DISCRETE MATHEMATICAL STRUCTURES

Course Code: 15BM1106

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Pre requisites:

1. Fundamentals of Set theory.
2. Elementary algebra and Calculus.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Rewrite mathematical arguments using logical connectives and quantifiers and verify the validity of logical flow of arguments using propositional logic, and truth tables.

CO 2 Verify the validity of logical flow of arguments using predicate logic, identify and give examples of various types of relations and describe various properties of the relations.

CO 3 Solve various types of recurrence relations.

CO 4 Determine isomorphism of graphs and spanning tree of a given graph using DFS / BFS. Also determine minimal spanning tree of a given graph.

CO 5 Explain fundamental concepts of fuzzy sets and apply them to an expert system.

UNIT-I (10 Lectures)

MATHEMATICAL LOGIC:

Statements and notations, connectives, well formed formulas, tautologies, equivalence of formulas, Duality law, Tautological Implications, other connectives, Normal forms, Rules of inference, consistency of premises and indirect method of proof.

(1-1, 1-2, 1-2.1 to 1-2.4, 1-2.6 to 1-2.11, 1-2.14, 1-3, 1-3.1 to 1-3.4, 1-4.2, 1-4.3 of Text book[1])

UNIT-II (10 Lectures)

PREDICATE CALCULUS:

Predicates, the statement function, variables and quantifiers, predicate formula, free and bound variables, universe of discourse, inference theory of the predicate calculus.

RELATIONS:

Definition, properties of binary relations in a set, Relation matrix and Graph of a relation, Partition and covering of set, equivalence relations, partial ordering.

(1-5, 1-5.1 to 1-5.5, 1-6.1 to 1-6.4, 2-3.1 to 2-3.5, 2.3.8 of Text book [1])

UNIT-III (10 Lectures)

RECURRENCE RELATIONS:

Generating Functions of sequences, Calculating coefficients of generating functions, Recurrence relations, Solving Recurrence relations by substitution and generating functions, the method of characteristic roots.

(3.1 to3.5 of Text book [2])

UNIT-IV (10 Lectures)

GRAPH THEORY

Basic concepts, Isomorphism and Subgraphs, Trees and their properties, Spanning trees: DFS, BFS, Kruskal's Algorithm for finding minimal Spanning tree.

(5.1-5.4 of Text book [2])

UNIT-V (10 Lectures)

Representation and Manipulation of Imprecision Fuzzy sets, Possibility theory, Applications of Fuzzy sets to Expert Systems.

(8.1 to 8.3 of Text book [2])

TEXT BOOKS:

1. J.P Tremblay, R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Publishing Company Limited, 1997.

2. J.L. Mott, A. Kandel, T.P. Baker, “Discrete Maths for Computer Scientists & Mathematicians”, Second Edition, Prentice Hall of India Pvt Limited, New Delhi, 2009.

REFERENCE:

1. Kenneth Bogart, Clifford Stein, Robert L.Drysdale, “Discrete Mathematics for Computer Science”, Springer International Edition, 2006.