

# Rajalakshmi Engineering College

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Batch: 2028  
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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 7\_Q1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement:

Rajiv is analyzing the energy consumption in his household and wants to calculate the total cost based on the daily energy usage. He is given the rate per unit of electricity and the energy consumed for multiple days. To structure this calculation efficiently, he decides to use an interface-based approach.

Implement an interface CostCalculator with the necessary methods to retrieve energy details and compute the cost. The calculations should be handled in the EnergyConsumptionTracker class, while the EnergyConsumptionApp class should only handle input and output.

##### Formula

Energy Cost for one day = Energy Consumed per day \* Rate Per Unit

### ***Input Format***

The first line of input consists of the rate per unit as an 'R' (a double value).

The second line of input consists of the number of days 'N' (an integer).

The third line of input consists of the daily energy consumption values for each day 'D' (double values), separated by space.

### ***Output Format***

The first line of the output prints: "Day-wise Energy Cost:"

The next N lines of the output print the day-wise energy costs(double type) and the total energy cost (double type) in Indian Rupees in the following format: "Day [day\_number]: Rs. [energy\_cost]"

The last line of the output prints: "Total Energy Cost: Rs. [total\_cost]"

Note: energy\_cost and total\_cost are rounded off to two decimal points

Refer to the sample output for the formatting specifications.

### ***Sample Test Case***

Input: 0.01

3

10.0 20.0 30.0

Output: Day-wise Energy Cost:

Day 1: Rs. 0.10

Day 2: Rs. 0.20

Day 3: Rs. 0.30

Total Energy Cost: Rs. 0.60

### ***Answer***

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

```
// You are using Java
```

```
import java.util.*;
```

```
interface CostCalculator {  
    void getEnergyDetails(Scanner scanner); // use Scanner as parameter  
    void calculateAndDisplayCost();  
}
```

```
class EnergyConsumptionTracker implements CostCalculator {  
    private double ratePerUnit;  
    private double[] dailyConsumption;  
    private double[] dailyCost;  
    private double totalCost;  
    private int numDays;
```

```
    public EnergyConsumptionTracker(double ratePerUnit, int numDays) {  
        this.ratePerUnit = ratePerUnit;  
        this.numDays = numDays;  
        this.dailyConsumption = new double[numDays];  
        this.dailyCost = new double[numDays];  
    }
```

```
    public void getEnergyDetails(Scanner scanner) {  
        for (int i = 0; i < numDays; i++) {  
            dailyConsumption[i] = scanner.nextDouble();  
        }  
    }
```

```
    public void calculateAndDisplayCost() {  
        totalCost = 0;  
        System.out.println("Day-wise Energy Cost:");  
        for (int i = 0; i < dailyConsumption.length; i++) {  
            dailyCost[i] = dailyConsumption[i] * ratePerUnit;  
            totalCost += dailyCost[i];  
            System.out.printf("Day %d: Rs. %.2f%n", i + 1, dailyCost[i]);  
        }  
        System.out.printf("Total Energy Cost: Rs. %.2f%n", totalCost);  
    }  
}
```

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

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

double ratePerUnit = scanner.nextDouble();
int numDays = scanner.nextInt();

CostCalculator tracker = new EnergyConsumptionTracker(ratePerUnit,
numDays);

tracker.getEnergyDetails(scanner);
tracker.calculateAndDisplayCost();

scanner.close();
}
```

**Status :** Correct

**Marks : 10/10**

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 7\_Q2

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Jaheer is working on a health monitoring system to help individuals calculate their Body Mass Index (BMI). He has implemented a basic BMI calculator and an interface called HealthCalculator. It should have a method called calculateBMI.

You are tasked with creating a program that takes weight and height as input, calculates the BMI using the BMICalculator class, and displays the result. If the height or weight is less than or equal to zero, then return -1.

Formula:  $BMI = \text{weight} / (\text{height} * \text{height})$

##### ***Input Format***

The first line of input consists of a double value W, the person's weight in kilograms.

The second line consists of a double value H, the height of the person in meters.

### **Output Format**

The output displays "BMI: " followed by a double value, representing the calculated BMI, rounded off to two decimal places.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 70.0

1.75

Output: BMI: 22.86

### **Answer**

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

```
// You are using Java
```

```
interface HealthCalculator
```

```
{  
    double calculateBMI(double weight,double height);  
}
```

```
class BMICalculator implements HealthCalculator
```

```
{  
    double weight;  
    double height;
```

```
    public BMICalculator()  
    {  
  
    }
```

```
    public double calculateBMI(double weight,double height)  
    {  
        if(height >0 && weight >0)  
        {  
            return weight/(height*height);
```

```
}
else
{
    return -1;
}
}

}

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

        double weight = scanner.nextDouble();
        double height = scanner.nextDouble();

        BMICalculator bmiCalculator = new BMICalculator();

        double bmi = bmiCalculator.calculateBMI(weight, height);

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

        scanner.close();
    }
}
```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 7\_Q3

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

A financial analyst, Alex, needs a program to calculate simple interest for various financial transactions. He requires a straightforward tool that takes in the principal amount, interest rate, and time in years and computes the interest.

The formula to be used is:  $\text{Interest} = \text{Principal} \times \text{Rate} \times \text{Time} / 100$

Implement this functionality using the InterestCalculator interface and the SimpleInterestCalculator class.

##### ***Input Format***

The first line of input consists of the principal amount P as a double value.



The second line of input consists of the annual interest rate  $r$  as a double value.

The third line of input consists of the number of years  $t$  as a positive integer, which is an integer value.

### **Output Format**

The output displays the calculated simple interest in the following format: "Simple Interest: [interest\_value]", Here, [interest\_value] should be replaced with the actual interest value calculated by the program.

Refer to the sample output for the formatting specifications.

### **Sample Test Case**

Input: 1000.00

5.00

2

Output: Simple Interest: 100.0

### **Answer**

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

```
// You are using Java
```

```
interface InterestCalculator
```

```
{
```

```
    double simpleInterest(double principal,double rate,int time);
```

```
}
```

```
class SimpleInterestCalculator implements InterestCalculator
```

```
{
```

```
    public double simpleInterest(double principal,double rate,int time)
```

```
    {
```

```
        double interest=(principal*rate*time)/100;
```

```
        return interest;
```

```
    }
```

```
}
```

```
class Main {
```

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

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

```
double principal = scanner.nextDouble();  
double rate = scanner.nextDouble();  
int time = scanner.nextInt();  
  
InterestCalculator calculator = new SimpleInterestCalculator();  
double interest = calculator.simpleInterest(principal, rate, time);  
  
System.out.println("Simple Interest: " + interest);  
  
}  
}
```

**Status :** Correct

**Marks :** 10/10

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## 2024\_28\_III\_OOPS Using Java Lab

### 2028\_REC\_OOPS using Java\_Week 7\_Q5

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Raj is curious about how old he is in the current year.

He has asked you to create a simple program that calculates a person's age based on their birth year. You decide to implement this functionality using the AgeCalculator interface and the HumanAgeCalculator class.

Note: The current year is 2024. Calculate the current age by using the formula: current year - birth year.

##### ***Input Format***

The input consists of an integer representing the birth year.

##### ***Output Format***

The output displays "You are X years old." where X is an integer representing the calculated age based on the entered birth year.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 1934

Output: You are 90 years old.

### **Answer**

```
import java.util.Scanner;

// You are using Java
interface AgeCalculator
{
    int calculateAge(int year);
}

class HumanAgeCalculator implements AgeCalculator
{
    public int calculateAge(int year)
    {
        int age = 2024-year;
        return age;
    }
}

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

        AgeCalculator ageCalculator = new HumanAgeCalculator();

        int birthYear = scanner.nextInt();
        int age = ageCalculator.calculateAge(birthYear);

        System.out.println("You are " + age + " years old.");
    }
}
```

**Status :** Correct

**Marks : 10/10**

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## 2024\_28\_III\_OOPS Using Java Lab

### REC\_2028\_OOPS using Java\_Week 7\_MCQ

Attempt : 1  
Total Mark : 15  
Marks Obtained : 15

#### Section 1 : MCQ

1. Which of the following statements about Java interfaces is true?

**Answer**

A class can implement multiple interfaces.

**Status : Correct**

**Marks : 1/1**

2. Can a Java interface contain both default and static methods?

**Answer**

Yes, an interface can have both default and static methods.

**Status : Correct**

**Marks : 1/1**

3. What is the output of the following code?

```
interface A {  
    static void display() {  
        System.out.println("Static method in A");  
    }  
}
```

```
class B implements A {  
    static void display() {  
        System.out.println("Static method in B");  
    }  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        B.display();  
    }  
}
```

**Answer**

Static method in B

**Status :** Correct

**Marks :** 1/1

4. If a class implements two interfaces that have the same default method, what must the class do?

**Answer**

The class must override the method to resolve ambiguity.

**Status :** Correct

**Marks :** 1/1

5. Consider a class implementing an interface and extending a class, both having a method with the same name. Which method gets called?

**Answer**

The method from the superclass

**Status :** Correct

**Marks :** 1/1

6. What is the output of the following code?

```
interface A {  
    default void show() {  
        System.out.println("A's Default Method");  
    }  
}
```

```
class B {  
    public void show() {  
        System.out.println("B's Method");  
    }  
}
```

```
class C extends B implements A {  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        C obj = new C();  
        obj.show();  
    }  
}
```

**Answer**

B's Method

**Status :** Correct

**Marks :** 1/1

7. What is the primary purpose of static methods in Java interfaces?

**Answer**

They allow an interface to provide helper methods without requiring an implementing class.

**Status :** Correct

**Marks :** 1/1



8. How can a class explicitly call a default method from an interface if there is a naming conflict?

**Answer**

Using InterfaceName.super.methodName();

**Status : Correct**

**Marks : 1/1**

9. Which of the following statements is true regarding default methods in Java interfaces?

**Answer**

A default method can be overridden in a class implementing the interface.

**Status : Correct**

**Marks : 1/1**

10. What is the output of the following code?

```
interface MathOperations {  
    static int square(int x) {  
        return x * x;  
    }  
}  
  
public class Main {  
    public static void main(String[] args) {  
        System.out.println(MathOperations.square(5));  
    }  
}
```

**Answer**

25

**Status : Correct**

**Marks : 1/1**

11. What is the output of the following code?

```
interface X {
```

```

    default void show() {
        System.out.println("X's Default Method");
    }
}

interface Y {
    default void show() {
        System.out.println("Y's Default Method");
    }
}

class Z implements X, Y {
    public void show() {
        System.out.println("Z's Method");
    }
}

public class Main {
    public static void main(String[] args) {
        Z obj = new Z();
        obj.show();
    }
}

```

**Answer**

Z's Method

**Status :** Correct

**Marks :** 1/1

12. What happens when an implementing class does not override a default method from an interface?

**Answer**

The default method's implementation from the interface will be used.

**Status :** Correct

**Marks :** 1/1

13. Which of the following is the correct way to declare an interface in

Java?

**Answer**

```
interface Vehicle { void start();}
```

**Status :** Correct

**Marks :** 1/1

14. How do you call a static method from an interface MyInterface?

**Answer**

```
MyInterface.staticMethod();
```

**Status :** Correct

**Marks :** 1/1

15. What is the output of the following code?

```
interface A {  
    default void show() {  
        System.out.println("A's Default Method");  
    }  
}
```

```
interface B {  
    default void show() {  
        System.out.println("B's Default Method");  
    }  
}
```

```
class C implements A, B {  
    public void show() {  
        A.super.show();  
    }  
}
```

```
public class Main {  
    public static void main(String[] args) {  
        C obj = new C();  
        obj.show();  
    }  
}
```

}  
}

**Answer**

A's Default Method

**Status :** Correct

**Marks : 1/1**