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**Time taken** 8 mins 10 secs

**Marks** 4.00/10.00

**Grade** 40.00 out of 100.00

### Question 1

Complete

Mark 0.00 out of 1.00

What is the maximum number of nodes in a binary tree of height `h` (where height is counted as the number of edges from root to the deepest node)?

- ☐ a.  $(2^{h+1} - 1)$
- ☒ b.  $(2^h - 1)$
- ☐ c.  $(h \log h)$
- ☐ d.  $(h^2)$

$h = 1 \text{ to } n$

### Question 2

Complete

Mark 1.00 out of 1.00

Consider the following pseudo-code for a function `func(Node root)` applied to a binary tree. What does it compute? Function func(Node root): if root is NULL: return 0 return 1 + func(root.left) + func(root.right)

- ☒ a. Number of nodes in the tree
- ☐ b. Maximum depth of the tree
- ☐ c. Height of the tree
- ☐ d. Sum of all node values

### Question 3

Complete

Mark 0.00 out of 1.00

Which of the following is always true for a full binary tree with `n` nodes?

- ☒ a. Every level is completely filled
- ☐ b. Every node has either 0 or 2 children
- ☐ c. The height of the tree is always  $\log n$
- ☐ d. The tree is always balanced

**Question 4**

Complete

Mark 1.00 out of 1.00

Given a BST, which of the following elements will always be found in the left subtree of a node with value `x`?

- ☐ a. Elements equal to `x`
- ☐ b. All elements in the tree
- ☐ c. Elements greater than `x`
- ☒ d. Elements less than `x`

**Question 5**

Complete

Mark 1.00 out of 1.00

What is the output of the following function when applied to a BST? Function findMin(Node root): if root is NULL: return NULL if root.left is NULL: return root.data return findMin(root.left)

- ☐ a. The height of the BST
- ☐ b. The maximum value in the BST
- ☒ c. The minimum value in the BST
- ☐ d. The sum of all nodes

**Question 6**

Complete

Mark 0.00 out of 1.00

What is the worst-case time complexity of deleting a node in an unbalanced BST with `n` nodes?

- ☐ a.  $O(n)$
- ☒ b.  $O(\log n)$
- ☐ c.  $O(n \log n)$
- ☐ d.  $O(1)$

**Question 7**

Complete

Mark 0.00 out of 1.00

Which of the following statements is true for Dijkstra's Algorithm?

- ☒ a. It works only for graphs with non-negative weights
- ☐ b. It guarantees the shortest path in all cases
- ☐ c. It works correctly with negative-weight cycles
- ☒ d. It finds the shortest path between all pairs of nodes

**Question 8**

Complete

Mark 0.00 out of 1.00

What is the time complexity of Depth-First Search (DFS) on a graph with 'V' vertices and 'E' edges using an adjacency matrix?

- ☒ a.  $O(V + E)$
- ☐ b.  $O(E \log V)$
- ☐ c.  $O(V)$
- ☐ d.  $O(V^2)$

**Question 9**

Complete

Mark 0.00 out of 1.00

Which traversal method should be used to determine if a directed graph contains a cycle?

- ☒ a. Dijkstra's Algorithm
- ☐ b. Breadth-First Search (BFS)
- ☐ c. Depth-First Search (DFS) with recursion stack
- ☐ d. Kruskal's Algorithm

**Question 10**

Complete

Mark 1.00 out of 1.00

What is the output of the following function when applied to an undirected graph represented as an adjacency list? Function fun(Node start): Queue Q Add start to Q While Q is not empty: Node u = Q.dequeue() print u For each neighbor v of u: If v is not visited: Mark v as visited Add v to Q

- ☐ a. Finding the minimum spanning tree
- ☐ b. Depth-First Traversal
- ☐ c. Detection of cycles
- ☒ d. Breadth-First Traversal