Semester	**: I**
Course Type	**: DSC**
Course Code	**: CSCDSC102**
Name of the Course	**: Discrete Mathematics**
Learning level	**: Foundation or Introductory Course**
Credits	**: 3**
Contact Hours	**: 45**
Total Marks	**: 100**
End Semester Marks	**: 70**
Internal Marks	**: 30**

Course Objectives:

1. The purpose of the course is to familiarize the concepts of mathematical structures that are fundamentally discrete.
2. To introduce the concepts of mathematical logic.
3. To provide an overview of sets, relations and functions; and their associated operations.
4. Give an understanding of graphs and trees.

UNIT I

Mathematical Logic: Statements and Notations, Connectives, Normal forms, Equivalences, Predicate calculus, Quantifiers, Inference theory of the predicate calculus.

UNIT II

Set Theory and Ordered Sets: Basic concept of set theory, Operations with Sets, Function, Relations, Properties of Relations, Representing Relations, Composition of Relations, Closures of Relations, Ordered Sets, Hasse Diagrams of Partially Ordered Sets

UNIT III

Ordering Relations, Lattices and Boolean Algebra: Partial Ordering Relations; Equivalence Relations, Lattices, Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices, Introduction to Boolean algebra, Boolean Functions, Representation and Minimization of Boolean functions

UNIT IV

Trees: Basic Concepts of Tree, Properties of Trees, Pendant vertices in a Tree, Centre of a Tree, Rooted binary trees, Complete and extended Binary Tree.

UNIT V

Graph theory with applications: Basic concepts of Graph Theory, Incidence and degree, Isomorphism, Homomorphism, Sub graphs and Union of graphs, multigraphs and weighted graphs, Planar Graphs, Walks, Paths and Circuits, Components and Connectedness, Eulerian graph, Hamiltonian graph, Complete Graph, Regular Graph, Bipartite graph, cut-sets and cut-vertices.

Course Outcomes: *After successful completion of the course, the students will be able to*

1. Apply mathematical logic to solve problems.
2. Learn the concept of sets, relations, functions and lattice.
3. Model and solve real world problems using graphs and trees.

Text Books:

1. Seymour Lipschutz and Marc Lars Lipson, **Discrete Mathematics**, Fourth Edition Schaum's Outline Series, McGraw Hill, 2022.
2. Kenneth H. Rosen, **Discrete Mathematics and Its Applications**, Seventh Edition, McGraw Hill, 2012.
3. Swapan K Sarkar, **A Textbook of Discrete Mathematics**, 9th Edition, S Chand & Co Ltd, 2016.

Reference Books:

1. D.J. Hunter, **Essentials of Discrete Mathematics**, Jones and Bartlett Publishers, 3rd Edition, 2008.
2. C.L. Liu, D.P. Mahopatra, **Elements of Discrete mathematics**, 2nd Edition, Tata McGraw Hill, 1985.
3. Deo N., **Graph Theory with Applications to Engineering and Computer Science**, PHI; 6th edition 2010.

Semester	**: II**
Course Type	**: DSC**
Course Code	**: CSCDSC151**
Name of the Course	**: Data Structure**
Learning level	**: Foundation or Introductory Course**
Credits	**: 3**
Contact Hours	**: 45**
Total Marks	**: 100**
End Semester Marks	**: 70**
Internal Marks	**: 30**

Course Objectives:

1. *Introduce the basic concepts and principles of data structures, including their definition, properties, and characteristics.*
2. *Familiarize students with the implementation of various data structures using programming languages, including arrays, linked lists, stacks, queues, trees, graphs, and hash tables.*
3. *How to analyze the time and space complexity of different data structures and algorithms, enabling them to make informed decisions regarding their selection and usage.*
4. *Cover various searching and sorting algorithms, including linear search, binary search, bubble sort, insertion sort, selection sort, merge sort, quicksort, and their analysis.*