Assignment - 2

Ans 1: A Data Structure is a data organisation, management, and storage format that enables efficient access and modification. (or)
A Data Structure is a collection of data values, the relationships among them and the functions or operations that can be applied to the data.
Ex: Array, Stack, Queue, Linked List, Tree, Graph etc., each have their own benefits and drawbacks.

Ans 2: Data Strcutures are used to implement the physical forms of abstract data types. This can be translated into a variety of applications, such as displaying a relationa databases as a binary tree.
Data Strcutures are used to organize code and information in a digital space. These play a crucial role in building softwares.

Ans 3: In Linked List, the insertion and deletion of data becomes easy, so the list can easily shrink and grow. Since the memory allocation is dynamic, whereas in array, memory must be allocated while writing the program, hence, the wastage of memory is very less compared to Array.

Ans 4:

```
typedef struct Node{
        struct Node *next;
        int data;
```

Ans 5: In Doubly Linked List, each node points to the next node and also previous node, so one can operate on a doubly linked list in two ways and can find a element easily when we know, in which half of the list does the element is present.

Ans 6: In Array, one can easily fetch the data by simply knowing the index of it. But in the case of stack, stack implements LIFO policy, so when we want to fetch particular element we need to remove all the elements above it. Stacks are mainly used in implementing trees.

Ans 7: To implement a priority queue, we need two queues, one for storing prioties and another for storing data.

Ans 8: There are mainly Three Tree Traversal Techniques.
1. Pre-order traversal (Left → Root → Right)
2. In-order traversal (Root → Left → Right)
3. Post-order traversal (Left → Right → Root)

There is another traversal technique which is called Level-order traversal

Ans 9: In simple binary tree, all the values are not in specific order. But in the binary search tree, all the elements are sorted according to their value, which helps us to ignore half of the search space everytime we do a comparison.

Ans 10: Graph Data Structure is used when a node is related to multiple nodes just like implementation of network. It is mainly used in social media network.

Ans 11: No, because the binary search relies on indexes and the linked list does not have any indexes.

Ans 12: When the unused objects ans variables are not destroyed to free up the memory allocation, the it is called memory leak.

Ans 13: In binary search tree, the maximum of the left branch must be less than the root and the minimum of the right branch must be greater than the root, and it is applied to every node of the tree and they all should satisfy it.

Ans 14: Stacks are used to perform recursion as function on the top of the stack can executed , the function can be popped and the data can be passed to the next function, this cycle continues until the required data is passed to the original function.

Ans 15: The Stacks are mainly used to implement calculations of BODMAS rule and implement recursion.

Ans 16: ---

Ans 17 to 22, check in the programs

Ans 23: We can simply find it by checking the criteria of a tree. A tree will not contain a cycle, so if there is any cycle in the graph, it is not a tree. We can check it using another approach, if the graph is connected and it has V-1 edges, it could be a tree. Here V is the number of vertices in the graph

Ans 24: Check the program

Ans25: By using Dijkstra’s Algorithm, we can find the shortest path between the two vertices.