FACULTY OF COMPUTER SCIENCE AND ENGINEERING
Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi

Lab Duration: 3 hrs. **CS112 Object Oriented Programming Lab** **Marks: 10**

Lab No: 07 **Instructor: Mr. Usman Haider** **Dated:11/04/2022**

Before performing tasks, keep in mind the following rules:

1. **CHEATING IS NOT ALLOWED. Looking at someone else's screen is also cheating.**
2. **Mobile phone and internet usage are not allowed.**
3. **If you have any queries related to a task, you can ask instructors only. Never talk to each other until you are allowed.**
4. **Do not answer any query until you are asked.**
5. **Perform all the tasks.**
6. **Avoiding any of the above rules will lead to marks deduction.**

TASK 1:

Write a C++ program to prompt two different users to enter names, registration numbers, and date of joining. Based on the joining date, find out who is senior.

Note: Following instructions should be followed while writing C++ code:

1. There must be a static member count, which will keep a record of the Number of Persons.
2. Two different classes should be there (i.e., Person, Date). One for getting a username and ID and one for getting the date of joining.
3. Date class must have a friend class and two friend functions (for input and output) and one relation overloaded constructor which will compare two dates.
4. Person class must have two friend functions (for input and output).
5. Input/Output should be in the same format as shown in the sample input/output.

Sample Input:

```
Person No. 1 Data
Enter Name and ID: Rahman 2034
Enter joining date (yyyy mm dd): 2019 11 12
Person No. 2 Data
Enter Name and ID: Khan 2101
Enter joining date (yyyy mm dd): 2020 12 15
```

Sample Output:

```
Rahman is senior to Khan because 2019-11-12 is earlier than 2020-12-15.
```

TASK 2:

Design a class to perform various matrix operations. A matrix is a set of numbers arranged in rows and columns. Therefore, every element of a matrix has a row position and a column position. If A is a matrix of five rows and six columns, we say that the matrix A is of the size 5x6 and sometimes denote it as A_{5x6}. Clearly, a convenient place to store a matrix is in a two-dimensional array. Two matrices

can be added and subtracted if they have the same size. Suppose A = [aij] and B = [bij] are two matrices of the size m _ n, in which aij denotes the element of A in the ith row and the jth column, and so on. The sum and difference of A and B are given by:

$$A + B = [a_{ij} + b_{ij}]$$

$$A - B = [a_{ij} - b_{ij}]$$

The multiplication of A and B (A * B) is defined only if the number of columns of A is the same as the number of rows of B. If A is of the size mxn and B is of the size nxt, then A *B = [Cik] is of the size mxt and the element Cik is given by the formula:

$$c_{ik} = a_{i1}b_{1k} + a_{i2}b_{2k} + \cdots + a_{in}b_{nk}$$

Design and implement a class matrixType that can store a matrix of any size. Overload the operators +, -, and * to perform the addition, subtraction, and multiplication operations, respectively, and overload the operator << to output a matrix. Also, write a test program to test various operations on the matrices.