Total No. of Pages:2

IIIrd SEMESTER

MID SEMESTER EXAMINATION

Roll No.....

B.Tech(SE)

(Sept. – 2018)

Paper Code: **SE-201**

Time: 1:30 Hours

Title: Data Structures

Max. Marks: 30

Note: 1. Attempt all questions. Assume any suitable value(s) for missing data.
2. If asked to write algorithms, write as C functions or in pseudo code.

1. (a) 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 (topl< top 2) 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 the algorithm for the Implementation of above said *twoStack*. If the space is to be used efficiently, what should be the condition for "stack full"? [6+2=8]

(b) Find out the time and space complexity of following C- program [2]

```
int i , j, k, sum=0;
for (i=0:i<n; i++)
  for(j=0;j<n; j++)
    for(k=0;k<9999;k++)
      sum++;
```

2. (a) Assume a set is represented by a linked list. Write down a best algorithm to perform union and intersection operation of two sets each represented by linked list containing n elements and find out the time complexity of each operation. [2+2+2=6]

(b) The following C function takes a singly linked list of integers as a parameter and rearranges the elements of the list. The list is represented as pointer to structure. The function is called with the list containing integers 1, 2, 3, 4, 5, 6, 7 in the given order. What will be the contents of the list after the function completes?

```
struct node{
        int value;
        struct node *next;
        };
void rearrange(struct node *list)
  {
```

P.T.O

```
struct node *p, *q; int
 temp;
if (list==NULL || list → next==NULL) return;
p = list;
q = list → next;
while(q!=NULL)
{ temp = p → value;
p → value = q → value;
q → value = temp;
p = q → next;
if (p!=NULL) q=p → next;
    else q= NULL;
}
}
```

[4]

3. (a) Perform the following operations using stack:
   Postfix to Prefix expression: AB+CD+*E/
   Evaluate the following Postfix expression: 2 4 6 * - 9 8 3 / + * 5 ^ 2 +
   Where ^ is an exponential. [2+2=4]

   (b) Why circular queue is preferred over linear queue? Write down the underflow, overflow condition of Circular queue? Write down the algorithm for traversal of circular queue considering all cases. [1+1+1+1]

   (c) Define the following terms in tree data structure: [2]

   - Depth of a node
   - Height of a node

END