18 August, 2021

EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Mid Term II Examination, Summer 2021 Semester

Course:	**CSE207- Data Structures, Section-4**
Instructor:	**Tanni Mittra, Senior Lecturer, CSE Department**
Full Marks:	**30 (25 will be counted for final grading)**
Time:	**1 Hour and 30 Minutes**

Note: There are **SIX** questions, answer ALL of them. Course Outcome (CO), Cognitive Level and Mark of each question are mentioned at the right margin.

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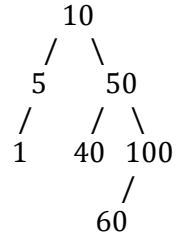
1. Suppose, you have an infix expression containing 12 characters. By following the algorithm of infix to postfix conversion, after performing operations on 11 characters you have following operator on stack, S = - (/. Draw the state of the stack for each of the following cases considering as 12th character – [CO2,C3, Mark: 5]

a. A minus sign
b. A closing parenthesis
c. A number
d. A plus sign
e. A multiplication sign

2. Consider a postfix expression ABC+-D*EF+/ and your student id. For example if your id is 2019-1-60-011 then ignore 0 of respective year (2019->219) and department Id 60(60->6). Then take value of the operand of above expression from your student id i.e. A =2, B=1,C=9,D=1,E=6,F=0. Now evaluate the value of the postfix expression using stack where the value of the operand is your student ID. [CO2,C3, Mark: 6]

3. Consider a Binary Search Tree (BST) is already created and reference Node **root* contains the address of the root of the BST. **Write** a function *Descendent (Node *data)* that will print all the descendants of a particular node and also print own left and/or right child of that particular node. For BST node consider the following Node class and you can use the functions of our created BST ADT. [CO2,C3, Mark: 5]

Example:



Input:
Node = 50
Output:
Descendants : 40 100 60
Parent: 40 and 100

```
Class Node
{
  int  data;
  node
*left,*right;
};
```

4. **Find** the contents of queue Q1and stack S1 after the following code is executed with the data: 5, 7, 12, 4, -1, 4, 6, 0, 8, 67, 34, 23, 5, -2, 44, 0, 33, 22, 6, and 55? Show step by step output of the following code snippet. [CO2,C3, Mark: 5]

```
1.  Q1 = createQueue; S1 = createStack;
2.  Loop (not end of data)
3.  Read number;
4.  If (number  > = 0)
5.    PushStack(S1, number)
6.  Else
7.    Pop(S1, x);
8.    loop (not empty S1)
        8.1. Pop (S1,x);
        8.2. Enqueue(Q1,x);
9.   end loop;
10. End if;
11. End loop;
```

5. Suppose you have already developed a Stack ADT with push() and pop() operations. You already knew the parenthesis checking algorithm. Now consider you have to modify the parenthesis checking algorithm that will parse only a specific type of expression containing parenthesis like {()} or ({}). Write a function called Modifyparen(char[] expression) that will parse the above mentioned specific type of expression [CO2,C3, Mark: 5]

6. a. Find minimum and maximum height of a binary tree having 31 numbers of nodes. [CO2,C2, Mark: 2]
b. Find minimum and maximum numbers of nodes of a binary tree of height 7. [CO2,C2, Mark: 2]