

Assignment 5

Problem-1: Print the sum, difference and product of two complex numbers by creating a class named 'Complex' with separate methods for each operation whose real and imaginary parts are to be entered by the user.

▪ Program:

```
import java.util.*;

class Complex {
    double re1, im1, re2, im2;

    Complex(double re1, double im1, double re2, double im2) {
        this.re1 = re1;
        this.im1 = im1;
        this.re2 = re2;
        this.im2 = im2;
    }

    void sum() {
        System.out.println("Sum is: " + (re1 + re2) + " + i" + (im1 + im2));
    }

    void dif() {
        System.out.println("Difference is: " + (re1 - re2) + " + i" + "(" + (im1 - im2) + ")");
    }

    void pro() {
        System.out.println("Product is: " + ((re1 * re2) - (im1 * im2)) + " + i" + "(" + ((re1 * im2) + (re2 * im1)) + ")");
    }
}

class p1 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter real part 1: ");
        double a = sc.nextDouble();
        System.out.println("Enter imaginary part 1: ");
```

```
double b = sc.nextDouble();
System.out.println("Enter real part 2: ");
double c = sc.nextDouble();
System.out.println("Enter imaginary part 2: ");
double d = sc.nextDouble();
Complex c1 = new Complex(a, b, c, d);
c1.sum();
c1.dif();
c1.pro();
}
}
```

- Output:
Enter real part 1:
34
Enter imaginary part 1:
5
Enter real part 2:
2
Enter imaginary part 2:
7
Sum is: 36.0 + i12.0
Difference is: 32.0 + i(-2.0)
Product is: 33.0 + i(248.0)

Problem-2: Create a base class called "Vehicle" that stores number of wheels and speed. Create the following derived classes "Car" that inherits "Vehicle" class and also stores number of passengers. Truck that inherits "Vehicle" class and also stores the load limit Write a main function to create objects of these two derived classes and display all the information about "Car" and "Truck". Also compare the speed of these two vehicles car and truck to display which one is faster.

■ Program:

```
import java.util.*;
class Vehicle {
    int w; double sp;
}
class Car extends Vehicle {
    int pass;
    Car(int pass, int w, double sp) {
        this.pass = pass; this.w = w; this.sp = sp;
        System.out.println("Speed of car: " + this.sp + " KMPH");
        System.out.println("Wheels of car: " + this.w);
        System.out.println("Passengers of car: " + this.pass);
    }
}
class Truck extends Vehicle {
    double limit;
    Truck(double limit, int w, double sp) {
        this.limit = limit; this.w = w; this.sp = sp;
        System.out.println("Speed of truck: " + this.sp + " KMPH");
        System.out.println("Wheels of truck: " + this.w);
        System.out.println("Limit of truck: " + this.limit + " Tons");
    }
}
class p2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        int w1, w2, p; double sp1, sp2, l;
        System.out.print("Enter car wheels:"); w1 = sc.nextInt();
        System.out.print("Enter car speed:"); sp1 = sc.nextDouble();
        System.out.print("Enter truck wheels:"); w2 = sc.nextInt();
        System.out.print("Enter truck speed:"); sp2 = sc.nextDouble();
        System.out.print("Enter passengers:"); p = sc.nextInt();
        System.out.print("Enter weight limit:"); l = sc.nextDouble();
        System.out.println();
        Car c1 = new Car(p, w1, sp1); Truck t1 = new Truck(l, w2, sp2);
        if (c1.sp > t1.sp)
            System.out.println("Car is faster");
        else
            System.out.println("Truck is faster");
    }
}
```

```
}  
}
```

- Output:

Enter car wheels:4

Enter car speed:98

Enter truck wheels:16

Enter truck speed:76

Enter passengers:6

Enter weight limit:1000

Speed of car: 98.0 KMPH

Wheels of car: 4

Passengers of car: 6

Speed of truck: 76.0 KMPH

Wheels of truck: 16

Limit of truck: 1000.0 Tons

Car is faster

Problem-3: Write a Java program to create a CSEallStudent class which contain data member as roll, name, dept. CSEallStudent class also has three methods getData(), putData() and deptRules(). getData() method is used to take input of above data members using Scanner class, putData() is used to display student details and deptRules() which cannot be inherited is used to display the rules of CSE department. CSEallStudent class has following two derived classes CSE3year(int oppMarks, String tech_fest_part) and CSE4year(double projMarks, String placement). Create one object for each 3d and 4th year CSE student, take all relevant inputs and display all the details of the students along with their departmental rules. (use of final method)

■ Program:

```
import java.util.*;
class CSEallStudent {
    String roll, name, dept;
    void getData(String roll, String name, String dept) {
        this.roll = roll; this.name = name; this.dept = dept;
    }
    void putData() {
        System.out.println("Name: " + name);
        System.out.println("Roll: " + roll);
        System.out.println("Dept: " + dept);
    }
    final void deptRules() {
        System.out.println("CSE RULES.....");
    }
}
class CSE3year extends CSEallStudent {
    int marks; String data;
    CSE3year(int oppMarks, String techfestpart, String n, String r, String d) {
        marks = oppMarks; data = techfestpart;
        super.getData(r, n, d); super.putData();
        System.out.println("Marks: " + marks);
        System.out.println("Tech fest: " + data);
    }
}
class CSE4year extends CSEallStudent {
    double projMarks; String placement;
    CSE4year(double projMarks, String placement, String n, String r, String d) {
        this.projMarks = projMarks; this.placement = placement;
        super.getData(r, n, d); super.putData();
        System.out.println("Project Marks: " + this.projMarks);
        System.out.println("Placement: " + this.placement);
    }
}
class p3 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
```

```
String t, n, r, d, pl; int o; double p;
System.out.println("3rd year...");
System.out.print("Enter name: "); n = sc.next();
System.out.print("Enter roll: "); r = sc.next();
System.out.print("Enter dept: "); d = sc.next();
System.out.print("Enter Marks: "); o = sc.nextInt();
System.out.print("Enter tech fest:"); t = sc.next();
System.out.println();
CSE3year c3 = new CSE3year(o, t, n, r, d); c3.deptRules();
```

```
System.out.println("4th year...");
System.out.print("Enter name: "); n = sc.next();
System.out.print("Enter roll: "); r = sc.next();
System.out.print("Enter dept: ");
d = sc.next();
System.out.print("Enter Project Marks: ");
p = sc.nextDouble();
System.out.print("Enter Placement: ");
pl = sc.next();
System.out.println();
CSE4year c4 = new CSE4year(p, pl, n, r, d);
c4.deptRules();
```

```
}
}
```

▪ **Output:**

3rd year...

Enter name: Sagnik

Enter roll: CSE/22/008

Enter dept: CSE

Enter Marks: 80

Enter tech fest: no

Name: Sagnik

Roll: CSE/22/008

Dept: CSE

Marks: 80

Tech fest: no

CSE RULES.....

4th year...

Enter name: Bikash

Enter roll: CSE21XXX

Enter dept: CSE

Enter Project Marks: 99

Enter Placement: Google

Name: Bikash

Roll: CSE21XXX

Dept: CSE

Project Marks: 99.0

Placement: Google

CSE RULES.....

Problem-4: Write a java program to Count Total Number of Objects Created for a Class. [use of static variable and method]

■ Program:

```
import java.util.*;
class countObjects{
    boolean isSuccess(){
        return true;
    }
}
public class p4 {
    static int sum = 0;
    public static void main(String[] args) {
        while(true) {
            System.out.println("Enter 1 for create object, Enter 2 to show, Enter 3
to exit");
            Scanner sc = new Scanner(System.in); int input = sc.nextInt();
            switch(input){
                case 1: createObj(sum); System.out.println("New Object created!");
                    break;
                case 2: System.out.println("No of objects: "+sum); break;
                case 3: System.out.println("Exited successfully....");
                    System.exit(input);
            }
        }
    }
    static void createObj(int s){
        countObjects c1 = new countObjects();
        if(c1.isSuccess()){
            sum++;
        }
    }
}
```

■ Output:

```
Enter 1 for create object, Enter 2 to show, Enter 3 to exit
1
New Object created!
Enter 1 for create object, Enter 2 to show, Enter 3 to exit
1
New Object created!
Enter 1 for create object, Enter 2 to show, Enter 3 to exit
2
No of objects: 2
Enter 1 for create object, Enter 2 to show, Enter 3 to exit
3
Exited successfully....
```

Program-5: Write a java program to create a class named Fuel which contains two static float data member ratePetrol and rateDiesel having initial values Rs 20 and Rs 10 respectively. Assume on creation of every object of Fuel class the rate of petrol and diesel will be hiked automatically by 10%. Display initial fuel rate. Next create 5 objects of Fuel class and display fuel rate immediate after creation each object. (use of static variable and method)

▪ Program:

```
class Fuel{
    static float ratePetrol;
    static float rateDiesel;
    Fuel(float a, float b){
        ratePetrol = a;
        rateDiesel = b;
        if(rateDiesel == 10 || ratePetrol == 20){
            System.out.println("Initial value of petrol is Rs. "+ratePetrol);
            System.out.println("Initial value of diesel is Rs. "+rateDiesel);
            System.out.println();
        }
    }
    float hikePetrol(){
        ratePetrol = (ratePetrol*0.1f) + ratePetrol;
        return ratePetrol;
    }
    float hikeDiesel(){
        rateDiesel = (rateDiesel*0.1f) + rateDiesel;
        return rateDiesel;
    }
    void showRate(float a1, float b1){
        System.out.println("Now value of petrol is Rs. "+a1);
        System.out.println("Now value of diesel is Rs. "+b1);
    }
}

public class p5 {
```



```

static float finalPetrol = 0;
static float finalDiesel = 0;
public static void main(String[] args) {
    Fuel f1 = new Fuel(20f,10f);
    finalPetrol = f1.hikePetrol();
    finalDiesel = f1.hikeDiesel();
    Fuel f2 = new Fuel(finalPetrol,finalDiesel);
    finalPetrol = f2.hikePetrol();
    finalDiesel = f2.hikeDiesel();
    Fuel f3 = new Fuel(finalPetrol,finalDiesel);
    finalPetrol = f3.hikePetrol();
    finalDiesel = f3.hikeDiesel();
    Fuel f4 = new Fuel(finalPetrol,finalDiesel);
    finalPetrol = f4.hikePetrol();
    finalDiesel = f4.hikeDiesel();
    Fuel f5 = new Fuel(finalPetrol,finalDiesel);
    finalPetrol = f5.hikePetrol();
    finalDiesel = f5.hikeDiesel();
    f5.showRate(finalPetrol,finalDiesel);
}
}

```

■ Output:

Initial value of petrol is Rs. 20.0

Initial value of diesel is Rs. 10.0

Now value of petrol is Rs. 32.2102

Now value of diesel is Rs. 16.1051