DISCRETE MATHEMATICS AND GRAPH THEORY

UNIT 1: PROPOSITIONAL LOGIC AND SETS:

Propositional Logic, Application of Propositional Logic. Sets - Set builder notations, quantifiers, Cardinality, Set operations, Tuples, induction theory.

Unit 2: Relations and Functions:

Cartesian Products and Relations, Functions - Plain and One-to-One,Onto Functions. The Pigeon-hole Principle, Function Composition and Inverse Functions.

Unit 3: Permutations and Combinations:

The Rules of Sum and Product, Permutations, Combinations-The Binomial Theorem, Combinations with Repetition, The Catalan Numbers

Unit 4: Graphs:

Definition and properties of a graph, subgraph and Examples, Complements, and Graph Isomorphism, Vertex Degree, Walks, Paths, Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles,

Graph Coloring, and Chromatic Polynomials. Directed graphs and their properties.

Unit 5: Trees

Definitions, Properties, and Examples, Routed Trees, Trees and Sorting, Weighted Trees and Prefix Codes. Dijkstra's Shortest Path Algorithm, Minimal Spanning Trees - Kruskal and Prims,