Data Structures and Algorithms
CS-F22
LAB-03

Issue Date: 12 July ,2024

Start Time: 8:15 AM
Completion Time: 11:15 M

Total Marks : 50

Objective:

In this lab, students will understand about different ways of writing and evaluating an expression using stack and how to integrate working of stack and queue together.

Instructions:

1) Follow the question instructions very carefully, no changes in function prototypes are allowed.
2) Your laptops must be on airplane mode.
3) Anyone caught in an act of plagiarism would be awarded an "F" grade in this Lab.

TASK 01: Infix To Postfix Expression [30 Marks]

You are tasked with building a calculator program that can evaluate complex mathematical expressions efficiently. The calculator should support addition, subtraction, multiplication, division, and parentheses for grouping operations.

Tasks to Perform:

- Implement Infix to Postfix Conversion. [**10 Marks**]
- Evaluate Postfix Expression. [**10 Marks**]
- Support User Input. [**10 Marks**]

Develop a user interface where users can input arithmetic expressions in infix notation.
Provide options for users to convert infix expressions to postfix and evaluate them.

Basic Structure of Class:

```
class Calculator
{
    string infix;
    char delimeter;
public:
    string infixToPostfix();
    int evaluatePostfix();
};
```

TASK 02: Implement queue using stack [20 Marks]

You have already implemented stack data structure in the previous lab. Your task is to implement Queue data structure using stack.
Following functions of Queue should be implemented:

- void enqueue(int x)
- int dequeue()

Sample Run:

Queue q;
q.enQueue(1);
q.enQueue(2);

```
q.enQueue(3);
cout << q.deQueue();
cout << q.deQueue();
cout << q.deQueue();
```

Output: 1 2 3