1.What is a data structure? What are some common data structures?
- Data Structure is a specialized format of organizing, processing, retrieving and storing data.
The common data structure are:

- Linear Data Structure: Arrays, Stacks, Queue, Linked List

Non-Linear Data Structure: Tree, Graph

2.What is an algorithm? What are some common algorithm design techniques ?
- Algorithms are a set of rules or instructions needed to complete a task.
The common algorithm design techniques are:

- Greedy methods Technique
- Divide and Conquer Technique
- Dynamic Programming
- Linear Programming
- Reduction
- Backtracking
- Branch and Bound

3.What is the time complexity of an algorithm? How is it calculated?
- Time complexity is the amount of time taken by algorithm to run, as a function of a length of the input.

- The time complexity calculated as N*c + N*N*c + c

4.What is the space complexity of an algorithm? How is it calculated ?
-Space Complexity of an algorithm refers to the total amount of memory space used by an algorithm, including the space of input values of execution.

5.What is the difference between an array and a linked list? When would you use one over the other?

S.N	Array	Linked List
1.	An array is a linearly-ordered data structure with the same type of elements in contiguous memory addresses.	A linked list data structure represents a sequence of nodes.
2.	It has a fixed size.	It has Dynamic size.
3.	Useless memory than linked lists	Uses more memory
4.	Memory is allocated at compile time	Memory is allocated at run time
5.	Insertion and Deletion operation takes place	Insertion and Deletion operation is faster

We use arrays when we need fast random access to elements by index. It is needed when we need a fixed size or a known maximum size.
But we use linked lists when we need efficient insertion and deletions, especially in the middle of the collection. It is used when we have a variable size and don't want to preallocate memory.It sues when we don’t require fast random access of index.

6.What is a stack ? How is it implemented? What are some common use cases ?
-A stack in data structure is a linear data structure that follows a specific order (LIFO - last in, first out) for operations.
Stack Data Structure is implemented using 1D Array stack and Single Linked List stack.

- The some common use cases are: Function call and Recursion, Expression Evaluation, Syntax Parsing, BackTracking Algorithm, Undo Functionality

7.What is a queue? How is it implemented? What are some common use cases?
-A stack in data structure is a linear data structure that follows a specific order (LIFO - last in, first out) for operations.
Stack Data Structure is implemented using Array based queue and Linked List queue.

- The some common use cases are: Breadth-First Search(BFS), Process Scheduling, Resource Sharing, Print Spooling, Message

8.What is a binary tree? How is it implemented? What are some common traversal algorithms?
-Binary tree is a data structure in which each node has at most two children which are referred to as a left child and a right child.
Binary trees can be implemented using a variety of approaches, but the most common implementation involves creating a node structure and linking nodes together using pointers.

- The some common traversal algorithms are : In-order traversal, Pre-order traversal and Post-order traversal

9.What is a hash table? How is it implemented? What are some common use cases?
-Hash table is a data structure that is used to store keys/values pairs
A hash table is typically implemented using an array of fixed size, where each element in the array is often referred to as a “bucket” or “slot”. When inserting a key-value pair into the hash table, a hash function is applied to the key to compute an index within the array.The value associated with the key is then stored in the corresponding bucket.

- Some common use cases are: Dictionary Data Structure, Caching, Symbol tables, Database Indexing, Hash sets.

10. What is a graph? How is it implemented? What are some common traversal algorithms?
-A graph is a non-linear data structure consisting of vertices and edges.
Graphs can be implemented using various data structures, each suited to different types of graphs and operations.The two most common representation of graph are: Adjacency Matrix and Adjacency List.

- The most common traversal algorithms are: Depth-First Search(DFS), Breadth-First Search(BFS), Dijkstra’s Algorithm, Bellman-Ford Algorithm.

11.What is dynamic programming? What are some common problems that can be solved using dynamic programming?
-Dynamic Programming is an optimization method for recursive algorithms, most of which are used to solve computing or mathematical problems.

- The some common problems that can be solved by using dynamic programming are: Fibonacci Sequence, Shortest path problem, Longest Common Subsequence, Matrix chain Multiplication