# MCQs from Unit-4 (Trees and Graphs)

### 1. What is a tree in data structures?

\*\*a)\*\* A collection of vertices and edges forming cycles

\*\*b)\*\* A hierarchical structure consisting of nodes and edges

\*\*c)\*\* A sequence of nodes stored linearly

\*\*d)\*\* A type of linked list

\*\*Answer:\*\* b) A hierarchical structure consisting of nodes and edges

### 2. What is the degree of a node in a tree?

\*\*a)\*\* The number of nodes in the tree

\*\*b)\*\* The number of edges connected to the node

\*\*c)\*\* The level of the node

\*\*d)\*\* The depth of the node

\*\*Answer:\*\* b) The number of edges connected to the node

### 3. What is the in-degree of a node in a tree?

\*\*a)\*\* Number of edges arriving at the node

\*\*b)\*\* Number of edges leaving the node

\*\*c)\*\* Number of children of the node

\*\*d)\*\* Total edges connected to the node

\*\*Answer:\*\* a) Number of edges arriving at the node

### 4. What is a leaf node?

\*\*a)\*\* A node with no children

\*\*b)\*\* A node with one child

\*\*c)\*\* A node with multiple parents

\*\*d)\*\* The root node of the tree

\*\*Answer:\*\* a) A node with no children

### 5. What is the height of a tree?

\*\*a)\*\* Total number of edges in the tree

\*\*b)\*\* Length of the longest path from the root to a leaf

\*\*c)\*\* Number of nodes in the tree

\*\*d)\*\* The sum of all node levels

\*\*Answer:\*\* b) Length of the longest path from the root to a leaf

### 6. Which node in a tree has an in-degree of 0?

\*\*a)\*\* Internal node

\*\*b)\*\* Root node

\*\*c)\*\* Leaf node

\*\*d)\*\* Parent node

\*\*Answer:\*\* b) Root node

### 7. What is a forest in data structures?

\*\*a)\*\* A set of disjoint graphs

\*\*b)\*\* A collection of trees

\*\*c)\*\* A cyclic graph

\*\*d)\*\* A tree with multiple roots

\*\*Answer:\*\* b) A collection of trees

### 8. What is a binary tree?

\*\*a)\*\* A tree where each node has at most two children

\*\*b)\*\* A tree where every node has exactly two children

\*\*c)\*\* A tree with one root and one leaf

\*\*d)\*\* A tree with only left or right children

\*\*Answer:\*\* a) A tree where each node has at most two children

### 9. In a binary tree, how many nodes can there be at level \(i\)?

\*\*a)\*\* \(i^2\)

\*\*b)\*\* \(2^i\)

\*\*c)\*\* \(i+2\)

\*\*d)\*\* \(2^{i-1}\)

\*\*Answer:\*\* b) \(2^i\)

### 10. What is a full binary tree?

\*\*a)\*\* A tree where all internal nodes have two children and all leaves are at the same level

\*\*b)\*\* A tree where each node has at most two children

\*\*c)\*\* A tree where every level is completely filled

\*\*d)\*\* A tree where all nodes have the same degree

\*\*Answer:\*\* a) A tree where all internal nodes have two children and all leaves are at the same level

### 11. What is a complete binary tree?

\*\*a)\*\* A binary tree in which all levels except possibly the last are completely filled

\*\*b)\*\* A binary tree where all nodes have two children

\*\*c)\*\* A binary tree where nodes are arranged in a specific order

\*\*d)\*\* A binary tree with only leaf nodes

\*\*Answer:\*\* a) A binary tree in which all levels except possibly the last are completely filled

### 12. What is an expression tree?

\*\*a)\*\* A tree representing logical expressions

\*\*b)\*\* A tree where leaves are operands and internal nodes are operators

\*\*c)\*\* A tree used for mathematical calculations

\*\*d)\*\* A binary tree used for sorting

\*\*Answer:\*\* b) A tree where leaves are operands and internal nodes are operators

### 13. What traversal method visits the root node, then the left subtree, and finally the right subtree?

\*\*a)\*\* In-order

\*\*b)\*\* Post-order

\*\*c)\*\* Pre-order

\*\*d)\*\* Level-order

\*\*Answer:\*\* c) Pre-order

### 14. In which traversal is the root node visited between traversing the left and right subtrees?

\*\*a)\*\* Pre-order

\*\*b)\*\* In-order

\*\*c)\*\* Post-order

\*\*d)\*\* Level-order

\*\*Answer:\*\* b) In-order

### 15. Which traversal method visits the left subtree, right subtree, and then the root node?

\*\*a)\*\* Pre-order

\*\*b)\*\* In-order

\*\*c)\*\* Post-order

\*\*d)\*\* Level-order

\*\*Answer:\*\* c) Post-order

### 16. What is the time complexity of traversing a binary tree?

\*\*a)\*\* O(1)

\*\*b)\*\* O(n)

\*\*c)\*\* O(log n)

\*\*d)\*\* O(n^2)

\*\*Answer:\*\* b) O(n)

### 17. What is a threaded binary tree?

\*\*a)\*\* A tree with pointers to in-order predecessors and successors

\*\*b)\*\* A tree where nodes are connected in a circular fashion

\*\*c)\*\* A tree used for multithreading applications

\*\*d)\*\* A tree with additional pointers for memory optimization

\*\*Answer:\*\* a) A tree with pointers to in-order predecessors and successors

### 18. How many pointers are present in each node of a doubly threaded binary tree?

\*\*a)\*\* One

\*\*b)\*\* Two

\*\*c)\*\* Three

\*\*d)\*\* Four

\*\*Answer:\*\* d) Four

### 19. What is the main property of a binary search tree (BST)?

\*\*a)\*\* Left subtree contains nodes with values greater than the root

\*\*b)\*\* Right subtree contains nodes with values greater than the root

\*\*c)\*\* Nodes are arranged in random order

\*\*d)\*\* Left subtree contains smaller values, and the right subtree contains larger values

\*\*Answer:\*\* d) Left subtree contains smaller values, and the right subtree contains larger values

### 20. Which traversal is commonly used to retrieve elements from a BST in sorted order?

\*\*a)\*\* Pre-order

\*\*b)\*\* Post-order

\*\*c)\*\* In-order

\*\*d)\*\* Level-order

\*\*Answer:\*\* c) In-order

### 21. What is an AVL tree?

\*\*a)\*\* A self-balancing binary search tree

\*\*b)\*\* A tree where all nodes have the same height

\*\*c)\*\* A tree where nodes are connected in a circular manner

\*\*d)\*\* A binary tree without leaves

\*\*Answer:\*\* a) A self-balancing binary search tree

### 22. What is the balance factor of a node in an AVL tree?

\*\*a)\*\* The difference between the heights of the left and right subtrees

\*\*b)\*\* The sum of the heights of the left and right subtrees

\*\*c)\*\* The total number of nodes in the tree

\*\*d)\*\* The depth of the node

\*\*Answer:\*\* a) The difference between the heights of the left and right subtrees

### 23. What does a balance factor of 0 indicate in an AVL tree?

\*\*a)\*\* Left subtree is taller

\*\*b)\*\* Right subtree is taller

\*\*c)\*\* Both subtrees have equal height

\*\*d)\*\* Tree is unbalanced

\*\*Answer:\*\* c) Both subtrees have equal height

### 24. What is a graph in data structures?

\*\*a)\*\* A collection of nodes connected by edges

\*\*b)\*\* A hierarchical structure of data

\*\*c)\*\* A linear data structure

\*\*d)\*\* A tree with multiple roots

\*\*Answer:\*\* a) A collection of nodes connected by edges

### 25. What is a directed graph?

\*\*a)\*\* A graph with undirected edges

\*\*b)\*\* A graph where all edges have a direction

\*\*c)\*\* A graph where nodes are arranged in levels

\*\*d)\*\* A graph with no edges

\*\*Answer:\*\* b) A graph where all edges have a direction

### 26. What is a spanning tree?

\*\*a)\*\* A tree with multiple roots

\*\*b)\*\* A subgraph that includes all vertices and forms a tree

\*\*c)\*\* A tree with cycles

\*\*d)\*\* A binary tree used for searching

\*\*Answer:\*\* b) A subgraph that includes all vertices and forms a tree

### 27. What is the purpose of Prim's algorithm?

\*\*a)\*\* To find the shortest path in a graph

\*\*b)\*\* To find the minimum spanning tree of a graph

\*\*c)\*\* To perform depth-first search

\*\*d)\*\* To traverse a graph level by level

\*\*Answer:\*\* b) To find the minimum spanning tree of a graph

### 28. What is Dijkstra's algorithm used for?

\*\*a)\*\* Finding the longest path in a graph

\*\*b)\*\* Finding the shortest path from a source to all vertices

\*\*c)\*\* Constructing a binary search tree

\*\*d)\*\* Sorting edges in a graph

\*\*Answer:\*\* b) Finding the shortest path from a source to all vertices