| BCS303 | Discrete Structures & Theory of Logic | |
|---|---|---|
| | **Course Outcome ( CO)** | **Bloom's Knowledge Level (KL)** |
| | **At the end of course , the student will be able to understand** | |
| CO 1 | Acquire Knowledge of sets and relations for solving the problems of POSET and lattices. | $K_3$, $K_4$ |
| CO 2 | Apply fundamental concepts of functions and Boolean algebra for solving the problems of logical abilities. | $K_1$, $K_2$ |
| CO 3 | Employ the rules of propositions and predicate logic to solve the complex and logical problems. | $K_3$ |
| CO 4 | Explore the concepts of group theory and their applications for solving the advance technological problems. | $K_1$, $K_4$ |
| CO 5 | Illustrate the principles and concepts of graph theory for solving problems related to computer science. | $K_2$, $K_6$ |

| **DETAILED SYLLABUS** | | **3-1-0** |
|---|---|---|
| **Unit** | **Topic** | **Proposed Lecture** |
| **I** | **Set Theory& Relations**: Introduction, Combination of sets. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.<br>**POSET & Lattices**: Hasse Diagram, POSET, Definition & Properties of lattices – Bounded, Complemented, Distributed, Modular and Complete lattice. | **08** |
| **II** | **Functions**: Definition, Classification of functions, Operations on functions. Growth of Functions.<br>**Boolean Algebra:** Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps. | **08** |
| **III** | **Theory of Logics**: Proposition, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference. Predicate Logic: First order predicate, well-formed formula of predicate, quantifiers, Inference theory of predicate logic. | **08** |
| **IV** | **Algebraic Structures**: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields. | **08** |
| **V** | **Graphs**: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring.<br>**Combinatorics**: Introduction, Counting Techniques, Pigeonhole Principle | **08** |

**Text books:**


1.Koshy, Discrete Structures, Elsevier Pub. 2008 Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.

2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.

3.E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.

4.R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004

5.Liptschutz, Seymour, " Discrete Mathematics", McGraw Hill.

6.Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill. 4. Deo,

7.Narsingh, "Graph Theory With application to Engineering and Computer.Science.", PHI.

8. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi