

## **1. What do you mean by Data structure and algorithms?**

It is a fundamental concept in computer science that focuses on organizing and manipulating data efficiently.

### **Key point of DSA**

#### **Data structures:**

These are containers or structures used to store and organize data in a computer's memory. Different data structures have different properties and are suitable for specific types of operations or problem-solving scenarios.

#### **Algorithms:**

These are well-defined sequences of steps or procedures used to solve specific computational problems or perform tasks efficiently. Algorithms can manipulate and process data stored in data structures.

#### **Efficiency analysis:**

DSA involves analyzing the time and space complexity of algorithms. Time complexity measures the amount of time an algorithm takes to run, while space complexity measures the amount of memory space it requires.

#### **Problem solving:**

DSA equips individuals with problem-solving techniques by providing a toolkit of data structures and algorithms. It helps in developing logical thinking and designing efficient solutions to various real-world problems.

### **Types of Data Structure and Algorithms**

#### **1. Linear Data Structure**

Array= It store data in tabular format.

Linked List = It stores data of node as well as the pointer to the next node address.

Stack = it is used in managing function execution thorough a call stack, syntax parsing

Queue = used to manage data flow and handle tasks in various applications, such as operating systems, network protocols, and data processing systems.

#### **2. Non-Linear Data Structure**

Trees = it is used to evaluate, analyze and modify the various expression. It is used to find out the associativity of each operator in the expression.

Graphs = It helps to define the flow of computation of software programs.

Used in Google Maps for building transportation systems.

Used in social networks such as Facebook and LinkedIn.

**What is the time complexity of an algorithm? How is it calculated?**

The amount of time taken by an algorithm to run, as a function of the length of the input.

**What is the space complexity of an algorithm? How is it calculated?**

The total amount of memory space used by an algorithm/programs, including the space of input values for execution. We can calculate the space complexity of an algorithm by determining the amount of memory used by the variables and functions.

**What is hash table? How is it implemented? what are the common use cases?**

It is a technique to convert a range of key values into a range of indexes of an array. It is implemented in two steps:

An element is converted into an integer by using a hash function. This element can be used as an index to store the original element, which falls into the hash table. The element is stored in the hash table where it can be quickly retrieved using hash key.

**What is dynamic programming? What are the some problem that can be solved using dynamic programming?**

A computer programming technique where an algorithm problem is first broken down into sub-problems, the result are saved, and then the sub problems are optimized to find the overall solution.

Count of occurrence

Counting sort algorithm

Longest subsequence

Pair of numbers

**What is recursion? How does it work? What are the some problems that can be solved using recursion?**

It is defined as a process which calls itself directly or indirectly and the corresponding function is called recursive function. Each time the function calls itself, it works on a

smaller subset of the original problem until a base case is reached, allowing the recursion to terminate.

Problem:

Finding factorial of a number

Fibonacci number

Length of string