Week 1

Design and Analysis of Algorithm Lab [DSE 2243]

L0 - Prerequisite Lab Exercise Questions (Related to Data structures):

1. Given a sorted array, write a program to implement binary search and return the index of the target element. If the target is not found, return -1.
2. Implement a stack using an array. Include functions to perform the following operations:
    - Push an element onto the stack
    - Pop an element from the stack
    - Display the top element
    - Check if the stack is empty
3. Implement a queue using an array. Include functions for the following operations:
    - Enqueue an element
    - Dequeue an element
    - Display the front element
    - Check if the queue is empty.

4. Implement a doubly linked list and perform the following operations:
    - Insert a node at the beginning and end
    - Delete a node from the beginning and end
    - Traverse the list in forward and backward directions

5. Implement a graph using an adjacency matrix. Write functions for:
    - Adding an edge
    - Removing an edge
    - Displaying the graph

6. Implement a binary search tree (BST) and write functions for:
    - Inserting a node
    - Deleting a node
    - Searching for a node

Lab Exercise 1:

1) Write an algorithm for finding the Greatest Common Divisor (GCD) of two numbers using Euclid's algorithm. Determine the time and space complexity of the algorithm. Write a program to implement the Euclid's algorithm.

2) Write a program to find GCD using consecutive integer checking method and analyze its time efficiency.

3) Write a program to sort a set of integers using selection sort and bubble sort algorithms and analyze their time efficiencies.

4) Write a program to implement brute-force string matching. Analyse its time efficiency.