**UNIVERSITY OF CENTRAL PUNJAB, LAHORE**

**Lab Final Term Spring 2022 (X1 dated 4th July)**

**Lab Title:** Programming Fundamentals - Lab                           **Time:** 90 minutes

**Semester:** Spring 2022                                                          **Program Name:** BS(CS)

**Total marks: 40 marks                                                    Obtained Marks:**

**INSTRUCTIONS**

* There are total 2 questions (20+20=40 marks).
* Given example is one of the sample inputs/outputs, your program should work on different inputs as well.
* Complete your exam in given time.
* Submit one zip folder on portal having only .cpp files
* Plagiarism will never be tolerated in any case.

**Question 1: 20 Marks**

Write a program that asks the user to enter a number N by showing the message “How many numbers you want to enter”. After that the user will input N integer numbers one by one. From those input numbers, place only the EVEN numbers in an array. (Memory should not be wasted). Ask the User if he wants to enter more numbers, if user says yes, repeat the above process until the user is interested to enter more numbers, but now extend the already existing array to place more numbers in it i.e. take input from the user, find the even numbers and place them in the array by extending it.

**Note: If there’s no even number in the user input, nothing would be added in the array.**

**Test Case**

|  |
| --- |
| How many numbers you want to enter? 3  Please enter 3 input(s): 2 6 5  Elements in the array are: 2 6  Do you want to enter more numbers?  Y |
| How many numbers you want to enter? 2  Please enter 2 input(s): 4 1  Elements in the array are: 2 6 4  Do you want to enter more numbers?  Y |
| How many numbers you want to enter? 6  Please enter 6 input(s): 16 5 60 1 9 12  Elements in the array are: 2 6 4 16 60 12  Do you want to enter more numbers?  Y |
| How many numbers you want to enter? 1  Please enter 1 input(s): 7  Elements in the array are: 2 6 4 16 60 12  Do you want to enter more numbers?  N |

**Question 2: 20 Marks**

A square matrix is called upper triangular matrix if all the entries below the main diagonal are zero. Following is Example of integer upper triangular matrices of order 4x4.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | 3 | 8 | 2 | 1 | | 0 | 4 | 3 | 5 | | 0 | 0 | 6 | 7 | | 0 | 0 | 0 | 5 | |  |

In this question, you are given a txt file named ‘MatrixData.txt’ which contains elements of an upper triangular matrix of order 5X5. File does not contain the entries below the main diagonal that are zero. You have to write a function that receives a 2-D integer array of size 5x5 and populate it using the MatrixData.txt file.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | MatrixData.txt | | 5 6 8 2 7  8 7 6 5  1 2 3  9 7  5 | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | Output Matrix: | | | | | | 5 | 6 | 8 | 2 | 7 | | 0 | 8 | 7 | 6 | 5 | | 0 | 0 | 1 | 2 | 3 | | 0 | 0 | 0 | 9 | 7 | | 0 | 0 | 0 | 0 | 5 | |