Semester I

(B.CA.,)

Mathematical Foundations for Computer Science

Unit I :Set theory

Introduction, Sets, Notation and description of sets, subsets, Venn – Euler diagram, Operation on sets, Properties of set operations (only statements), Laws of Algebra of sets, The principle of Duality, Addition Principle.

Unit II : Propositional Logic

Symbolic Logic: Logical Operations, Conditional and Biconditional operators, Converse, Inverse, and contrapositive, Tautology and Contradiction, Algebra of propositions, Arguments.

Unit III: Mathematical Induction and Recurrence Relations

Mathematical induction: Techniques of Proof, Mathematical Induction – Recurrence Relations: Recurrence - An Introduction, Recurrence Relations, Solution of finite order homogenous (Linear) relations.

Unit IV: Algebraic System

Introduction to Algebraic system: Binary operations, Group, Sub-Groups: Properties of Sub-Groups, Cyclic Groups, Order of a group, Lagrange's theorem, Permutation group (simple problems), Normal Sub-group.

Unit V: Graph Theory

Basic Concepts, Subgraph, Some special classes of Graph, Path, Cycle, and Connectedness, Matrix Representation of the Graph; Trees: Definitions, Spanning Trees, Minimal Spanning trees: Kruskal's Algorithm, Prim's Algorithm; Shortest Path Problem: Dijkstra's Algorithm.

Text Books:

1. Kenneth H.Rosen, Discrete Mathematics and its Applications, 6th Edition, Tata McGraw Hill, New Delhi (2007)
2. P.R. Vittal, Mathematical Foundations, Margham Publications, Chennai
   Unit II: Chapter 1.
   Unit IV: Chapter 38, Chapter 39 - Pg. No. (39.51-39.55)
3. M.K. Venkataraman, N.Sridharan, N. Chandarasekaran, Discrete Mathematics, The National Publishing Company , Chennai.
   Unit I: Chapter I
   Unit III: Chapter IV, Chapter V – 1, 3, 4.
   Unit V: Chapter XI

References:

1. J.P.Tremblay R. Manohar, Discrete Mathematics Structures with Applications to Computer Science, McGraw Hill International Edition.
2. Srimanta Pal, Subodh C. Bhunia, Engineering Mathematics, Oxford University Press

Free online resources available.