

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
BACHELOR OF ENGINEERING
in

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B.M.S. College of Engineering,
Bull Temple Road, Bangalore 560019
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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **Rishi Kumar Chourasia (1BF24CS253)**, who is a 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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Program 1

Implement Quadratic Equation

CODE

```
import java.util.*;
class quadratic
{
    public static void main(String[] args)
    {

        int a,b,c,d;
        double r1,r2;
        System.out.println("\nRishi Kumar Chourasia - 1BF24CS253\n");
        Scanner in = new Scanner(System.in);

        System.out.print("Enter value of coefficient a - ");
        a = in.nextInt();
        System.out.println();

        System.out.print("Enter value of coefficient b - ");
        b = in.nextInt();
        System.out.println();

        System.out.print("Enter value of coefficient c - ");
        c = in.nextInt();
        System.out.println();

        if(a == 0)
        {
            System.out.println("Not a Quadratic Equation");
        }

        else
        {
            d= b*b - 4*a*c;

            if(d==0)
            {
                r1 = (-b)/(2*a);
                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+" and "+r2);
    }

    else
    {
        r1 = (-b)/(2*a);
        r2 = Math.sqrt(-d)/(2*a);
        System.out.println("Roots are imaginary -> "+r1+" and "+r2);
    }
}
}
}

```

Terminal Output :

```

Rishi Kumar Chourasia - 1BF24CS253
Enter value of coefficient a - 0

Enter value of coefficient b - 1

Enter value of coefficient c - 1

Not a Quadratic Equation
PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }

Rishi Kumar Chourasia - 1BF24CS253
Enter value of coefficient a - 1

Enter value of coefficient b - -2

Enter value of coefficient c - 1

Roots are real and equal -> 1.0
PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }

Rishi Kumar Chourasia - 1BF24CS253
Enter value of coefficient a - 2

Enter value of coefficient b - 5

Enter value of coefficient c - -3

Roots are real and distinct-> 0.5 and -3.0
PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }

Rishi Kumar Chourasia - 1BF24CS253

Enter value of coefficient a - 1

Enter value of coefficient b - 2

Enter value of coefficient c - 5

Roots are imaginary -> -1.0 and 2.0
PS C:\Users\Admin\Desktop\1BF24CS253> 

```

Activate Windows
Go to Settings to activate Windows.

Program 2

Implement 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 Main {
    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();
}
```


Terminal Output :

```
Enter number of students: 2

Enter details for student 1:
Enter student name: Rishi Kumar Chourasia
Enter student USN: 1BF24CS253
Enter marks for subject 1: 95
Enter credits for subject 1: 4
Enter marks for subject 2: 90
Enter credits for subject 2: 4
Enter marks for subject 3: 85
Enter credits for subject 3: 3
Enter marks for subject 4: 80
Enter credits for subject 4: 3
Enter marks for subject 5: 87
Enter credits for subject 5: 3
Enter marks for subject 6: 82
Enter credits for subject 6: 3
Enter marks for subject 7: 90
Enter credits for subject 7: 1
Enter marks for subject 8: 77
Enter credits for subject 8: 1

Enter details for student 2:
Enter student name: Sagarmatha Khatri
Enter student USN: 1BF24CS260
Enter marks for subject 1: 80
Enter credits for subject 1: 4
Enter marks for subject 2: 75
Enter credits for subject 2: 4
Enter marks for subject 3: 73
Enter credits for subject 3: 3
Enter marks for subject 4: 77
Enter credits for subject 4: 3
Enter marks for subject 5: 90
Enter credits for subject 5: 3
Enter marks for subject 6: 55
Enter credits for subject 6: 3
Enter marks for subject 7: 85
Enter credits for subject 7: 1
Enter marks for subject 8: 90
Enter credits for subject 8: 1

--- Student Results ---

Student Details:
Name: Rishi Kumar Chourasia
USN: 1BF24CS253
SGPA: 9.363636363636363

Student Details:
Name: Sagarmatha Khatri
USN: 1BF24CS260
SGPA: 8.318181818181818
```

Lab Program 3

Implement Bookstore management 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 Main
{
    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();
}
}

```

Terminal Output :

```
C:\Users\Admin\Desktop\1BF24CS253>java Main
Enter number of books: 2

Enter details for book 1:
Name: Harry_Potter
Author: JK_Rowling
Price: 450
Number of pages: 223

Enter details for book 2:
Name: Percy_Jackson
Author: Rick_Riordan
Price: 399
Number of pages: 350

Book details:

Book name: Harry_Potter
Author name: JK_Rowling
Price: 450
Number of pages: 223

Book name: Percy_Jackson
Author name: Rick_Riordan
Price: 399
Number of pages: 350
```

Lab Program 4

Implement a program to calculate attributes of different shapes

CODE

```
import java.util.Scanner;

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

abstract class Shape extends InputScanner
{
    int x, y;

    abstract void printArea();

    void inputDimensions(int shapecode)
    {
        if(shapecode==1)
        {
            System.out.print("Enter length: ");
            x = in.nextInt();
            System.out.print("Enter breadth: ");
            y = in.nextInt();
        }

        else if(shapecode==2)
        {
            System.out.print("Enter base: ");
            x = in.nextInt();
            System.out.print("Enter height: ");
            y = in.nextInt();
        }

        else if(shapecode==3)
        {
            System.out.print("Enter radius: ");
            x = in.nextInt();
        }
        else
        {
            System.out.println("Error");
        }
    }
}
```

```

}

class Rectangle extends Shape {
    void printArea() {
        double area = x * y;
        System.out.println("Area of Rectangle: " + area);
    }
}

class Triangle extends Shape {
    void printArea() {
        double area = 0.5 * x * y;
        System.out.println("Area of Triangle: " + area);
    }
}

class Circle extends Shape {
    void printArea() {
        double area = Math.PI * x * x;
        System.out.println("Area of Circle: " + area);
    }
}

public class Shapemain
{
    public static void main(String[] args)
    {
        Rectangle rect = new Rectangle();
        Triangle tri = new Triangle();
        Circle cir = new Circle();

        System.out.println("\nRectangle");
        rect.inputDimensions(1);
        rect.printArea();

        System.out.println("\nTriangle");
        tri.inputDimensions(2);
        tri.printArea();

        System.out.println("\nCircle");
        cir.inputDimensions(3);
        cir.printArea();
    }
}

```

Terminal Output :

Rectangle

Enter length: 12

Enter breadth: 24

Area of Rectangle: 288.0

Triangle

Enter base: 5

Enter height: 12

Area of Triangle: 30.0

Circle

Enter radius: 10

Area of Circle: 314.1592653589793

Lab Program 5

Implement a program for a banking software

CODE

```
import java.util.Scanner;

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

    Account(String customerName, String accountNumber, String accountType, double initialBalance)
    {
        this.customerName = customerName;
        this.accountNumber = accountNumber;
        this.accountType = accountType;
        this.balance = initialBalance;
    }

    void deposit(double amount)
    {
        if (amount > 0)
        {
            balance += amount;
            System.out.println("Deposited: " + amount);
        }
        else
        {
            System.out.println("Invalid deposit amount.");
        }
    }

    void displayBalance() {
        System.out.println("Current Balance: " + balance);
    }
}

class Saving extends Account
{
    double INTEREST_RATE = 0.05;

    Saving(String customerName, String accountNumber, double initialBalance)
```



```

    {
        super(customerName, accountNumber, "Savings", initialBalance);
    }

    void Interest(int years) {
        double interest = balance * Math.pow((1 + INTEREST_RATE), years) - balance;
        balance += interest;
        System.out.println("Interest of " + String.format("%.2f", interest) + " added to your account.");
    }
    void withdraw(double amount)
    {
        if (amount <= balance)
        {
            balance -= amount;
            System.out.println("Withdrawn:" + amount);
        } else
        {
            System.out.println("Insufficient balance!");
        }
    }
}

class Current extends Account {
    static final double MIN_BALANCE = 1000.0;
    static final double SERVICE_CHARGE = 50.0;

    public Current(String customerName, String accountNumber, double initialBalance)
    {
        super(customerName, accountNumber, "Current", initialBalance);
    }

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

    void checkMinimumBalance() {
        if (balance < MIN_BALANCE) {
            balance -= SERVICE_CHARGE;
            System.out.println("Balance below minimum! Service charge of ₹" + SERVICE_CHARGE +
" imposed.");
        }
    }
}

```

```

    }
}

public class Main {
    public static void main(String[] args) {
        Scanner in = new Scanner(System.in);

        System.out.println("Enter Customer Name:");
        String name = in.nextLine();

        System.out.println("Enter Account Number:");
        String accNo = in.nextLine();

        System.out.println("Enter Account Type (savings/current):");
        String type = in.nextLine().toLowerCase();

        System.out.println("Enter Initial Balance:");
        double balance = in.nextDouble();

        Account account;

        if (type.equals("savings"))
        {
            account = new Saving(name, accNo, balance);
        }
        else
        {
            account = new Current(name, accNo, balance);
        }

        int choice;
        do {
            System.out.println("\nOptions Available");
            System.out.println("1. Deposit");
            System.out.println("2. Withdraw");
            System.out.println("3. Display Balance");
            if (account instanceof Saving)
                System.out.println("4. Compute and Deposit Interest");
            System.out.println("5 . Exit");
            System.out.print("Enter choice: ");
            choice = in.nextInt();

            switch (choice) {
                case 1:
                    System.out.print("Enter amount to deposit: ");
                    double depositAmount = in.nextDouble();
                    account.deposit(depositAmount);

```

```

        break;

    case 2:
        System.out.print("Enter amount to withdraw: ");
        double withdrawAmount = in.nextDouble();
        if (account instanceof Saving) {
            ((Saving) account).withdraw(withdrawAmount);
        } else {
            ((Current) account).withdraw(withdrawAmount);
        }
        break;

    case 3:
        account.displayBalance();
        break;

    case 4:
        if (account instanceof Saving) {
            System.out.print("Enter number of years for interest: ");
            int years = in.nextInt();
            ((Saving) account).Interest(years);
        } else {
            System.out.println("Interest computation not available for Current Account.");
        }
        break;

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

    default:
        System.out.println("Invalid choice. Try again.");
    }
} while (choice != 0);

in.close();
}
}

```

Terminal Output :

```
Microsoft Windows [Version 10.0.19045.6456]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin\Desktop\1bf24cs253>javac main.java

C:\Users\Admin\Desktop\1bf24cs253>java main
Enter Customer Name:
Rishi Kumar Chourasia
Enter Account Number:
99887766
Enter Account Type (savings/current):
savings
Enter Initial Balance:
10000

Options Available
1. Deposit
2. Withdraw
3. Display Balance
4. Compute and Deposit Interest
5 . Exit
Enter choice: 1
Enter amount to deposit: 100
Deposited: 100.0

Options Available
1. Deposit
2. Withdraw
3. Display Balance
4. Compute and Deposit Interest
5 . Exit
Enter choice: 2
Enter amount to withdraw: 500
Withdrawn:500.0

Options Available
1. Deposit
2. Withdraw
3. Display Balance
4. Compute and Deposit Interest
5 . Exit
Enter choice: 3
Current Balance: 9600.0

Options Available
1. Deposit
2. Withdraw
3. Display Balance
4. Compute and Deposit Interest
5 . Exit
Enter choice: 4
Enter number of years for interest: 3
Interest of 1513.20 added to your account.

Options Available
1. Deposit
2. Withdraw
3. Display Balance
4. Compute and Deposit Interest
5 . Exit
Enter choice: 5
Exiting Program
```

Lab Program 6

Implement a program to show packages in java

CODE

Package CIE Programs :

1.

```
package CIE;

import java.util.Scanner;

public class Internals extends Student {
    protected int marks[] = new int[5];

    public void inputCIEmarks() {
        Scanner in = new Scanner(System.in);
        System.out.println("Enter CIE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("CIE Mark " + (i + 1) + ": ");
            marks[i] = in.nextInt();
        }
    }
}
```

2.

```
package CIE;

import java.util.Scanner;

public class Student {
    protected String usn;
    protected String name;
    protected int sem;

    public void inputStudentDetails() {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter USN: ");
        usn = in.nextLine();
        System.out.print("Enter Name: ");
        name = in.nextLine();
        System.out.print("Enter Semester: ");
        sem = in.nextInt();
    }
}
```

```

    }

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

```

Package SEE Program :

```

package SEE;

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

public class Externals extends Internals {

    protected int marksSEE[];
    protected int finalMarks[];

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

    public void inputSEEmarks() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter SEE marks for 5 subjects:");
        for (int i = 0; i < 5; i++) {
            System.out.print("SEE Mark " + (i + 1) + ": ");
            marksSEE[i] = s.nextInt();
        }
    }

    public void calculateFinalMarks() {
        for (int i = 0; i < 5; i++) {
            finalMarks[i] = marks[i] + marksSEE[i];
        }
    }

    public void displayFinalMarks() {
        displayStudentDetails();
        System.out.println("Final marks (CIE + SEE):");
        for (int i = 0; i < 5; i++) {
            System.out.println("Subject " + (i + 1) + ": " + finalMarks[i]);
        }
    }
}

```

```

    }
}
}

```

Main Program :

```

import SEE.Externals;

class Main {
    public static void main(String args[]) {
        int n = 0;
        java.util.Scanner s = new java.util.Scanner(System.in);

        System.out.print("Enter number of students: ");
        n = s.nextInt();

        Externals arr[] = new Externals[n];

        for (int i = 0; i < n; i++) {
            System.out.println("\nEnter details of student " + (i + 1));
            arr[i] = new Externals();
            arr[i].inputStudentDetails();
            arr[i].inputCIEmarks();
            arr[i].inputSEEmarks();
            arr[i].calculateFinalMarks();
        }

        System.out.println("\nFINAL MARKS ");
        for (int i = 0; i < n; i++) {
            System.out.println("\nStudent " + (i + 1) + ":");
            arr[i].displayFinalMarks();
        }
    }
}

```

Terminal Output :

```
Enter Semester: 2
Enter CIE marks for 5 subjects:
CIE Mark 1: 41
CIE Mark 2: 45
CIE Mark 3: 44
CIE Mark 4: 50
CIE Mark 5: 47
Enter SEE marks for 5 subjects:
SEE Mark 1: 50
SEE Mark 2: 40
SEE Mark 3: 44
SEE Mark 4: 41
SEE Mark 5: 38

Enter details of student 2
Enter USN: 1BF24CS260
Enter Name: Sagarmatha Khatri
Enter Semester: 2
Enter CIE marks for 5 subjects:
CIE Mark 1: 35
CIE Mark 2: 45
CIE Mark 3: 43
CIE Mark 4: 41
CIE Mark 5: 40
Enter SEE marks for 5 subjects:
SEE Mark 1: 45
SEE Mark 2: 41
SEE Mark 3: 42
SEE Mark 4: 40
SEE Mark 5: 38

FINAL MARKS

Student 1:
USN: 1BF24CS253
Name: Rishi Kumar Chourasia
Semester: 2
Final marks (CIE + SEE):
Subject 1: 91
Subject 2: 85
Subject 3: 88
Subject 4: 91
Subject 5: 85

Student 2:
USN: 1BF24CS260
Name: Sagarmatha Khatri
Semester: 2
Final marks (CIE + SEE):
Subject 1: 80
Subject 2: 86
Subject 3: 85
Subject 4: 81
Subject 5: 78

C:\Users\Admin\Desktop\1bf24cs253\Lab Program-6 Package>
```


Lab Program 7

Implement a java program to show error handling

CODE

```
import java.util.Scanner;

class WrongAge extends Exception
{
    public WrongAge(String message)
    {
        super(message);
    }
}

class Father
{
    int fatherAge;

    Father(int age) throws WrongAge
    {
        if (age<0)
        {
            throw new WrongAge("Father's age cannot be negative!");
        }
        this.fatherAge = age;
    }
    void display()
    {
        System.out.println("Father's age : "+fatherAge);
    }
}

class Son extends Father{
    int sonAge;

    Son(int fatherAge,int sonAge) throws WrongAge
    {
        super(fatherAge);

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

```

    }

    if (sonAge<0)
    {
        throw new WrongAge("Son's age cannot be negative!");
    }

    this.sonAge=sonAge;
}
}

public class Main
{
    public static void main(String[] args)
    {
        Scanner in = new Scanner(System.in);
        int s_age,f_age;
        System.out.println("Enter father's age : ");
        f_age = in.nextInt();
        System.out.println("Enter son's age : ");
        s_age = in.nextInt();
        try{
            Son s = new Son(f_age,s_age);
            System.out.println("Father and Son objects created successfully!");
            s.display();
        }
        catch(WrongAge e)
        {
            System.out.println("Wrong Age Error: " + e.getMessage());
        }
    }
}

```

Terminal Output :

```

PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac newMain.java } ; if ($?) { java newMain }
Enter father's age : 10
Enter son's age : 15
Wrong Age Error: Son's age cannot be greater than or equal to father's age!
PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac newMain.java } ; if ($?) { java newMain }
Enter father's age : 30
Enter son's age : -1
Wrong Age Error: Son's age cannot be negative!
PS C:\Users\Admin\Desktop\1BF24CS253> cd "c:\Users\Admin\Desktop\1BF24CS253\" ; if ($?) { javac newMain.java } ; if ($?) { java newMain }
Enter father's age : 35
Enter son's age : 15
Father and Son objects created successfully!
Father's age : 35
PS C:\Users\Admin\Desktop\1BF24CS253> █

```

Lab Program 8

Implement a java program to show working of Threads

CODE

```
class MessageThread extends Thread {
    private String message;
    private int interval;

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

    public void run() {
        try {
            while (true) {
                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);
        MessageThread t2 = new MessageThread("CSE", 2000);

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

Terminal Output :

```
PS C:\Users\Admin\Desktop\1bf24cs253> cd "c:\Users\Admin\Desktop\1bf24cs253\" ; if ($?) { javac Main.java } ; if ($?) { java Main }
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
PS C:\Users\Admin\Desktop\1bf24cs253> 
```

Lab Program 9

Open Ended Question 1

CODE

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

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

        JFrame frame = new JFrame("Integer Division");
        frame.setSize(350, 200);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setLayout(new GridLayout(4, 2));

        JLabel l1 = new JLabel("Num1:");
        JTextField t1 = new JTextField();

        JLabel l2 = new JLabel("Num2:");
        JTextField t2 = new JTextField();

        JLabel l3 = new JLabel("Result:");
        JTextField result = new JTextField();
        result.setEditable(false);

        JButton divideBtn = new JButton("Divide");

        divideBtn.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                try {
                    int num1 = Integer.parseInt(t1.getText());
                    int num2 = Integer.parseInt(t2.getText());

                    int res = num1 / num2;
                    result.setText(Integer.toString(res));
                }
                catch (NumberFormatException ex) {
                    JOptionPane.showMessageDialog(frame,
                        "Please enter valid integers!",
                        "Number Format Error",
```

```

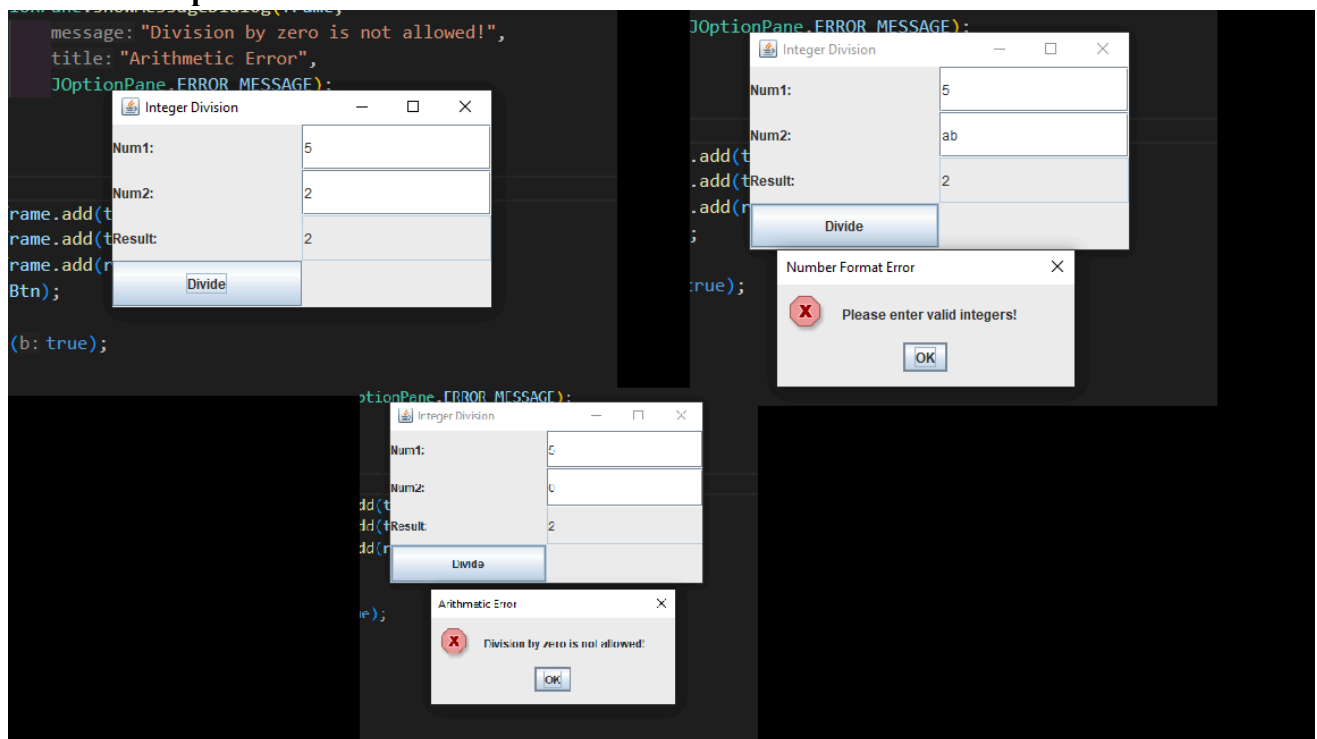
        JOptionPane.ERROR_MESSAGE);
    }
    catch (ArithmeticException ex) {
        JOptionPane.showMessageDialog(frame,
            "Division by zero is not allowed!",
            "Arithmetic Error",
            JOptionPane.ERROR_MESSAGE);
    }
}
});

frame.add(l1); frame.add(t1);
frame.add(l2); frame.add(t2);
frame.add(l3); frame.add(result);
frame.add(divideBtn);

frame.setVisible(true);
}
}

```

Terminal Output :



Lab Program 10

Open Ended Question 2

CODE

```
class Q {
    int n;
    boolean valueSet = false;

    synchronized int get() {
        while (!valueSet) {
            try {
                System.out.println(" Consumer waiting");
                wait();
            } catch (InterruptedException e) {
                System.out.println("InterruptedException caught");
            }
        }

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

        System.out.println("Intimate Producer");
        notify();
        return n;
    }

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

        this.n = n;
        valueSet = true;

        System.out.println("Put: " + n);
        System.out.println("Intimate Consumer");
        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 < 3) {
            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 < 3) {
            int r = q.get();
            System.out.println("Consumed: " + r);
            i++;
        }
    }
}

public class PCDemo {
    public static void main(String[] args) {
        Q q = new Q();
        new Producer(q);
        new Consumer(q);
    }
}

```


Terminal Output :

```
PS C:\Users\Admin\Desktop\1bf24cs253> cd "c:\Users\Admin\Desktop\1bf24cs253\" ; if ($?) { javac PCDemo.java } ; if ($?) {  
java PCDemo }  
Put: 0  
Intimate Consumer  
Producer waiting  
Got: 0  
Intimate Producer  
Put: 1  
Intimate Consumer  
Producer waiting  
Consumed: 0  
Got: 1  
Intimate Producer  
Consumed: 1  
Put: 2  
Intimate Consumer  
Got: 2  
Intimate Producer  
Consumed: 2  
PS C:\Users\Admin\Desktop\1bf24cs253>
```