Experiment Number : 07 **Date: 4.02.2026**

METHOD OVERLOADING AND METHOD OVERRIDING

Aim:

To understand and implement method overloading and method overriding.

PRE LAB EXERCISE

QUESTIONS

- ✓ What is method overloading?

- Method overloading means having multiple methods with the same name in the same class.
- The methods must differ in number, type, or order of parameters.
- It is a compile-time polymorphism.
- Return type alone cannot differentiate overloaded methods.
- It improves code readability and flexibility.

- ✓ What is method overriding?

  - Method overriding means **redefining a parent class method** in the child class.
  - The method name and parameters must be **exactly the same**.
  - It is a **runtime polymorphism**.
  - Used to provide **specific implementation** in the child class.
  - Requires inheritance.

- ✓ Difference between overloading and overriding.

Method Overloading	Method Overriding
Same method name, different parameters	Same method name and same parameters
Occurs in the same class	Occurs in parent–child classes
Compile-time polymorphism	Runtime polymorphism

Method Overloading	Method Overriding
Inheritance not required	Inheritance required
Improves flexibility	Improves behavior customization

IN LAB EXERCISE

Objective:

To demonstrate compile-time and runtime polymorphism.

PROGRAMS:

1.Student Result System (Method Overriding)

Description:

- Base class Student has method displayResult().
- Subclasses UGStudent and PGStudent override the method to show different grading systems.

Code :

```
import java.util.Scanner;

// Base class
class Student {
   String name;

   void displayResult() {
      System.out.println("Student Result");
   }
}

// UG Student subclass
class UGStudent extends Student {
   int marks;
```

```
    UGStudent(String n, int m) {
        name = n;
        marks = m;
    }

    @Override
    void displayResult() {
        double percentage = (marks / 100.0) * 100;
        System.out.println("UG Student: " + name);
        System.out.println("Marks: " + marks);
        System.out.println("Percentage: " + percentage + "%");
    }
}

// PG Student subclass
class PGStudent extends Student {
    double gpa;

    PGStudent(String n, double g) {
        name = n;
        gpa = g;
    }

    @Override
    void displayResult() {
        System.out.println("PG Student: " + name);
        System.out.println("GPA: " + gpa + " / 10");
    }
}

// Main class
```

```
public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        // Input for UG student
        System.out.print("Enter UG Student Name: ");
        String ugName = sc.nextLine();
        System.out.print("Enter UG Student Marks (out of 100): ");
        int ugMarks = sc.nextInt();
        sc.nextLine(); // consume newline

        // Input for PG student
        System.out.print("Enter PG Student Name: ");
        String pgName = sc.nextLine();
        System.out.print("Enter PG Student GPA (0-10): ");
        double pgGpa = sc.nextDouble();

        // Create objects
        Student s1 = new UGStudent(ugName, ugMarks);
        Student s2 = new PGStudent(pgName, pgGpa);

        System.out.println("\n--- Student Results ---");
        s1.displayResult();
        System.out.println();
        s2.displayResult();

        sc.close();
    }
}
```

OUTPUT:

Sample Input:

Enter UG Student Name: Ram

Enter UG Student Marks (out of 100): 85

Enter PG Student Name: Ravi

Enter PG Student GPA (0-10): 9.2

Output:

--- Student Results ---

UG Student: Ram

Marks: 85

Percentage: 85.0%

PG Student: Ravi

GPA: 9.2 / 10

```
PS C:\Users\msand\OneDrive\Desktop\java> java Main
Enter UG Student Name: Ram
Enter UG Student Marks (out of 100): 85
Enter PG Student Name: Ravi
Enter PG Student GPA (0-10): 9.2

--- Student Results ---
UG Student: Ram
Marks: 85
Percentage: 85.0%

PG Student: Ravi
GPA: 9.2 / 10
PS C:\Users\msand\OneDrive\Desktop\java>
```

2. Calculator Program (Method Overloading)

Description:
Create a Calculator class with multiple add() methods to calculate:

- Addition of 2 integers
- Addition of 3 integers

- Addition of 2 double numbers

Code:

```
import java.util.Scanner;
class Calculator {
   int add(int a, int b) {
      return a + b;
   }

   int add(int a, int b, int c) {
      return a + b + c;
   }

   double add(double a, double b) {
      return a + b;
   }
}
public class Main {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      Calculator calc = new Calculator();

      System.out.print("Enter two integers: ");
      int x = sc.nextInt();
      int y = sc.nextInt();
      System.out.println("Sum of two integers: " + calc.add(x, y));

      System.out.print("Enter three integers: ");
      int p = sc.nextInt();
      int q = sc.nextInt();
      int r = sc.nextInt();
      System.out.println("Sum of three integers: " + calc.add(p, q, r));
```

```
        System.out.print("Enter two decimal numbers: ");
        double a = sc.nextDouble();
        double b = sc.nextDouble();
        System.out.println("Sum of two doubles: " + calc.add(a, b));

        sc.close();
    }
}
```

Output:

Sample Input:

Enter two integers: 10 20

Enter three integers: 5 10 15

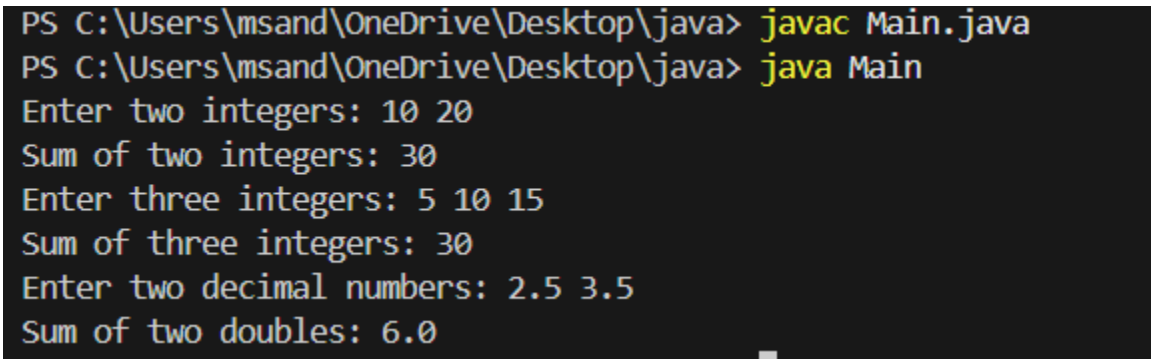
Enter two decimal numbers: 2.5 3.5

Output:

Sum of two integers: 30

Sum of three integers: 30

Sum of two doubles: 6.0



POST LAB EXERCISE

✓ Is return type important in method overloading and method overriding?

- **Method Overloading**:
  - Return type is **not important** for overloading.
  - Overloading is decided by the **method name and parameter list**.
- **Method Overriding**:
  - Return type **must be same or covariant** (subclass type).
  - Changing return type completely is **not allowed**.

✓ Can you overload a method by changing only the return type?

- No, a method **cannot be overloaded** by changing only the return type.
- The parameter list must be **different**.
- Java identifies methods using **method signature** (name + parameters).
- Changing only return type causes **compile-time error**.

✓ Can static methods be overridden? Can they be overloaded?

- **Static methods cannot be overridden**.
- They belong to the class, not to objects.
- This is called **method hiding**, not overriding.
- **Static methods can be overloaded**.
- Overloading depends on method signature, not object behavior.

✓ Can a method be overridden if the parameter list is different?

- No, a method **cannot be overridden** if the parameter list is different.
- The method name and parameters must be **exactly the same**.
- Different parameter list results in **method overloading**, not overriding.

Result:

Thus the method overloading and overriding concepts were implemented and executed successfully.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	**5**	
In Lab Exercise	**10**	
Post Lab Exercise	**5**	
Viva	**10**	
Total	**30**	
	Faculty Signature	