1/4 B.Tech - FIRST SEMESTER

DISCRETE MATHEMATICS
(Only for IT during I B.Tech, I Semester)

Course Code: IT1T4   **Credits:3**
Lecture : 3 Periods/week   **Internal assessment: 30 marks**
Practice/Interaction: 1Period /week   **Semester end examination: 70 marks**

Objectives:
- To know the notations used in the discrete mathematics associated with computer science and engineering.
- To learn the rudiments of elementary mathematical reasoning (elementary proofs; proofs by induction, Normal forms).
- To understand basic set-theoretical notions: relations, functions, graphs, equivalence relations, and orderings.
- To understand the fundamentals of counting and discrete probability.
- To understand the concept of Recurrence Relations

Course Outcomes:
At the end of the course students will be able to
1. Write truth tables and summarise the concept of logical equivalence and its relationship to equivalent logic circuits and Normal forms.
2. Apply rules in inference theory, and extend this to predicate calculus using quantifiers. Able to do simple proofs by mathematical induction. Know the properties of equivalence relations and partial orderings. Understand lattices and Hasse Diagrams.
3. Make use of graphs as representing relations. Identify isomorphism in variants of graphs, and classify algorithms for relations based on graphs or matrices.
4. Summarize the fundamentals of counting and discrete probability.
5. Solve the homogeneous, non-homogeneous relations using different methods.

Syllabus:

UNIT- I
Statements and Notation, Connectives- Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well formed formulas, Tautologies, equivalence of formulas, Duality Law, Tautological Implications, Functionally Complete Sets of Connectives, Other connectives.
Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal of Disjunctive Normal Forms (PDNF), Principal of Conjunctive Normal Forms (PCNF).

UNIT-II
Logical inferences, Methods of proof of an implication, First Order Logic and other methods of proof, Rules of Inference for Quantified Propositions, Mathematical induction.
Relations and Directed Graphs, Special properties of binary relations, Equivalence relation, Ordering relations, Lattices, and Enumerations.

UNIT-III
Operations on relations, Paths and Closures, Directed graphs and Adjacency matrices. Warshall"s algorithm- Transitive closure. Basic concepts, Representation of Graphs, Isomorphism and sub graphs, Planar graphs, Multi graphs, Euler circuits, Euler Graphs and Hamiltonian graphs, Chromatic number

UNIT-IV

Basics of counting, Combinations and Permutations, Enumeration of combinations and permutations, Enumerating Combinations and Permutations with repetitions, Enumerating permutations with constrained repetitions, The Principle of Inclusion-Exclusion.

UNIT -V

Generating functions of Sequences, Recurrence relations, solving recurrence relations by Substitution and Generating functions, the method of Characteristic roots, Solutions of In-homogeneous Recurrence Relations.

Text Books:
1. Joe L. Mott. Abraham Kandel and Theodore P.Baker, Discrete Mathematics for Computer Scientists & Mathematicians. PHI, 2nd Edition (For Units II to V).
2. J P Trembly and R Manohar , Discrete Mathematical Structures with Applications to Computer Science. TMH (For Unit I).

Reference Books:
1. Swapan kumar Chakraborthy, Bikash Kanti Sarkar, Discrete Mathematics. Oxford.
2. Dr.J Rajendra Prasad, T.Rama Rao, A. Madana Mohana Rao, Mathematical Foundations of Computer Science, Lakshmi Publishers.

earning Resources:
1. http://nptel.ac.in/courses.php
2. http://jntuk-coeerd.in/