Total No. of Pages:2
IIIrd SEMESTER
MID TERM EXAMINATION
Paper Code: **SE-201**

Time: 1:30 Hours

Roll No.........
B.Tech (SE)
(Sept – 2019)
Title: Data Structures
Max. Marks: 30

> **Note:** 1. All questions are compulsory.
> 2. Assume any suitable value(s) for missing data.
> 3. If asked to write algorithms, write as C/C++ functions or in pseudo code.

Q 1. **(2*5=10 marks)**

(a) What is meant by stack overflow condition? Is it applicable to the linked list method of implementation of the stack? Give reasons.

(b) Consider a two-dimensional array A [20][10]. Assume 4 words per memory cell, the base address of array A is 100, elements are stored in row-major order and first element is A[0][0]. What is the address of A[11][5] ?

(c) What is the output of following function for start pointing to first node of following linked list? 1->2->3->4->5->6

```
void fun(struct node*start)
{
 if(start == NULL)
   return;
 printf("%d  ", start->data);
  if(start->next != NULL )
   fun(start->next->next);
 printf("%d  ", start>data);
}
```

(d) What is the time complexity of the function?

```
int fun(int n)
{
 int count = 0;
 for (int i = n; i > 0; i /= 2)
   for (int j = 0; j < i; j++)
     count += 1;
 return count;
}
```

(e) The result of evaluating the postfix expression 10, 5, +, 60, 6, /, *, 8, – is

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Q 2.

a) Consider the following queue of characters where QUEUE is a circular array which is allocated six memory cells: **(3 marks)**
Front=2 Rear=4 QUEUE: _, A, C, D, _, _ ("_" denotes empty memory cells).
Describe the queue after each step as the following operations takes place:
i) F is added to the queue, ii) Two letters are deleted, iii) K, L, and M are added to queue, iv)Two letters are deleted, v) R is added to queue, vi) Two letters are deleted, vii) S is added to queue, viii) Two letters are deleted.

b) Translate the following infix expression into postfix expression: **(2 marks)**

A + (B * C – (D / E / F) * G) * H

c) Let A and B be two linked list. Write a ‘C’ function to create a new linked list C that contains elements alternately from A and B beginning with the first element of A. If you run out of elements in one of the lists, the append the remaining elements of the other list to C. **(5 marks)**

Q 3.

a) Write an algorithm to concatenate two singly linked list? **(3 marks)**

b) Create a data structure *twoStacks* that represents two stacks. A single array A[1...MAXSIZE] is used to implement *twoStacks*. The two stacks S1 and S2 grow from opposite ends of the array. Variables top1 and top2 (top1<top2) point to the location of the topmost element in each of the stacks. Following functions must be supported by *twoStacks*.
Push1(int x)→ pushes x to first stack.
Push2(int x)→ pushes x to second stack.
Pop1()→ pops an element from first stack and return the popped element.
Pop2()→ pops an element from second stack and return the popped element.
Write an algorithm for the implementation of above said *twoStack*. **(5 marks)**

c) Write an algorithm to insert a new node ‘p’ in a doubly linked list after a node pointed by a node pointer ‘q’ consider all the cases. **(2 marks)**