



University of Central Punjab

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FACULTY OF INFORMATION TECHNOLOGY

Data Structures and Algorithms - Lab

Lab 4			
<u>CLO NO</u>	<u>CLO STATEMENT</u>	<u>Blooms Taxonomy Level</u>	<u>PLO</u>
<u>1</u>	Solve real-world problems skillfully with precision using programming constructs learned in theory with the course toolkit.	P3	5

Task 1

Create a C++ generic class named Matrix the following:

Attributes:

- Type `**arr;`
- `int rows;`
- `int cols;`

Functions:

- `void insertValue(int row, int col, Type value);`
// Should insert a value at the given row and column index.
- `Type getValue(int row, int col);`
// Should return the value at the given row and column index.
- `void displayMatrix();`
// Should print the matrix in a structured format.
- `void deleteValue(int row, int col);`
// Should set the value at the given position to zero.

- `bool searchValue(Type value);`
// Should return true if the value is found, otherwise false.

Instructions:

- Write a parameterized constructor with default arguments for the above class.
- Write a copy constructor for the above class.
- Write destructor for the above class.

Task 2

Create a menu-based program for the following functions using the class made in **Task 1**. Make a class named **MyMatrix**.

Functions:

- **`bool isEmpty()`**: Returns whether the matrix is empty or not.
- **`bool isFull()`**: Returns whether the matrix is completely filled or not.
- **`int getRowSize()`**: Returns the total number of rows in the matrix.
- **`int getColSize()`**: Returns the total number of columns in the matrix.
- **`bool updateValue(int row, int col, Type value)`**: Updates the value at the given index if within bounds.
- **`Type getLastValue()`**: Returns the last value entered in the matrix.
- **`bool search(Type value)`**: Returns true if the searched value is present in the matrix, else returns false.

Instructions:

- Write a parameterized constructor with default arguments for the above class.
- Write a copy constructor for the above class.
- Write destructor for the above class.