

- Write a Python program to compute following computation on matrix:
- a) Addition of two matrices
 - B) Subtraction of two matrices
 - c) Multiplication of two matrices
 - d) Transpose of a matrix

```
def matrix_addition(A,B):
    if len(A)!= len(B) or len(A[0]) != len(B[0]):
        raise ValueError("Matrices must be of the same size to add
them.")
    rows = len (A)
    cols = len (A[0])
    result = [[0] * cols for _ in range (rows)]
    for i in range (rows):
        for j in range (cols):
            result [i] [j] = A [i] [j] + B [i] [j]
    return result

def matrix_subtraction (A,B):
    if len(A) != len(B) or len(A[0]) != len (B[0]):
        raise ValueError(" Matrices must be of the same size to subtract
them.")
    rows = len(A)
    cols = len (A[0])
    result = [[0] * cols for _ in range (rows)]
    for i in range(rows):
        for j in range (cols):
            result [i] [j] = A [i] [j] - B [i] [j]
    return result

def matrix_multiplication(A,B):
    if len(A[0]) != len(B):
        raise ValueError ("Number of columns in A must be equal to
number of rows  in B for multiplication")
```

```
rows_A = len(A)
cols_A = len(A[0])
cols_B = len(B[0])
result = [[0] * cols_B for _ in range (rows_A)]
for i in range (rows_A):
    for j in range (cols_B):
        for k in range (cols_A):
            result [i][j] += A [i][k] * B [k][i]
return result
```

```
def matrix_transpose(A):
    rows = len (A)
    cols = len (A[0])
    transposed = [[0] * rows for _ in range (cols)]
    for i in range (rows):
        for j in range (cols):
            transposed [j][i] = A [i][j]
    return transposed
```

```
def display_matrix (matrix):
    for row in matrix:
        print(row)
```

```
def read_matrix():
    rows = int(input("Enter the number of rows: "))
    cols=int(input("Enter the number of columns:" ))
    matrix = []
    print("Enter the elements row-wise: ")
```

```
for i in range (rows):
    row = []
    for j in range (cols):
        element = int(input(f"Enter element [{i+1}][{j+1}]:"))
        row.append(element)
    matrix.append(row)
return matrix
```

while True:

```
print("\n Menu:")
print("1.Addition of two matrices")
print("2.Subtraction of two matrices")
print("3.Multiplication of two matrices")
print("4.Transpose of a matrix")
print("5.Exit")
```

```
choice = input("Enter your choice (1-5):")
```

```
if choice == '1':
```

```
    print("\nEnter the first matrix:")
    matrix1 = read_matrix()
    print("\nEnter the second matrix:")
    matrix2 = read_matrix()
    try:
        result = matrix_addition(matrix1, matrix2)
        print("\nResult of addition:")
        display_matrix(result)
    except ValueError as e:
        print("Error.",e)
```

```
elif choice == '2':
```

```
    print("\nEnter the first matrix:")
    matrix1 = read_matrix()
    print("\nEnter the second matrix:")
    matrix2 = read_matrix()
    try:
        result = matrix_subtraction(matrix1, matrix2)
        print("\nResult of subtraction:")
        display_matrix(result)
    except ValueError as e:
        print("Error.",e)
```

```
elif choice == '3':
```

```
    print("\nEnter the first matrix:")
    matrix1 = read_matrix()
    print("\nEnter the second matrix:")
    matrix2 = read_matrix()
    try:
        result = matrix_multiplication(matrix1, matrix2)
        print("\nResult of multiplition:")
        display_matrix(result)
    except ValueError as e:
        print("Error.",e)
```

```
elif choice == '4':
```

```
    print("\nEnter the matrix to transpose:")
    matrix = read_matrix()
    result = matrix_transpose(matrix)
    print("\nTranspose of matrix:")
    display_matrix(result)
```

```
elif choice == '5':
    print("\nExiting the program. Goodbye!")
    break
else:
    print("Invalid choice. Please enter a number between 1 and 5.")
```

// OUTPUT

```
Menu:
1.Addition of two matrices
2.Subtraction of two matrices
3.Multiplication of two matrices
4.Transpose of a matrix
5.Exit
Enter your choice (1-5):1

Enter the first matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:1
Enter element [1][2]:1
Enter element [2][1]:1
Enter element [2][2]:1

Enter the second matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:1
Enter element [1][2]:1
Enter element [2][1]:1
Enter element [2][2]:1

Result of addition:
[2, 2]
[2, 2]
```

```
Menu:
1.Addition of two matrices
2.Subtraction of two matrices
3.Multiplication of two matrices
4.Transpose of a matrix
5.Exit
Enter your choice (1-5):2

Enter the first matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:2
Enter element [1][2]:2
Enter element [2][1]:2
Enter element [2][2]:2

Enter the second matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:2
Enter element [1][2]:2
Enter element [2][1]:2
Enter element [2][2]:2

Result of subtraction:
[0, 0]
[0, 0]
```

```
Menu:
1.Addition of two matrices
2.Subtraction of two matrices
3.Multiplication of two matrices
4.Transpose of a matrix
5.Exit
Enter your choice (1-5):3

Enter the first matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:1
Enter element [1][2]:2
Enter element [2][1]:3
Enter element [2][2]:4

Enter the second matrix:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:1
Enter element [1][2]:2
Enter element [2][1]:3
Enter element [2][2]:4

Result of multiplition:
[7, 7]
[22, 22]
```

```
Menu:
1.Addition of two matrices
2.Subtraction of two matrices
3.Multiplication of two matrices
4.Transpose of a matrix
5.Exit
Enter your choice (1-5):4

Enter the matrix to transpose:
Enter the number of rows: 2
Enter the number of columns:2
Enter the elements row-wise:
Enter element [1][1]:65
Enter element [1][2]:66
Enter element [2][1]:67
Enter element [2][2]:68

Transpose of matrix:
[6, 67]
[66, 68]

Menu:
1.Addition of two matrices
2.Subtraction of two matrices
3.Multiplication of two matrices
4.Transpose of a matrix
5.Exit
Enter your choice (1-5):5

Exiting the program. Goodbye!

=== Code Execution Successful ===
```