

Practical No.12

Write a java program to calculate the area of a rectangle, a square and a circle. Create an abstract class 'Shape' with three abstract methods namely rectangleArea() taking two parameters, squareArea() and circleArea() taking one parameter each. Now create another class 'Area' containing all the three methods rectangleArea(),squareArea() and circleArea() for printing the area of rectangle, square and circle respectively. Create an object of class Area and call all the three methods.

Source code:

```
import java.util.Scanner;

abstract class shapearea{

    void rectangleArea(double l, double b) {

    }

    void squareArea(double s) {

    }

    void circleArea(double r) {

    }

};

class area extends shapearea{

    void rectangleArea(double l,double b){

        System.out.println("Area of rectangle: " + l * b);

    }

    void squareArea(double s){

        System.out.println("Area of square: " + s * s);

    }

    void circleArea(double r){

        System.out.println("Area of circle: " + (r*r*22)/7);

    }

    public static void main(String args[]) {

        Scanner sc = new Scanner(System.in);

        shapearea obj1 = new area(); //upcasting

        System.out.println("Press 1 to find area of rectangle");
```

```
System.out.println("Press 2 to find area of square");
System.out.println("Press 3 to find area of circle");
System.out.println("Press 4 to exit");
int choice;
do {
    System.out.print("Enter your choice: ");
    choice = sc.nextInt();
    switch (choice) {
        case 1:
            System.out.print("Enter the length of rectangle: ");
            double l = sc.nextDouble();
            System.out.print("Enter the breadth of rectangle: ");
            double b = sc.nextDouble();
            obj1.rectangleArea(l, b);
            break;
        case 2:
            System.out.print("Enter the side of square: ");
            double s = sc.nextDouble();
            obj1.squareArea(s);
            break;
        case 3:
            System.out.print("Enter the radius of circle: ");
            double r = sc.nextDouble();
            obj1.circleArea(r);
            break;
        case 4:
            System.out.println("EXIT");
            break;
        default:
```

```
        System.out.println("INVALID CHOICE");
    }
    } while (choice != 4);
}
};
```

OUTPUT:

```
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> c::; cd 'c:\Users\bajel\OneDrive\Desktop\MANSI BAJELI\code\area'
-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\bajel\AppData\Roaming\Code\User\
a\jdt_ws\MANSI BAJELI_2ed81789\bin' 'area'
Press 1 to find area of rectangle
Press 2 to find area of square
Press 3 to find area of circle
Press 4 to exit
Enter your choice: 1
Enter the length of rectangle: 4
Enter the breadth of rectangle: 5
Area of rectangle: 20.0
Enter your choice: 2
Enter the side of square: 4
Area of square: 16.0
Enter your choice: 3
Enter the radius of circle: 2
Area of circle: 12.571428571428571
Enter your choice: 4
EXIT
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> |
```

Practical No.13

Write a java program to implement abstract class and abstract method with following details:
Create a abstract Base Class Temperature

Data members:

double temp;

Method members:

void setTempData(double)

abstract void changeTemp()

Sub Class Fahrenheit (subclass of Temperature)

Data members:

double ctemp;

method member:

Override abstract method changeTemp() to convert Fahrenheit temperature into degree Celsius by using formula $C = 5/9 * (F - 32)$ and display converted temperature

Sub Class Celsius (subclass of Temperature)

Data member:

double ftemp;

Method member:

Override abstract method changeTemp() to convert degree Celsius into Fahrenheit temperature by using formula $F = 9/5 * c + 32$ and display converted temperature

Source code:

```
import java.util.Scanner;
```

```
abstract class Temprature {  
    double temp;  
    void setTempData(double t) {  
        temp = t;  
    }  
    abstract void changeTemp();  
}
```

```

};

class Fahrenheit extends Temperature {
    double ctemp;

    void changeTemp() {
        ctemp = 5.0 / 9.0 * (temp - 32);
        System.out.println("Temperature in Celsius: " + ctemp);
    }
};

class Celsius extends Temperature {
    double ftemp;

    void changeTemp() {
        ftemp = 9.0 / 5.0 * temp + 32;
        System.out.println("Temperature in Fahrenhite: " + ftemp);
    }
}

class Driver{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter 0 to EXIT");
        System.out.println("Enter 1 to convert temperature to fahrenheit");
        System.out.println("Enter 2 to convert temperature to celcius");
        int choice;
        do {
            System.out.print("Enter your choice: ");
            choice = sc.nextInt();
            switch (choice) {
                case 1:
                    Temperature obj = new Celsius();
                    System.out.print("Enter temperature: ");

```

```
        double temp = sc.nextDouble();
        obj.setTempData(temp);
        obj.changeTemp();
        break;
    case 2:
        Temperature obj1 = new Fahrenheit();
        System.out.print("Enter temprature: ");
        double temp1 = sc.nextDouble();
        obj1.setTempData(temp1);
        obj1.changeTemp();
        break;
    case 3:
        System.out.println("EXIT");
        break;
    default:
        System.out.println("INVALID CHOICE");
    }
} while (choice != 3);

}

};
```

OUTPUT:

```
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> & 'C:\Program Files\Java\jdk-23\bin\java.exe' '--
tionMessages' '-cp' 'C:\Users\bajel\AppData\Roaming\Code\User\workspaceStorage\62562c7cfbadb842afa4
_2ed81789\bin' 'Driver'
Enter 0 to EXIT
Enter 1 to convert temprature to fahrenheit
Enter 2 to convert temprature to celcius
Enter your choice: 1
Enter temprature: 18
Temprature in Fahrenhite: 64.4
Enter your choice: 2
Enter temprature: 18
Temprature in Celsius: -7.777777777777779
Enter your choice: 3
EXIT
```

Practical No.14

Write a java program to create an interface that consists of a method to display volume () as an abstract method and redefine this method in the derived classes to suit their requirements. Create classes called Cone, Hemisphere and Cylinder that implements the interface. Using these three classes, design a program that will accept dimensions of a cone, cylinder and hemisphere interactively and display the volumes.

Volume of cone = $(1/3)\pi r^2 h$

Volume of hemisphere = $(2/3)\pi r^3$

Volume of cylinder = $\pi r^2 h$

Source code:

```
import java.util.Scanner;

interface Shape {
    void volume(double r,double h);
};

class Cone implements Shape
{
    public void volume(double r,double h)
    {
        System.out.println("Volume of cone: "+(1.0/3)*3.14*r*r*h);
    }
};

class Hemisphere implements Shape
{
    public void volume(double r,double h)
    {
        System.out.println("Volume of hemisphere: "+(2.0/3)*3.14*r*r*r);
    }
};

class Cylinder implements Shape
{

```



```

public void volume(double r,double h)
{
    System.out.println("Volume of cylinder: "+3.14*r*r*h);
}
};

class Drive{

    public static void main(String args[]) {

        Scanner sc = new Scanner(System.in);

        System.out.println("Press 1 to find volume of cone");
        System.out.println("Press 2 to find volume of hemisphere");
        System.out.println("Press 3 to find volume of cylinder");
        System.out.println("Press 4 to exit");

        int choice;

        double r,h;

        do {

            System.out.print("Enter your choice: ");

            choice = sc.nextInt();

            switch (choice) {

                case 1:

                    Shape obj1=new Cone();

                    System.out.print("Enter the radius: ");

                    r = sc.nextDouble();

                    System.out.print("Enter the height: ");

                    h = sc.nextDouble();

                    obj1.volume(r,h);

                    break;

                case 2:

                    Shape obj2=new Hemisphere();

                    System.out.print("Enter the radius: ");

```

```
        r = sc.nextDouble();
        h = 1.0;
        obj2.volume(r,h);
        break;
    case 3:
        Shape obj3=new Cylinder();
        System.out.print("Enter the radius: ");
        r = sc.nextDouble();
        System.out.print("Enter the height: ");
        h = sc.nextDouble();
        obj3.volume(r,h);
        break;
    case 4:
        System.out.println("EXIT");
        break;
    default:
        System.out.println("INVALID CHOICE");
    }
} while (choice != 4);
}
};
```

OUTPUT:

```
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> & 'C:\Program Files\Java\jdk-23\bin\java.exe' '--enable-p
tionMessages' '-cp' 'C:\Users\bajel\AppData\Roaming\Code\User\workspaceStorage\62562c7cfbadb842afa4e4eaa6c
_2ed81789\bin' 'Drive'
Press 1 to find volume of cone
Press 2 to find volume of hemisphere
Press 3 to find volume of cylinder
Press 4 to exit
Enter your choice: 1
Enter the radius: 5
Enter the height: 12
Volume of cone: 314.0
Enter your choice: 2
Enter the radius: 15
Volume of hemisphere: 7065.0
Enter your choice: 3
Enter the radius: 12
Enter the height: 24
Volume of cylinder: 10851.84
Enter your choice: 4
EXIT
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> |
```

Practical No.15

Design a student management system using Java packages. The system should manage information about students, courses, and their enrolments. You will organize the functionality across multiple packages and use object-oriented principles such as encapsulation.

1. In the student package, create a Student class with fields for studentId, name, and age. Include a constructor to initialize these fields and a getStudentInfo() method to return the student's details.
2. In the course package, create a Course class with fields for courseId, courseName, and credits. Include a constructor and a getCourseInfo() method to return the course's details.
3. In the enrollment package, create an Enrollment class that holds references to Student and Course objects. Include a constructor and a getEnrollmentInfo() method to return the enrollment details.
4. In the default package, create instances of Student, Course, and Enrolment, then print details using the getStudentInfo(), getCourseInfo(), and getEnrollmentInfo() methods.

Source code:

```
package student;

public class Student {

    String studentId;

    String name;

    int age;

    public Student(String id, String vName, int vAge) {

        studentId = id;

        name = vName;

        age = vAge;

    }

    public String getStudentInfo() {

        return "Student Info:" + "\nStudent ID : " + studentId + "\nStudent Name : " + name +
"\nAge : " + age;

    }

}

package course;

public class Course {
```

```

String courseId;
String courseName;
int credits;
public Course(String id, String cName, int cCredits) {
    courseId = id;
    courseName = cName;
    credits = cCredits;
}
public String getCourseInfo() {
    return "Course Info:" + "\nCourse ID : " + courseId + "\nCourse Name : " + courseName +
"\nCredits : " + credits;
}
}
package enrollment;
import course.Course;
import student.Student;
public class Enrollment {
    private Student student;
    private Course course;
    public Enrollment(Student student, Course course) {
        this.student = student;
        this.course = course;
    }
    public String getEnrollmentInfo() {
        System.out.println("\nEnrollment Info:");
        return student.getStudentInfo() + course.getCourseInfo();
    }
}

```

```

import course.Course;
import enrollment.Enrollment;
import java.util.Scanner;
import student.Student;

public class Main
{
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter Student Id: ");
        String v_Id = sc.next();
        System.out.print("Enter Student Name: ");
        sc.nextLine();
        String v_Name = sc.nextLine();
        System.out.print("Enter Student Age: ");
        int v_Age = sc.nextInt();
        Student s1 = new Student(v_Id, v_Name, v_Age);
        System.out.print("Enter Course Id: ");
        String c_Id = sc.next();
        System.out.print("Enter Course Name: ");
        sc.nextLine();
        String c_Name = sc.nextLine();
        System.out.print("Enter Course Credits: ");
        int c_Credits = sc.nextInt();
        Course c1 = new Course(c_Id, c_Name, c_Credits);
        Enrollment e1 = new Enrollment(s1, c1);
        System.out.println(s1.getStudentInfo());
        System.out.println(c1.getCourseInfo());
        System.out.println(e1.getEnrollmentInfo());
    }
}

```

```
}  
}
```

OUTPUT:

```
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> javac -d . Student.java  
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> javac -d . Course.java  
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> javac -d . Enrollment.java  
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> javac -d . Main.java  
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> java Main  
Enter Student Id: 23014556  
Enter Student Name: Mansi Bajeli  
Enter Student Age: 19  
Enter Course Id: 409  
Enter Course Name: Java  
Enter Course Credits: 4  
Student Info:  
Student ID : 23014556  
Student Name : Mansi Bajeli  
Age : 19  
Course Info:  
Course ID : 409  
Course Name : Java  
Credits : 4  
  
Enrollment Info:  
Student Info:  
Student ID : 23014556  
Student Name : Mansi Bajeli  
Age : 19  
Course Info:  
Course ID : 409  
Course Name : Java  
Credits : 4  
PS C:\Users\bajel\OneDrive\Desktop\MANSI BAJELI> 
```