



# SILVER OAK UNIVERSITY

College of Computer Application  
Integrated M.Sc (IT)

Subject Name: Advanced Mathematics for Computer Applications

Subject Code: 1040275102

Semester:II

**Prerequisite:** Mathematics for Computer Applications

**Objective:**

- To introduce mathematical concepts of matrix, group theory, graph theory and tree
- To enable students analyze various techniques to apply them on real world problems of computer science.

**Teaching and Examination Scheme:**

| Teaching Scheme |   |   | Credits | Evaluation Scheme |    |          |    | Total Marks |
|-----------------|---|---|---------|-------------------|----|----------|----|-------------|
| L               | T | P | C       | Internal          |    | External |    |             |
|                 |   |   |         | Th                | Pr | Th       | Pr |             |
| 4               | 0 | 0 | 4       | 40                |    | 60       |    | 100         |

**Content:**

| Unit No. | Course Contents   | Teaching Hours | Weightage % |
|----------|---|----------------|-------------|
| 1        | <b>Matrices</b> <ul style="list-style-type: none"> <li>➤ Definition and Types</li> <li>➤ Algebra of Matrices</li> <li>➤ Ad-joint and Inverse</li> <li>➤ Matrix Inversion Method</li> <li>➤ Applications</li> </ul>  | 10             | 20          |
| 2        | <b>Group Theory</b> <ul style="list-style-type: none"> <li>➤ Binary and n-Ary Operations</li> <li>➤ Algebraic System: Definition and Properties</li> <li>➤ Semi-Groups and Monoids</li> <li>➤ Sub Semi-Groups and Sub-Monoids</li> <li>➤ Group, Order of a Group, Order of an Element, Properties of Group</li> <li>➤ Permutation Group, Dihedral Group, Cyclic Group, Subgroups</li> <li>➤ Applications</li> </ul> | 10             | 20          |

|   |  |    |    |
|---|--|----|----|
| 3 | <b>Graph Theory</b> <ul style="list-style-type: none"> <li>➤ Directed and Undirected Graphs</li> <li>➤ Special Simple Graphs</li> <li>➤ Operations on Graphs</li> <li>➤ Matrix Representation of Graphs</li> <li>➤ Graphs Invariants and Isomorphism</li> <li>➤ Walk, Path, Circuit</li> <li>➤ Connectedness in Undirected Graphs</li> <li>➤ Euler Path and Circuit</li> <li>➤ Hamiltonian Path and Circuit</li> <li>➤ Shortest Path in Graph: Dijkstra's Algorithm</li> <li>➤ Applications</li> </ul> | 20 | 35 |
| 4 | <b>Trees and Spanning Trees</b> <ul style="list-style-type: none"> <li>➤ Introduction of a Tree, Properties of Tree</li> <li>➤ Distance and Center in a Tree</li> <li>➤ Rooted Tree, Height of a Vertex, Height of a Tree, Descendent and Children of a Vertex, Leaf, Internal Vertex</li> <li>➤ Binary Tree, Properties of Binary Tree</li> <li>➤ Spanning Tree</li> <li>➤ Minimum Spanning Tree, Prim's and Kruskal's Algorithms</li> <li>➤ Applications</li> </ul>                                  | 16 | 25 |

#### Course Outcome:

| Sr. No. | CO statement  | Unit No |
|---------|---|---------|
| CO-1    | Determine need of matrices in image processing, computer graphics and cryptography                                  | 1       |
| CO-2    | Apply knowledge of group theory for data encryption.  | 2       |
| CO-3    | Design and use foundational concepts of notations and results of graph theory in information storage and retrieval. | 3       |
| CO-4    | Apply the basic concepts of spanning tree algorithm namely DFA, BFS, Prim's and Kruskal's in design of networks.    | 4       |

#### Books Recommended:

1. T. Veerarajan, Discrete Mathematics with Graph Theory and Combinatorics, Tata McGraw Hill.
2. P. Lancaster, M. Tismenetsky, The Theory of matrices with applications.
3. N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI.
4. Kenneth H Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, Tata McGraw Hill.
5. U. Agarwal, U. Pal Singh, Graph Theory, University Science Press.
6. J. P. Singh, Calculus, Ane Books Pvt. Ltd.