion-Exclusion Principle, Permutations and Combinations, Binomial Coefficients, Counting Principles, Applications.

UNIT -III

Advanced Counting Techniques: Recurrence Relations, Solving Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Solution of Recurrence Relations by the method of Generating Function..

Latices and boolean algebra: Lattices, Hasse Diagram, Principle of Duality, Types of Lattices, Special Lattices, Boolean Expression, Equivalent circuits, Dual, Normal Forms.

UNIT -IV

Graphs: Introduction, Terminology, Types of Graphs, Representation of Graphs, Paths and Circuits, Cut-set and Cut - Vertices, Graph Isomorphism, Homomorphism, Connectivity, Bipartite Graphs, Subgraphs, Operations on Graphs, Euler and Hamiltonian Paths, Shortest Path Problem, Planar & Dual Graphs, Coloring Covering and Partitioning.

Tree: Tree Notations, Properties of tree, Types of Tree, Minimum Spanning Tree (MST).

Text Books:

1. Kenneth G. Rosen, “Discrete Mathematics And Its Applications”, Tata McGraw Hill.
2. Koshy T., “Discrete Mathematics with Applications”, Elsevier India.

Reference Books:

1. Eric Gosett, “Discrete Mathematics with proof”, Wiley India Pvt. Ltd.
2. Seymour Lipshutz, “Schaum Outlines of Discrete Mathematics”, Tata McGraw-Hill.
3. Olympia Nicodemy, “Discrete Mathematics”, CBS Publisher