University of Engineering & Management, Kolkata

1st Term Examination, September, 2022

Programme Name: Btech (CSE / CSE(AIML) / CSE(IOT, CYS, BCT))

Semester: 3rd

Course Name: Data Structure & Algorithms

Course Code: PCCCS301

Full Marks: 30 **Date:21st September, 2022** **Time: 9.30 am – 10.30 am**

GROUP – A (10 marks)

Answer the following questions. Each question is of 2 marks **5 x 2 = 10**

1. i) Given an array arr[1.....10][1.....15] with a base value of 100 and the size of each element is 1 Byte in memory find the address of arr[7][6] with the help of column-major order.

ii) Find the time complexity of given code snippets:

```
int i, j, k = 0;
for (i = n / 2; i <= n; i++) {
   for (j = 2; j <= n; j = j * 2) {
     k = k + n / 2;
   }
}
```

iii) What do you understand by stable sort and external sort?

iv) State true or false with proper explanation:

a) Both dynamic array and linked list uses sequential access of data.

b) malloc() allocates memory in heap and realloc() releases memory from heap.

c) In case of deletion of a node, previous pointer concept is required in single linked list but not required in double linked list.

d) head or start of a linked list can also be considered a node of a linked list.

v) State the following condition using appropriate syntax. Define all the necessary terms.

a) Stack using linked list is in the underflow.

b) Queue using array is in underflow.

GROUP – B (10 marks)

Answer any two questions. Each question is of 5 marks **2 x 5 = 10**

2. Find the time complexity of the following functions: (Mention proper reason)

i) Delete a duplicate node from the first of a double-linked list.

ii) Delete all the duplicate nodes from a single linked list.

iii) Insert a node at a specific position of a single linked list.

iv) reverse a single linked list.

v) Delete an element from any position of a dynamic array.

3. Evaluate the following infix expression using stack: (Show all the steps)

14 / 7 * 3 – 4 +9 / 2

4. Arrange the given binary numbers in sorted manner using radix sort: 1101, 11000, 00110, 11, 1001, 110011.

5. Compare the performance of binary search & interpolation search with a suitable example.

6. Write a C program to take 5 words as input and print first letter of each word.

GROUP - C (10 Marks)

Answer any one question. The question is of 10 marks **1 x 10 = 10**

7. a. Write a C program to implement a Linked List using array and display the content in proper order.

b. Write an algorithm to add all the data of the nodes present in a single linked list and add the result as a node to the last of the linked list.

8. a. Write an algorithm of In-place reverse operation in an array.

b. Consider an array A is a 1D with N elements and K is a positive integer such that K<=N. Write an algorithm to delete an element present at the K-th position.

9. Write a C program to add diagonal elements of a matrix using function and pointer to array concept.

10. Write quick sort algorithm and explain it with an example of 5 numbers.

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