

**Course No: MCA-1T5**  
**Course Title : Discrete Mathematics**

**UNIT I**

Propositions and logical operations, Notation, Connections, Normal forms, Truth Tables. Equivalence and Implications, Theory of inference for statement calculus, Predicate calculus, Quantifiers, Rules of Logic . Review of set concepts, operations on sets, Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, One-to-One Correspondence and the Cardinality of a Set, sequences and summations, The growth of functions . **Methods of Proof: Different methods of proof, Direct Proof, Indirect Proof, Mathematical Induction** for proving algorithms.

**UNIT II**

Principles of counting: The Principle of Inclusion-Exclusion, Applications of inclusion-exclusion principle, The Addition and Multiplication Rules, The Pigeon-Hole Principle . Permutation, combinations, repetitions, discrete probability, recurrence relations, solving recurrence relations, Relations and digraphs, Properties of relations, Binary Relations, Equivalence relations, Matrix representation of relations and digraphs, Computer representation of relations and digraphs, Manipulation of relations; Partially Ordered Sets (Posets), External elements of partially ordered sets.

**UNIT III**

Lattices, Graph theory: Definition, paths, circuits, reachability, connectedness. Matrix representation of graphs, trees, tree traversal, trees and sorting, spanning trees, minimal spanning trees, Transitive closure, Warshall's Algorithms, Eulerian and Hamiltonian graphs, graph coloring, Storage representations of graphs

**UNIT IV**

Finite Boolean algebra, Function on Boolean algebra's, Boolean functions as Boolean polynomials. Groups and applications: Monoids , semigroups, Product and quotients of algebraic structures, Isomorphism, homomorphism , automorphism, Normal subgroups , Codes and group codes, Overview of Formal Languages : Representation of special languages and grammars, finite state machines.

TextBook : KOLMAN/REHMAN "Discrete Mathematical Structures" Pearson Education .

**Reference Books:**

1. LIU "Elements of Discrete Mathematics" Tata McGraw Hill
2. SCHAUMS "Discrete Mathematics" Tata McGraw Hill
3. NICODEMI "Discrete Mathematics" CBS
4. KENNETH H. ROSEN "Discrete Mathematics and Its Applications" The Random House/Birkhauser Mathematics series