1) What do you mean by a Data structure?

A data structure is a particular way of organizing data in a computer so that it can be used effectively.

2) What are some of the applications of DS?

Some common Data structure and their application are:

1.Array can be used for sorting elements, can perform matrix operation & can be used in CPU scheduling.

2.Stack is used in Expression evaluation, Forward and backward feature in web browsers, syntax parsing, Used in many algorithms like Tower of Hanoi, histogram problem etc.

3.Queue is used when a resource is shared among multiple consumers like in CPU scheduling, Disk Scheduling. It is also used in Palindrome recognition.

4.Tree is used as dictionary, such as one found on a mobile telephone for autocompletion and spell-checking.

5.Hash Table is used for fast data lookup - symbol table for compilers, database indexing, caches, Unique data representation.

6.Graphs are used to represent networks. Graphs are also used in social networks like LinkedIn, Facebook. For example, in Facebook, each person is represented with a vertex (or node). Each node is a structure and contains information like person id, name, gender and locale. They are also used in Routing Algorithms.

3) What are the advantages of a Linked list over an array?

Advantage of linked list:

1.Dynamic Size

2.Ease of insertion and deletion (O(1)).

4) Write the syntax in C to create a node in the singly linked list.

```
struct node
{
  int data;
  struct node *next;
};
```

5) What is the use of a doubly-linked list when compared to that of a singly linked list?

In singly linked list traversal is possible in only forward direction whereas in doubly-linked list it is possible in both forward and backward direction. Deletion and reverse the list is easy is doubly linked list as compared to singly linked list.

6) What is the difference between an Array and Stack?

STACK	Array
1.Stacks are based on the LIFO principle, i.e., the element inserted at the last, is the first element to come out of the list.	1, In the array the elements belong to indexes, i.e., if you want to get into the fourth element you have to write the variable name with its index or location within the square bracket e.g. arr[4].
2.Insertion and deletion in stacks takes place only from one end of the list called the top.	2. Insertion and deletion in array can be done at any index in the array.
3. Stack has a dynamic size.	3. Array has a fixed size.
4. Stack can contain elements of different data type.	4. Array contains elements of same data type.
5. We can do only linear search	5. We can do both linear and Binary search

7) What are the minimum number of Queues needed to implement the priority queue?

Minimum 2 queues are used. One for storing data and another is used for priorities.

8) What are the different types of traversal techniques in a tree?

1.Preorder traversal

2.Postorder traversal

3.Inorder traversal

9) Why it is said that searching a node in a binary search tree is efficient than that of a simple binary tree?

Binary tree is unordered hence slower in process of insertion, deletion and searching. Searching of an element is faster in Binary search tree than binary tree due to the ordered characteristics. In binary search tree the left subtree has elements less than the nodes element and the right subtree has elements greater than the nodes element.

10) What are the applications of Graph DS?

1. In Computer science graphs are used to represent the flow of computation.

2. Google maps uses graphs for building transportation systems, where intersection of two (or more) roads are considered to be a vertex and the road connecting two vertices is considered to be an edge, thus their navigation system is based on the algorithm to calculate the shortest path between two vertices.
3. In Facebook, users are considered to be the vertices and if they are friends then there is an edge running between them. Facebook's Friend suggestion algorithm uses graph theory. Facebook is an example of undirected graph.
4. In World Wide Web, web pages are considered to be the vertices. There is an edge from a page to other page.
5. In Operating System, we come across the Resource Allocation Graph where each process and resources are considered to be vertices. Edges are drawn from resources to the allocated process, or from requesting process to the requested resource. If this leads to any formation of a cycle then a deadlock will occur.

11) Can we apply Binary search algorithm to a sorted Linked list?

No, binary search cannot be applied on sorted linked because binary search work on indexes.

12) When can you tell that a Memory Leak will occur?

Memory leak occurs when we create a memory in the heap and forget to delete it after using it.

13) How will you check if a given Binary Tree is a Binary Search Tree or not?

Binary search trees have following properties:

1.The left subtree of a node contains only nodes with keys less than the node's key.
2. The right subtree of a node contains only nodes with keys greater than the node's key.
3. Both the left and right subtrees must also be binary search trees.

14) Which data structure is ideal to perform recursion operation and why?

Stack has the LIFO property; it remembers it's 'caller'. Therefore, it knows to whom it should return when the function has to return. On the other hand, recursion makes use of the system stack for storing the return addresses of the function calls.

15) What are some of the most important applications of a Stack?

Applications of stack:

1.Expression handling: ex- infix to postfix or infix to prefix

2.To check parenthesis matching

3.Backtracking procedure: ex-N-Queen Problem

4.Memory Management.

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16) Convert the below given expression to its equivalent Prefix and Postfix notations.

17)Sorting a stack using a temporary stack

18)Program to reverse a queue

19) Program to reverse first k elements of a queue

20)Program to return the nth node from the end in a linked list

21)Reverse a linked list

22)Replace each element of the array by its rank in the array

23) Check if a given graph is a tree or not

24) Find out the Kth smallest element in an unsorted array

25) How to find the shortest path between two vertices