SEMESTER – III
Branch : COMPUTER SCIENCE & ENGG.

MH 13111 Discrete Structure (3-1-0), Credit – 4

Unit 1:

Sets, relations and functions : Brief description of Basic operations on sets, Cartesian Products, disjoint union (sum), and power sets, Arbitrary union , intersection and product. Finite and Infinite sets, countable and uncountable, Cantor's diagonal argument and power set theorem, non computability of all number theoretic functions. (3 L)

Unit 2:

Propositional Logic : Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic, Introduction to first order logic and axiom of choice. ~~(Size of set: Finite and infinite sets, countable and uncountable, Cantor's diagonal argument and power set theorem, non computability of all number theoretic functions .)~~ (6L)

Unit 3:

Partially ordered sets: Complete partial ordering, chain, lattice, Complete, distributive, modular and complemented lattices, Boolean and pseudo Boolean lattices. Different sub lattices, monoton map and morphaisms, quotient structures, filters. Tarski's fixed point theorem. (8L)

Unit 4:

Algebraic Structures: Algebraic structures with one binary operation – semi group, monoid and group. Congruence relation and quotient structures. Morphisms. Free and cyclic monoids and groups. Permutation group , Substructures, Algebraic structures with two binary operations. Basic concept of Ring, Integral domain and field. Boolean algebra and Boolean Ring. (13L)

Unit5:

Introduction to Counting : Basic counting techniques – inclusion and exclusion, pigeon hole principle, permutation, Combination, summations. Introduction to recurrence relation and generating function. Introduction to graph : Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk , graph colouring , planar graph, trees. (10)

Text Books : 1. Discrete Mathematical Structures with Application to Computer Science by J.P. Tremblay & R. Monohar (New York, Mc- Graw Hill)
2. Elements of Discrete Mathematics by C.L. Liu (New York, Mc.Graw Hill)

Reference Book : 1. Discrete Mathematics by S.Lipshutz & M. Lipson (Tata McGraw – Hill Edition)