

## BCSC0010: DISCRETE MATHEMATICS

**Objective:** The objective is to introduce students to language and methods of the area of Discrete Mathematics. The focus of the module is on basic mathematical concepts in discrete mathematics and on applications of discrete mathematics in computer science.

**Credits: 4**

**L-T-P-J: 3-1-0-0**

Module No.	Content	Teaching Hours
I	<b>Sets, Relations and Functions:</b> Introduction to Set Theory, Venn diagrams, algebra of Sets, Inclusion-Exclusion Principle, Partitions, Proof Techniques, Relations, Properties and their types, Function and their types. <b>Recurrence Relations and Generating Functions</b> <b>Introduction to Counting Principle:</b> Permutation, Combination, Permutation with Repetition, Combination with Repetition, Pigeonhole Principle.	13
II	<b>Probability Theory:</b> Introduction to Probability Theory, Conditional Probability, Total Probability, Bayes' Theorem. <b>Propositional Logic</b> - Logical Connectives, Truth Tables, Normal Forms (Conjunctive and Disjunctive), Validity; <b>Predicate Logic</b> - Quantifiers, Inference Theory, Methods of Proof: Direct, Indirect, Mathematical Induction.	14
III	<b>Algebra:</b> Motivation of Algebraic Structures, Finite Groups, Subgroups and Group Homomorphism; Lagrange's Theorem; Commutative Rings and Elementary Properties; <b>Graph Theory:</b> Introduction to Graphs, Types: Planner, Directed, Complete, Bipartite Graph, Isomorphism, Euler Graph, Hamiltonian Graph, Operations on Graphs, Representation of graphs, Connectivity.	13

### Text Book:

- Kenneth H Rosen (2012), "Discrete Mathematics and Its Applications", 7<sup>th</sup> edition, TMH.

### Reference Books:

- J.P.Tremblay (1997), "Discrete Mathematical Structures with Applications to Computer Science", TMH, New Delhi.
- V. Krishnamurthy (1986), "Combinatorics: Theory and Applications", East-West Press, New Delhi.
- Ralph P. Grimaldi (2004), "Discrete and Combinatorial Mathematics- An Applied Introduction", 5th Edition, Pearson Education.
- C.L.Liu (2000), "Elements of Discrete Mathematics", 2nd Edition, TMH.

**Outcome:** After the completion of the course, the student will be able to:

- Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
- Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
- Use effectively algebraic techniques to analyze basic discrete structures and algorithms.