राष्ट्रीय प्रौद्योगिकी संस्थान गोवा

NATIONAL INSTITUTE OF TECHNOLOGY GOA

Farmagudi, Ponda, Goa, 403401

Programme Name: B.Tech.

Mid Semester Examinations, October-2021

Course Name: Data Structures   Course Code: CS201
Date: 5/10/2020   Time: 10:00 AM-11:30 AM
Duration: 1 Hour 30 Minutes   Max. Marks: 50

ANSWER ALL QUESTIONS

1. In C language, if the base address of **int a[5][7]** is 110, calculate the address of a[3][5] in both row major and column major order. (Assume the size of int to be 4 bytes).   (7 Marks)

2. Using stack, evaluate the following expression.

   $$8 \; 2 \; 1 \; \wedge \; / \; 2 \; 3 \; * \; + \; 5 \; 1 \; * \; -$$

   Note: single digit operands are used.

   ^ indicates exponential operator.

   Write down all the steps required.   (7 Marks)

3. Consider the following pseudo code of a function named star. Explain the following function for t = 16?(Assume there is no syntax error)   (7 Marks)

```
void star(int t)
{
 int x;
Stack Z;  // Assume empty stack Z is created.
while (t > 0)
{
// Pushes t%3 to stack Z
 push(&Z, t%3);
 t = t/4;
 }
 // Execute till Stack Z is not empty
 while (!isempty(&Z))
{
x = pop(&Z);
 printf("%d ", x*x*x*x);
 }
 }
```

4. Describe node structure of a doubly linked list. Write a 'C' functions to insert a node at beginning and delete last node of a non-empty doubly linked list. (7 Marks)

5. Describe node structure of a single linked list. Write a 'C' functions to insert a node at beginning and delete last node of a non-empty singly linked list. (7 Marks)

6. What is pointer to a function? Explain with an example. (4 Marks)

7. Explain the difference between *p++ and ++*p. where p indicates address variable. (4 Marks)

8. What does the following code segment "action" represents? (Assume there is no syntax error) (4 Marks)

```
struct node*head;

void action ( struct node *prev, struct node *curr)
{
if(curr)
{
action (curr, curr->link);
curr->link = prev;
}
else
head = prev;
}

void main()
{
……
action (null, head)
….
}
```

9. What is operand stack? Convert the following infix expression into postfix.
   a*b+(c-d) (3 Marks)