Assignment 2

1. A double linked list is a linked list where each element has pointers to both of its neighbors. The advantage of a double linked list is that it can be traversed in both directions. Draw a proper double linked list and explain its benefits.

2. Find the minimum and maximum values in a list using a stack. Explain why using a stack is more efficient than using an array.

3. Explain the time complexity of the following algorithms: a) QuickSort, b) MergeSort, and c) Binary Search. Draw their time complexity graphs.

4. Compare and contrast the advantages and disadvantages of the following sorting algorithms: a) Bubble Sort, b) Insertion Sort, and c) Selection Sort. Discuss their usage scenarios.

5. Write a function to check if a binary tree is balanced. A tree is balanced if the heights of the two subtrees of any node differ by no more than one.

6. Explain the concept of an iterator in C++ and how it is used to traverse through a collection.

7. A tree is a non-linear data structure. Explain its characteristics and applications. Draw a proper tree data structure.

8. What is the difference between the order of elements in a list and the order of elements in a set? Explain with examples.

9. Construct a binary search tree from the following list of numbers: 5, 3, 8, 1, 9, 2, 7.

10. Implement a function to print all the leaf nodes of a tree.

11. Explain the concept of an abstract data type (ADT). Give an example of an ADT in C++.

12. Write a function to check if a string is a palindrome. Explain your approach.

13. Implement a queue using two stacks. Discuss its advantages and disadvantages.

14. Write a C++ function to reverse a linked list. Explain your approach.

15. Explain the concept of a queue and its applications. Discuss its use in the context of a shared memory model.

16. Write a program to find the maximum element in an array using a queue.

17. Explain the concept of a stack and its applications. Discuss its use in the context of a shared memory model.

18. Write a function to check if a string is a palindrome using a stack. Explain your approach.

19. Describe the different types of data structures in C++ and their usage scenarios.

20. Explain the difference between a stack and a queue. Discuss their usage scenarios.

21. Write a C++ program to find the maximum and minimum elements in an array using a stack.