Q1.

```
import java.util.Scanner;

public class q1Course {
    protected String coursename, coursecode, classvenue;
    protected int credithours;

    public q1Course(String a, String b, String c, int d) {
        this.coursename = a;
        this.classvenue = b;
        this.coursecode = c;
        this.credithours = d;
    }
}
class JavaCourse extends q1Course {
    protected String teachername;

    public JavaCourse(String a, String b, String c, int d, String
teachername) {
        super(a, b, c, d);
        this.teachername = "Laiba";
    }

    public void display(){
        System.out.println(coursename);
        System.out.println(teachername);
        System.out.println(coursecode);
        System.out.println(classvenue);
        System.out.println(credithours);
    }

    public static void main(String[] args) {
        Scanner A = new Scanner(System.in);
        String a, b, c, tn;
        int d;


        System.out.println("Enter course name");
        a = A.next();
        System.out.println("Enter course code");
        b= A.next();
        System.out.println("Enter class venue");
        c= A.next();
        System.out.println("Enter teacher name");
        tn= A.next();
        System.out.println("Enter credit hours");
        d= A.nextInt();

        JavaCourse J = new JavaCourse(a,b,c,d,tn);
        J.display();
    }
}
```

Q2.

```
import java.util.Scanner;

public class q2Person {

    protected String name, nationality, address, cnic;
    protected int age;
    q2Person() {
        System.out.println("I am a person");
    }


    public void Input(){
        Scanner A= new Scanner(System.in);
        System.out.println("Enter name");
        name = A.next();
        System.out.println("Enter nationality");
        nationality = A.next();
        System.out.println("Enter address");
        address = A.next();
        System.out.println("Enter age");
        age = A.nextInt();
        do {
            System.out.println("Enter cnic");
            cnic = A.next();
            if (cnic.length() != 13) {
                System.out.println("Digits are not 13");
            }
        }while (cnic.length() != 13);



    }
    public void display(){
        System.out.println(name);
        System.out.println(nationality);
        System.out.println(address);
        System.out.println(age);
        System.out.println(cnic);
    }
}
class Employee extends q2Person{
    protected String company,city;
    protected int years;
    public Employee() {
        super();
        System.out.println("I am an employee");
    }
    public void Input(){
        Scanner A = new Scanner(System.in);
        System.out.println("Enter company name");
        company = A.next();
        System.out.println("Enter city name");
```

```
        city = A.next();
        System.out.println("Enter years");
        years = A.nextInt();
    }
    public void display(){
        System.out.println(company);
        System.out.println(city);
        System.out.println(years);

    }
}

class Manager extends Employee{
    Scanner A = new Scanner(System.in);
    String arr[]= new String[5];
    public Manager() {
        super();
        System.out.println("I am a manager");
    }
    public void Input(){
        for(int i =0;i<5;i++){
            System.out.println("Enter name of employee" +(i+1) );
            arr[i]= A.next();
        }
    }

    public void display() {
        for (int i = 0; i < 5; i++) {
            System.out.println(" name of employee" + (i + 1) + " " +
arr[i]);
        }

    }

    public static void main(String[] args) {
        q2Person p = new q2Person();
        p.Input();
        p.display();
        Employee e = new Employee();
        e.Input();
        e.display();
        Manager m = new Manager();
        m.Input();
        m.display();
    }

}
```

Q3.

```
import com.sun.security.jgss.GSSUtil;

public class q3Vehicle {
    protected int Speed;
    protected String colour;
    protected int wheels;

    public q3Vehicle() {
    }

    public q3Vehicle(int a, String b, int c) {
        this.Speed = a;
        this.colour = b;
        this.wheels = c;

    }

    public int getSpeed() {
        return Speed;
    }

    public void setSpeed(int speed) {
        Speed = speed;
    }

    public String getColour() {
        return colour;
    }

    public void setColour(String colour) {
        this.colour = colour;
    }

    public int getWheels() {
        return wheels;
    }

    public void setWheels(int wheels) {
        this.wheels = wheels;
    }
}

class MotorVehicle extends q3Vehicle{
    protected String licenseplate;

    public MotorVehicle(int a, String b, int c, String d) {
        super(a,b,c);
        this.licenseplate = d;
    }

    public String getLicenseplate() {
        return licenseplate;
```

```
    }

    public void setLicenseplate(String licenseplate) {
        this.licenseplate = licenseplate;
    }
}

class Car extends MotorVehicle{
    protected int doors;

    public Car(int a, String b, int c, String d, int e) {
        super(a,b,c,d);
        this.doors=e;
    }


    public int getDoors() {
        return doors;
    }

    public void setDoors(int doors) {
        this.doors = doors;
    }

    public void display(){
        System.out.println(Speed);
        System.out.println(colour);
        System.out.println(wheels);
        System.out.println(licenseplate);
        System.out.println(doors);

    }

    public static void main(String[] args) {
        Car c = new Car(25,"Black", 4,"CS1001",4);
        c.display();
    }
}
```

Q4.

```
class Rectangle {
    int length;
    int breadth;

    Rectangle(int length, int breadth) {
        this.length = length;
        this.breadth = breadth;
    }

    void printArea() {
        System.out.println("Area of Rectangle: " + length * breadth);
    }

    void printPerimeter() {
        System.out.println("Perimeter of Rectangle: " + 2 * (length +
breadth));
    }
}

class Square extends Rectangle {
    int side;

    Square(int side) {
        super(side, side);
        this.side = side;
    }

    void printArea() {
        System.out.println("Area of Square: " + side * side);
    }

    void printPerimeter() {
        System.out.println("Perimeter of Square: " + 4 * side);
    }
}

public class q4Test {
    public static void main(String[] args) {
        Rectangle r = new Rectangle(5, 10);
        r.printArea();
        r.printPerimeter();

        Square s = new Square(7);
        s.printArea();
        s.printPerimeter();
    }
}
```

Q5. class Books {

```
    protected int bookID;
    protected String bookName;
    protected String bookAuthor;
    protected String ISBN;
    protected double price;

    public Books(int id, String name, String author, String isbn, double
price) {
        bookID = id;
        bookName = name;
        bookAuthor = author;
        ISBN = isbn;
        this.price = price;
    }
}

class Category1 extends Books {
    private String category;

    public Category1(int id, String name, String author, String isbn,
double price, String category) {
        super(id, name, author, isbn, price);
        this.category = category;
    }

    public void display() {
        System.out.println("Category: " + category);
        System.out.println("Book ID: " + bookID);
        System.out.println("Book Name: " + bookName);
        System.out.println("Book Author: " + bookAuthor);
        System.out.println("ISBN: " + ISBN);
        System.out.println("Price: " + price);
        System.out.println();
    }
    public static void main(String[] args) {
        Category1 book1 = new Category1(1, "Java", "Laiba", "123456",
40.99, "Java");
        Category1 book2 = new Category1(2, "OOP", "Fatima", "789012",
42.99, "OOP");
        Category1 book3 = new Category1(3, "C ", "Sheikh", "345678",
38.99, "C");

        book1.display();
        book2.display();
        book3.display();

        // Upcasting child object to parent class object
        Books book = (Books) new Category1(4, "C++", "Noor", "901234",
80.99, "C++");

    }
}
```