9. a) Digital Wallet & Payment processing system

Code :

```
import java.util.*;
import java.text.DecimalFormat;

abstract class PaymentGateway
{
	private static final DecimalFormat df = new DecimalFormat("0.00");
	abstract public void processPayment(double amount,float rate);
	public  double chargeAmount(double amt,float rate)
	{
		return Double.parseDouble(df.format(amt*(rate/100)));
	}
	public void verifyPayment()
	{
		System.out.println("Payment verified successfully..!");
	}
}

class UPIPayment extends PaymentGateway
{
	@Override
	public void processPayment(double amt, float rate)
	{
		verifyPayment();
		double charge = chargeAmount(amt,rate);
		System.out.println("Processing UPI Payment.....");
		System.out.println("Payment Amount : Rs. "+amt);
		System.out.println("Charge Amount : Rs. "+charge);
		System.out.println("Total Deducted Amount : Rs. "+(amt+charge));
		System.out.println("UPI payment successful....!");
	}
}
class CreditCardPayment extends PaymentGateway
{
	@Override
	public void processPayment(double amt, float rate)
	{
		verifyPayment();
		double charge = chargeAmount(amt,rate);
		System.out.println("Processing Credit card Payment.....");
		System.out.println("Payment Amount : Rs. "+amt);
		System.out.println("Charge Amount : Rs. "+charge);
		System.out.println("Total Deducted Amount : Rs. "+(amt+charge));
		System.out.println("Credit card payment successful....!");
	}
}
```

```
class NetBankingPayment extends PaymentGateway
{
	@Override
	public void processPayment(double amt, float rate)
	{
		verifyPayment();
		double charge = chargeAmount(amt,rate);
		System.out.println("Processing Net Banking Payment.....");
		System.out.println("Payment Amount : Rs. "+amt);
		System.out.println("Charge Amount : Rs. "+charge);
		System.out.println("Total Deducted Amount : Rs. "+(amt+charge));
		System.out.println("Net Banking Payment successful....!");
	}
}

class WalletPayment extends PaymentGateway
{
	@Override
	public void processPayment(double amt, float rate)
	{
		verifyPayment();
		double charge = chargeAmount(amt,rate);
		System.out.println("Processing Wallet Payment.....");
		System.out.println("Payment Amount : Rs. "+amt);
		System.out.println("Charge Amount : Rs. "+charge);
		System.out.println("Total Deducted Amount : Rs. "+(amt+charge));
		System.out.println("Wallet Payment successful....!");
	}
}

public class DigitalWalletSystem {
	public static void main(String[] args)
	{
		Scanner sc = new Scanner(System.in);
		PaymentGateway payment;
		System.out.println("*****Digital Wallet System*****");
		System.out.println("_____");
		double amt;
		System.out.print("Enter the amount : ");
		amt = sc.nextDouble();
		System.out.println("Choose your payment methods : ");
		System.out.println("1. UPI Payment\n2. Credit card Payment\n3. Net banking
Payment\n4. Wallet Payment");
		System.out.print("Enter the option : ");
		int option = sc.nextInt();
		switch(option)
		{
```

```
                    case 1:
                        payment = new UPIPayment();
                        payment.processPayment(amt, 1.0f);
                        break;

                    case 2:
                        payment = new CreditCardPayment();
                        payment.processPayment(amt, 2.5f);
                        break;

                    case 3:
                        payment = new NetBankingPayment();
                        payment.processPayment(amt, 1.0f);
                        break;

                    case 4:
                        payment = new WalletPayment();
                        payment.processPayment(amt, 0.5f);
                        break;
                }
                System.out.println("Exiting...");
            }
        }
```

Output :

```
*****Digital Wallet System*****
_______________________________
Enter the amount : 10000
Choose your payment methods :
1. UPI Payment
2. Credit card Payment
3. Net banking Payment
4. Wallet Payment
Enter the option : 1
Payment verified successfully..!
Processing UPI Payment.....
Payment Amount : Rs. 10000.0
Charge Amount : Rs. 100.0
Total Deducted Amount : Rs. 10100.0
UPI payment successful....!
Exiting...
```

9. b) AI-Based Credit Card Fraud Detection System

Code :

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

// Abstract class
abstract class FraudDetection {
   public abstract String analyzeTransaction(double amount, String location);
}

// Credit card fraud subclass
class CreditCardFraud extends FraudDetection {
   @Override
   public String analyzeTransaction(double amount, String location) {
      double score = simulateFraudScore(amount, location);
      StringBuilder result = new StringBuilder();
      result.append("\n[Credit Card] Transaction of Rs.").append(amount)
          .append(" at ").append(location).append("\n");
      result.append(String.format("AI Fraud Probability: %.2f%%\n", score * 100));
      if (score > 0.7) {
         result.append("ALERT: Credit Card Fraud Detected!\n");
      } else {
         result.append("Transaction is safe.\n");
      }
      return result.toString();
   }

   private double simulateFraudScore(double amount, String location) {
      Random rand = new Random();
      return (amount > 1000 ? 0.6 : 0.2) + rand.nextDouble() * 0.4;
   }
}

// Bank transfer fraud subclass
class BankTransferFraud extends FraudDetection {
   @Override
   public String analyzeTransaction(double amount, String location) {
      double score = simulateFraudScore(amount, location);
      StringBuilder result = new StringBuilder();
      result.append("\n[Bank Transfer] Transaction of Rs.").append(amount)
          .append(" at ").append(location).append("\n");
      result.append(String.format("AI Fraud Probability: %.2f%%\n", score * 100));
      if (score > 0.6) {
         result.append("ALERT: Bank Transfer Fraud Detected!\n");
      } else {
         result.append("Transaction is safe.\n");
      }
```

```
        return result.toString();
    }

    private double simulateFraudScore(double amount, String location) {
        Random rand = new Random();
        return (location.equalsIgnoreCase("international") ? 0.5 : 0.1) + rand.nextDouble() * 0.5;
    }
}

// Main class
public class FraudDetectionSystem {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        boolean run = true;

        System.out.println("=== AI-Based Fraud Detection System ===");

        while (run) {
            System.out.println("\nChoose Transaction Type:");
            System.out.println("1. Credit Card");
            System.out.println("2. Bank Transfer");
            System.out.println("3. Exit");
            System.out.print("Enter your choice: ");
            int choice = sc.nextInt();
            sc.nextLine(); // consume newline

            if (choice == 3) {
                System.out.println("Exiting Fraud Detection System. Stay Safe!");
                break;
            }

            System.out.print("Enter transaction amount: Rs.");
            double amount = sc.nextDouble();
            sc.nextLine(); // consume newline

            System.out.print("Enter transaction location: ");
            String location = sc.nextLine();

            FraudDetection detector = null;

            if (choice == 1) {
                detector = new CreditCardFraud();
            } else if (choice == 2) {
                detector = new BankTransferFraud();
            } else {
                System.out.println("Invalid choice. Please try again.");
                continue;
            }
```

```
            // Analyze transaction and display result
            String result = detector.analyzeTransaction(amount, location);
            System.out.println(result);
        }

        sc.close();
    }
}
```

Output :

```
=== AI-Based Fraud Detection System ===

Choose Transaction Type:
1. Credit Card
2. Bank Transfer
3. Exit
Enter your choice: 2
Enter transaction amount: Rs.1000
Enter transaction location: karur

[Bank Transfer] Transaction of Rs.1000.0 at karur
AI Fraud Probability: 59.36%
Transaction is safe.


Choose Transaction Type:
1. Credit Card
2. Bank Transfer
3. Exit
Enter your choice: 1
Enter transaction amount: Rs.100000
Enter transaction location: chennai

[Credit Card] Transaction of Rs.100000.0 at chennai
AI Fraud Probability: 81.25%
ALERT: Credit Card Fraud Detected!


Choose Transaction Type:
1. Credit Card
2. Bank Transfer
3. Exit
Enter your choice:
```