

**JIS College of Engineering**  
**(NAAC 'A' Accredited Autonomous Institution)**

**Syllabus for M. Tech (SE) 1<sup>ST</sup> YEAR 1<sup>ST</sup> SEM**

**Paper Name: Discrete Structure**

**Paper Code: MSE 104**

**Contact: 3L+1T**

**Course contents**

**Module I**

Sets and functions, Groups, Semi groups and monoids, Cyclic semi groups and submonoids, Subgroups and Cosets, Congruence relations on Semi groups. Morphisms, Normal subgroups. Structure of cyclic groups, permutation groups, dihedral groups. Elementary applications in coding theory.

10L

**Module II**

**Rings and Boolean Algebra**

Rings, Subrings, morphism of rings, ideals and quotient rings. Euclidean domains. Integral domains and fields. Boolean Algebra - direct product, Morphisms. Boolean sub-algebra. Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.

10L

**Module III**

**Recursion and Recurrence Relation**

Basic idea, Sequence and discrete function. Generating functions and applications.

5L

**Module IV**

**Graph Theory**

Graphs, Digraphs, Isomorphism, Walks, Paths, Circuits, Shortest Path Problem, Dijkstra's Algorithm, Trees, Properties of Trees, Cotrees and Fundamental Circuits, Shortest Spanning Trees - Kruskal's Algorithm, Prims' Algorithm, DFS, BFS, Cut Sets, Fundamental Cut Sets and Cut Vertices, Planar and Dual Graphs, Metric Representation of Graphs, Networks, Flow Augmenting Path, Ford-Fulkerson Algorithm for Maximum Flow.

15L

**Suggested Text / Reference Books:**

1. Kolmann, Busby and Ross, “Discrete mathematical structures”, 3/ed, Pearson Ed.
2. Liu C. L., “Introduction to combinatorial mathematics”, McGraw Hill, 1968.
3. Mott J. L., Kandel A. and Baker T. P., “Discrete mathematics for Computer Scientists and Mathematicians”, PH, 1986.
4. Rosen—Discrete Mathematics, 2/e, TMH.
5. S.K. Mapa—Higher Algebra (Abstract & Modern).
6. Robert J. McElice, Robert B. Ash & Carol Ash, “Introduction to discrete Mathematics”, Tata McGraw Hill.
7. Deo N., “Graph Theory with Applications to Engineering and Computer Science”, PHI, 1980.
8. Tremblay and Manohar, “Discrete mathematical structures with applications to computer science”, McGraw Hill, 1975.