

1. What is a hash function?
 - A) Maps input data to a fixed-size value
 - B) Searches an element linearly
 - C) Sorts data
 - D) Compresses data
2. Which collision resolution technique uses a linked list at each hash index?
 - A) Chaining
 - B) Linear Probing
 - C) Quadratic Probing
 - D) Double Hashing
3. Which collision resolution method searches sequentially for next available slot?
 - A) Linear Probing
 - B) Chaining
 - C) Separate Chaining
 - D) Double Hashing
4. What is load factor in hashing?
 - A) n / m (number of elements / table size)
 - B) $n * m$
 - C) m / n
 - D) n^2 / m
5. Which heap maintains smallest element at root?
 - A) Min-Heap
 - B) Max-Heap
 - C) BST
 - D) AVL
6. Which heap maintains largest element at root?
 - A) Max-Heap
 - B) Min-Heap
 - C) BST
 - D) AVL
7. What is time complexity for inserting into a heap?
 - A) $O(\log n)$
 - B) $O(n)$
 - C) $O(1)$
 - D) $O(n \log n)$
8. What is time complexity for extracting min or max from heap?
 - A) $O(\log n)$

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

9. Which heap is used in priority queues?

- A) Min-Heap or Max-Heap
- B) BST
- C) AVL
- D) Linear array

10. What is primary purpose of hash table?

- A) Fast lookup, insert, delete
- B) Sorting
- C) DFS traversal
- D) BFS traversal

11. Which heap operation maintains heap property after insertion?

- A) Heapify-up
- B) Heapify-down
- C) Linear search
- D) Merge

12. Which heap operation maintains heap after deletion of root?

- A) Heapify-down
- B) Heapify-up
- C) Linear search
- D) Merge

13. Which type of hash function uses division method?

- A) $h(k) = k \bmod m$
- B) $h(k) = k^2$
- C) $h(k) = \text{sum of digits}$
- D) $h(k) = k + 1$

14. Which type of hash function uses multiplication method?

- A) $h(k) = \text{floor}(m * (k * A \bmod 1))$
- B) $h(k) = k \bmod m$
- C) $h(k) = k + 1$
- D) $h(k) = \text{sum of digits}$

15. Which hashing method reduces clustering?

- A) Double Hashing
- B) Linear Probing

- C) Chaining
- D) Quadratic Probing

16. Which heap is complete binary tree?

- A) All heaps (min/max)
- B) BST
- C) AVL
- D) Graph

17. Which collision resolution method is preferred in dynamic table sizes?

- A) Chaining
- B) Linear Probing
- C) Quadratic Probing
- D) Double Hashing

18. What is primary disadvantage of open addressing?

- A) Clustering
- B) Requires extra memory
- C) Slower access
- D) No deletion

19. Which heap is used in heap sort?

- A) Max-Heap
- B) Min-Heap
- C) BST
- D) AVL

20. Which hashing method allows multiple elements at same index?

- A) Chaining
- B) Linear Probing
- C) Quadratic Probing
- D) Double Hashing

21. Which heap operation has $O(n)$ complexity?

- A) Build Heap
- B) Insert
- C) Delete Root
- D) Extract Min/Max

22. Which collision resolution method uses formula $(h(k) + i^2) \% m$?

- A) Quadratic Probing
- B) Linear Probing
- C) Chaining
- D) Double Hashing

23. Which is true for perfect hash function?
- A) No collisions
 - B) Multiple collisions
 - C) Linear search
 - D) Heap-based
24. Which type of heap is suitable for implementing min-priority queue?
- A) Min-Heap
 - B) Max-Heap
 - C) BST
 - D) AVL
25. Which is used in Dijkstra's algorithm for selecting minimum distance node?
- A) Min-Heap
 - B) Max-Heap
 - C) BST
 - D) Linear array
26. What is primary issue in hashing?
- A) Collisions
 - B) Sorting
 - C) Traversal
 - D) Recursion
27. Which method reduces primary clustering?
- A) Quadratic Probing
 - B) Linear Probing
 - C) Chaining
 - D) Double Hashing
28. Which method reduces secondary clustering?
- A) Double Hashing
 - B) Linear Probing
 - C) Quadratic Probing
 - D) Chaining
29. What is the worst-case time complexity of search in hash table with chaining?
- A) $O(n)$
 - B) $O(\log n)$
 - C) $O(1)$
 - D) $O(n \log n)$
30. What is average-case complexity for hash table search?
- A) $O(1)$

- B) $O(\log n)$
- C) $O(n)$
- D) $O(n \log n)$