Data Structures and Algorithms Lab CS-F23

LAB-07

Total Marks: 30 Start Time: 11:45 AM Submission Time: 12:45 AM

The objective of this lab is to:

This lab aims to enhance students' understanding of **stacks** and their applications in solving real-world problems efficiently.

Instructions:

- 1) Use **stacks** to solve both tasks efficiently.
- 2) Do not use built-in stack libraries
- 3) Ensure correctness by testing with multiple **input cases**.
- 4) Implement each function **efficiently** to minimize time and space complexity.

Task 01(Remove K Digits to Get the Smallest Number)

15 Marks

Issue Date: March 17, 2025

Given a non-negative integer represented as a string num, and an integer k, remove k digits from the number so that the resulting number is the smallest possible.

If the resulting number is empty, return "0.

Example:

Input: "1432219", k = 3

Process:

- Remove $4 \rightarrow$ "132219"
- Remove $3 \rightarrow$ "12219"
- Remove $2 \rightarrow$ "1219"

Output: "1219"

Constraints: Solve the problem O(n) time complexity

Function Prototype: string removeKdigits(string num, int k)

Task 02 (Evaluate Boolean Expression)

15 Marks

You are given a valid boolean expression as a string. The expression follows these rules:

- 1. 't' \rightarrow Represents true.
- 2. 'f' \rightarrow Represents false.
- 3. $'!(subExpr)' \rightarrow Represents logical NOT of subExpr.$
- 4. '&(subExpr1, subExpr2, ..., subExprn)' \rightarrow Represents logical AND of n subexpressions ($n \ge 1$).
- 5. $|(subExpr1, subExpr2, ..., subExprn)| \rightarrow Represents logical OR of n subexpressions <math>(n \ge 1)$.

Return the boolean result (true or false) after evaluating the expression.

Example:

Input: expression = "&(t, !(f), t)"

Output: true

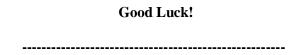
Explanation:

• $!(f) \rightarrow true$

• &(t, true, t) \rightarrow AND of (true, true, true) \rightarrow true

Constraints: Solve the problem O(n) time complexity

Function Prototype: bool evaluateBooleanExpression(string expression);



Note: You must complete all your tasks individually. Absolutely NO collaboration is allowed. Any case of plagiarism/cheating would result in 0 marks in sessional activities.