

Data Structure and Algorithm

UNIT 1: Introduction to Data Structures & Algorithms (1–12)

1. Which of the following is a collection of data elements with a logical relationship?
 - A. Data type
 - B. Data structure
 - C. Algorithm
 - D. Variable
2. An Abstract Data Type (ADT) defines:
 - A. Only data
 - B. Only operations
 - C. Data and operations together
 - D. Memory allocation
3. Which of the following is NOT a primitive data type?
 - A. int
 - B. float
 - C. char
 - D. stack
4. Dynamic memory allocation in C is done using:
 - A. malloc()
 - B. sizeof()
 - C. printf()
 - D. scanf()
5. Which function is used to deallocate dynamic memory in C?
 - A. delete()
 - B. remove()
 - C. free()
 - D. clear()
6. Which header file is required for dynamic memory allocation?
 - A. stdio.h
 - B. conio.h
 - C. stdlib.h
 - D. string.h

7. An algorithm must be:
- A. Finite
 - B. Ambiguous
 - C. Infinite
 - D. Hardware dependent
8. Which notation describes the upper bound of an algorithm?
- A. Ω (Omega)
 - B. Θ (Theta)
 - C. O (Big-O)
 - D. Σ (Sigma)
9. Best case complexity is represented by:
- A. Big-O
 - B. Big- Ω
 - C. Big- Θ
 - D. Log-O
10. Which of the following grows fastest?
- A. $O(n)$
 - B. $O(\log n)$
 - C. $O(n^2)$
 - D. $O(1)$
11. Time complexity depends on:
- A. Compiler
 - B. Input size
 - C. Output size
 - D. Operating system
12. Which complexity represents constant time?
- A. $O(n)$
 - B. $O(\log n)$
 - C. $O(1)$
 - D. $O(n \log n)$
13. Stack follows which principle?
- A. FIFO
 - B. LIFO
 - C. FILO
 - D. Random

14. Which operation inserts an element into a stack?
- A. Pop
 - B. Push
 - C. Peek
 - D. Display
15. Which operation removes an element from a stack?
- A. Push
 - B. Pop
 - C. Insert
 - D. Append
16. Stack overflow occurs when:
- A. Stack is empty
 - B. Stack is full
 - C. Memory leak happens
 - D. Stack pointer is null
17. Stack underflow occurs when:
- A. Stack is full
 - B. Stack is empty
 - C. Stack pointer overflows
 - D. Stack grows dynamically
18. Which application uses stack?
- A. CPU scheduling
 - B. Expression evaluation
 - C. BFS traversal
 - D. Disk scheduling
19. Infix expression is:
- A. A+B
 - B. AB+
 - C. +AB
 - D. A+B+
20. Postfix expression is:
- A. A+B
 - B. AB+
 - C. +AB
 - D. (A+B)

21. Prefix expression is:

- A. $A+B$
- B. $AB+$
- C. $+AB$
- D. $(A+B)$

22. Stack is used in:

- A. Recursion
- B. Sorting
- C. Searching
- D. Hashing

23. Which element is accessed in stack?

- A. Bottom
- B. Middle
- C. Random
- D. Top

24. Which stack operation returns top element without removing it?

- A. Push
- B. Pop
- C. Peek
- D. Display

25. Queue follows which principle?

- A. LIFO
- B. FIFO
- C. FILO
- D. Random

26. In queue, insertion happens at:

- A. Front
- B. Middle
- C. Rear
- D. Any position

27. Deletion in queue happens at:

- A. Rear
- B. Front
- C. Middle
- D. End

28. Which queue overcomes wastage of space?
- A. Linear Queue
 - B. Simple Queue
 - C. Circular Queue
 - D. Priority Queue
29. Which queue assigns priority to elements?
- A. Linear Queue
 - B. Circular Queue
 - C. Priority Queue
 - D. Deque
30. Queue overflow occurs when:
- A. Queue is empty
 - B. Queue is full
 - C. Front = -1
 - D. Rear = -1
31. Which application uses queue?
- A. Function call
 - B. Recursion
 - C. CPU scheduling
 - D. Expression evaluation
32. Which operation inserts element in queue?
- A. Dequeue
 - B. Enqueue
 - C. Push
 - D. Pop
33. Which operation removes element from queue?
- A. Enqueue
 - B. Push
 - C. Pop
 - D. Dequeue
34. Deque allows insertion and deletion at:
- A. Front only
 - B. Rear only
 - C. Both ends
 - D. Middle

35. Which queue is used in BFS?
- A. Stack
 - B. Priority Queue
 - C. Circular Queue
 - D. Simple Queue
36. Queue can be implemented using:
- A. Array
 - B. Linked list
 - C. Both A and B
 - D. None
37. A function calling itself is called:
- A. Iteration
 - B. Recursion
 - C. Looping
 - D. Nesting
38. Base condition is used to:
- A. Increase recursion
 - B. Stop recursion
 - C. Optimize memory
 - D. Increase speed
39. Tail recursion means:
- A. Recursive call at start
 - B. Recursive call in middle
 - C. Recursive call at end
 - D. No recursive call
40. Which problem is best solved using recursion?
- A. Factorial
 - B. Sorting
 - C. Searching
 - D. Hashing
41. Tower of Hanoi problem uses:
- A. Stack
 - B. Queue
 - C. Recursion
 - D. Tree

42. Recursive calls are stored in:
- A. Heap
 - B. Queue
 - C. Stack
 - D. Array
43. Recursive approach generally uses:
- A. Less memory
 - B. More memory
 - C. No memory
 - D. Fixed memory
44. Which is faster generally?
- A. Recursion
 - B. Iteration
 - C. Both same
 - D. Depends on compiler
45. Fibonacci sequence is an example of:
- A. Linear recursion
 - B. Binary recursion
 - C. Tail recursion
 - D. Infinite recursion
46. GCD can be computed using:
- A. Stack
 - B. Queue
 - C. Recursion
 - D. Hashing
47. Recursive function must have:
- A. Loop
 - B. Return value
 - C. Base case
 - D. Global variable
48. Which is NOT an application of recursion?
- A. Tree traversal
 - B. Graph traversal
 - C. Binary search
 - D. Bubble sort

49. A list is a collection of:
- A. Similar data
 - B. Different data
 - C. Random data
 - D. Unrelated data
50. Which list implementation uses contiguous memory?
- A. Linked list
 - B. Array list
 - C. Circular list
 - D. Doubly list
51. Linked list stores elements in:
- A. Contiguous memory
 - B. Random memory
 - C. Stack
 - D. Queue
52. Each node in singly linked list contains:
- A. Data only
 - B. Address only
 - C. Data and next pointer
 - D. Two pointers
53. Doubly linked list has:
- A. One pointer
 - B. Two pointers
 - C. Three pointers
 - D. No pointer
54. Circular linked list last node points to:
- A. NULL
 - B. First node
 - C. Middle node
 - D. Itself
55. Which insertion is fastest in linked list?
- A. Beginning
 - B. Middle
 - C. End
 - D. Random

56. Which deletion is easiest in linked list?

- A. Beginning
- B. End
- C. Middle
- D. Random

57. Linked list overcomes:

- A. Stack overflow
- B. Memory wastage
- C. Queue overflow
- D. Recursion

58. Stack can be implemented using:

- A. Array
- B. Linked list
- C. Both
- D. None

59. Queue implemented using linked list avoids:

- A. Overflow
- B. Underflow
- C. Priority
- D. Recursion

60. Head pointer of linked list points to:

- A. Last node
- B. First node
- C. NULL
- D. Random

61. Which operation is costly in linked list?

- A. Insertion
- B. Deletion
- C. Traversal
- D. Memory allocation

62. Linked list does not allow:

- A. Dynamic size
- B. Efficient insertion
- C. Random access
- D. Efficient deletion

63. Which list uses both previous and next pointers?

- A. Singly
- B. Circular
- C. Doubly
- D. Simple

64. Which is NOT a type of linked list?

- A. Singly
- B. Doubly
- C. Circular
- D. Linear array

65. Sorting means arranging data in:

- A. Random order
- B. Ascending/Descending
- C. Reverse only
- D. Hash order

66. Bubble sort repeatedly:

- A. Selects minimum
- B. Swaps adjacent elements
- C. Divides array
- D. Builds heap

67. Selection sort selects:

- A. Largest element
- B. Smallest element
- C. Random element
- D. Middle element

68. Insertion sort works like:

- A. Playing cards
- B. Queue
- C. Stack
- D. Tree

69. Which sort is stable?

- A. Selection sort
- B. Quick sort
- C. Bubble sort
- D. Heap sort

70. Merge sort follows:

- A. Greedy method
- B. Dynamic programming
- C. Divide and conquer
- D. Backtracking

71. Quick sort uses:

- A. Pivot
- B. Heap
- C. Queue
- D. Stack only

72. Worst case of quick sort is:

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

73. Heap sort uses:

- A. Binary tree
- B. Binary heap
- C. Stack
- D. Queue

74. Which sorting is fastest on average?

- A. Bubble
- B. Selection
- C. Quick
- D. Insertion

75. External sorting is used when:

- A. Data fits in memory
- B. Data is small
- C. Data is large
- D. Data is sorted

76. Shell sort is an improvement of:

- A. Bubble
- B. Selection
- C. Insertion
- D. Merge

77. Merge sort requires:

- A. No extra space
- B. Constant space
- C. Extra memory
- D. Stack only

78. Which is comparison sort?

- A. Counting sort
- B. Radix sort
- C. Bubble sort
- D. Bucket sort

79. Searching means:

- A. Sorting data
- B. Finding element
- C. Deleting data
- D. Inserting data

80. Linear search time complexity:

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

81. Binary search requires:

- A. Sorted array
- B. Unsorted array
- C. Linked list
- D. Stack

82. Best case of binary search:

- A. $O(n)$
- B. $O(n \log n)$
- C. $O(1)$
- D. $O(\log n)$

83. Hashing is used to:

- A. Sort data
- B. Search faster
- C. Traverse graph
- D. Compress data

84. Hash function maps keys to:
- A. Nodes
 - B. Values
 - C. Hash table index
 - D. Queue
85. Collision occurs when:
- A. Same key inserted
 - B. Same index generated
 - C. Table is full
 - D. Data lost
86. Which is collision resolution technique?
- A. Sorting
 - B. Linear probing
 - C. Traversal
 - D. Recursion
87. Load factor is:
- A. Size of table
 - B. Number of keys
 - C. Keys/Table size
 - D. Collisions
88. Which hashing method uses linked list?
- A. Linear probing
 - B. Quadratic probing
 - C. Chaining
 - D. Rehashing
89. Tree is a:
- A. Linear structure
 - B. Non-linear structure
 - C. Circular structure
 - D. Sequential structure
90. Root of tree has:
- A. Parent
 - B. Child only
 - C. No parent
 - D. No child

91. Degree of a node is:

- A. Height
- B. Depth
- C. Number of children
- D. Level

92. Binary tree has maximum children:

- A. 1
- B. 2
- C. 3
- D. Unlimited

93. In order traversal of BST gives:

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

94. AVL tree is:

- A. Unbalanced tree
- B. Balanced BST
- C. Heap tree
- D. Binary heap

95. Balance factor of AVL tree is:

- A. -2,0,2
- B. -1,0,1
- C. 0,1,2
- D. Any value

96. Graph consists of:

- A. Nodes only
- B. Edges only
- C. Vertices and edges
- D. Trees

97. BFS uses:

- A. Stack
- B. Queue
- C. Recursion
- D. Heap

98. DFS uses:

- A. Queue
- B. Stack
- C. Heap
- D. Array

99. Minimum spanning tree connects:

- A. All vertices with minimum cost
- B. Few vertices
- C. Only root
- D. Cycles

100. Dijkstra's algorithm is used for:

- A. Sorting
- B. Searching
- C. Shortest path
- D. Spanning tree

The END