

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



## LAB REPORT

on

## OBJECT-ORIENTED JAVA PROGRAMMING

*Submitted by*

**Harshala Rani (1BM21CS074)**

*in partial fulfillment for the award of the degree of*

**BACHELOR OF ENGINEERING**

*in*

**COMPUTER SCIENCE AND ENGINEERING**



**B.M.S. COLLEGE OF ENGINEERING**

(Autonomous Institution under VTU)

**BENGALURU-560019**

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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 lab**” carried out by **Harshala Rani(1BM21CS074)**, who is bonafide student of **B. M. S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022-23. The Lab report has been approved as it satisfies the academic requirements in respect of Data structures Lab - (**21CS3PCOOJ**) work prescribed for the said degree.

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## Course Outcome

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
CO2	Analyze the given Java application for correctness/functionalities.
CO3	Develop Java programs / applications for a given requirement.
CO4	Conduct practical experiments for demonstrating features of Java.

## LAB PROGRAM 1: QUADRATIC EQUATION

### CODE:

```
import java.util.Scanner;
import java.lang.Math;
public class Trial
{
    public static void main(String[] args)
    {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the coefficients: ");
        float a = s.nextFloat();
        float b = s.nextFloat();
        float c = s.nextFloat();
        double r1,r2;
        float d = (b*b)-(4.0f*a*c);
        if(d>0)
        {
            r1=(-b+Math.sqrt(d))/(2*a);
            r2=(-b-Math.sqrt(d))/(2*a);
            System.out.println("Roots are Real");
            System.out.println("Root 1: "+r1+" Root 2: "+r2);
        }
        else if(d==0)
        {
            r1=(-b)/(2*a);
            System.out.println("Roots are Equal");
            System.out.println("Root is: "+r1);
        }

        else
```

```

    {
        double e=(-b)/(2.0f*a);
        double f=(Math.sqrt(-d))/(2*a);
        System.out.println("Roots are imaginary");
        System.out.println("Root 1: "+e+"i"+"f);
        System.out.println("Root 2: "+e+"i-"+f);
    }
}
}

```

cmd Command Prompt

```

Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\harshala rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac p1.java
p1.java:4: error: class program1 is public, should be declared in a file named program1.java
public class program1 {
      ^
1 error

C:\Program Files\Java\jdk-19\bin>javac p1.java

C:\Program Files\Java\jdk-19\bin>java p1
Enter a
1
Enter b
-2
Enter c
1
Roots and real and equal 1.0

C:\Program Files\Java\jdk-19\bin>java p1
Enter a
1
Enter b
1
Enter c
1
roots are imaginary
-0.5iNaN
-0.5iNaN

C:\Program Files\Java\jdk-19\bin>java p1
Enter a
1
Enter b
5
Enter c
2
Roots are real and unequal -7.061552812808831and-2.9384471871911697

C:\Program Files\Java\jdk-19\bin>

```

## LAB PROGRAM 2: SGPA CALCULATION

### CODE

```
import java.util.Scanner;

class Student
{
    String USN;
    String name;
    int[] credits = new int[20];
    int[] marks = new int[20];
    void input(int n)
    {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter Student USN: ");
        USN = s.nextLine();
        System.out.print("Enter Student Name: ");
        name = s.nextLine();
        for(int i=0;i<n;i++)
        {
            System.out.print("Enter the Subject "+(i+1)+" marks and credits
respectively: ");
```

```
marks[i] = s.nextInt();
credits[i] = s.nextInt();
}
}
float calculate(int n)
{
    int sum_of_credits = 0;
    float result=0.0f;
    for(int i=0;i<n;i++)
    {
        sum_of_credits+=credits[i];
        if(calculate_grade_point(marks[i])== -1)
            return -1.0f;
        else
        {
            result = result +(float)
(calculate_grade_point(marks[i])*credits[i]);
        }
    }
    return (result/sum_of_credits);
}
```

```
int calculate_grade_point(int marks)
{
    if(marks>=90)
        return 10;
    else if ((marks>=80)&&(marks<90))
        return 9;
    else if ((marks>=70)&&(marks<80))
        return 8;
    else if ((marks>=60)&&(marks<70))
        return 7;
    else if ((marks>=50)&&(marks<60))
        return 6;
    else if ((marks>=40)&&(marks<50))
        return 5;
    return -1;
}
```

```
void display(int n,float result)
{
    System.out.println("\n");
    System.out.println("Student Details");
}
```



```

        System.out.println();

        System.out.println("Student USN: "+USN);

        System.out.println("Student Name: "+name);

        System.out.println("Student Marks and Credits");

        for(int i=0;i<n;i++)

        {

            System.out.println("Subject 1 -->\tMarks: "+marks[i]+" Credits:
"+credits[i]);

        }

        System.out.println("SGPA: "+result);

    }

}

public class Lab_02_SGPA

{

    public static void main(String[] args)

    {

        Scanner s = new Scanner(System.in);

        Student s1 = new Student();

        System.out.print("Enter the number of subjects: ");

        int n = s.nextInt();

        s1.input(n);

        float result = s1.calculate(n);

```

```
        if(result == -1.0f)
        {
            System.out.println();

            System.out.println("The Student has failed in a subject. SGPA cannot
be calculated!");

            System.exit(0);
        }

        s1.display(n,result);
    }
}
```

ca. Command Prompt

```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\Users\harshala_rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac program2.java

C:\Program Files\Java\jdk-19\bin>java program2
Enter your USN
1bm21cs074
Enter your Name
harshala
Enter the number of subjects
3
Enter the marks in subject 0:
80
Enter the credits in subject 0:
1
Enter the marks in subject 1:
90
Enter the credits in subject 1:
2
Enter the marks in subject 2:
98
Enter the credits in subject 2:
3
SGPA scored is 9.0

C:\Program Files\Java\jdk-19\bin>
```

## LAB PROGRAM 3: IMPLEMENTING ARRAY OF OBJECTS

### CODE

```
import java.util.*;
import java.io.*;

class Book
{
    String title,author;
    float price;
    int num_pages;

    Book()
    {
        title = "Default Value";
        author = "Default Value";
        price = 0.0f;
        num_pages = 0;
    }

    void setTitle(String title)
```

```
{  
this.title=title;  
}
```

```
void setAuthor(String author)  
{  
this.author=author;  
}
```

```
void setPrice(float price)  
{  
this.price=price;  
}
```

```
void setPages(int num_pages)  
{  
this.num_pages = num_pages;  
}
```

```
public String toString()  
{
```

```
return title+"\t\t"+author+"\t\t"+price+"\t\t"+num_pages+"\n";  
}
```

```
}
```

```
public class BookDetails
```

```
{
```

```
public static void main(String args[])
```

```
{
```

```
String t, a;
```

```
float p;
```

```
int np,n;
```

```
Scanner s = new Scanner(System.in);
```

```
System.out.print("Enter the number of Books: ");
```

```
n = s.nextInt();
```

```
Book[] b = new Book[n];
```

```
for(int i=0;i<n;i++)
```

```
{
```

```
System.out.println();
```

```
System.out.print("Enter the book name: ");
t = s.next();
System.out.print("Enter the author name: ");
a = s.next();
System.out.print("Enter the book price: ");
p = s.nextFloat();
System.out.print("Enter the number of pages: ");
np = s.nextInt();

b[i] = new Book();
b[i].setTitle(t);
b[i].setAuthor(a);
b[i].setPrice(p);
b[i].setPages(np);
}
System.out.println("Title \t\t Author \t\t Price \t\t Pages\n");
for(int i=0; i<n;i++)
{
    System.out.println(b[i]);
}
}
}
```

Command Prompt

Microsoft Windows [Version 10.0.22000.1455]

(c) Microsoft Corporation. All rights reserved.

C:\Users\harshala\_rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac program3.java

C:\Program Files\Java\jdk-19\bin>java program3

enter number of books

2

Enter the book name

reminders of him

enter the author name

collen hoover

Enter the price of the book

350

enter the number of pages

700

Enter the book name

it ends with us

enter the author name

collen hoover

Enter the price of the book

450

enter the number of pages

300

Book name is reminders of him. Author name is collen hoover. Price of the boos is 350 with no of pages 700

Book name is it ends with us. Author name is collen hoover. Price of the boos is 450 with no of pages 300

C:\Program Files\Java\jdk-19\bin>\_

## LAB PROGRAM 4: CALCULATING AREA OF SHAPES (ABSTRACT CLASS)

### CODE

```
import java.util.Scanner;

public class Shape1
{
    public static void main(String args[])
    {
        int choice;

        Scanner s = new Scanner(System.in);

        do
        {
            System.out.println("1. Calculate Area of Rectangle\n2. Calculate Area
of Triangle\n3. Calculate Area of " +
                "Circle\n4. Exit the Program\n\nEnter the choice: ");

            choice = s.nextInt();

            switch(choice)
            {

                case 1: Rectangle r = new Rectangle();

                    r.printArea();

                    break;
```



```
        case 2: Triangle t = new Triangle();
                t.printArea();
                break;
        case 3: Circle c = new Circle();
                c.printArea();
                break;
        case 4: System.out.println("Exiting the program!");
                System.exit(0);
                break;
        default: System.out.println("\nInvalid Choice!\n");
    }
    }while(true);
}
```

```
abstract class Shape
```

```
{
    int a,b;
    abstract void printArea();
}
```

```
class Rectangle extends Shape
```

```
{  
  
    void printArea()  
    {  
        int area;  
  
        Scanner s = new Scanner(System.in);  
  
        System.out.println("Enter the length and breadth of rectangle: ");  
  
        a = s.nextInt();  
        b = s.nextInt();  
  
        area = a*b;  
  
        System.out.println("\nArea of Rectangle: "+area+"\n");  
    }  
}
```

```
class Triangle extends Shape
```

```
{  
  
    void printArea()  
    {  
        float area;  
  
        Scanner s = new Scanner(System.in);  
  
        System.out.println("Enter the base and height of triangle: ");  
  
        a = s.nextInt();  
        b = s.nextInt();  
    }  
}
```

```
        area = 0.5f*a*b;

        System.out.println("\nArea of triangle: "+area+"\n");
    }
}
```

class Circle extends Shape

```
{
    void printArea()
    {
        double area;

        Scanner s = new Scanner(System.in);

        System.out.println("Enter the radius of circle: ");

        a = s.nextInt();

        area = Math.PI*a;

        System.out.println("Area of Circle: "+area+"\n");
    }
}
```

```
C:\Program Files\Java\jdk-19\bin>javac program4.java
```

```
C:\Program Files\Java\jdk-19\bin>java program4
```

```
Area of circle is3.14
```

```
Area of triangle is6.0
```

```
Area of rectangle is12.0
```

```
C:\Program Files\Java\jdk-19\bin>
```

## LAB PROGRAM 5: BANK PROGRAM

### CODE

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

```
class Customer
```

```
{
```

```
    private int customer_no, qty;
```

```
    private double price , totalprice, discount , netprice;
```

```
    private String customer_name;
```

```
    public Customer()
```

```
    {
```

```
        customer_name = "Saf";
```

```
        customer_no = 10;
```

```
        qty = 3;
```

```
        price = 20000;
```

```
        totalprice = price * qty;
```

```
        discount = callDiscount(totalprice);
```

```
        show();
```

```
    }
```

```
public Customer(String customer_name , int customer_no , int qty ,  
double price)
```

```
{  
    this.customer_name = customer_name;  
    this.customer_no = customer_no;  
    this.qty = qty;  
    this.price = price;  
    totalprice = price * qty;  
    discount = callDiscount(totalprice);  
    show();  
}
```

```
public double callDiscount(double totalprice)
```

```
{  
    if(totalprice>=50000)  
    {  
        discount = 0.25*totalprice;  
    }  
    else if((totalprice>=25000)&&(totalprice<50000))  
    {  
        discount = 0.1 * totalprice;  
    }  
}
```

```
        else
            discount =0;
            netprice = totalprice - discount;
            return discount;
    }

    public void show()
    {
        System.out.println("\nCustomer Name: "+customer_name);
        System.out.println("\nCustomer Number: "+customer_no);
        System.out.println("\n Item Quantity: "+qty);
        System.out.println("\nPrice per Quantity: "+price);
        System.out.println("\nTotal Price: "+totalprice);
        System.out.println("\nDiscount: "+discount);
        System.out.println("\nNet Price: "+netprice);
    }
}

class HelloWorld
{
    public static void main(String[] args)
    {
        Customer c = new Customer();
    }
}
```

```
Scanner s = new Scanner(System.in);

String customer_name;

int customer_no, qty;

double price;

int n, i=1;

System.out.print("\nEnter the number of customers: ");

n = s.nextInt();

while(i<=n)

{

    System.out.print("\nEnter the Customer Name: ");

    customer_name = s.nextLine();

    System.out.print("\nEnter the Customer Number: ");

    customer_no = s.nextInt();

    System.out.print("\nEnter the Item Quantity: ");

    qty = s.nextInt();

    System.out.print("\nEnter the Item Price: ");

    price = s.nextDouble();

    Customer cc = new Customer(customer_name , customer_no , qty ,
price);

    i++;

}

}
```

Command Prompt - java program5

```
Microsoft Windows [Version 10.0.22000.1455]
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C:\Users\harshala rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac program5.java

C:\Program Files\Java\jdk-19\bin>java program5
1. Savings or 2. Current?
1
Exception in thread "main" java.util.InputMismatchException
    at java.base/java.util.Scanner.throwFor(Scanner.java:943)
    at java.base/java.util.Scanner.next(Scanner.java:1598)
    at java.base/java.util.Scanner.nextInt(Scanner.java:2263)
    at java.base/java.util.Scanner.nextInt(Scanner.java:2217)
    at program5.main(program5.java:116)

C:\Program Files\Java\jdk-19\bin>java program5
1. Savings or 2. Current?
2
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
Enter customer name: harshala
Enter account number: 113979
Enter bank balance: 7000
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
Customer name is: harshala
Customer account type is: Savings
Customer account number is: 113979
Current balance is: 7000.0
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
```

Command Prompt - java program5

```
6. exit
3
Enter the amount to be deposited: 500
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
2
Customer name is: harshala
Customer account type is: Savings
Customer account number is: 113979
Current balance is: 7500.0
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
5
Enter the amount to be withdrawn:
70
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
3
Enter the amount to be deposited: 200
Enter the choice:
1. Set the values for savings acc
2. display
3. deposit
4. Interest
5. Withdraw
6. exit
6
2
Customer name is: harshala
Customer account type is: Savings
Customer account number is: 113979
Current balance is: 7630.0
Enter the choice:
1. Set the values for savings acc
2. display
```



## LAB PROGRAM 6: AGE EVALUATION - EXCEPTION HANDLING

### CODE

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

```
public class Age
```

```
{
```

```
    public static void main(String[] args) throws WrongAge,InvalidAge
```

```
    {
```

```
        new Son();
```

```
    }
```

```
}
```

```
class WrongAge extends Exception
```

```
{
```

```
    public String getMessage()
```

```
    {
```

```
        return "Age Cannot Be Negative";
```

```
    }
```

```
}
```

```
class InvalidAge extends Exception
{
    public String getMessage()
    {
        return "Son's Age cannot be greater than Father's!";
    }
}

class Father
{
    Scanner s = new Scanner(System.in);
    int f;
    Father() throws WrongAge
    {
        System.out.print("Enter the Father's Age: ");
        f = s.nextInt();
        try
        {
            if(f<0)
                throw new WrongAge();
        }
        catch(WrongAge e1)
        {

```

```
        System.out.println(e1.getMessage());
    System.exit(0);
    }
    }
}
```

```
class Son extends Father
```

```
{
    int son;
    Son() throws WrongAge,InvalidAge
    {
        super();
        System.out.print("Enter the Son's Age: ");
        son = s.nextInt();
        try
        {
            if(son<0)
                throw new WrongAge();
        }
        catch(WrongAge e2)
        {
            System.out.println(e2.getMessage());
        }
    }
}
```

```

        System.exit(0);
    }

    try
    {
        if(son>f)
            throw new InvalidAge();
    }

    catch(InvalidAge e3)
    {
        System.out.println(e3.getMessage());

        System.exit(0);
    }

    System.out.println("Ages are appropriate");
}

```

```

Command Prompt
Microsoft Windows [Version 10.0.22000.1455]
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C:\Users\harshala rani>javac program6.java
error: file not found: program6.java
Usage: javac <options> <source files>
use --help for a list of possible options

C:\Users\harshala rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac program6.java

C:\Program Files\Java\jdk-19\bin>java program6
Enter the father's age:
70
Enter the age of son:
30

C:\Program Files\Java\jdk-19\bin>javac program6.java

C:\Program Files\Java\jdk-19\bin>java program6
Enter the father's age:
0
Enter the age of son:
8
Son's age is more than father's age

C:\Program Files\Java\jdk-19\bin>java program6
Enter the father's age:
45
Enter the age of son:
0

C:\Program Files\Java\jdk-19\bin>java program6
Enter the father's age:
60
Enter the age of son:
90
Son's age is more than father's age

C:\Program Files\Java\jdk-19\bin>java program6
Enter the father's age:
10
Enter the age of son:
60
Son's age is more than father's age

C:\Program Files\Java\jdk-19\bin>

```

## LAB PROGRAM 7: MULTI-THREADING

### CODE

```
class MyThread extends Thread
{
    long time;
    private volatile boolean running = true;
    MyThread(){
        System.out.println("Default");
    }
    MyThread(String name, long time)
    {
        super(name);
        this.time = time;
    }
    public void pause()
    {
        running = false;
    }
    public void run()
    {
        try
        {
            while(running)
```

```
        {
            System.out.println(this.getName());
            Thread.sleep(time*1000);
        }
    }
    catch(InterruptedException ie)
    {
        System.out.println("Exception caught in method");
    }
}
}
```

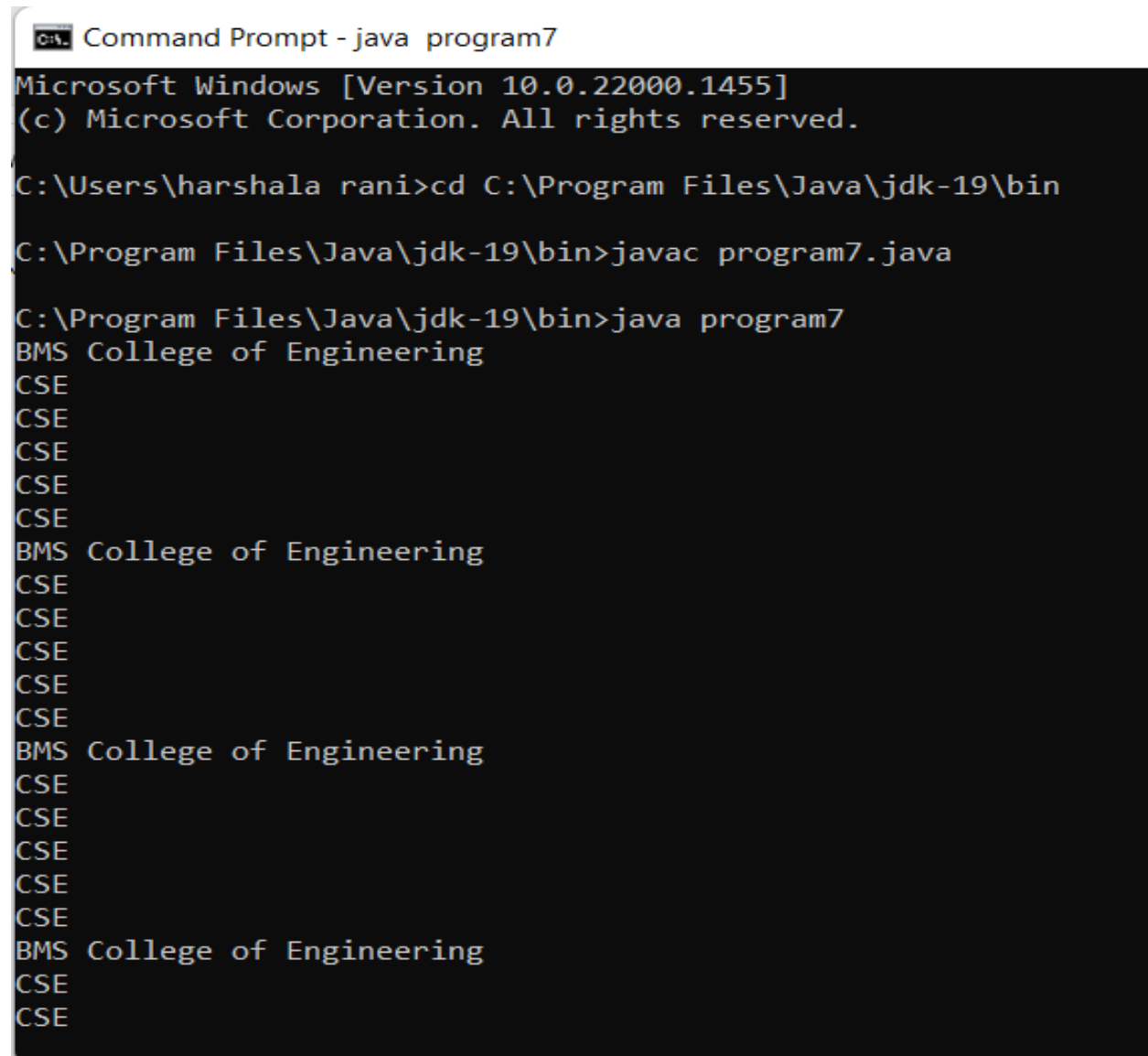
class Main

```
{
    public static void main(String [] args)
    {
        MyThread mt1 = new MyThread("BMS", 10);
        MyThread mt2 = new MyThread("CSE", 2);
        mt1.start();
        mt2.start();
        Try
        {
            Thread.sleep(20*1000);
            mt1.pause();
            mt2.pause();
        }
    }
}
```

```

    }
    catch(InterruptedException ie)
    {
        System.out.println("Exception caught in main");
    }
}
}

```



The screenshot shows a Windows Command Prompt window titled "Command Prompt - java program7". The window displays the following commands and output:

```

Microsoft Windows [Version 10.0.22000.1455]
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C:\Users\harshala rani>cd C:\Program Files\Java\jdk-19\bin

C:\Program Files\Java\jdk-19\bin>javac program7.java

C:\Program Files\Java\jdk-19\bin>java program7
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE

```