

## Assignment No 4

### **Class & Objects Q1 :-**

Room Volume Calculation Design a class named Room with three data members: height, width, and breadth. Include a method volume() to compute and return the volume of the room. Create a separate class RoomDemo that creates instances of the Room class and displays the volume for each instance.

### **Code :-**

```
import java.util.*;

class Room{

    int height;

    int width;

    int breadth;

    int volume;


    public Room(int height,int width,int breadth){

        this.height=height;

        this.width=width;

        this.breadth=breadth;

    }

    public void volume(){

        volume=height*width*breadth;

        System.out.println("volume of room is : "+volume);}


    public void display(){

        System.out.println("enter height of room : "+height);

        System.out.println("enter width of room : "+width);

        System.out.println("enter breadth of room : ");

    }

}
```

```

class RoomDemo{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.println("enter height of room : ");
        int height=sc.nextInt();
        System.out.println("enter width of room : ");
        int width=sc.nextInt();
        System.out.println("enter bredth of room : ");
        int breadth=sc.nextInt();
        sc.close();

        Room room=new Room(height,width,breadth);
        room.display();
        room.volume();

    }
}

```

**Output:- D:\cdac25\all assignment\java\assignment 4>java RoomDemo**

**enter height of room :**

**7**

**enter width of room :**

**8**

**enter bredth of room :**

**8**

**enter height of room : 7**

**enter width of room : 8**

**enter breadth of room :**

**volume of room is : 448**

Q2. Student Marks and Average Create a class Student with the following members: ● Name of the student ● Marks in three subjects ● A method to assign initial values ● A method to compute the total and average marks ● A method to display the student's name and total marks Write a main() method to demonstrate the functionality of the class.

**Code :-**

```
import java.util.*;

class Student{

    String name;

    int sum=0;

    int average;

    int marks[]=new int[3];


    public Student(String name,int marks[]){

        this.name=name;

        this.marks=marks;}


    public void display(){

        System.out.println("enter name of student: "+name);

        for(int i=0;i<3;i++){

            System.out.println("enter marks of student: "+ marks[i]);}

        System.out.println();

        System.out.println("sum of marks is: "+sum);

        System.out.println("Average of marks is : "+average);

    }

    public void calc(){

        for(int i=0;i<3;i++){

            sum+=marks[i];

        }

        for(int i=0;i<3;i++){

            average=sum/3;

        }

    }

}
```

```

}
class StudentDemo{
    public static void main(String[] arge){
Scanner sc= new Scanner(System.in);
System.out.println("enter name of student: ");
    String name=sc.nextLine();
    int marks[]=new int[3];
    for(int i=0;i<3;i++){
        System.out.println("enter marks of student: ");
        marks[i]=sc.nextInt();
    }
    sc.close();

    Student student=new Student(name,marks);
    student.calc();
    student.display();

    }
}

```

**Output:- D:\cdac25\all assignment\java\assignment 4>java StudentDemo**

**enter name of student:**

**sakshi**

**enter marks of student:**

**87**

**enter marks of student:**

**87**

**enter marks of student:**

**99**

**enter name of student: sakshi**

**enter marks of student: 87**

**enter marks of student: 87**

**enter marks of student: 99**

**sum of marks is: 273**

**Average of marks is : 91**

Q3. Box Area and Volume Write a class Box with three member variables: height, width, and breadth. Include appropriate constructors to initialize these variables. Also, implement two methods: ● getVolume() to return the volume of the box ● getArea() to return the surface area of the box Create two instances of the Box class and display their volumes and surface areas.

**Code :-**

```
import java.util.*;

class Box{

    int height;

    int width;

    int breadth;

    int volume;

    int area;

    public Box(int height, int width, int breadth ){

        this.height=height;

        this.width=width;

        this.breadth=breadth;

    }

    public void getVolume(){

        volume= height*width*breadth;

    }

    public void getArea(){

        area= 2 *( height * width+ width * breadth+ height* breadth );

    }

}
```

```
}
```

```
public void display(){
```

```
    System.out.println("enter height of box : "+height);
```

```
    System.out.println("enter width of box : " +width);
```

```
    System.out.println("enter breadth of box : "+breadth);
```

```
    System.out.println("volume of box : "+volume);
```

```
    System.out.println("Area of box : "+area);
```

```
}
```

```
}
```

```
class BoxDemo{
```

```
public static void main(String[] args){
```

```
    Scanner sc=new Scanner(System.in);
```

```
    System.out.println("enter height of box1 : ");
```

```
    int h1=sc.nextInt();
```

```
    System.out.println("enter width of box 1: ");
```

```
    int w1=sc.nextInt();
```

```
    System.out.println("enter breadth of box 1: ");
```

```
    int b1=sc.nextInt();
```

```
    Box box1=new Box(h1,w1,b1);
```

```
    box1.getVolume();
```

```
    box1.getArea();
```

```
    box1.display();
```

```
System.out.println("enter height of box 2: ");
int h2=sc.nextInt();
System.out.println("enter width of box 2: ");
int w2=sc.nextInt();
System.out.println("enter breadth of box 2: ");
int b2=sc.nextInt();
```

```
Box box2=new Box(h2,w2,b2);
box2.getVolume();
box2.getArea();
box2.display();
sc.close();
}
```

```
}
```

**Output:- D:\cdac25\all assignment\java\assignment 4>java BoxDemo**

**enter height of box1 :**

**3**

**enter width of box 1:**

**4**

**enter breadth of box 1:**

**5**

**enter height of box : 3**

**enter width of box : 4**

**enter breadth of box : 5**

**volume of box : 60**

**Area of box : 94**

**enter height of box 2:**

**3**

**enter width of box 2:**

**4**

**enter breadth of box 2:**

**5**

**enter height of box : 3**

**enter width of box : 4**

**enter breadth of box : 5**

**volume of box : 60**

**Area of box : 94**

Q4. Complex Number Operations Create a class to represent complex numbers. Include the following constructors: 1. A default constructor that sets both real and imaginary parts to 0 2. A constructor that initializes the real part only 3. A constructor that initializes both real and imaginary parts Also, write member functions to: • Add two complex numbers • Multiply two complex numbers In the main() method: • Create two complex numbers:  $3 + 2i$  and  $4 - 2i$  • Display their sum and product.

**Code :-**

```
public class Complex {  
    private double real;  
    private double imag;  
  
    // 1. Default constructor that sets both real and imaginary parts to 0  
    public Complex() {  
        real = 0;  
        imag = 0;  
    }  
  
    // 2. Constructor that initializes the real part only  
    public Complex(double r) {  
        real = r;  
        imag = 0;  
    }  
  
    // 3. Constructor that initializes both real and imaginary parts
```



```

public Complex(double r, double i) {
    real = r;
    imag = i;
}

// Method to add two complex numbers
public Complex add(Complex other) {
    double newReal = this.real + other.real;
    double newImag = this.imag + other.imag;
    return new Complex(newReal, newImag);
}

// Method to multiply two complex numbers
public Complex multiply(Complex other) {
    double newReal = (this.real * other.real) - (this.imag * other.imag);
    double newImag = (this.real * other.imag) + (this.imag * other.real);
    return new Complex(newReal, newImag);
}

// Method to display the complex number
public void display() {
    if (imag >= 0) {
        System.out.println(real + " + " + imag + "i");
    } else {
        System.out.println(real + " - " + (-imag) + "i");
    }
}

// Main method to test everything
public static void main(String[] args) {
    // Create two complex numbers: 3 + 2i and 4 - 2i
    Complex c1 = new Complex(3, 2);

```

```

Complex c2 = new Complex(4, -2);

// Add the two complex numbers
Complex sum = c1.add(c2);

// Multiply the two complex numbers
Complex product = c1.multiply(c2);

// Display results
System.out.print("First Complex Number: ");
c1.display();

System.out.print("Second Complex Number: ");
c2.display();

System.out.print("Sum: ");
sum.display();

System.out.print("Product: ");
product.display();
}
}

```

**Output:-**

**D:\cdac25\all assignment\java\assignment 4>java Complex**

**First Complex Number: 3.0 + 2.0i**

**Second Complex Number: 4.0 - 2.0i**

**Sum: 7.0 + 0.0i**

**Product: 16.0 + 2.0i**

Q5. BMI Calculator Design a Java program to implement a BMI (Body Mass Index) calculator. The program should consist of a class named BMICalculator with the following specifications:

```
class BMICalculator{

    double height;

    double weight;

    double BMI;

    public BMICalculator() {
height = 0.0;
weight = 0.0;
    }

    //parameterized constructor
    public BMICalculator(double height,double weight){
this.height=height;
this.weight=weight;
    }

    // Getter for height

    public double getHeight(){
return height;}

    //setter

    public void setHeight(double height){
this.height=height;
    }

    //getter

    public double getWeight(){
return weight;}

    //setter

    public void setWeight(double weight){
this.weight=weight;
```

```

    }

    public double calculateBMI(){
        BMI=weight/(height*height);
        return BMI;
    }

    public void display(){

        System.out.printf("BMI is: %.2f\n", BMI);
    }

}

class BMICalculatorDemo{
    public static void main(String[] args){
        BMICalculator bmi=new BMICalculator();
        bmi.setHeight(1.70);
        bmi.setWeight(65);

        System.out.println("Enter height (in meter):- " +bmi.getHeight() + " meter");
        System.out.println("Enter weight (in kg):- " +bmi.getWeight() + " kg");
        bmi.calculateBMI();
        bmi.display();

    }

}

```

**Output:-**

**D:\cdac25\all assignment\java\assignment 4>java BMICalculatorDemo**

**Enter height (in meter):- 1.7 meter**

**Enter weight (in kg):- 65.0 kg**

**BMI is: 22.49**

#### Q6. Electricity Bill Calculation –

Java Program Design a Java program to calculate the electricity bill for a customer based on the number of units consumed. Implement a class named ElectricityBill with the following specifications:

```
import java.lang.*;
import java.util.*;
class ElectricityBill{
    String customerName;
    double unitsConsumed;
    double billAmount;

    void calculateBillAmount() {
        if (unitsConsumed <= 100) {
            billAmount = unitsConsumed * 5; // Rs. 5 per unit for first 100 units
        } else if (unitsConsumed <= 300) {
            billAmount = 100 * 5 + (unitsConsumed - 100) * 7; // Rs. 7 per unit for 101 to 300 units
        } else {
            billAmount = 100 * 5 + 200 * 7 + (unitsConsumed - 300) * 10; // Rs. 10 per unit above 300
            units
        }

    }

    public ElectricityBill(String customerName, double unitsConsumed ){

        this.customerName=customerName;
        this.unitsConsumed=unitsConsumed;
        calculateBillAmount(); // Automatically calculate bill after object creation
    }
}
```

```

void printBill(){
    System.out.println("enter customer name : " +customerName);
        System.out.println("enter unitsConsumed : "+unitsConsumed);
        System.out.println("Bill amount is: "+billAmount);

}

```

```

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

    System.out.println("enter customer name : ");
    String customerName=sc.nextLine();
    System.out.println("enter unitsConsumed : ");
    double unitsConsumed=sc.nextDouble();

    // Create ElectricityBill object
    ElectricityBill bill = new ElectricityBill(customerName, unitsConsumed);

    // Print the bill details
    bill.printBill();
}
}

```

### **Output:-**

**D:\cdac25\all assignment\java\assignment 4>java ElectricityBill**

**enter customer name :**

**sakshi**

**enter unitsConsumed :**

**87**

**enter customer name : sakshi**

**enter unitsConsumed : 87.0**

**Bill amount is: 435.0**