1.What is the height of a tree?
a) The number of edges in the longest path from the root to a leaf node
b) The number of nodes in the longest path from the root to a leaf node
c) The number of levels in the tree
d) The number of nodes in the tree

Answer: a) The number of edges in the longest path from the root to a leaf node.
Explanation: The height of a tree is defined as the number of edges in the longest path from the root to a leaf node. It represents the depth of the tree.

2.In a binary tree, what is the maximum degree of a node?
a) 1
b) 2
c) 3
d) Unlimited

Answer: b) 2
Explanation: In a binary tree, each node can have at most two children, hence the maximum degree of a node is 2.

3.What operation is NOT typically associated with a binary search tree?
a) Insertion
b) Deletion
c) Search
d) Sorting

Answer: d) Sorting

Explanation: While binary search trees can be used to efficiently perform searching, insertion, and deletion operations, they are not typically used for sorting directly.

4.Which traversal of a binary tree visits the left subtree, then the root, and finally the right subtree?
a) Preorder
b) Inorder
c) Postorder
d) Level order

Answer: b) Inorder
Explanation: In inorder traversal, nodes are visited in the order: left subtree, root, right subtree.

5.What is AVL tree mainly used for?
a) Searching
b) Insertion and deletion operations
c) Sorting
d) Encryption

Answer: b) Insertion and deletion operations
Explanation: AVL trees are self-balancing binary search trees, primarily used to maintain balanced trees during insertion and deletion operations.

6.In a heap, what property is satisfied at every node?
a) Max Heap property
b) Min Heap property

c) AVL property
d) Red-Black tree property

Answer: b) Min Heap property
Explanation: In a min heap, the value of each node is less than or equal to the values of its children, satisfying the min heap property.

7.Which of the following is NOT an application of trees?
a) Symbol table implementation
b) Huffman coding
c) Graph representation
d) Sorting algorithms

Answer: d) Sorting algorithms
Explanation: While trees can be used in various algorithms, sorting algorithms typically don’t directly use trees.

8.Which tree structure is commonly used in databases and file systems?
a) Multi-way Tree
b) B tree
c) Red-Black Tree
d) AVL Tree

Answer: b) B tree
Explanation: B trees are commonly used in databases and file systems due to their ability to store large amounts of data efficiently.

9.What is the key feature of a B+ tree compared to a B tree?

a) B+ trees have a higher branching factor
b) B+ trees store keys in internal nodes
c) B+ trees do not store pointers to data in internal nodes
d) B+ trees have faster search operations

Answer: c) B+ trees do not store pointers to data in internal nodes
Explanation: In B+ trees, only leaf nodes store pointers to data, while internal nodes only store keys for navigation.

10.Which of the following trees is NOT a type of self-balancing binary search tree?
a) AVL Tree
b) Red-Black Tree
c) B Tree
d) Binary Heap

Answer: d) Binary Heap
Explanation: While AVL trees, Red-Black trees, and B trees are all types of self-balancing binary search trees, binary heaps are not self-balancing trees.

11.What is the primary advantage of a Red-Black tree compared to an AVL tree?
a) Red-Black trees have faster insertion and deletion operations
b) Red-Black trees have a lower height
c) Red-Black trees have a simpler balancing mechanism
d) Red-Black trees have a higher degree of balance

Answer: c) Red-Black trees have a simpler balancing mechanism
Explanation: Red-Black trees have a simpler balancing mechanism compared to AVL trees,

making them easier to implement.

12.In a forest, what does each tree represent?
a) A group of nodes
b) A separate data structure
c) A separate connected component
d) A subtree

Answer: c) A separate connected component
Explanation: In a forest, each tree represents a separate connected component in a graph.

13.Which of the following is NOT a type of multi-way tree?
a) B tree
b) B+ tree
c) B* tree
d) AVL tree

Answer: d) AVL tree
Explanation: AVL trees are not multi-way trees; they are self-balancing binary search trees.

14.What is the main advantage of B* trees over B+ trees?
a) B* trees have lower space overhead
b) B* trees have faster search operations
c) B* trees have a higher degree of balance
d) B* trees have faster insertion and deletion operations

Answer: c) B* trees have a higher degree of balance
Explanation: B* trees have a higher degree of balance compared to B+ trees, resulting in

fewer nodes needing to be visited during search operations.

15.Which type of tree is commonly used in relational databases for indexing?
a) AVL tree
b) Red-Black tree
c) B tree
d) Binary tree

Answer: c) B tree
Explanation: B trees are commonly used in relational databases for indexing due to their ability to handle large datasets efficiently.

16.What is the worst-case time complexity for searching in a binary search tree?
a) O(1)
b) O(log n)
c) O(n)
d) O(n log n)

Answer: b) O(log n)
Explanation: In a balanced binary search tree, the worst-case time complexity for searching is O(log n), where n is the number of nodes in the tree.

17.Which type of traversal of a binary tree visits the root before its subtrees?
a) Preorder
b) Inorder
c) Postorder
d) Level order

Answer: a) Preorder
Explanation: Preorder traversal visits the root before traversing its left and right subtrees.

18.In which type of tree are sibling nodes always adjacent to each other in memory?
a) AVL tree
b) Red-Black tree
c) B tree
d) B+ tree

Answer: d) B+ tree
Explanation: In B+ trees, sibling nodes are always adjacent to each other in memory, facilitating efficient range queries.

19.Which balancing operation may be needed in AVL trees after an insertion or deletion?
a) Right rotation
b) Left rotation
c) Restructuring
d) Rebalancing

Answer: c) Restructuring
Explanation: After an insertion or deletion in an AVL tree, restructuring operations such as rotations may be needed to maintain the AVL property.

20.Which tree structure guarantees logarithmic time complexity for all basic operations?
a) AVL tree
b) Red-Black tree
c) B+ tree

d) Binary tree

Answer: c) B+ tree
Explanation: B+ trees guarantee logarithmic time complexity for all basic operations, including insertion, deletion, and searching, even in worst-case scenarios.

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