B.Tech. (Computer Science and Engineering)
Semester-III
Subject: Data Structures and Algorithms
Subject code BCO 002B
Marks: 64

CO1: Show the understanding of various data structure concepts like Arrays, Sorting, Time & Space Complexity

Assignment#1

Tutorial sheet 1

Sec-A

1. [CO1] What is Abstract Data Type? Give example. [2 marks]
2. [CO1] What is space complexity? How is it different than time complexity? [2 marks]
3. [CO1] What is the time and space complexity of the following code?

```
int sum(int n) {
    int sum = 0;
    for (int i = 1; i <= n; i++) {
        sum += i;
    }
    return sum;
}
```

[2 marks]

4. [CO1] How are the elements of a 2D array stored in the memory? Explain with example. [2 marks]
5. [CO1] Given the base address of an array B[1300…..1900] as 1020 and the size of each element is 2 bytes in the memory, find the address of B[1700]. [2 marks]

Sec-B

1. [CO1] Write an efficient program for printing K largest elements in an array. Elements in an array can be in any order.
   Example: Input: [1, 23, 12, 9, 30, 2, 50], K = 3
   Output: 50, 30, 23 [7 marks]
2. [CO1] Explain the basic operations performed on array data structure with algorithms for each Operation. [7 marks]
3. [CO1] What are Asymptotic Notations? Explain in detail. [7 marks]

Sec-C

1. [CO1] Implement quick sort algorithm on the below list:
   97,82,450,99,45,99,101,230,23.
   Write down all the implementation phases and the changed list, also write the test case that will generate the worst-case time complexity. [11 marks]
2. [CO1] Given an Integer N and a list arr. Sort the array using the bubble sort algorithm. [11 marks]
   Example: Input: N = 5, arr[] = {4, 1, 3, 9, 7}
   Output: 1 3 4 7 9
3. [CO1] Write a linear search algorithm to find the element in an array. Also analyze its behavior in the worst, best and average cases. [11 marks]