Advanced Data Structures – Tricky MCQ Test Paper

Instructions: Attempt all questions. Each question carries equal marks. Space is provided for answers. Difficulty levels are marked as Easy (E), Moderate (M), or Hard (H).

Q1. In a singly linked list, if the head pointer is lost, which of the following is true?

Difficulty: M

A. The list can still be traversed backwards.
B. The list can be restored using the tail pointer only.
C. The entire list becomes inaccessible.
D. Garbage collection automatically restores the head.

Answer: _____

Q2. What is the time complexity of reversing a doubly linked list of n nodes?

Difficulty: E

A. O(1)
B. O(log n)
C. O(n)
D. $O(n^2)$

Answer: _____

Q3. If a queue is implemented using two stacks, the amortized complexity of a dequeue operation is:

Difficulty: H

A. O(1)
B. O(n)
C. O(log n)
D. $O(n^2)$

Answer: _____

Q4. A stack is used to evaluate a postfix expression. The expression has n operands and (n-1) operators. The maximum stack size needed is:

Difficulty: M

A. n
B. n–1
C. log■n
D. n+1

Answer: _____

Q5. Which of these can not be implemented using a single linked list efficiently?

Difficulty: H

A. Stack

B. Queue
C. Deque
D. Polynomial addition

Answer: _____

Q6. In a binary search tree (BST), the inorder traversal gives elements in:

Difficulty: E

A. Random order
B. Descending order
C. Ascending order
D. Level order

Answer: _____

Q7. A full binary tree with 7 internal nodes has how many leaves?

Difficulty: M

A. 6
B. 7
C. 8
D. 9

Answer: _____

Q8. The height of an AVL tree with 15 nodes is approximately:

Difficulty: M

A. 3
B. 4
C. 5
D. 6

Answer: _____

Q9. Which of the following traversal sequences uniquely determines a binary tree?

Difficulty: H

A. Preorder + Inorder
B. Preorder + Postorder
C. Inorder + Level order
D. Postorder + Level order

Answer: _____

Q10. In an expression tree, which nodes are always leaves?

Difficulty: E

A. Operators
B. Operands
C. Internal nodes
D. Parent nodes

Answer: _____

Q11. A graph with n vertices and n-1 edges is:

Difficulty: M

A. Always cyclic
B. Always a tree
C. A forest if connected components exist
D. A DAG

Answer: _____

Q12. The time complexity of DFS using adjacency list representation is:

Difficulty: E

A. O(n)
B. O(n + e)
C. $O(n^2)$
D. $O(e^2)$

Answer: _____

Q13. Which of the following cannot be used for topological sorting?

Difficulty: H

A. DAG
B. Tree
C. Graph with a cycle
D. Directed acyclic graph

Answer: _____

Q14. The space complexity of an adjacency matrix for a graph with n vertices is:

Difficulty: M

A. O(n)
B. O(n log n)
C. $O(n^2)$
D. O(e + n)

Answer: _____

Q15. In BFS, which of the following data structures is used?

Difficulty: E

A. Stack
B. Queue
C. Priority Queue
D. Recursion

Answer: _____

Q16. Which sorting algorithm is stable?

Difficulty: E

A. Quick sort
B. Heap sort
C. Merge sort
D. Selection sort

Answer: _____

Q17. If every element in an array is at most k positions away from its sorted position, the best sorting method is:

Difficulty: H

A. Merge sort
B. Insertion sort
C. Heap sort
D. Radix sort

Answer: _____

Q18. The average case complexity of Quick sort is:

Difficulty: E

A. O(n log n)
B. $O(n^2)$
C. O(n)
D. O(log n)

Answer: _____

Q19. Binary search can be applied only if:

Difficulty: E

A. Data is sorted
B. Data is random
C. Data is unsorted
D. Data is dynamic

Answer: _____

Q20. Which sorting algorithm has the best worst-case complexity among comparison sorts?

Difficulty: M

A. Heap sort
B. Merge sort
C. Quick sort
D. Bubble sort

Answer: _____

Q21. If a linked list has 100 nodes, how many swaps are required to reverse it iteratively?

Difficulty: M

A. 50
B. 99
C. 100

D. 198

Answer: _____

Q22. If the time complexity of an algorithm is O(n log n), doubling the input size increases the time approximately by:

Difficulty: H

A. 2×
B. log■n×
C. 2 log■2n
D. 4×

Answer: _____

Q23. For a graph with 10 vertices, the maximum number of edges in an undirected simple graph is:

Difficulty: E

A. 45
B. 90
C. 100
D. 20

Answer: _____

Q24. The number of comparisons in the best case of bubble sort is:

Difficulty: E

A. n^2
B. n log n
C. n–1
D. 0

Answer: _____

Q25. If hashing uses chaining and all keys hash to the same index, search time becomes:

Difficulty: M

A. O(1)
B. O(log n)
C. O(n)
D. $O(n^2)$

Answer: _____

Answer Key

Q1: C
Q2: C
Q3: A
Q4: A
Q5: C
Q6: C
Q7: C
Q8: C
Q9: A
Q10: B
Q11: C
Q12: B
Q13: C
Q14: C
Q15: B
Q16: C
Q17: C
Q18: A
Q19: A
Q20: B
Q21: B
Q22: C
Q23: A
Q24: C
Q25: C