Discrete Mathematics

Index

Chapter 1: Mathematical Logic

- 1.1 Propositional Calculus
- 1.2 Equivalence of Formulas
- 1.3 Duality Law
- 1.4 Tautological Implications
- 1.5 Normal Forms
- 1.6 Theory of Inference for Statement Calculus
- 1.7 Consistency of Premises
- 1.8 Indirect Method of Proof (Proof by Contradiction)
- 1.9 Predicate Calculus
- 1.10 Free and Bound Variables
- 1.11 Inference Theory in Predicate Calculus

Chapter 2: Set Theory

- 2.1 Introduction and Operations on Binary Sets
- 2.2 Inclusion-Exclusion Principle
- 2.3 Relations
- 2.4 Properties of Binary Relations on a Set
- 2.5 Relation Matrix and Graphical Representation of a Relation
- 2.6 Partition and Covering of a Set
- 2.7 Equivalence Relations
- 2.8 Compatibility Relations
- 2.9 Composition of Binary Relations
- 2.10 Transitive Closure
- 2.11 Partial Ordering
- 2.12 Hasse Diagrams
- 2.13 Functions
- 2.14 Composition of Functions
- 2.15 Inverse Functions
- 2.16 Recursive Functions
- 2.17 Permutation Functions
- 2.18 Lattices

Chapter 3: Algebraic Structures

- 3.1 Binary Operations and Properties of Binary Operations
- 3.2 Algebraic Structures and Semigroup
- 3.3 Homomorphism of Semigroups
- 3.4 Monoid
- 3.5 Subsemigroup and Submonoid
- 3.6 Group
- 3.7 Addition Modulo *m* and Multiplication Modulo *p*
- 3.8 Subgroups
- 3.9 Homomorphism

Chapter 4: Number Theory

- 4.1 Properties of Integers
- 4.2 Greatest Common Divisor (GCD)
- 4.3 Division Algorithm (or Division Theorem)
- 4.4 Euclidean Algorithm for Finding the Greatest Common Divisor (GCD)
- 4.5 Least Common Multiple (LCM) and Prime Numbers
- 4.6 Fundamental Theorem of Arithmetic
- 4.7 Testing for Primality
- 4.8 Modular Arithmetic
- 4.9 Fermat's Little Theorem
- 4.10 Euler's Totient Function

Chapter 5: Combinatorics

- 5.1 Basics of Counting
- 5.2 Permutations
- 5.3 Combinations
- 5.4 Restricted Combinations
- 5.5 Generating Functions
- 5.6 Binomial and Multinomial Theorems
- 5.7 Principle of Inclusion-Exclusion (PIE)
- 5.8 Pigeonhole Principle (PHP)