

1/3 MCA First Semester

CA1T1 DISCRETE MATHEMATICAL STRUCTURES Credits : 4

Lecture Hours : 4 periods / week

Internal assessment : 30 Marks

Semester and Examination: 70 Marks

Course Description

Discrete mathematics is the study of mathematical structures that are fundamentally discrete in nature. It is concerned with techniques to solve certain types of problems such as how to count or to enumerate quantities. The course is intended to cover the main aspects which are useful in studying, describing and modelling of objects and problems in the context of computer algorithms and programming languages.

Course Objectives

- | To study the basic set theory.
- | To familiarize different mathematical structures
- | To study the basic concepts of Permutations and combinations
- | To study the different properties of graphs
- | To study the basic search algorithms to find the shortest path
- | To study the homogeneous recurrence relations

UNIT-I:

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

UNIT-II:

Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT-III:

Set Theory: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

UNIT-IV:

Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monoids, groups sub groups' homomorphism, Isomorphism.

UNIT-V:

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

UNIT-VI:

Recurrence Relations: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating Functions. Characteristics roots solution of In homogeneous Recurrence Relation.

UNIT-VII: Graph Theory: Representation of Graph, DFS, BFS, Spanning Trees, and planar Graphs

UNIT-VIII: Applications of Graph: Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

Learning Resources :

Text Books:

1. Mathematical Foundation of computer science(Discrete Structures)-Dr.D.S.C, PRISM, 3/e, 2010.
2. Mathematical Foundation of computer science-Dr.J.Rajendra Prasad, T.Rama Rao, A.Madana Mohana Rao, 1/e, 2011.
3. Discrete mathematics structure with application to computer science, Tremblay. JP & Manohar P., Mc-Graw-Hill, 2/e, 2004.

Reference Books:

1. Discrete Mathematics, Norman Biggs, Oxford. 10/e, 2010.
2. Discrete Mathematics for Computer Scientists and Mathematicians. Joe L. Mott, Abraham Kandel, and Theodore P. Baker, Prentice Hall, 2/e, 2002.
3. Elements of Discrete Mathematics, C. L. Liu, McGraw-Hill, 3/e, 2008.
4. Discrete and Combinatorial Mathematics – An Applied Introduction – Ralph. P. Grimaldi, Pearson Education , 5/e ,2003.
5. Discrete mathematics and its applications, Kenneth H. Rosen, McGraw-Hill, 7/e, 2012.

