## Lecture 8-binary search tree and trie

1. What defines a tree data structure?

 a) Multiple roots

 b) Cycles allowed

 c) Single root and no cycles

 d) Unlimited parents per node

 Answer: c) Single root and no cycles

2. In a binary tree, how many children can each node have?

 a) Any number

 b) At most 1

 c) At most 2

 d) Exactly 2

 Answer: c) At most 2

3. Which traversal method visits the root node first?

 a) In-order

 b) Pre-order

 c) Post-order

 d) Level-order

 Answer: b) Pre-order

4. What is the time complexity of searching in a balanced binary search tree?

 a) O(1)

 b) O(log n)

 c) O(n)

 d) O(n^2)

 Answer: b) O(log n)

5. Which data structure is used for implementing level-order traversal?

 a) Stack

 b) Queue

 c) Linked List

 d) Array

 Answer: b) Queue

6. In a binary search tree, where are smaller values stored relative to a node?

 a) Left subtree

 b) Right subtree

 c) Parent node

 d) Sibling nodes

 Answer: a) Left subtree

7. What is the main advantage of a balanced binary search tree over a linked list?

 a) Faster insertion

 b) Faster deletion

 c) Faster search

 d) Less memory usage

 Answer: c) Faster search

8. Which traversal method would print a binary search tree's values in ascending order?

 a) Pre-order

 b) In-order

 c) Post-order

 d) Level-order

 Answer: b) In-order

9. What is the worst-case time complexity for searching in an unbalanced binary search tree?

 a) O(1)

 b) O(log n)

 c) O(n)

 d) O(n^2)

 Answer: c) O(n)

10. In a trie (prefix tree), what does each node typically represent?

 a) A complete word

 b) A character

 c) A number

 d) An object

 Answer: b) A character

11. Which traversal method visits the root node last?

 a) In-order

 b) Pre-order

 c) Post-order

 d) Level-order

 Answer: c) Post-order

12. What is the main advantage of a trie over a binary search tree for storing strings?

 a) Less memory usage

 b) Faster insertion

 c) Faster prefix matching

 d) Simpler implementation

 Answer: c) Faster prefix matching

13. In a binary search tree, where are larger values stored relative to a node?

 a) Left subtree

 b) Right subtree

 c) Parent node

 d) Sibling nodes

 Answer: b) Right subtree

14. Which data structure is typically used for implementing depth-first traversals?

 a) Queue

 b) Stack

 c) Array

 d) Heap

 Answer: b) Stack

15. What is the time complexity of inserting a node into a balanced binary search tree?

 a) O(1)

 b) O(log n)

 c) O(n)

 d) O(n^2)

 Answer: b) O(log n)

16. In a trie, what does the path from the root to a node represent?

 a) A complete word

 b) A prefix

 c) A suffix

 d) An anagram

 Answer: b) A prefix

17. Which tree property ensures that the left subtree of a node contains only nodes with keys less than the node's key?

 a) AVL property

 b) Red-black property

 c) Binary search tree property

 d) Heap property

 Answer: c) Binary search tree property

18. What is the main advantage of using a balanced binary search tree over a regular binary search tree?

 a) Simpler implementation

 b) Less memory usage

 c) Guaranteed O(log n) operations

 d) Faster insertion

 Answer: c) Guaranteed O(log n) operations

19. In a binary tree, which traversal visits nodes level by level from left to right?

 a) In-order

 b) Pre-order

 c) Post-order

 d) Level-order

 Answer: d) Level-order

20. What is the primary use of a trie data structure?

 a) Sorting numbers

 b) Storing and retrieving strings efficiently

 c) Balancing binary trees

 d) Graph traversal

 Answer: b) Storing and retrieving strings efficiently