

**VISVESVARAYA TECHNOLOGICAL
UNIVERSITY**

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT

on

Object Oriented Java Programming

(23CS3PCOOJ)

Submitted by

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in partial fulfillment for the award of the degree of
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in

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**B.M.S. College of Engineering,
Bull Temple Road, Bangalore 560019**
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **Snigdha kashyap (1BF24CS295)**, who is bonafide student of **B.M.S. College of Engineering**. It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object-Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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Github Link: <https://github.com/snigdhakashyapcs24-star/JAVA.git>

Program 1:

Implement Quadratic Equation

Code:

```
import java.util.Scanner;

class quadratic
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        float a,b,c,d;
        double r1,r2;
        System.out.println("Enter coefficient of a:");
        a= s.nextFloat();
        System.out.println("Enter coefficient of b: ");
        b= s.nextFloat();
        System.out.println("Enter coefficient of c:");
        c= s.nextFloat();
        d= b*b - 4*a*c;
        if (a==0)
        {
            System.out.println("Not a quadratic equation");
        }
        else {

            if (d==0) {
                r1= (-b)/(2*a);
                r2=r1;
                System.out.println("Roots are real and equal:"+r1);
            }
            else if (d>0) {
                r1 = ((-b) + (Math.sqrt(d)))/(double)(2*a);
                r2 = ((-b) - (Math.sqrt(d)))/(double)(2*a);
                System.out.println("Roots are real and distinct R1:"+r1+ "and R2:"+r2);
            }
            else {
                System.out.println("Roots are imaginary");
                r1 = (-b)/(2*a);
                r2 = Math.sqrt(-d)/(2*a);
            }
        }
    }
}
```

```
        System.out.println("Root 1:"+r1+"+"+r2+"i");
        System.out.println("Root 2:"+r1+"-"+r2+"i");
    }
}
}
```

OUTPUT

```
Enter the first number:  
1  
Enter the second number:  
5  
Enter the third number:  
8  
The roots are imaginary  
-2.5  
1.3228756555322954  
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295>
```

Program 2: SGPA Calculator

Code:

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

```
class Subject {  
    int subjectMarks;  
    int credits;  
    int grade;  
  
    public Subject() {  
        this.subjectMarks = 0;  
        this.credits = 0;
```

```

        this.grade = 0;
    }
}

class Student {
    String name;
    String usn;
    double SGPA;
    Scanner s;
    Subject[] subject;

    public Student() {
        s = new Scanner(System.in);
        subject = new Subject[8];
        for (int i = 0; i < 8; i++) {
            subject[i] = new Subject();
        }
    }

    public void getStudentDetails() {
        System.out.print("Enter student name: ");
        name = s.nextLine();
        System.out.print("Enter student USN: ");
        usn = s.nextLine();
    }

    public void getMarks() {
        for (int i = 0; i < 8; i++) {
            System.out.print("Enter marks for subject " + (i + 1) + ": ");
            subject[i].subjectMarks = s.nextInt();
            System.out.print("Enter credits for subject " + (i + 1) + ": ");
            subject[i].credits = s.nextInt();

            subject[i].grade = (subject[i].subjectMarks / 10) + 1;

            if (subject[i].grade == 11) {
                subject[i].grade = 10;
            }
            if (subject[i].grade <= 4) {
                subject[i].grade = 0;
            }
        }
    }

    public void computeSGPA() {
        int effectiveScore = 0;
        int totalCredits = 0;

```

```

        for (int i = 0; i < 8; i++) {
            effectiveScore += (subject[i].grade * subject[i].credits);
            totalCredits += subject[i].credits;
        }

        SGPA = (double) effectiveScore / totalCredits;
    }

    public void display() {
        System.out.println("\nStudent Details:");
        System.out.println("Name: " + name);
        System.out.println("USN: " + usn);
        System.out.println("SGPA: " + SGPA);
    }
}

public class SGPAcalculator {
    public static void main(String[] args)
    {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter number of students: ");
        int n = scanner.nextInt();
        scanner.nextLine();

        Student[] students = new Student[n];

        for (int i = 0; i < n; i++) {
            System.out.println("\nEnter details for student " + (i + 1) + ":");
            students[i] = new Student();
            students[i].getStudentDetails();
            students[i].getMarks();
            students[i].computeSGPA();
        }
        System.out.println("\n--- Student Results ---");
        for (int i = 0; i < n; i++) {
            students[i].display();
        }

        scanner.close();
    }
}

```

OUTPUT

```

PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> & 'C:\Program Files\Eclipse Ado-
tium\jdk-25.0.0_36-hotspot\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp'
' 'C:\Users\kashy\AppData\Roaming\Code\User\workspaceStorage\e9d63e6a58cf106b99dcc7eaebc408cd\redhat.java\
jdt_ws\jdt.ls-java-project\bin' 'StudentSGPACalculator'
Enter USN: 1BF24CS297
Enter Name: Ramesh
Enter number of subjects: 6
Enter credits for subject 1: 3
Enter marks for subject 1: 98
Enter credits for subject 2: 3
Enter marks for subject 2: 94
Enter credits for subject 3: 2
Enter marks for subject 3: 89
Enter credits for subject 4: 3
Enter marks for subject 4: 96
Enter credits for subject 5: 1
Enter marks for subject 5: 90
Enter credits for subject 6: 1
Enter marks for subject 6: 90

Student Details:
USN: 1BF24CS297
Name: Ramesh
Subject 1 - Credits: 3, Marks: 98
Subject 2 - Credits: 3, Marks: 94
Subject 3 - Credits: 2, Marks: 89
Subject 4 - Credits: 3, Marks: 96
Subject 5 - Credits: 1, Marks: 90
Subject 6 - Credits: 1, Marks: 90
SGPA of the student: 9.85
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295>

```

Program 3: Bookstore Program

Code:

```

import java.util.Scanner;

class Books {
    String name;
    String author;
    int price;
    int num_pages;

    Books(String name, String author, int price, int num_pages)
    {
        this.name = name;
        this.author = author;
        this.price = price;
        this.num_pages = num_pages;
    }
    public String toString()
    {

```

```

String name = "Book name: " + this.name + "\n";
String author = "Author name: " + this.author + "\n";
String price = "Price: " + this.price + "\n";
String num_pages = "Number of pages: " + this.num_pages + "\n";
return name + author + price + num_pages;
}
}

public class BookStore
{
    public static void main(String args[])
    {
        Scanner in = new Scanner(System.in);
        String name,author;
        int price, num_pages;

        System.out.print("Enter number of books: ");
        int n = in.nextInt();

        Books[] b = new Books[n];

        for (int i = 0; i < n; i++)
        {
            System.out.println("\n\nEnter details for book " + (i + 1) + ":");

            System.out.print("Name: ");
            name = in.next();

            System.out.print("Author: ");
            author = in.next();

            System.out.print("Price: ");
            price = in.nextInt();

            System.out.print("Number of pages: ");
            num_pages
            = in.nextInt();

            b[i] = new Books(name, author, price, num_pages
            );
        }

        System.out.println("\n\nBook details:\n");

        for (int i = 0; i < n; i++)
        {
            System.out.println(b[i].toString());
        }
    }
}

```

```
    }  
    in.close();  
}  
}
```

OUTPUT

```
Enter the name of book:  
Pride and Prejudice  
Enter the author of the book:  
jane austen  
Enter price of book:  
320  
Enter the number of pages:  
279
```

```
Enter the name of book:  
Twilight  
Enter the author of the book:  
Stephenie Meyers  
Enter price of book:  
430  
Enter the number of pages:  
300
```

```
Books entered:  
-----  
Book name: Pride and Prejudice  
Author name: jane austen  
Price: 320  
Number of pages: 279  
  
-----  
Book name: Twilight  
Author name: Stephenie Meyers  
Price: 430  
Number of pages: 300
```

```
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295> █
```

Program 4: Shapes Program

Code:

```

import java.util.Scanner;

class InputScanner {
    Scanner sc = new Scanner(System.in);

    int getInt(String msg) {
        System.out.print(msg);
        return sc.nextInt();
    }

    double getDouble(String msg) {
        System.out.print(msg);
        return sc.nextDouble();
    }
}

abstract class Shape extends InputScanner {
    int a, b;
    abstract void printArea();
}

class Rectangle extends Shape {
    void input() {
        a = getInt("Enter length: ");
        b = getInt("Enter breadth: ");
    }

    void printArea() {
        System.out.println("Area of Rectangle = " + (a * b));
    }
}

class Triangle extends Shape {
    void input() {
        a = getInt("Enter base: ");
        b = getInt("Enter height: ");
    }

    void printArea() {
        System.out.println("Area of Triangle = " + (0.5 * a * b));
    }
}

class Circle extends Shape {
    void input() {
        a = getInt("Enter radius: ");
    }
}

```

```

    }

    void printArea() {
        System.out.println("Area of Circle = " + (3.1416 * a * a));
    }
}

public class MainShape {
    public static void main(String[] args) {
        System.out.println("Enter the dimensions of rectangle:");
        Rectangle r = new Rectangle();
        r.input();
        r.printArea();

        System.out.println("\nEnter the dimensions of triangle:");
        Triangle t = new Triangle();
        t.input();
        t.printArea();

        System.out.println("\nEnter the dimension of circle:");
        Circle c = new Circle();
        c.input();
        c.printArea();
    }
}

```

OUTPUT

```

cp' 'C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\bin'
ShapeTest'
Enter the dimensions of the rectangle (length and breadth): 1 2
Enter the dimensions of the triangle (base and height): 3 5
Enter the dimension of the circle (radius): 6

Area of Rectangle = 2.0
Area of Triangle = 7.5
Area of Circle = 113.09733552923255
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295> █

```

Program 5: Bank Program

Code:

```

import java.util.Scanner;

class Account {
    String customerName;
    int accountNumber;
    String accountType;
    double balance;

    Account(String name, int accNo, String type) {
        customerName = name;
        accountNumber = accNo;
        accountType = type;
        balance = 0.0;
    }

    void deposit(double amount) {
        balance += amount;
        System.out.println("Deposited: " + amount + ". Updated balance: " + balance);
    }

    void display() {
        System.out.println("Customer name: " + customerName);
        System.out.println("Account number: " + accountNumber);
        System.out.println("Type of Account: " + accountType);
        System.out.println("Account Balance: " + balance);
    }
}

class SavAcct extends Account {
    SavAcct(String name, int accNo, String type) {
        super(name, accNo, type);
    }

    void computeInterest() {
        double rate = 0.04;
        double interest = balance * rate;
        balance += interest;
        System.out.println("Interest added: " + interest + ". Updated balance: " + balance);
    }

    void withdraw(double amount) {
        if (amount > balance) {
            System.out.println("Insufficient balance!");
        } else {
            balance -= amount;
            System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
        }
    }
}

```

```

        }
    }
}

class CurAcct extends Account {
    final double MIN_BAL = 500.0;
    final double SERVICE_CHARGE = 100.0;

    CurAcct(String name, int accNo, String type) {
        super(name, accNo, type);
    }

    void checkBalance() {
        if (balance < MIN_BAL) {
            balance -= SERVICE_CHARGE;
            System.out.println("Balance below minimum. Service charge imposed: " +
SERVICE_CHARGE);
            System.out.println("Updated balance: " + balance);
        }
    }

    void withdraw(double amount) {
        if (amount > balance) {
            System.out.println("Insufficient balance!");
        } else {
            balance -= amount;
            checkBalance();
            System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
        }
    }
}

public class BankSystem {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Account[] accounts = new Account[2];

        for (int i = 0; i < 2; i++) {
            System.out.print("Enter customer name: ");
            String name = sc.nextLine();
            System.out.print("Enter account number: ");
            int accNo = Integer.parseInt(sc.nextLine());
            System.out.print("Enter type of account (saving/current): ");
            String type = sc.nextLine().toLowerCase();

            if (type.equals("saving"))
                accounts[i] = new SavAcct(name, accNo, type);
        }
    }
}

```

```

        else
            accounts[i] = new CurAcct(name, accNo, type);
    }

int choice;
do {
    System.out.println("\n-----MENU-----");
    System.out.println("1. Deposit");
    System.out.println("2. Withdraw");
    System.out.println("3. Compute Interest for Savings Account");
    System.out.println("4. Display Account Details");
    System.out.println("5. Exit");
    System.out.print("Enter your choice: ");
    choice = sc.nextInt();

    switch (choice) {
        case 1:
            System.out.print("Enter the type of account (saving/current): ");
            String type = sc.next().toLowerCase();
            System.out.print("Enter the deposit amount: ");
            double depAmt = sc.nextDouble();
            for (Account acc : accounts) {
                if (acc.accountType.equals(type)) {
                    acc.deposit(depAmt);

                    break;
                }
            }
            break;

        case 2:
            System.out.print("Enter the type of account (saving/current): ");
            type = sc.next().toLowerCase();
            System.out.print("Enter the withdrawal amount: ");
            double wAmt = sc.nextDouble();
            for (Account acc : accounts) {
                if (acc.accountType.equals(type)) {
                    if (type.equals("saving"))
                        ((SavAcct) acc).withdraw(wAmt);
                    else
                        ((CurAcct) acc).withdraw(wAmt);

                    break;
                }
            }
            break;
    }
}

```

```

case 3:
    System.out.print("Enter the type of account (saving/current): ");
    type = sc.nextLine().toLowerCase();
    for (Account acc : accounts) {
        if (acc.accountType.equals("saving") && type.equals("saving")) {
            ((SavAcct) acc).computeInterest();

            break;
        }
    }
    break;

case 4:
    System.out.print("Enter the type of account (saving/current): ");
    type = sc.nextLine().toLowerCase();
    for (Account acc : accounts) {
        if (acc.accountType.equals(type)) {
            acc.display();
            break;
        }
    }
    break;

case 5:
    System.out.println("Exiting...");
    break;

default:
    System.out.println("Invalid choice!");
}
} while (choice != 5);

sc.close();
}
}

```

OUTPUT

```
PS C:\Users\Admin\Desktop\1BF24CS295> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if ($?) { javac MainBank.java } ; if ($?) { java MainBank }

Enter customer name: Nikhil
Enter account Number: 1
Enter customer name: Priya
Enter account Number: 2

-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 1
Enter the type of account: saving
Enter the deposit amount: 1000

-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 2
Enter the type of account: saving
Enter the withdrawal amount: 200

-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 1
Enter the type of account: current
Enter the deposit amount: 2000

-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 4
Enter the type of account: saving
Customer name: Nikhil
Account number: 1
Type of Account: saving
Balance = 800.0

-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
```

```
-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 4
Enter the type of account: saving
Customer name: Nikhil
Account number: 1
Type of Account: saving
Balance = 800.0
```

```
-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 4
Enter the type of account: current
Customer name: Priya
Account number: 2
Type of Account: current
Balance = 2000.0
```

```
-----MENU-----
1. Deposit
2. Withdraw
3. Compute interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 5
Exiting...
PS C:\Users\Admin\Desktop\1BF24CS295> █
```

Program 6: Packages

Code:

```
package CIE;
```

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

```
public class Student {
```

```

protected String usn;
protected String name;
protected int sem;

public void inputStudentDetails() {
    Scanner s = new Scanner(System.in);
    System.out.print("Enter USN: ");
    usn = s.nextLine();

    System.out.print("Enter Name: ");
    name = s.nextLine();

    System.out.print("Enter Semester: ");
    sem = s.nextInt();
}

public void displayStudentDetails() {
    System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
    System.out.println("Semester: " + sem);
}

package CIE;
import java.util.Scanner;

public class Internals extends Student {

    protected int marks[] = new int[5];

    public void inputCIEmarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter 5 CIE marks: ");

        for (int i = 0; i < 5; i++) {
            System.out.print("CIE Mark in Subject " + (i + 1) + ": ");
            marks[i] = s.nextInt();
        }
    }
}

package SEE;

import CIE.Internals;
import java.util.Scanner;

public class Externals extends Internals {

```

```

protected int marks[];
protected int finalMarks[];

public Externals() {
    marks = new int[5];
    finalMarks = new int[5];
}

public void inputSEEmarks() {
    Scanner s = new Scanner(System.in);
    System.out.println("Enter 5 SEE marks: ");

    for (int i = 0; i < 5; i++) {
        System.out.print("SEE Mark in Subject " + (i + 1) + ": ");
        marks[i] = s.nextInt();
    }
}

public void calculateFinalMarks() {
    for (int i = 0; i < 5; i++) {
        finalMarks[i] = super.marks[i] + marks[i]/2; // CIE + SEE
    }
}

public void displayFinalMarks() {
    System.out.println("\n--- Final Marks ---");
    displayStudentDetails();

    for (int i = 0; i < 5; i++) {
        System.out.println("Final Marks in Subject " + (i + 1) + ": " + finalMarks[i]);
    }
}

import SEE.Externals;

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

        Externals obj = new Externals();

        obj.inputStudentDetails();
        obj.inputCIEmarks();
        obj.inputSEEmarks();
        obj.calculateFinalMarks();
        obj.displayFinalMarks();
    }
}

```

```
}
```

OUTPUT

```
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> & 'C:\Program Files\Eclipse Aca  
dium\jdk-25.0.0.36-hotspot\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' ''  
'C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295\bin' 'Main'  
Enter number of students (n): 1  
  
--- Student 1 ---  
Enter USN: 1BF24CS295  
Enter name: Snigdha  
Enter semester (int): 3  
Enter CIE marks for subject 1: 45  
Enter CIE marks for subject 2: 47  
Enter CIE marks for subject 3: 49  
Enter CIE marks for subject 4: 39  
Enter CIE marks for subject 5: 47  
Enter SEE marks for subject 1: 78  
Enter SEE marks for subject 2: 76  
Enter SEE marks for subject 3: 74  
Enter SEE marks for subject 4: 67  
Enter SEE marks for subject 5: 78  
  
===== Final Marks for All Students =====  
  
Student 1:  
USN: 1BF24CS295 Name: Snigdha Sem: 3  
Subject 1 Final Marks: 65  
Subject 2 Final Marks: 64  
Subject 3 Final Marks: 64  
Subject 4 Final Marks: 56  
Subject 5 Final Marks: 66  
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295>
```

Program 7: Errors

Code:

```
import java.util.*;  
  
class WrongAge extends Exception {  
    WrongAge(String message) {  
        super(message);  
    }  
}  
  
class InputScanner {  
    Scanner sc;
```

```

InputScanner() {
    sc = new Scanner(System.in);
}

int getInt() {
    return sc.nextInt();
}

class Father extends InputScanner {
    int fatherAge;

    Father() throws WrongAge {
        System.out.print("Enter Father's Age: ");
        fatherAge = getInt();

        if (fatherAge < 0) {
            throw new WrongAge("Age cannot be negative");
        }
    }

    void display() {
        System.out.println("Father's Age: " + fatherAge);
    }
}

class Son extends Father {
    int sonAge;

    Son() throws WrongAge {
        super();

        System.out.print("Enter Son's Age: ");
        sonAge = getInt();

        if (sonAge < 0) {
            throw new WrongAge("Age cannot be negative");
        }

        if (sonAge >= fatherAge) {
            throw new WrongAge("Son's age cannot be greater than or equal to father's age");
        }
    }

    void display() {
        super.display();
    }
}

```

```

        System.out.println("Son's Age: " + sonAge);
    }
}

public class Main {
    public static void main(String[] args) {
        try {
            Son s = new Son();
            s.display();

        } catch (WrongAge e) {
            System.out.println("Exception: " + e.getMessage());
        }
    }
}

```

OUTPUT

```

PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> ^C
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295>
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> & 'C:\Program Files\Eclipse Adoptium\jdk-25.0.0-36-hotspot\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\kashy\AppData\Roaming\Code\User\workspaceStorage\e9d63e6a58cf106b99dcc7eaebc408cd\redhat.java\jdt_ws\jdt.ls-java-project\bin' 'Main'
Enter Father's Age: 35
Enter Son's Age: 24
Father's Age: 35
Son's Age: 24
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> █

```

```

PS C:\Users\Admin\Desktop\1BF24CS295> cd "c:\Users\Admin\Desktop\" ; if ($?) { javac Main.java } ; if ($?) { java Main }
Enter Father's Age: 45
Enter Son's Age: 78
Error: Son's age cannot be greater than father's age
PS C:\Users\Admin\Desktop> cd "c:\Users\Admin\Desktop\" ; if ($?) { javac Main.java } ; if ($?) { java Main }
Enter Father's Age: 56
Enter Son's Age: 89
Error: Son's age cannot be greater than father's age

```

Program 8: Multi Threading

Code:

```

class MessageThread extends Thread {
    String message;
    int interval;
    int count;

    MessageThread(String msg, int time, int count) {
        this.message = msg;
        this.interval = time;
    }
}

```

```

        this.count = count;
    }

public void run() {
    try {
        for (int i = 1; i <= count; i++) {
            System.out.println(message);
            Thread.sleep(interval);
        }
    } catch (InterruptedException e) {
        System.out.println("Thread Interrupted");
    }
}

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

        MessageThread t1 = new MessageThread("BMS College of Engineering", 10000, 5);

        MessageThread t2 = new MessageThread("CSE", 2000, 10);

        t1.start();
        t2.start();
    }
}

```

Output:



A screenshot of a terminal window titled "Windows PowerShell". The command entered is "PS C:\Users\Admin\Desktop\1BF24CS295\CIE> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if (\$?) { javac CollegeThreads.java } ; if (\$?) { java CollegeThreads }". The output shows the execution of the Java code, with multiple instances of "CSE" and "BMS College of Engineering" printed to the console.

```

PS C:\Users\Admin\Desktop\1BF24CS295\CIE> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if ($?) { javac CollegeThreads.java } ; if ($?) { java CollegeThreads }
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE

```

Program 9: Open Ended Question 1

Code:

```

import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

```

```

public class DivisionUI extends JFrame implements ActionListener {

    JTextField num1Field, num2Field, resultField;
    JButton divideButton;

    DivisionUI() {
        setTitle("Integer Division");
        setSize(350, 200);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLayout(new GridLayout(4, 2, 5, 5));

        add(new JLabel("Num 1:"));
        num1Field = new JTextField();
        add(num1Field);

        add(new JLabel("Num 2:"));
        num2Field = new JTextField();
        add(num2Field);

        divideButton = new JButton("Divide");
        add(divideButton);

        divideButton.addActionListener(this);

        add(new JLabel("Result:"));
        resultField = new JTextField();
        resultField.setEditable(false);
        add(resultField);

        setVisible(true);
    }

    public void actionPerformed(ActionEvent e) {
        try {
            int num1 = Integer.parseInt(num1Field.getText());
            int num2 = Integer.parseInt(num2Field.getText());

            if (num2 == 0) {
                throw new ArithmeticException("Cannot divide by zero");
            }

            int result = num1 / num2;
            resultField.setText(Integer.toString(result));
        } catch (NumberFormatException ex) {

```

```

        JOptionPane.showMessageDialog(this,
            "Please enter valid integers!",
            "Number Format Error",
            JOptionPane.ERROR_MESSAGE);

    } catch (ArithmaticException ex) {
        JOptionPane.showMessageDialog(this,
            ex.getMessage(),
            "Arithmatic Error",
            JOptionPane.ERROR_MESSAGE);
    }
}

public static void main(String[] args) {
    new DivisionUI();
}
}

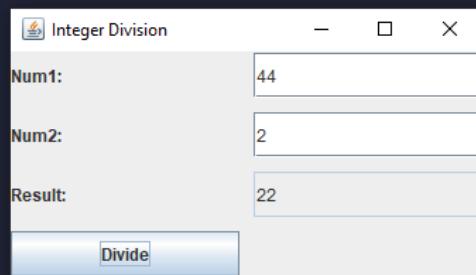
```

Output

```

PS C:\Users\Admin\Desktop\1BF24CS295> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if ($?) { javac DivisionGUI.java } ; if ($?) { java
PS C:\Users\Admin\Desktop\1BF24CS295> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if ($?) { javac DivisionGUI.java } ; if ($?) { java
PS C:\Users\Admin\Desktop\1BF24CS295> cd "c:\Users\Admin\Desktop\1BF24CS295\" ; if ($?) { javac DivisionGUI.java } ; if ($?) { java

```



Program 10: Open Ended Question 2

Code:

```

class Q {

    int n;
    boolean valueSet = false;

    synchronized int get() {
        while (!valueSet) {

```

```

        try {
            System.out.println("\nConsumer waiting\n");
            wait();
        } catch (InterruptedException e) {
            System.out.println("InterruptedException caught");
        }
    }

    System.out.println("Got: " + n);
    valueSet = false;

    System.out.println("\nIntimate Producer\n");
    notify();

    return n;
}

synchronized void put(int n) {
    while (valueSet) {
        try {
            System.out.println("\nProducer waiting\n");
            wait();
        } catch (InterruptedException e) {
            System.out.println("InterruptedException caught");
        }
    }

    this.n = n;
    valueSet = true;
    System.out.println("Put: " + n);

    System.out.println("\nIntimate Consumer\n");
    notify();
}
}

class Producer implements Runnable {
    Q q;

    Producer(Q q) {
        this.q = q;
        new Thread(this, "Producer").start();
    }

    public void run() {
        int i = 0;

```

```

        while (i < 5) {
            q.put(i++);
        }
    }

class Consumer implements Runnable {

    Q q;

    Consumer(Q q) {
        this.q = q;
        new Thread(this, "Consumer").start();
    }

    public void run() {
        int i = 0;
        while (i < 5) {
            int r = q.get();
            System.out.println("Consumed: " + r);
            i++;
        }
    }
}

public class main {
    public static void main(String args[]) {
        Q q = new Q();
        new Producer(q);
        new Consumer(q);
        System.out.println("Press Control-C to stop.");
    }
}

```

Output:

```
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295> & 'C:\Program Files\Eclipse Adium\jdk-25.0.0.36-hotspot\bin\java.exe' '--enable-preview' '-XX:+ShowCodeDetailsInExceptionMessages' '-Djava.library.path=C:\Users\kashy\AppData\Roaming\Code\User\workspaceStorage\e9d63e6a58cf106b99dcc7eaebc408cd\redhat.jdt_ws\jdt.ls-java-project\bin' 'Main'
Put: 0
Producer waiting...
Got: 0
Put: 1
Producer waiting...
Consumed: 0
Got: 1
Consumed: 1
Put: 2
Producer waiting...
Got: 2
Consumed: 2
Put: 3
Producer waiting...
Got: 3
Consumed: 3
Put: 4
Got: 4
Consumed: 4
PS C:\Users\kashy\OneDrive\Desktop\1BF24CS295\1BF24CS295\src\1BF24CS295>
```