EE1102 Introduction to Programming **Assignment 3-B**

Total Marks: 50
Due Date and Time: February 19, 2021 6 pm. **No late submission will be permitted.**
Submission Procedure: Upload the C program files by the due date and time. The files should be named as specified in each problem statement. Replace ROLLNO with your roll number (all small letters). **Do not upload exe files.**

NOTE: Meaningful messages should be printed when input is required from the user and when output is printed.

Problem 1. Write a C program called ROLLNO_char_count.c that reads characters continuously until a '?' is given as input and prints at the end the total number of input characters (including the final question mark) and the number of alphabets, digits, and symbols in the input. You should use do - while loop for this problem.

Marks: 10

Problem 2. Write a C program called ROLLNO_sum_of_series.c that takes as input an integer, say n, and prints the value of the following sum:

$$1 + (1/2) + (1/3) + \ldots. + (1/n).$$

Restriction:

(1) You must use loop for this program
(2) You can use loop only once in this program (irrespective of the type of loop you use)
(3) When you run the program, make sure you give a message asking the user to give input like the one shown below:

Enter an integer:

Let us say the input is 4. Then, the output should have the following format:

Sum of series = 1 + (1/2) + (1/3) + (1/4) = 2.083333

(4) Make sure you handle all possible integer values (zero, negative, and positive) as input. You can decide how you want to handle zero or negative value input.

Marks: 15

Problem 3. Write a C program called ROLLNO_matrix_multiply.c that will perform matrix multiplication using one-dimensional (1D) arrays as explained below. You should read input for two (int or float) 1D arrays A and B each with 12 elements, where A represents a matrix of size 3 x 4 and B represents a matrix of size 4 x 3. The program should compute values for another 1D array C (9 elements to represent 3 x 3 matrix) that stores the result of matrix multiplication C = A x B.

The output of the program should print the elements of A, B, and C in a matrix form. For example, if input for A is 1,2,3,4,5,6,7,8,9,10,11,12, then the output should be formatted to look something similar to what is shown below.

A (3x4 matrix) is
1 2 3 4
5 6 7 8
9 10 11 12

Hint on how to store matrices as 1D arrays: You can assume that the matrix elements are saved such that the elements of the first row are saved first followed by the second row and so on. Example representation of 3 x 4 matrix A when represented in the 1D array form is shown below.

A(0,0)	A(0,1)	A(0,2)	A(0,3)	A(1,0)	A(1,1)	A(1,2)	A(1,3)	A(2,0)	A(2,1)	A(2,2)	A(2,3)

Marks: 25

Bonus: Additional 5 points will be awarded if you implement the program such that if size of A and B matrices have to be changed, we need to only make changes in the variable declarations of A, B, C, and initialization of variables that store dimension of A and B matrices.