Semester IV

Savitribai Phule Pune University

S.Y.B.Sc. (Computer Science) - Sem – IV

Course Type: Major

Course Code: CS-253-MJ-P

Course Title : Lab Course based on CS-251-MJ-T & CS-252-MJ-T

Teaching Scheme	No. of Credits	Examination Scheme
04 Hrs/ week	2	IE : 15 marks UE: 35 marks

Prerequisites

- Fundamentals concepts of Pointers, Data Structures,
- knowledge of Algorithm and proficiency in memory management
- Basic Knowledge of DBMS and SQL Queries.
- Basics concepts of Relational Database Design and ER model.

Course Objectives

- Apply tree-based data structures by implementing Binary Search Trees (BST) and traversal techniques.
- Analyze graph representations and perform fundamental graph operations, including traversal, topological sorting, and spanning tree algorithms.
- Evaluate shortest path algorithms and their efficiency in solving real-world pathfinding problems.
- Design and implement hash table techniques for efficient data storage and retrieval.

Course Outcomes: -

On completion of this course, students will be able to:

CO1: Understand the basic concepts of data structures.

CO2: Choose the appropriate data structure for a given problem.

CO3: Design and implement database applications to solve real-world problems.

CO4: Implement database security concept and access control mechanism.

Operating Environment:

For Data Structures II

Operating system: Linux

Editor: Any linux based editor like vi, gedit etc.

Compiler: cc or gcc

For Database Management System II

Operating system: Linux

Editor: Any linux based editor like vi, gedit etc.

Suggested List of Assignments:

A) Data Structures II

Assignment 1. Binary Search Tree and Traversals

1. Implementation of Binary Search Tree (BST) to perform Create, Search, Insert, Copy operation on BST
2. Implementation of Traversal Techniques: Inorder, Preorder and Postorder

Assignment 2. Binary Search Tree Operations and Applications

1. Implement Binary Search Tree (BST) to perform following operations on BST–copy and mirror image of BST, counting leaf, non-leaf and total nodes.
2. Level-order traversal of binary search tree using queue.
3. Heap sort

Assignment 3. Graph implementation

1. Implement Graph as adjacency matrix and adjacency list
2. Calculate indegree and outdegree of vertices
3. Graph traversals: BFS and DFS.

Assignment 4. Graph Applications - I

1. Implementation of Topological sorting
2. Implementation of Prims/Kruskals Minimum spanning tree algorithm

Assignment 5. Graph Applications - II

1. Implementation of Dijkstra's shortest path algorithm for finding Shortest Path from a given source vertex using adjacency cost matrix.
2. Implementation of Floyd Warshall algorithm for all pairs shortest path.

Assignment 6. Hash Table

1. Implementation of static hash table with Linear Probing.
2. Implementation of static hash table with chaining.
3. Implementation of linked hash table with chaining.

B) Database Management Systems II:

Lab Book:

Assignment 1: Stored Procedure

1. A Simple Stored Procedure
2. A Stored Procedure with IN, OUT and IN/OUT parameter

Assignment 2: Function

1. A Simple Stored Function
2. A Stored Function that returns
3. A Stored Function recursive

Assignment 3: Cursors

1. A Simple Cursor
2. A Parameterize Cursor

Assignment 4: Exception Handling

1. Simple Exception- Raise Debug Level Messages
2. Simple Exception- Raise Notice Level Messages
3. Simple Exception- Raise Exception Level Messages

Assignment 5: Triggers

1. Before Triggers (insert, update, delete)
2. After Triggers (insert, update, delete)

Note: Laboratory handbook prepared by the University.