

Lab 1

Q1. Implement a Java program that demonstrates the three key OOP principles: Abstraction, Encapsulation, and Inheritance.

Problem Statement: You are developing a Vehicle Management System. The system should support different types of vehicles like Cars and Bikes while following OOP principles.

Tasks:

1. Abstraction: Create an abstract class Vehicle with the following:
 - String brand (Encapsulated, use getter/setter)
 - An abstract method void startEngine()
2. Inheritance:
 - Create two classes, Car and Bike, that inherit from Vehicle.
 - Implement the startEngine() method in both subclasses with a unique message.
3. Encapsulation: The brand field in Vehicle should be private, and accessible via public getter/setter methods.

Code

Vehicle.java

```
public abstract class Vehicle {
    private String brand;
    public String getBrand() {
        return brand;
    }
    public void setBrand(String brand) {
        this.brand = brand;
    }
    public abstract void startEngine();
}
```

Car.java

```
public class Car extends Vehicle {
    public void startEngine() {
        System.out.println("Car is starting.....");
    }
}
```

Bike.java

```
public class Bike extends Vehicle {
    @Override
    public void startEngine() {
```

```

        System.out.println("Bike is Starting.....");
    }
}

```

Main.java

```

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

        System.out.println("-----");
        System.out.println("Name: Bimochan Poudel (20780638)");
        System.out.println("TU Roll: 28555/078");
        System.out.println("-----");

        Car cr = new Car();
        cr.setBrand("Mercedes");
        System.out.println(cr.getBrand());
        cr.startEngine();

        Bike bk = new Bike();
        bk.setBrand("Pulsar");
        System.out.println(bk.getBrand());
        bk.startEngine();
    }
}

```

Output

```

● PS D:\28555 - 7th Sem Labworks\Java\Lab> cd inheritance
● PS D:\28555 - 7th Sem Labworks\Java\Lab\inheritance> javac Main.java
● PS D:\28555 - 7th Sem Labworks\Java\Lab\inheritance> java Main
-----
Name: Bimochan Poudel (20780638)
TU Roll: 28555/078
-----
Mercedes
Car is starting.....
Pulsar
Bike is Starting.....
○ PS D:\28555 - 7th Sem Labworks\Java\Lab\inheritance> 

```