



**DEPARTMENT OF MECHANICAL ENGINEERING  
FACULTY OF ENGINEERING  
UNIVERSITY OF MORATUWA**



<b>Module Code</b> : CS 2883	<b>Laboratory</b> : CAD centre
<b>Practical No.</b> : 08	<b>Practical Title</b> : Operator Overloading
<b>Practical Code</b> : CS2883-P08	
<b>Co-ordinator</b> : Dr. Manoj Ranaweera	<b>Facilitator(s)</b> :

BY NOW, YOU ARE EXPECTED TO DEMONSTRATE THE SKILLS IN RESOLVING **ALL** COMPILING ERRORS **BY YOURSELF** WITHOUT THE SUPPORT FROM INSTRUCTORS!!!

**Duration** - 2 hours

**Objective(s):**

1. To familiarize with operator overloading and program development with classes.

**Task:**

Write a program to perform some matrix operations over  $3 \times 3$  matrices as specified below.

Define a class named “Matrix” with the following data members and member functions to perform matrix operations. Class interface and the implementation should be separated. The class interface and implementation files should bear the name “Matrix”.

**Class attributes:**

<b>Data member / member function</b>	<b>Description</b>
Default constructor	Initialize all elements to ZERO
Overloaded constructor	Take $3 \times 3$ double type array as the only input parameter and initialize the matrix elements with the corresponding array values.
A[3][3]	A double type array. This should not be accessible from outside the class hierarchy. However, any derived class can access it.
Print()	Prints the matrix on screen with rows and columns

**Class Functionalities:**

- a) Overload the addition and subtraction operators to perform addition and subtraction of two matrices, respectively.
- b) Overload the multiplication operator to perform scalar multiplication of a matrix. Program should work whether the scalar is the rightmost or the leftmost operand. (ex:  $5 * \text{mat1}$  or  $\text{mat1} * 5$ )
- c) Overload the multiplication and assignment operator ( $*=$ ) such that a matrix can be assigned to itself once multiplied by a scalar (ex:  $\text{mat1} *= 5$ ;) )
- d) Class interface and implementation must be separated. Measures must be taken to prevent errors caused by multiple inclusion of the same header file.

**Main Program:**

- 1) Take values for nine elements from the user using a double type array. Also, take a value for the scalar multiplication of matrix.
- 2) Create a double type array named Ar1 and initialize it as follows.  

```
double Ar1[3][3] = { { 2 , 3 , 4 }, {1 , 7 , 4}, {6, 1, 1}};
```
- 3) Create two matrices and initialize them with the two data set created in above 1) and 2).
- 4) Print the two matrices on screen.
- 5) Perform matrix addition and subtraction, and print the result on screen with an appropriate message
- 6) Perform scalar multiplication of a matrix with the scalar provided by the user and print the result on screen with an appropriate message.
- 7) Perform multiplication and assignment operation with the user provided scalar and print the result on screen.