Discrete Structures & Theory of Logic

SWAYAM Prabha Course Code-KCS303

PROFESSOR'S NAME	Mradul Kumar Jain
DEPARTMENT	Computer Science & Engineering
INSTITUTE	ABES Engineering College, Ghaziabad
COURSE OUTLINE	This course provide an fundamental knowledge of Discrete Structures covering the topics Set Theory , Functions and Natural Numbers, Algebraic Structures, Lattices, Propositional Logic and Predicate Logic, Tree, Graph and Combinatorics

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	Lecture 1	Sets and It's Representation and Types of Sets
2	Lecture 2	Operations and Identities of Sets, Principle of Inclusion and Exclusion, Ordered Pairs
3	Lecture 3	Relations: Definition, Properties, Representation and Composition
4	Lecture 4	Relations: Operations on Relations and Closure of Relations
5	Lecture 5	Relations: Warshall's Algorithm, Equivalence Relations and Equivalence Classes
6	Lecture 6	Poset, Totally Ordered Set, Chains
7	Lecture 7	Hasse Diagram, Poset Elements
8	Lecture 8	Functions, Operations & Composite Function
9	Lecture 9	Algebraic Structures: Definition, Groups, Subgroups and order
10	Lecture 10	Cyclic Groups
11	Lecture 11	Cosets, Lagrange's Theorem

12	Lecture 12	Normal Subgroups
13	Lecture 13	Permutations and Symmetric Group
14	Lecture 14	Group Homeomorphisms
15	Lecture 15	Definition and elementary properties of Rings
16	Lecture 16	Definition and elementary properties of Fields and Integral Domain
17	Lecture 17	Lattices: Definition, Properties of lattices – Bounded, Complemented Lattices
18	Lecture 18	Modular and Complete Lattice, Morphisms of lattices.
19	Lecture 19	Boolean Algebra: Introduction, Axiom, Theorems of Boolean Algebra
20	Lecture 20	Algebraic manipulation of Boolean expressions.
21	Lecture 21	Specification of Boolean Functions
22	Lecture 22	Karnaugh maps
23	Lecture 23	Logic Gates
24	Lecture 24	Digital circuits
25	Lecture 25	Boolean algebra
26	Lecture 26	Propositional Logic: Proposition, well-formed formula, Truth Tables
27	Lecture 27	Tautology, Satisfiability, Contradiction
28	Lecture 28	Algebra of proposition
29	Lecture 29	Theory of Inference.
30	Lecture 30	Predicate Logic: First order predicate, well-formed formula of predicate
31	Lecture 31	Quantifiers
32	Lecture 32	Inference theory of predicate logic

33	Lecture 33	Trees: Definition, Binary tree, Binary tree traversal, Binary search tree.
34	Lecture 34	Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs
35	Lecture 35	Planar graphs, Isomorphism and Homeomorphism of graphs
36	Lecture 36	Euler and Hamiltonian paths, Graph coloring
37	Lecture 37	Recurrence Relation: Recursive definition of functions, Recursive algorithms,
38	Lecture 38	Method of solving recurrence relations
39	Lecture 39	Method of solving recurrence relations using Generating Functions
40	Lecture 40	Combinatorics: Introduction, Counting Techniques, Pigeonhole Principle

References Books:

- Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
- B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
- E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
- R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004
- Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill.
- Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.
- Deo, 7.Narsingh, "Graph Theory With application to Engineering and Computer Science.", PHI.
- Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi