ADS Mid Quiz

1. Which data structure follows the Last In First Out (LIFO) principle?

- ○ Queue
- ◉ Stack
- ○ Array
- ○ Linked List

2. In a min-heap, what is the time complexity of extracting the minimum element?

- ◉ O(1)
- ○ O(n log n)
- ○ O(n)
- ○ O(log n)

3. Which of the following data structures allows insertion and deletion from both ends?

- ◉ Dequeue
- ○ Queue
- ○ Stack
- ○ Priority Queue

4. In a circular queue of size n, if the front is at position i and the rear is at position j, what is the condition for the queue being full?

- ○ i == j
- ○ (i + 2) % n == j
- ◉ (j + 1) % n == i
- ○ (i + 1) % n == j

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5. What will be the result of the following code for inserting an element into a Min-Heap?

```
import heapq

heap = [3, 9, 2, 1, 7]

heapq.heapify(heap)

heapq.heappush(heap, 5)

print(heap)
```

- ○ [1, 3, 2, 9, 7, 5]
- ○ [1, 2, 3, 9, 7, 5]
- ○ [1, 5, 2, 3, 7, 9]
- ○ [9, 3, 2, 1, 7, 5]

6. Which of the following is true about Dequeue (Double-Ended Queue)?

- ○ You can insert elements only at the rear end
- ○ Elements are always deleted in a LIFO order
- ◉ You can insert and delete elements from both ends
- ○ You can delete elements only from the front end

7. In an array-based implementation of a stack, what is the time complexity of pushing an element?

- ○ O(n)
- ○ O(log n)
- ◉ O(1)
- ○ O(n log n)

8. Which of the following strategies does Quick Sort use?

- ◉ Divide and Conquer

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- ○ Backtracking
- ○ Greedy
- ○ Dynamic Programming

9. What is the worst-case time complexity for accessing an element in an unsorted array?

- ◉ O(n)
- ○ O(n log n)
- ○ O(log n)
- ○ O(1)

10. What is the time complexity of inserting an element at the end of a singly linked list if the tail pointer is maintained?

- ○ O(log n)
- ○ O(n)
- ◉ O(1)
- ○ $O(n^2)$

11. In which of the following scenarios is a stack used?

- ○ Implementing an operating system scheduler
- ◉ Recursive function calls
- ○ Maintaining the order of jobs in a print queue
- ○ Graph traversal in BFS

12. Which data structure is used for Depth First Search (DFS) traversal of a graph?

- ◉ Stack
- ○ Queue
- ○ Heap
- ○ Dequeue

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13. In a linked list, what is the time complexity of finding the last element?

- ○ O(log n)
- ○ O(n log n)
- ◉ O(n)
- ○ O(1)

14. In which of the following applications is a circular queue most commonly used?

- ○ Breadth First Search
- ◉ Task scheduling in operating systems
- ○ Expression evaluation
- ○ Depth First Search

15. Which data structure is the most appropriate to implement a priority queue?

- ○ Dequeue
- ◉ Heap
- ○ Linked List
- ○ Stack

16. Which algorithm strategy is used in Merge Sort?

- ○ Greedy
- ◉ Divide and Conquer
- ○ Dynamic Programming
- ○ Backtracking

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17. Which of the following algorithms is a greedy algorithm?

- ○ Floyd-Warshall
- ◉ Dijkstra's shortest path algorithm
- ○ Quick Sort
- ○ Merge Sort

18. What is the main advantage of a circular queue over a regular queue?

- ○ It has a smaller time complexity
- ○ It allows insertion from both ends
- ○ It is easier to implement
- ◉ It avoids wastage of space

19. Which of the following operations is not possible in an array in constant time?

- ◉ Delete an element by value
- ○ Insert an element at the end
- ○ Access an element by index
- ○ Update an element by index

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20. What is the output of the following recursive function for n = 5?

```
public class Main {


   public static int mystery(int n) {
      if (n == 1) {
         return 1;
      }
     return n + mystery(n - 1);
   }
  public static void main(String[] args) {
       System.out.println(mystery(5));
   }
}
```

- (●) 15
- ( ) 10
- ( ) 5
- ( ) 25

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