Object Oriented Programming using Java Laboratory (DJS23FLES201)
Academic Year 2023-24

EXPERIMENT NO. 11

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AIM / OBJECTIVE:

To implement Abstract classes and packages

1. Write an abstract class program to calculate area of circle, rectangle and triangle.

CODE-

```
abstract class Shape {
    abstract double area();
}

class Circle extends Shape {
    double radius;

    Circle(double radius) {
        this.radius = radius;
    }

    @Override
    double area() {
        return Math.PI * radius * radius;
    }
}

class Rectangle extends Shape {
    double length;
    double width;

    Rectangle(double length, double width) {
        this.length = length;
        this.width = width;
    }

    @Override
    double area() {
```

```
        return length * width;
    }
}

class Triangle extends Shape {
    double base;
    double height;

    Triangle(double base, double height) {
        this.base = base;
        this.height = height;
    }

    @Override
    double area() {
        return 0.5 * base * height;
    }
}

public class Main {
    public static void main(String[] args) {
        Circle circle = new Circle(5);
        Rectangle rectangle = new Rectangle(4, 6);
        Triangle triangle = new Triangle(3, 4);

        System.out.println("Area of Circle: " + circle.area());
        System.out.println("Area of Rectangle: " + rectangle.area());
        System.out.println("Area of Triangle: " + triangle.area());
    }
}
```

OUTPUT-

```
C:\Users\Arshad\Desktop\study\java>java Main
Area of Circle: 78.53981633974483
Area of Rectangle: 24.0
Area of Triangle: 6.0
```

2. WAP to create a package called vol having Cylinder class and volume (). WAP that imports this package to calculate volume of a Cylinder.

CODE-

(PACKAGE)

```
package vol;

public class Cylinder {
    private double radius;
    private double height;

    public Cylinder(double radius, double height) {
        this.radius = radius;
        this.height = height;
    }

    public double volume() {
        return Math.PI * radius * radius * height;
    }
}
```

(MAIN)

```
import vol.Cylinder;

public class Main {
    public static void main(String[] args) {
        double radius = 3.5;
        double height = 7.2;

        Cylinder cylinder = new Cylinder(radius, height);
        double volume = cylinder.volume();

        System.out.println("Volume of the cylinder: " + volume);
    }
}
```

OUTPUT –

```
C:\Users\Arshad\Desktop\study\java>javac -d . Cylinder.java

C:\Users\Arshad\Desktop\study\java>javac main.java

C:\Users\Arshad\Desktop\study\java>java main.java
Volume of the cylinder: 277.08847204661976
```

Base all conclusions on your actual results; describe the meaning of the experiment and the implications of your results.

We created an abstract class named `Shape` with abstract method `area()`, and implemented concrete subclasses `Circle`, `Rectangle`, and `Triangle` to calculate their respective areas. This program demonstrated the concept of abstraction andWe created a package named `vol` containing a `Cylinder` class with a method to calculate the volume of a cylinder. We then imported this package into another program to calculate the volume of a cylinder using the `Cylinder` class.