Continuous Assessment 1

Course: Data Structures and Algorithms **Course Code: CSE-205**
Section: K19HV **Max. Marks: 30**
Assigned Date: 15-08-2020 **Submission Date: 22-08-2020**

Important Guidelines:

1. **Two Questions are assigned to each group and each group has 10 students.**
2. **Both Questions are compulsory with equal marks weightage. i.e. 15 Marks each.**
3. **The Groups are like from Roll no. [1 to 10] are in Group 1 then [11 to 20] in Group 2 and so on.**
4. **Submission must be on or before 22-08-2020 (Saturday). Late Submissions are not acceptable.**
5. **Submission must be in .doc or .docx or .pdf format. Any other format is not acceptable.**
6. **Don't copy directly from any mode like website or book or from your classmates. You can use ppts, books or websites for your reference which are shared to you.**
7. **Lastly, Read the question carefully before executing or wring it. There are no language restrictions like c or cpp or any other. But preference is given to cpp.(if you are writing program else you can write the pseudo-code).**

Group 1 from Roll no. [1 to 10]

Q1. Find the two repeating elements in a given array?

Objective: Given an array of n+2 elements. All elements of the array are in range 1 to n and all elements occur once except two numbers which occur twice. Write an algorithm or program to find the two repeating numbers.

Input: int A [] = {1,4,5,6,3,2,5,2};

Output: Two Repeated elements are: 2 and 5

Constraints: Time Complexity: O (N), Space Complexity: O (1)

Q2. Given a singly linked list which represents a number where each node contains only one digit **[0 – 9]**. The task is to add **1** to the number represented by the given linked list and print the new linked list.

Input: 9 -> 9 -> 9 -> 9 -> NULL
Output:
Original list is: 9 9 9 9
Resultant list is: 1 0 0 0 0

Constraints: Space Complexity: O (1)

Group 2 from Roll no. [11 to 20]

Q1. Given an array of positive integers and integer 'K'. Write an algorithm or program to count all the possible sub arrays where product of all the elements in the sub array is less than k.

Input: Int A [] = {10, 4, 2, 6}; K = 100;

Output: 9 Sub arrays: [10], [10 4], [10, 4, 2], [4], [4, 2], [4, 2, 6], [2], [2, 6], [6]

Constraints: Time Complexity: O (N)

Q2. Given a linked list, find length of the longest palindrome list that exist in that linked list.

Test Cases:

Input: List = 2->3->7->3->2->12->24

Output: 5 The longest palindrome list is 2->3->7->3->2

Input: List = 12->4->4->3->14

Output: 2 The longest palindrome list is 4->4

Constraints: Space Complexity: O (1)

Group 3 from Roll no. [21 to 30]

Q1. Given an array and an integer, find the smallest subarray whose sum is greater than the given integer.

Input: arr A [] = {1, 5, 20, 70, 8} Integer = 97

Output: Min Length = 3 Subarray = [20, 70, 8]

Input: arr A [] = {1, 10, 3, 40, 18} Integer = 50

Output: Min Length = 2 Subarray = [40, 18]

Constraints: Time Complexity: O (N)

Q2. Implement binary search on singly, circular and doubly linked list and compare their complexities?

Group 4 from Roll no. [31 to 40]

Q1. Given an array A[], find the 'x' such that x=Maximum(A[i]-A[i+1]).

Input: int[] A = { 12, 3, 1, 5, 6};

Output: 9

Input: int [] A = {7,4,3,8,1,10}

Output: 7

Constraints: Time Complexity: O (N)

Q2. Demonstrate selection sorting algorithm on circular list and find the complexity of it?

Group 5 from Roll no. [41 to 50]

Q1. Given an array A[], find the 'y' such that x=Minimum(A[i]-A[i+1]).

Test cases

Input: int[] A = { 12, 3, 1, 5, 6};

Output: -4

Input: int [] A = {7,4,3,8,1,10}

Output: -9

Constraints: Time Complexity: O (N)

Q2. Sort the doubly linked list with minimum time complexity?

Group 6 from Roll no. [51 to 60]

Q1. Given an array and an integer, find the smallest subarray with length 2 whose absolute difference is greater than the given integer.

Test cases

Input: A [] = {1, 5, 20, 70, 8} Integer = 18

Output: Subarray = [20, 1]

Input: A [] = {1, 10, 3, 40, 18} Integer = 33

Output: Subarray = [40, 1]

Constraints: Time Complexity: O (N)

Q2. Find the minimum missing positive integer in a list?

Input: 1->2>3>5->NULL

Output: 4

Input: 6->4->5->7->9->NULL

Output: 8

Group 7 from Roll no. [61 to 71]

Q1. For the Recurrence relation $T(n)=4T(n/2) + n^2\log n$. Find the complete computational complexity of it and conclude your results.

Q2. Write functions to demonstrate the deletion of a particular node in singly and circular list.