

100 DSA Viva Questions for B.Tech 2nd Year Students

01. Introduction to Data Structures

1. What is a data structure?
2. Differentiate between primitive and non-primitive data structures.
3. What is the need for data structures in programming?
4. What is an abstract data type (ADT)?
5. Explain memory representation of an array.
6. How is time and space complexity different?
7. What is the difference between best, average, and worst-case complexity?
8. Give an example of $O(1)$, $O(n)$, and $O(\log n)$ algorithms.
9. What is asymptotic notation? Explain Big-O.
10. What is the purpose of analyzing algorithms?
11. What is recursion? Give an example.
12. How is recursion implemented internally?
13. Compare iterative and recursive approaches.
14. What are static and dynamic data structures?
15. Why do we prefer dynamic structures over arrays sometimes?

02. Linked List, Stack, and Queue

1. What is a linked list?
2. Difference between array and linked list.
3. Types of linked lists.
4. How do you insert a node at the beginning of a singly linked list?
5. How to delete a node from the end of a singly linked list?
6. What is the advantage of using a circular linked list?
7. How do you reverse a linked list?
8. What is a doubly linked list?
9. How is memory allocated in linked lists?
10. What is the time complexity for searching in a linked list?
11. Define a stack.
12. What are the applications of a stack?
13. What is stack overflow and underflow?
14. How to implement a stack using an array?
15. How to implement a stack using a linked list?
16. Explain postfix and prefix expressions.
17. How is stack used for recursion?
18. Convert infix to postfix using a stack.
19. Define a queue.
20. What is the difference between a stack and a queue?
21. What is a circular queue?
22. What is a priority queue?
23. How to implement a queue using two stacks?
24. Applications of queues in real life.
25. Explain the enqueue and dequeue operations.

03. Trees and Graphs

1. Define a tree.
2. What is the difference between binary tree and binary search tree?
3. What is the maximum number of nodes in a binary tree of height h?
4. What are the types of binary tree traversals?
5. Write the preorder traversal of a binary tree.
6. Write the inorder traversal of a binary tree.
7. Write the postorder traversal of a binary tree.
8. What is the height of a tree?
9. How do you find the minimum and maximum value in a BST?
10. What is a complete binary tree?
11. What is an AVL tree? Why is it used?
12. What is the balance factor in AVL trees?
13. What is a heap?
14. Difference between min-heap and max-heap.
15. What is a graph?
16. Difference between directed and undirected graph.
17. What are weighted graphs?
18. Explain adjacency matrix and adjacency list.
19. What is BFS (Breadth-First Search)?
20. What is DFS (Depth-First Search)?
21. What is the time complexity of BFS and DFS?
22. Applications of BFS and DFS.
23. What is a spanning tree?
24. What is a minimum spanning tree (MST)?
25. Explain Kruskal's and Prim's algorithm.

04. Hashing and File Structures

1. What is hashing?
2. What is a hash function?
3. What are collisions in hashing?
4. What are the methods to resolve collisions?
5. Explain linear probing.
6. Explain quadratic probing.
7. What is double hashing?
8. What is the load factor in hashing?
9. What are the advantages of hashing over searching?
10. What is a hash table?
11. What is rehashing?
12. What is the difference between hashing and encryption?
13. What are file structures?
14. Difference between sequential and indexed file organization.
15. What is direct file organization?

05. Sorting and Searching Techniques

1. What is sorting?
2. Why is sorting important in data structures?
3. Explain bubble sort with an example.
4. Explain selection sort.
5. Explain insertion sort.
6. What is merge sort?
7. What is quick sort?

8. What is heap sort?
9. Compare merge sort and quick sort.
10. Which sorting algorithm is best for large datasets?
11. What is the time complexity of merge sort?
12. What is the best and worst case of quick sort?
13. What is searching?
14. Difference between linear and binary search.
15. What is the time complexity of binary search?
16. Can binary search be applied to linked lists? Why or why not?
17. What are interpolation search and exponential search?
18. How to find duplicates efficiently in an array?
19. What is the importance of sorting before binary search?