ASSIGNMENT 5

- **PROBLEM STATEMENT:**

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.**

- **SOURCE CODE:**

```
import java.util.Scanner;

class Complex {
   int rn;
   int in;

   Complex(int r, int i) {
      this.rn = r;
      this.in = i;
   }

   public Complex sum(Complex c1, Complex c2) {
      return new Complex(c1.rn + c2.rn, c1.in + c2.in);
   }

   public Complex diff(Complex c1, Complex c2) {
      return new Complex(c1.rn - c2.rn, c1.in - c2.in);
   }

   public Complex product(Complex c1, Complex c2) {
      int realPart = c1.rn * c2.rn - c1.in * c2.in;
      int imagPart = c1.rn * c2.in + c1.in * c2.rn;
      return new Complex(realPart, imagPart);
   }

   public void display() {
      System.out.println("Complex Number: " + rn + " + " + in + "i");
   }
}

public class p1 {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);

      System.out.println("First Complex Number:");
      System.out.print("Enter Real and Imaginary parts: ");
      int r1 = sc.nextInt();
      int i1 = sc.nextInt();

      System.out.println("Second Complex Number:");
      System.out.print("Enter Real and Imaginary parts: ");
      int r2 = sc.nextInt();
      int i2 = sc.nextInt();

      Complex c1 = new Complex(r1, i1);
      Complex c2 = new Complex(r2, i2);

      System.out.println("First Complex Number:");
```

```
        c1.display();
        System.out.println("Second Complex Number:");
        c2.display();

        Complex sum = c1.sum(c1, c2);
        System.out.println("Sum:");
        sum.display();

        Complex diff = c1.diff(c1, c2);
        System.out.println("Difference:");
        diff.display();


        Complex product = c1.product(c1, c2);
        System.out.println("Product:");
        product.display();
    }
}
```

- **OUTPUT:**

```
First Complex Number:
Enter Real and Imaginary parts: 5 8
Second Complex Number:
Enter Real and Imaginary parts: 6 2
First Complex Number:
Complex Number: 5 + 8i
Second Complex Number:
Complex Number: 6 + 2i
Sum:
Complex Number: 11 + 10i
Difference:
Complex Number: -1 + 6i
Product:
Complex Number: 14 + 58i
```

- **PROBLEM STATEMENT:**

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.**

- **SOURCE CODE:**

```
class Vehicle {
   int w,s;
   Vehicle(int w, int s) {
      this.w = w;
      this.s = s;
   }
}
class Car extends Vehicle {
   int n;
   Car(int n, int w, int s) {
      super(w, s);
      this.n = n;
   }}
class Truck extends Vehicle {
   int l;
   Truck(int l, int w, int s) {
      super(w, s);
      this.l = l;
   }
}
class p2 {
   public static void main(String[] args) {
      Car c = new Car(5, 4, 80);
      Truck t = new Truck(30, 2, 70);
      System.out.println("Car details:");
      System.out.println("Number of passengers: " + c.n);
      System.out.println("Number of wheels: " + c.w);
      System.out.println("Speed: " + c.s + " m/s");
      System.out.println("Truck details:");
      System.out.println("Load limit: " + t.l);
      System.out.println("Number of wheels: " + t.w);
      System.out.println("Speed: " + t.s + " m/s");
      if(c.s>t.s)      System.out.println("Faster Vehicle is Car");
      else System.out.println("Faster Vehicle is Truck");
   }
}
```

- **OUTPUT:**

```
Car details:
Number of passengers: 5
Number of wheels: 4
Speed: 80 m/s
Truck details:
Load limit: 30
Number of wheels: 2
Speed: 70 m/s
Faster Vehicle is Ca
```

- **PROBLEM STATEMENT:**

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 proj Marks, String placement). Create one object for each 3rd 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)**

- **SOURCE CODE:**

```
import java.util.Scanner;
class CSEallStudent {
   int r;
   String n, dep;

   void getData(Scanner sc) {
      r = sc.nextInt();
         sc.nextLine();
      n = sc.nextLine();
      dep = sc.nextLine();
   }
   void putData() {
      System.out.println("Roll: " + r);
      System.out.println("Name: " + n);
      System.out.println("Department: " + dep);
   }
   final void deptRules() {
      System.out.println("75% Attendance in class");
      System.out.println("90% Attendance in Lab");
   }
}
class CSE3year extends CSEallStudent {
   int oppMarks;
   String tech_fest_part;
   void getData(Scanner sc) {
      super.getData(sc);
      oppMarks = sc.nextInt();
         sc.nextLine();
      tech_fest_part = sc.nextLine();
   }
   void putData() {
      super.putData();
      System.out.println("Opportunity Marks: " + oppMarks);
      System.out.println("Tech Fest Participation: " + tech_fest_part);
   }
}
class CSE4year extends CSEallStudent {
   double projMarks;
   String placement;
   void getData(Scanner sc) {
      super.getData(sc);
      projMarks = sc.nextDouble();
            sc.nextLine();
```

```
        placement = sc.nextLine();
    }
    void putData() {
        super.putData();
        System.out.println("Project Marks: " + projMarks);
        System.out.println("Placement Record: " + placement);
    }
}
public class p3 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        CSE3year c3 = new CSE3year();

        System.out.println("Enter data for CSE3year student:");
        c3.getData(sc);
        c3.putData();

        CSE4year c4 = new CSE4year();
        System.out.println("Enter data for CSE4year student:");
        c4.getData(sc);
        c4.putData();

        CSEallStudent c = new CSEallStudent();
        c.deptRules();
    }
}
```

- **OUTPUT:**

```
Enter data for CSE3year student:
28
Partha Sarathi Manna
CSE
92
Dance
Roll: 28
Name: Partha Sarathi Manna
Department: CSE
Opportunity Marks: 92
Tech Fest Participation: Dance
Enter data for CSE4year student:
25
Sayak
CSE
93
90%
Roll: 25
Name: Sayak
Department: CSE
Project Marks: 93.0
Placement Record: 90%
75% Attendance in class
90% Attendance in Lab
```

- **PROBLEM STATEMENT:**

4. **Write a java program to Count Total Number of Objects Created for a Class. (use of static variable and method).**

- **SOURCE CODE:**

```
class CountObj{
	static int count=0;

	CountObj(){
		count++;
	}

	static void display(){
		System.out.println("Total Number of Objects Create :"+count);
	}
}

class p4{
	public static void main(String[] args){
		CountObj ob1 = new CountObj();
		CountObj ob2 = new CountObj();
		CountObj ob3 = new CountObj();
		CountObj ob4 = new CountObj();

		CountObj.display();
	}
}
```

- **OUTPUT:**

```
Total Number of Objects Create :4
```

- **PROBLEM STATEMENT:**

5. Witte 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 3 respectively. Assume on creation of every object of Fuel class the rate of petrol and diesel will be häked automatically by 100%. Display initial fuel rate. Next create 5 objects of Fuel clays and display fail rate immediate after creation each object (use of static variable and method)

- **SOURCE CODE:**

```
class Fuel{
    static float ratePatrol=20,rateDiesel=10;

    Fuel(){
            ratePatrol += ratePatrol * 0.1f;
            rateDiesel += rateDiesel * 0.1f;
    }

    static void display(){
            System.out.println("Fuel price:"+ratePatrol);
            System.out.println("Diesel price:"+rateDiesel);
    }

}

class p5{
    public static void main(String args[]){

            Fuel.display();
            Fuel f1 = new Fuel();
            f1.display();
            Fuel f2 = new Fuel();
            f2.display();
            Fuel f3 = new Fuel();
            f3.display();
    }
}
```

OUTPUT:

```
Fuel price:20.0
Diesel price:10.0
Fuel price:22.0
Diesel price:11.0
Fuel price:24.2
Diesel price:12.1
Fuel price:26.62
Diesel price:13.31
```