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| **Course Code** | **:** | **BCSL-043** |
| **Title** | **:** | **Java Programming Lab** |
| **Assignment Number** | **:** | **BCA(IV)/L-043/Assignment/2026-27** |
| **Maximum Marks** | **:** | **50** |
| **Last date of Submission** | **:** | **31st October, 2026 (for July 2026 Session)** |
| | **:** | **30th April, 2027 (for January 2027 Session)** |

**This assignment has two questions. Answer all the questions. These questions carry 40 marks. Rest 10 marks are for viva voce. You are advised to give proper comments and do proper alignments while writing program. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.**

**Q1:**

**(a)** Write a Java program to perform multiplication of two matrices. Define appropriate classes, constructors, and methods to perform matrix multiplication operations. Include necessary validations to check if matrix multiplication is possible. **(10 Marks)**

**(b)** Write a Java program that takes the account balance and withdrawal amount for a bank customer as input and processes the transaction. Define proper class, methods and constructor in your program. Implement custom exception handling for the following scenarios: **(10 Marks)**

i. The withdrawal amount is negative or zero.

ii. The withdrawal amount exceeds the current balance (Insufficient Funds).

iii. The remaining balance after withdrawal falls below the mandatory minimum balance requirement of Rs. 1,0000/-.

**Q2:**

**(a)** Write a Java program that accepts text input from the user via the console and writes it to a file. Then, read the contents back from the file, count the total number of words present, and display the result on the screen. Implement proper exception handling for all File I/O operations. **(10 Marks)**

**(b)** Create a Java Applet using appropriate GUI components that accepts an integer from the user and calculates its square upon clicking a button. Use appropriate UI components such as labels, text fields, buttons and proper layout managers, and input validation to handle non-numeric or out-of-range inputs. **(10 Marks)**

## Q1:

## (a) Write a Java program to perform multiplication of two matrices. Define appropriate classes, constructors, and methods to perform matrix multiplication operations. Include necessary validations to check if matrix multiplication is possible. (10 Marks)

### Answer

The Matrix class has a constructor that allocates a matrix, a method to read its elements, and a method to multiply two matrices. For matrices A of order m × n and B of order n × p, the product C has order m × p. Each element is calculated as C[i][j] = sum of A[i][k] × B[k][j] over the common dimension. The program checks the dimensions before accepting the elements and again inside the multiplication method.

### Java program

```
import java.util.Scanner;

class Matrix {
    private final int rows, cols;
    private final long[][] values;

    Matrix(int rows, int cols) {
        if (rows <= 0 || cols <= 0 || rows > 20 || cols > 20)
            throw new IllegalArgumentException(
                "Rows and columns must be between 1 and 20.");
        this.rows = rows;
        this.cols = cols;
        values = new long[rows][cols];
    }

    void read(Scanner input) {
        for (int i = 0; i < rows; i++) {
            for (int j = 0; j < cols; j++) {
                System.out.print("Element [" + (i + 1) + "]["
                                 + (j + 1) + "]: ");
                values[i][j] = input.nextLong();
            }
        }
    }

    boolean canMultiply(Matrix other) { return cols == other.rows; }

    Matrix multiply(Matrix other) {
        if (!canMultiply(other))
            throw new IllegalArgumentException(
                "First matrix columns must equal second matrix rows.");
        Matrix product = new Matrix(rows, other.cols);
        for (int i = 0; i < rows; i++)
            for (int j = 0; j < other.cols; j++)
```