**National University of Computer and Emerging Sciences**



**Laboratory Manual**

*for*

**Object Oriented Programming Lab**

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**Objectives:**

In this lab, students will practice:

1. operator overloading

# Exercise- Complex Numbers:

Create a Complex class to represent complex numbers with real and imaginary parts. Overload the following operators:

* +: Adds two complex numbers (real and imaginary components added separately).
* -: Subtracts two complex numbers (real and imaginary components subtracted separately).
* \*: Multiplies two complex numbers (follow the formula for complex number multiplication).
* <<: Overloaded for output stream insertion (cout << complexObject). Print the complex number in the format "(real, imag)".
* >>: Overloaded for input stream extraction (cin >> complexObject). Read the real and imaginary parts of the complex number from the user.

# Exercise- Time:

Create a Time class to represent time with hours, minutes, and seconds. Overload the following operators:

* +: Adds two time objects (handle overflow for hours, minutes, and seconds).
* -: Subtracts two time objects (handle underflow for hours, minutes, and seconds).
* ++: Pre-increment operator that increments the time by 1 second (handle overflow for minutes and hours).
* --: Pre-decrement operator that decrements the time by 1 second (handle underflow for minutes and hours).
* ==: Compares two time objects for equality.
* !=: Compares two time objects for inequality.

# Exercise- Distance:

Create a Distance class to represent distance in meters. Overload the following operators:

* <: Less than operator to compare distances.
* >: Greater than operator to compare distances.
* <=: Less than or equal to operator to compare distances.
* >=: Greater than or equal to operator to compare distances.
* +=: Adds a certain number of meters to the distance object.
* -=: Subtracts a certain number of meters from the distance object.

**Bonus Challenge: Overload the logical operators (&& and ||) for the Time class. You can define them based on whether both times are within a certain time range (e.g., morning hours).**

# Exercise- Matrix Multiplication:

Create a Matrix class to represent a 2D matrix with rows and columns. Overload the following operators:

* Overload the \* operator to perform matrix multiplication between two Matrix objects.
* Ensure proper dimension checks to prevent invalid multiplication.