# Programming Paradigms Laboratory

**B.Tech.**


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## Faculty of Engineering & Technology

### Ramaiah University of Applied Sciences

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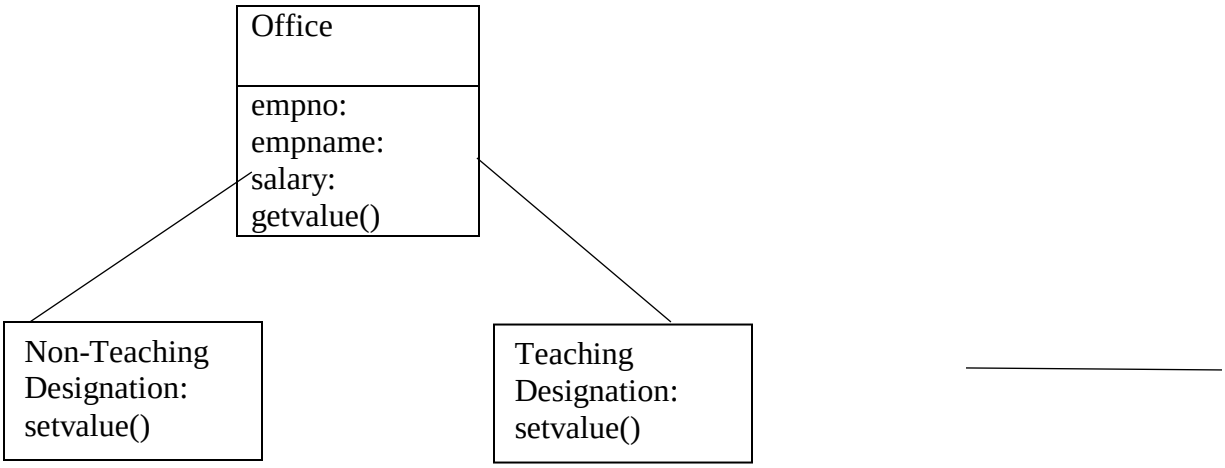
|---|---|
| Faculty | Engineering & Technology |
| Programme | B. Tech. in Computer Science and Engineering |
| Year/Semester | 2nd Year / 4th Semester |
| Name of the Laboratory | Programming Paradigms Laboratory |
| Laboratory Code | 19CSL217A |

## Laboratory 6

Title of the Laboratory Exercise: Inheritance

1. Questions

   a. Develop a java application to implement educational hierarchy using inheritance




   b. Develop a Java program to create an class shape. Let rectangle and triangle inherit this shape class. Add necessary functions.

2. Calculations/Computations/Algorithms

**Part B:-**

```
package lab_6;
public class Lab_6 {
    public static void main(String[] args) {
//       shape s1=new shape(3.5,4.5,5.5,7.8,9.9);
System.out.println("For triangle :-");
       triangle t1=new triangle(3,8,5);
       t1.compute();
        System.out.println("");
System.out.println("For rectangle:- ");
       rectangle r1=new rectangle(3,4,5,10,20);
       r1.compute();
    }

}
```

```
package lab_6;
public class shape {
    int a,b,c;

    public shape(int a, int b, int c) {
        this.a = a;
        this.b = b;
        this.c = c;
    }
}
```

```java
package lab_6;
class triangle extends shape{

    public triangle(int a, int b, int c) {
        super(a, b, c);
    }

    public void compute(){
        double s=(a+b+c)/2;
        double area;
        // sum of two sides should always be greater than third side
        // sides cannot be negative
        if(a+b>c&&a+c>b&&b+c>a&&a>0&&b>0&&c>0){
            area=Math.pow(s*(s-a)*(s-b)*(s-c),0.5);
            System.out.println("parimeter of triangle is:- "+2*s);
            System.out.println("area of triangle is :- "+area);
        }
        else{
            System.out.println("\t\t!!invalid sides of triangle");
        }

    }
}
```

```java
package lab_6;
public class rectangle extends shape{
    int length,breadth;

    public rectangle( int a, int b, int c, int breadth,int length) {
        super(a, b, c);
        this.length = length;
        this.breadth = breadth;
    }
    public void compute(){
        double area=length*breadth;
        double peri=2*(length+breadth);
        System.out.println("perimeter of rectangle is "+peri);
        System.out.println("area of rectangle is :- "+ area);
    }
}
```

**Part A:-**

```java
package lab_6;
import java.util.*;
public class Lab_6 {
    public static void main(String[] args) {
        non_teaching t1 = new non_teaching();
        teaching t2 = new teaching();
        Scanner s = new Scanner(System.in);
        System.out.println("Enter teaching employee details: ");
        t2.getvalue();
        System.out.println("Enter non-teaching employee details: ");
        t1.getvalue();
        System.out.println("");
        System.out.println("");
        System.out.println("                EMPLOYEE DETAILS");
        System.out.println("Teaching:- ");
        System.out.println("Employee designation: "+t2.designation);
        t2.setvalue();
        System.out.println("");
        System.out.println("\nNon-Teaching:- ");
        System.out.println("Employee designation: "+t1.designation);
        t1.setvalue();

    }

}
```

```java
package lab_6;
import java.util.*;
class office
{
    int emp_no;
    String emp_name;
    float salary;

    office()
    {
        this.emp_no=0;
        this.emp_name="-";
        this.salary=0;
    }

    void setvalue()
    {
        System.out.println("Employee number: "+emp_no+"\n
Employee name: "+emp_name+"\nSalary: "+salary);
    }
}
```

```java
package lab_6;
import java.util.*;
class teaching extends office
{
     String designation="-";

     teaching()
     {
         super();
         designation="";
     }

    void getvalue()
    {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter employee designation: ");
        designation = s.nextLine();
        System.out.println("Enter employee number: ");
        emp_no = s.nextInt();
        System.out.println("Enter employee name: ");
        emp_name = s.next();
        System.out.println("Enter employee salary: ");
        salary = s.nextFloat();
    }
}
```

```java
package lab_6;
import java.util.*;
class non_teaching extends office
{
     String designation;

     non_teaching()
     {
         super();
         designation="";
     }

    void getvalue()
    {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter employee designation: ");
        designation = s.nextLine();
        System.out.println("Enter employee number: ");
        emp_no = s.nextInt();
        System.out.println("Enter employee name: ");
        emp_name = s.next();
        System.out.println("Enter employee salary: ");
        salary = s.nextFloat();
    }
}
```

3. Presentation of Results

**Part B:-**

For triangle sides (3,8,5):-

```
run:
For triangle :-
        !!invalid sides of triangle

For rectangle:-
perimeter of rectangle is 60.0
area of rectangle is :- 200.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

For triangle sides (3,4,5):-

```
run:
For triangle :-
parimeter of triangle is:- 12.0
area of triangle is :- 6.0

For rectangle:-
perimeter of rectangle is 60.0
area of rectangle is :- 200.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

**Part A:-**

```
run:
Enter teaching employee details:
Enter employee designation:
assit. professor
Enter employee number:
2178
Enter employee name:
john
Enter employee salary:
80000
Enter non-teaching employee details:
Enter employee designation:
sweeper
Enter employee number:
7890
Enter employee name:
ramlal
Enter employee salary:
8000


                EMPLOYEE DETAILS
Teaching:-
Employee designation: assit. professor
Employee number: 2178
Employee name: john
Salary: 80000.0


Non-Teaching:-
Employee designation: sweeper
Employee number: 7890
Employee name: ramlal
Salary: 8000.0
BUILD SUCCESSFUL (total time: 1 minute 20 seconds)
```

4. Conclusions :-

**Inheritance in Java:-**

Inheritance is an important pillar of OOP(Object Oriented Programming). It is the mechanism in java by which one class is allow to inherit the features(fields and methods) of another class. Important terminology:

- Super Class: The class whose features are inherited is known as super class(or a base class or a parent class).
- Sub Class: The class that inherits the other class is known as sub class(or a derived class, extended class, or child class). The subclass can add its own fields and methods in addition to the superclass fields and methods.
- Reusability: Inheritance supports the concept of “reusability”, i.e. when we want to create a new class and there is already a class that includes some of the code that we want, we can derive our new class from the existing class. By doing this, we are reusing the fields and methods of the existing class.

5. Limitations of Experiments and Results

   Main disadvantage of using inheritance is that the two classes (parent and child class) gets tightly coupled. This means that if we change code of parent class, it will affect to all the child classes which is inheriting/deriving the parent class, and hence, it cannot be independent of each other.