Experiment Number : 06 **Date: 05.02.2026**

ABSTRACT CLASSES

Aim:

To understand and implement inheritance concepts in Java.

PRE LAB EXERCISE

QUESTIONS

- ✓ What is an abstract class?

  An abstract class is a class that cannot be instantiated and may contain abstract methods as well as concrete methods. It is used to achieve abstraction in Java.
- ✓ Why are abstract methods used?

  Abstract methods are used to define a method without implementation. They force the child classes to provide their own implementation, ensuring consistency.
- ✓ Difference between abstract class and interface.

Abstract Class	**Interface**
Can have abstract and non-abstract methods	Contains only abstract methods (Java 7)
Can have constructors	Cannot have constructors
Can have instance variables	Variables are public, static, final
Supports single inheritance	Supports multiple inheritance

IN LAB EXERCISE

Objective:

To implement abstract class and demonstrate abstraction.

PROGRAMS:

1.University System

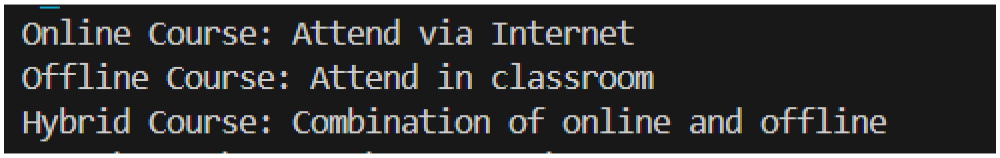
Scenario:
A university has different types of courses: Online, Offline, and Hybrid. Each course has a getDetails() method.

Question:
Create an abstract class Course with abstract method getDetails(). Implement OnlineCourse, OfflineCourse, and HybridCourse classes.

Code:

```
abstract class Course {
    abstract void getDetails();}
class OnlineCourse extends Course {
    void getDetails() {
        System.out.println("Online Course: Attend via Internet");}}
class OfflineCourse extends Course {
    void getDetails() {
        System.out.println("Offline Course: Attend in classroom");}}
class HybridCourse extends Course {
    void getDetails() {
        System.out.println("Hybrid Course: Combination of online and offline");}}
public class Main {
    public static void main(String[] args) {
        Course c1 = new OnlineCourse();
        Course c2 = new OfflineCourse();
        Course c3 = new HybridCourse();
        c1.getDetails();
        c2.getDetails();
        c3.getDetails();}}
```

Output:



```
Online Course: Attend via Internet
Offline Course: Attend in classroom
Hybrid Course: Combination of online and offline
```

2. Employee Payroll System

Scenario:
A company has different types of employees — Regular and Contract. All employees have a salary, but the calculation differs for each type.

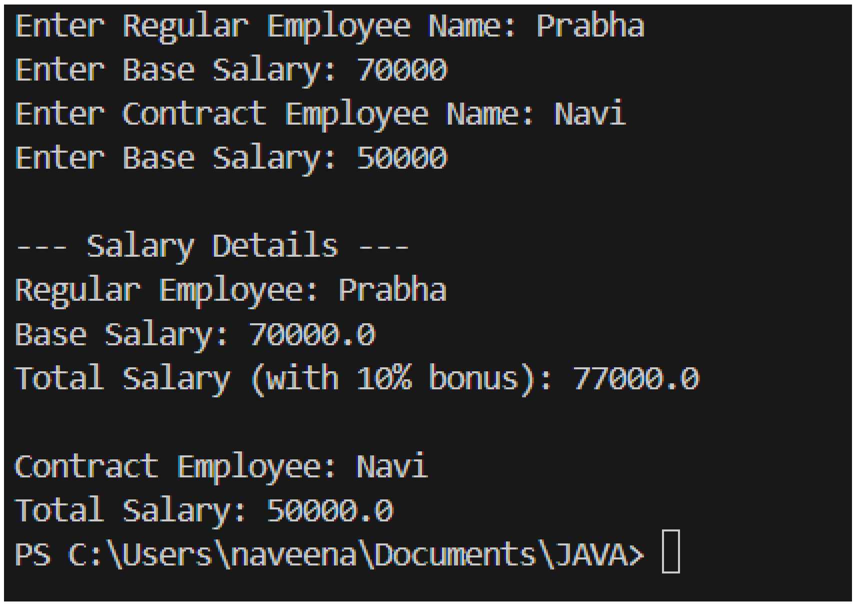
Question:
Design an abstract class Employee with an abstract method calculateSalary(). Implement subclasses RegularEmployee and ContractEmployee to calculate salary differently.

Code:

```
import java.util.Scanner;
abstract class Employee {
    String name;
    double baseSalary;
    // Abstract method to calculate total salary
    abstract void calculateSalary();
}
class RegularEmployee extends Employee {
    double bonusRate = 0.1; // 10% bonus
    void calculateSalary() {
        double totalSalary = baseSalary + (baseSalary * bonusRate);
        System.out.println("Regular Employee: " + name);
        System.out.println("Base Salary: " + baseSalary);
        System.out.println("Total Salary (with 10% bonus): " + totalSalary);}}
class ContractEmployee extends Employee {
    void calculateSalary() {
        System.out.println("Contract Employee: " + name);
        System.out.println("Total Salary: " + baseSalary);}}
public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        // Input for Regular Employee
        System.out.print("Enter Regular Employee Name: ");
        String regName = sc.nextLine();
        System.out.print("Enter Base Salary: ");
        double regSalary = sc.nextDouble();
        sc.nextLine(); // Consume newline
        // Input for Contract Employee
        System.out.print("Enter Contract Employee Name: ");
        String conName = sc.nextLine();
        System.out.print("Enter Base Salary: ");
        double conSalary = sc.nextDouble();
        // Create objects
        Employee e1 = new RegularEmployee();
        e1.name = regName;
        e1.baseSalary = regSalary;
        Employee e2 = new ContractEmployee();
        e2.name = conName;
        e2.baseSalary = conSalary;
        System.out.println("\n--- Salary Details ---");
        e1.calculateSalary();
        System.out.println();
        e2.calculateSalary();
    sc.close();}}
```

Output:



```
Enter Regular Employee Name: Prabha
Enter Base Salary: 70000
Enter Contract Employee Name: Navi
Enter Base Salary: 50000

--- Salary Details ---
Regular Employee: Prabha
Base Salary: 70000.0
Total Salary (with 10% bonus): 77000.0

Contract Employee: Navi
Total Salary: 50000.0
PS C:\Users\naveena\Documents\JAVA> 
```

3.Banking System

Scenario:

A bank has different types of accounts: Savings and Current. Both accounts need a method to calculate interest, but the calculation differs for each account type.

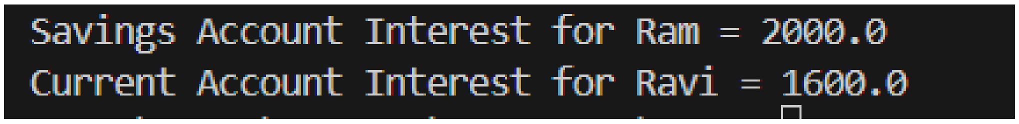
Question:

Use an abstract class BankAccount with an abstract method calculateInterest() and implement it in SavingsAccount and CurrentAccount classes.

Code

```
abstract class BankAccount {
  String accountHolder;
  double balance;
  BankAccount(String name, double bal) {
    accountHolder = name;
    balance = bal;}
  abstract void calculateInterest();  // Abstract method}
class SavingsAccount extends BankAccount {
    double interestRate = 0.04; // 4% interest
    SavingsAccount(String name, double bal) {
        super(name, bal);}
    void calculateInterest() {
        double interest = balance * interestRate;
        System.out.println("Savings Account Interest for " + accountHolder + " = " + interest);}}
class CurrentAccount extends BankAccount {
    double interestRate = 0.02; // 2% interest
    CurrentAccount(String name, double bal) {
        super(name, bal);}
    void calculateInterest() {
        double interest = balance * interestRate;
        System.out.println("Current Account Interest for " + accountHolder + " = " + interest);}}
public class Main {
    public static void main(String[] args) {
        BankAccount acc1 = new SavingsAccount("Ram", 50000);
        BankAccount acc2 = new CurrentAccount("Ravi", 80000);
        acc1.calculateInterest();
        acc2.calculateInterest();}}
```

Output



```
Savings Account Interest for Ram = 2000.0
Current Account Interest for Ravi = 1600.0
```

POST LAB EXERCISE

- ✓ How is an abstract class different from a regular class?

  An abstract class cannot be instantiated and may contain abstract methods, whereas a regular class can be instantiated and contains only concrete methods.

- ✓ Can you create an object of an abstract class? Why or why not?

  No, an object of an abstract class cannot be created because it may contain abstract methods without implementation.

- ✓ What happens if a subclass does not implement an abstract method?

  If a subclass does not implement all abstract methods, it must be declared as abstract; otherwise, a compilation error occurs.

- ✓ Can an abstract class exist without any abstract methods?

  Yes, an abstract class can exist without abstract methods. It is used to prevent object creation and provide a common base class.

- ✓ Can an abstract class extend another abstract class?

  Yes, an abstract class can extend another abstract class and may or may not implement the abstract methods.

Result:

Thus the abstract classes and methods were implemented and executed successfully.

ASSESSMENT

Description	**Max Marks**	**Marks Awarded**
Pre Lab Exercise	**5**	
In Lab Exercise	**10**	
Post Lab Exercise	**5**	
Viva	**10**	
Total	**30**	
Faculty Signature		