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Lab Manual : **03**
Course Code : **CSE/ICE207**
Course Title : **Data Structures**
Instructor : **Md. Manowarul Islam, Adjunct Faculty, Department of CSE**

Objective:

The objective of this lab is to provide a fundamental idea about the 2-dimensional array using C programming. At the end of the lab, students are able:

- Understand how to take input into a 2D array and print it.
- Utilize 2D arrays for matrix manipulation and operations.

Lab Tasks

1. Write a program in C to find whether a matrix is identity matrix or not.

Sample Input	Sample Output
Input array elements: 1 0 0 0 1 0 0 0 1	This is an identity matrix.

2. Write a program in C to find the diagonal sum of a square matrix.

Sample Input	Sample Output
Input array elements: 1 2 3 4 5 6 7 8 9	The diagonal Sum is: 15

3. Write a program in C to find the transpose of a square matrix.

Sample Input	Sample Output
Input array elements: 1 2 3 4 5 6 7 8 9	1 4 7 2 5 8 3 6 9

4. Write a program in C to perform matrix addition of two matrices of size *n x n*. Ensure that the program takes input for both matrices and displays the resulting matrix after addition.

Sample Input	Sample Output
Elements of 1st array : $\begin{bmatrix} 8 & 5 \\ 2 & 3 \end{bmatrix}$ Elements of 2nd array: $\begin{bmatrix} 9 & 5 \\ 1 & 2 \end{bmatrix}$	Resulting array after addition: $\begin{bmatrix} 17 & 10 \\ 3 & 5 \end{bmatrix}$

5. Write a program in C that takes a 2D array as user input and finds the column with the maximum sum (i.e., identify the column whose sum of elements is the highest among all columns in the array).

Sample Input	Sample Output
1 2 3 4 5 6 7 8 9	3 No. column has the maximum sum which is 18