MCBS1001 DISCRETE MATHEMATICS (3-0-0)

Course Objectives:

- To learn the mathematical foundations required for computer science.
- This course will help in understanding other courses in computer science.

Learning Outcomes:

Upon completion of this course, students will be able to:

CO1 : Define & describe various logical connectives and expressions along with rules of inferences.

CO2 : Apply various methods of proofs and proof strategies.

CO3 :learn the concepts of function and develop the various algorithms and its complexity.

CO4 : Model counting techniques using recurrence relations & generating functions for applications.

CO5 : Develop the concepts and applications of graphs in various computer science problems

UNIT-1:

Logic and Proofs: Propositional logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs. Sets: Venn Diagrams, Subsets, The size of a set, Power Sets, Cartesian Products, Set Operations.

UNIT-2:

Functions: One-to-One and Onto Functions, Inverse Functions and Compositions of Functions Partial Functions. Sequences and Summations. Algorithms, Searching Algorithms: Linear Search, Binary Search, Sorting: Bubble Sort, Insertion Sort, The Growth of Functions, Complexity of Algorithms.

UNIT-3:

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Recurrence Relations.
Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closure of Relations, Equivalence Relations, Partial Orderings.

UNIT-4:

Graphs: Graph Terminology and Special Types of Graphs, Bipartite Graphs, Representing Graphs: Isomorphism of Graphs, Euler and Hamilton Paths, Shortest Path Problems: Dijkstra's Algorithm, Traveling Salesperson Problem, Planar Graphs, Graph Coloring. Trees: Tree Traversal, Minimum Spanning Trees.

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Mc Graw Hills International Seventh Edition.
2. C. L. Liu, "Elements of Discrete Mathematics", McGraw Hills International Second Edition.

Reference Books:

1. Elements of Discrete Mathematics by C. L. Liu and D.P. Mohapatra, TMH, 2012
2. J. P Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 1997.