

**Marks: 40**

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

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	<p>iii) (3 Marks) Suppose the Student ID 120 needs to be deleted. Show the updated BST after performing deletion while maintaining BST properties.</p> <p>iv) (2 Marks) Analyze the worst-case and average-case time complexity of insertion, searching, and deletion in a BST. Discuss how an unbalanced BST can affect performance and propose an alternative approach to improve efficiency.</p> <p><i>(Full correct implementation: 10 marks, Partial correctness: 6-8 marks, Minor issues: 3-5 marks)</i></p>		
2.	<p>a) (i) Explain the differences between In-order, Pre-order, and Post-order traversal of a Binary Tree with an example? (ii) How a MinHeap is different from MaxHeap. Give an example.</p> <p>b) Write a C program to implement an AVL Tree with the following functionalities:</p> <ol style="list-style-type: none"> Insertion of a node (Ensure the balance factor is maintained). Left and Right Rotation functions to maintain balance. Display the tree in In-order traversal to verify balancing. <p>Requirements: (1) Explain the importance of the balance factor. (2) Demonstrate with an example how an imbalance is corrected using rotations.</p> <p><i>(Full correct implementation: 10 marks, Partial correctness: 6-8 marks, Minor issues: 3-5 marks)</i></p>	5	CO1
		10	CO3
3.	<p>Problem Solving (Analysis & Evaluation Level): A traffic navigation system needs to efficiently manage road networks where each intersection is a node, and roads are weighted edges (distance/time). The system should be able to:</p> <ol style="list-style-type: none"> Find the shortest path between two locations. Identify the best route when certain roads are closed due to maintenance. <p>Task:</p> <ol style="list-style-type: none"> Propose a Graph-based model for this system. Explain how this Graph can be used for shortest path calculation. Draw a diagram to represent the structure of this system. <p><i>(Solution approach: 5 marks, Diagram: 3 marks, Explanation: 2 marks)</i></p>	10	CO3

Good Luck