

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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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “Object Oriented Java Programming (23CS3PCOOJ)” carried out by **SAKSHI SHAWARN JHA(1BF24CS266)**, 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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Index

Sl. No.	Date	Experiment Title	Page No.
1	23/9/25	Quadratic Equations	4-5
2	13/10/25	SGPA Calculator	6-9
3	14/10/25	Bookstore Program	9-11
4	4/11/25	Shapes Program	12-14
5	4/11/25	Bank Program	14-19
6	18/11/25	Packages	19-22
7	26/11/25	Errors	22-24
8	9/12/25	Multi Threading	24-26
9	9/12/25	Open Ended Question 1	26-28
10	9/12/25	Open Ended Question 2	28-31

Github Link: <https://github.com/sakshishawarncs24-ui/JAVA>

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");
            }
        }
    }
}
```

```
System.out.println("USN:1BF24CS262 Name:Sahil Biswas");  
s.close();
```

```
}  
}
```

Output:

```
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\Sakshi\Desktop\1BF24CS266> cd "c:\Users\Sakshi\Desktop\1BF24  
  
Enter value of coefficient a - 1  
Enter value of coefficient b - 2  
Enter value of coefficient c - 5  
No real solution (roots are imaginary)  
PS C:\Users\Sakshi\Desktop\1BF24CS266> cd "c:\Users\Sakshi\Desktop\1BF24  
  
Enter value of coefficient a - 1  
Enter value of coefficient b - -3  
Enter value of coefficient c - 2  
Roots are real and distinct -> 2.0 and 1.0  
PS C:\Users\Sakshi\Desktop\1BF24CS266>
```

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\Adin\Desktop\Ivan24cs222> & "C:\Program Files\Java\jdk-21\bin\java.exe" "-XX:+ShowCodeDetailsInExceptionMessages" "-cp" "C:\Users\Adin\AppData\Local\Temp\code\user\workspace\storage\02d8e092097607e1b8e1a04b75298\vedhat-.java\jdt_ws\Ivan24cs222_26ae948a\bin" "StudentSGPACalculator"
Enter USN: 18F2MCS206
Enter Name: SAKSHI SHARMA
Enter number of subjects: 8
Enter credits for subject 1: 4
Enter marks for subject 1: 96
Enter credits for subject 2: 4
Enter marks for subject 2: 80
Enter credits for subject 3: 4
Enter marks for subject 3: 78
Enter credits for subject 4: 4
Enter marks for subject 4: 68
Enter credits for subject 5: 3
Enter marks for subject 5: 70
Enter credits for subject 6: 3
Enter marks for subject 6: 90
Enter credits for subject 7: 3
Enter marks for subject 7: 86
Enter credits for subject 8: 1
Enter marks for subject 8: 94

Student Details:
USN: 18F2MCS206
Name: SAKSHI SHARMA
Subject 1 - Credits: 4, Marks: 96
Subject 2 - Credits: 4, Marks: 80
Subject 3 - Credits: 4, Marks: 78
Subject 4 - Credits: 4, Marks: 68
Subject 5 - Credits: 3, Marks: 70
Subject 6 - Credits: 3, Marks: 90
Subject 7 - Credits: 3, Marks: 86
Subject 8 - Credits: 1, Marks: 94
SGPA of the student: 8.73
PS C:\Users\Adin\Desktop\Ivan24cs222> & "C:\Program Files\Java\jdk-21\bin\java.exe" "-XX:+ShowCodeDetailsInExceptionMessages" "-cp" "C:\Users\Adin\AppData\Local\Temp\code\user\workspace\storage\02d8e092097607e1b8e1a04b75298\vedhat-.java\jdt_ws\Ivan24cs222_26ae948a\bin" "StudentSGPACalculator"
Enter USN: 18F2MCS201
Enter Name: PRIYANK SHARMA
Enter number of subjects: 8
Enter credits for subject 1: 4
Enter marks for subject 1: 67
Enter credits for subject 2: 4
Enter marks for subject 2: 78
Enter credits for subject 3: 4
Enter marks for subject 3: 87
Enter credits for subject 4: 3
Enter marks for subject 4: 56
Enter credits for subject 5: 2
Enter marks for subject 5: 70
Enter credits for subject 6: 3
Enter marks for subject 6: 69
Enter credits for subject 7: 1
Enter marks for subject 7: 57
Enter credits for subject 8: 1

```



```

    }
}

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 details of Book 1:
Enter Book name: Java1
Enter Author name: ABC
Enter Price: 450
Enter Number of pages: 320

Enter details of Book 2:
Enter Book name: python
Enter Author name: guido
Enter Price: 500
Enter Number of pages: 290

--- Book Details ---

Book 1 Details:
Book name: Java1
Author name: ABC
Price: 450
Number of pages: 320

Book 2 Details:
Book name: python
Author name: guido
Price: 500
Number of pages: 290
```

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:

```

java EasyShapeArea }
--- Shape Area Calculation Program ---
Enter Rectangle Length: 5 6
Enter Rectangle Width: Area of Rectangle (L=5, W=6): 30.00

Enter Triangle Base: 7 9
Enter Triangle Height: Area of Triangle (B=7, H=9): 31.50

Enter Circle Radius: 50
Area of Circle (Radius=50): 7853.98
PS C:\Users\BMSCECSE\Documents\adeebnews>

```

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.next().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.next().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\Adelin\java> cd "c:\Users\Adelin\java" ; if ($?) { javac MainBank.java } ; if ($?) { java MainBank }
Enter customer name: ran
Enter account Number: 123
Enter customer name: ran
Enter account Number: 456

-----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: 10000

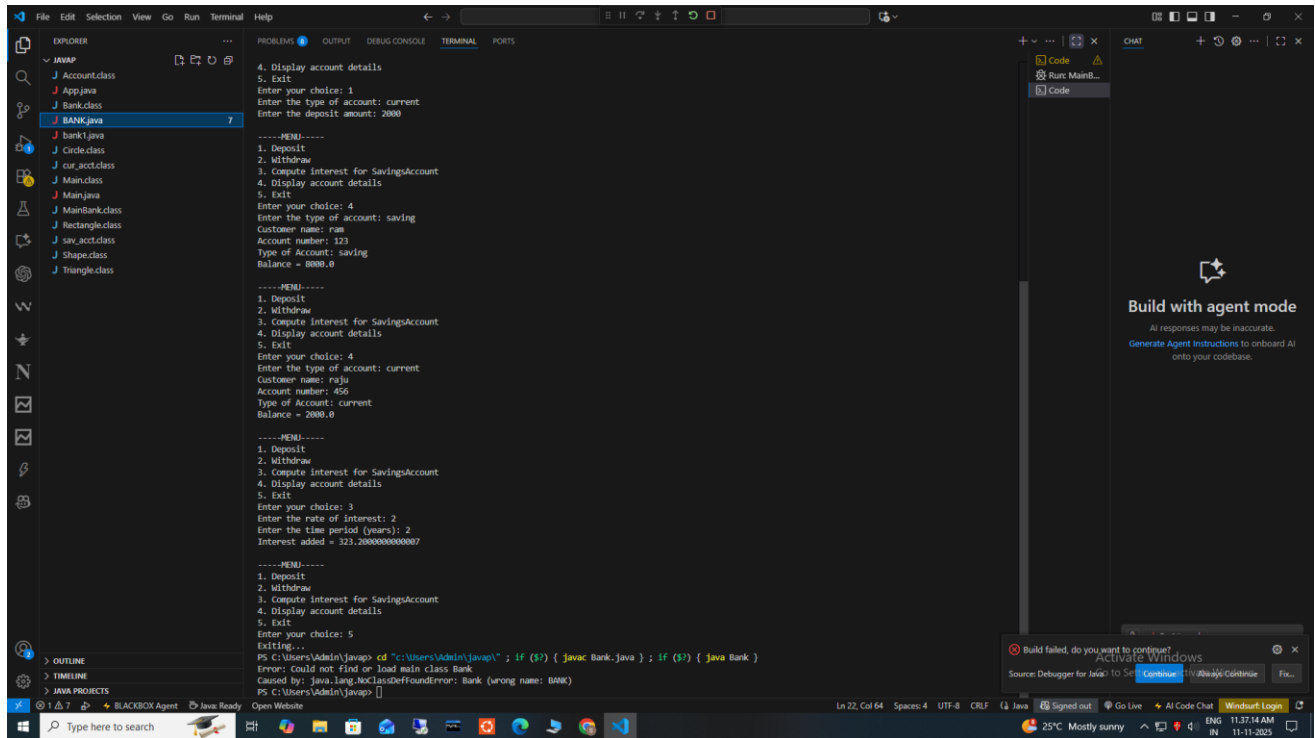
-----MENU-----
1. Deposit
2. Withdraw
3. Compute Interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 2
Enter the type of account: saving
Enter the withdrawal amount: 2000

-----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: ran
Account number: 123
Type of Account: saving
Balance = 8000.0

-----MENU-----
1. Deposit
2. Withdraw
3. Compute Interest for SavingsAccount
4. Display account details
5. Exit
Enter your choice: 4

```



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:

```

Enter number of students: 2

USN: 1BF24CS266
Name: Sakshi
Semester: 3
Enter 5 internal marks:
90
97
88
84
Enter 5 SEE marks:
90
99
84
88

Enter details for student 2

USN: 1BF24CS286
Name: Shreya
Semester: 3
Enter 5 internal marks:
90
91
88

                        FINAL MARKS ----
Student 1
USN: 1BF24CS266
Name: Sakshi
Final Marks (per subjeetct: 90. 98.0 86.0 92.0 91.0
Student 2
USN: 1BF24CS286
Name: Shreya
Final Marks (per subject): 88.5 92.0 88.0 80.5 89.5

```

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:

```

Enter father's age: 56
Enter son's age: 60
Exception: Son's age cannot be greater than or equal to father's age.

=== Code Execution Successful ===

```

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:

```
BMS College of Engineering
CSE
CSE
CSE
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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 (ArithmeticException ex) {
        JOptionPane.showMessageDialog(this,
            ex.getMessage(),
            "Arithmetic Error",
            JOptionPane.ERROR_MESSAGE);
    }
}

```

```

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

```

Output:

```

PS C:\Users\Admin\Desktop\Lab9> cd "c:\Users\Admin\Desktop\Lab9\" ; if ($?) { javac Lab9.java } ; if ($?) { java Lab9 }
PS C:\Users\Admin\Desktop\Lab9> cd "c:\Users\Admin\Desktop\Lab9\" ; if ($?) { javac Lab9.java } ; if ($?) { java Lab9 }
PS C:\Users\Admin\Desktop\Lab9> cd "c:\Users\Admin\Desktop\Lab9\" ; if ($?) { javac Lab9.java } ; if ($?) { java Lab9 }

```



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\shash\Desktop\Lab10> cd "c:\Users\shash\Desktop\Lab10\" ; if ($?) { javac Lab10.java } ; if ($?) { java Lab10 }
● Press Control-C to stop.
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

Producer waiting

Got: 2

```

```
Intimate Producer
Consumed: 2
Put: 3

Intimate Consumer

Producer waiting

Got: 3

Intimate Producer
Consumed: 3
Put: 4

Intimate Consumer

Got: 4

Intimate Producer

Consumed: 4
PS C:\Users\shash\Desktop\Lab10>
```