School of Engineering
Jawharlal Nehru University
B. Tech. (2nd Semester)
Subject: Data Structure

Instructions:

1. You are advised to use Google Document to write your program.
2. Write your document name as (Branch_RollNumber_Lab_1) [Example: CS_01_Lab_1]
3. Each program should start with new page.
4. At least four Test Cases should be provided with each program.
5. Plagiarised content (program) will be penalised.
6. Submit the assignment on time (request for date extension will not be entertained)
7. Check the linked Sample Copy for further clarification.
   https://docs.google.com/document/d/1TfnEi_MgEwByxG_9Ez_s51Ss_GYh_5G6FBA0KoFh_j8/edit?usp=sharing

Lab Assignment No. 2 (Array and Stack)

1. Write a C++ program to display a linear representation of the sparse matrix.

   Test Case:
   Sparse Matrix:
   0 5 0 0 0
   0 0 8 0 0
   0 0 0 3 0
   0 0 0 0 0
   Sparse Matrix Representation:
   (0, 1): 5
   (1, 2): 8
   (2, 3): 3

2. Write a C++ program for the matrix representation of polynomial equations.

   Test Case:
   Matrix Representation of Polynomial Equation:
   Coefficient | Exponent
   3   4
   -2   2
   5   1
   -7   0

3. Write a C++ program to implement a stack with a maximum size of 10 with basic stack operations like push, pop and display. (Don't use stack library)

   Test Case:
   10 pushed to the stack.
   20 pushed to the stack.
   30 pushed to the stack.
   Stack elements: 10 20 30
   30 popped from the stack.
   Stack elements: 10 20

4. **Write a C++ program using stack which will check that the given string belongs to grammar L= {wcw^R | w {a, b}*} (Where w^R is the reverse of w and c is in middle) or not. (You can use stack library)**

   Test Case 1:
   Enter a string: abcab
   The string does not belong to the grammar.

   Test Case 2:
   Enter a string: abcba
   The string belongs to the grammar

5. **Write a C++ program using a stack to determine if an input character string is of the form a^{i}b^i where i >= 1. (You can use stack library)**

   Test Case 1:
   Enter a string: abb
   Invalid String

   Test Case 2:
   Enter a string: aabb
   Valid String