## 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