VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Object Oriented Java Programming

Submitted by

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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
Oct 2022-Feb 2022

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"** carried out by **M Ananta Naga Rajesh (1BM21CS098),** 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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Index Sheet

	withdrawal and update the balance Check for the minimum balance, imposepenalty if necessary and update the balance.	
6	Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero,the program would throw an Arithmetic Exception Display the exception in a message dialog box.	23
7	Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son class, implement a constructor that cases bothfather and son's age and throws an exception if son's age is >=father's age.	24
8	Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds	27

Course Outcome

CO1	Apply the knowledge of Java concepts to find the solution for a given problem.
CO2	Analyse 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.

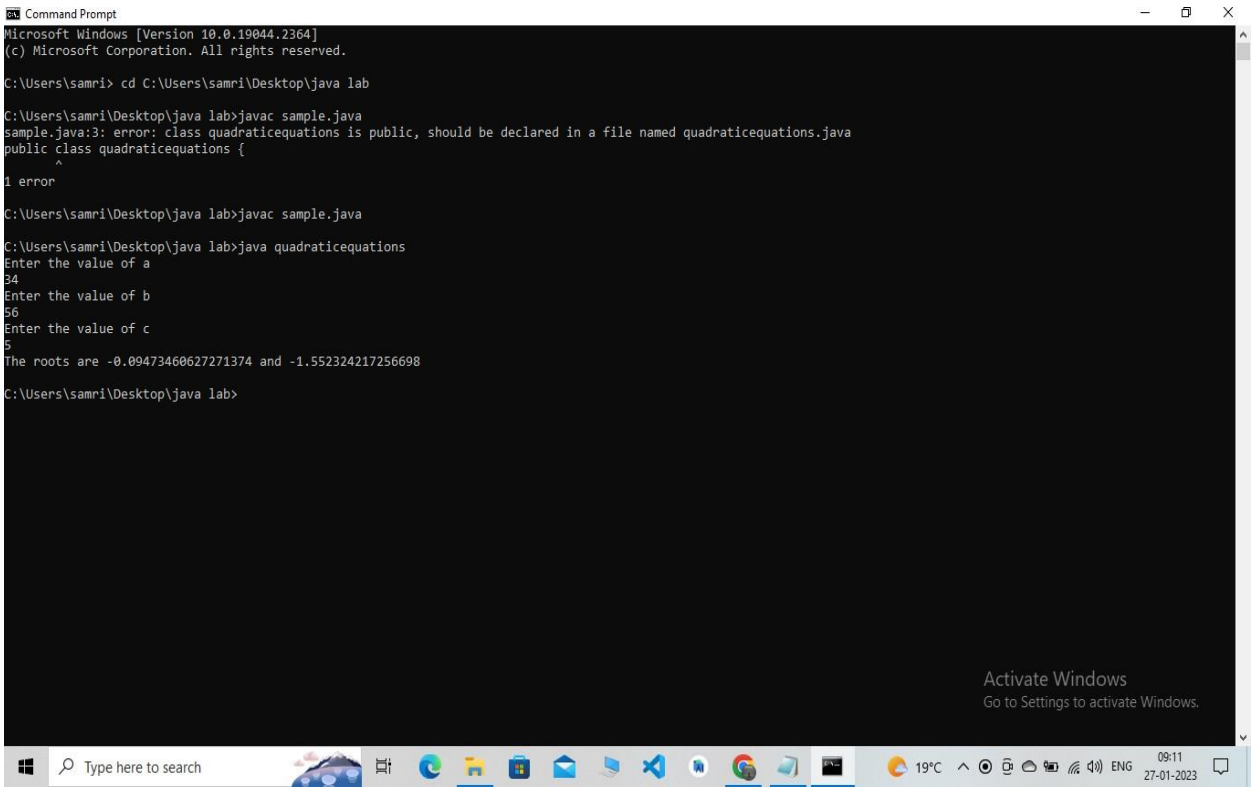
PROGRAM 1

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If thediscriminate b2 -4ac is negative, display a message stating that there are no real solutions.

```
import java.util.*;
import java.lang.*;
class box
{
 public static void main (String args[])
 {
  System.out.println("Enter the coefficients of quadrartic equation");
  Scanner sc= new Scanner(System.in);
  double a=sc.nextDouble();
  double b=sc.nextDouble();
  double c=sc.nextDouble();
  double d=(b*b)-(4*a*c);
  double r1;
  double r2;
  if(a==0)
  {
   System.out.println("Enter a valid value");
  }
  else
  {
  if(d>0)
  {
    r1=(-b+Math.sqrt(d))/(2*a);
    r2=(-b-Math.sqrt(d))/(2*a);
    System.out.println("Roots are real and distinct");
    System.out.println("The roots are r1="+r1+""+"and r2="+r2);
  }
 else if(d==0)
  {
```

```
    r1=r2=(-b)/(2*a);
    System.out.println("Roots are real and same");
    System.out.println("The roots are r1=r2="+""+r1);
  }
else
{
    r1=(-b)/(2*a);
    r2=(Math.sqrt(-d))/(2*a);
    System.out.println("Roots are imaginary and distinct");
    System.out.println("The roots are r1="+r1+"+i"+r2);
    System.out.println("The roots are r2="+r1+"-i"+r2);
}
}
}
```

OUTPUT:



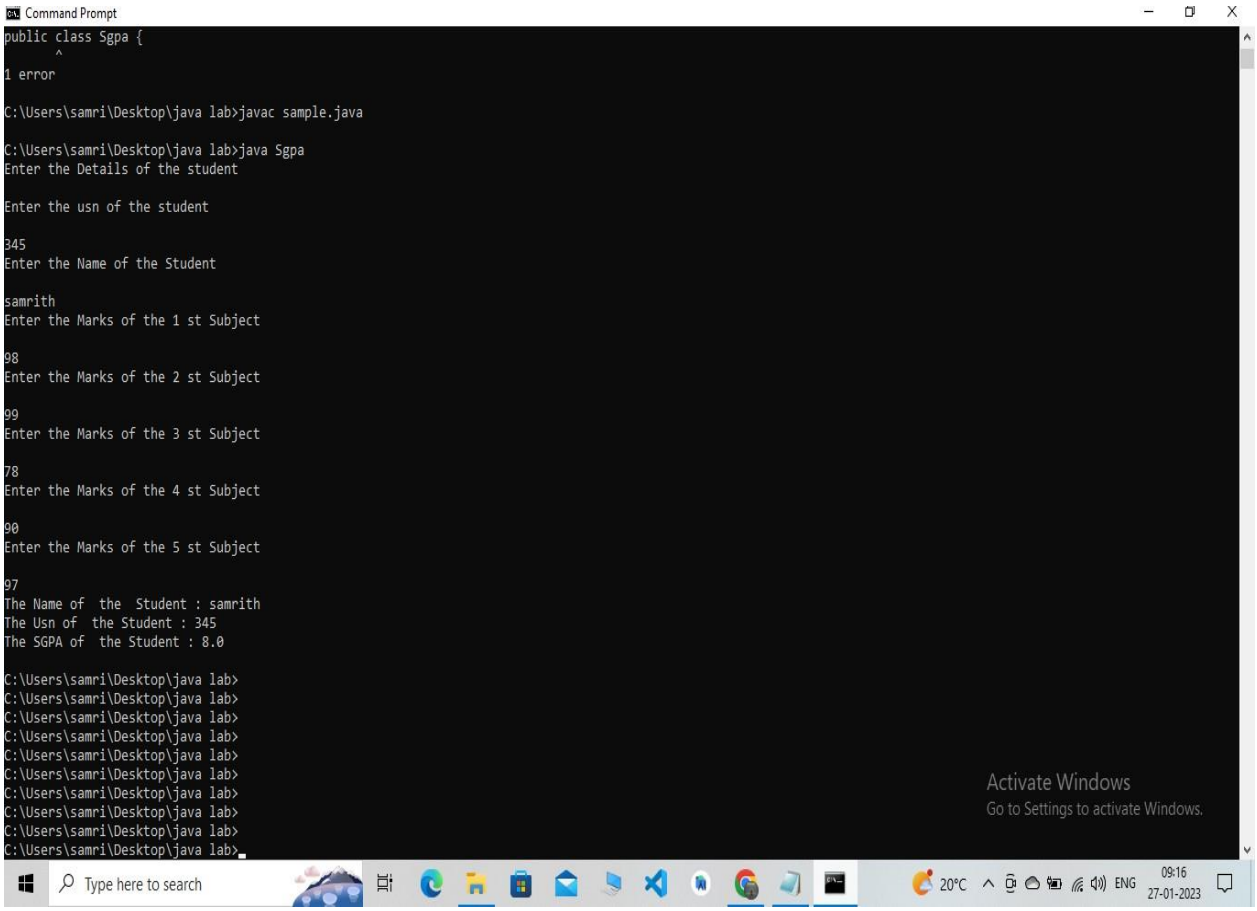
PROGRAM 2

Develop a Java program to create a class Student with members usn, name, an array credits and an array mark. Include methods to accept anddisplay details and a method to calculate SGPA of a student.

```
import java.util.*;
class Student{
String usn,name;
Scanner sc = new Scanner(System.in);
Student(){
System.out.println("Enter your USN");
usn=sc.next();
System.out.println("Enter your Name");
name=sc.next();
}
int marks[]=new int[50];
int credits[]=new int[50];
int sum1=0;
int sum2=0;
void markenter(int x)
{
for (int i=0;i<x;i++){
System.out.println("Enter the marks in subject "+i+": ");
marks[i]=sc.nextInt();
System.out.println("Enter the credits in subject "+i+": ");
credits[i]=sc.nextInt();
sum1+=credits[i];
if (marks[i]>=90){
marks[i]=10;
}
else if (marks[i]>=80 && marks[i]<90)
{
marks[i]=9;
}
else if (marks[i]>=70 && marks[i]<80)
{
marks[i]=8;
}
else if (marks[i]>=60 && marks[i]<70)
```

```
{
marks[i]=7;
}
else if(marks[i]>=50 && marks[i]<60)
{
marks[i]=6;
}
else if(marks[i]>=40 && marks[i]<50)
{
marks[i]=5;
}
else
{
marks[i]=0;
}
}
}


double calc(int z)
{
for (int f=0;f<z;f++){
sum2+=marks[f]*credits[f];

}
return (sum2/sum1);
}
}


class SGPA{
public static void main(String args[]){
Student stud=new Student();
Scanner sc= new Scanner(System.in);
System.out.println("Enter the number of subjects");
 int n=sc.nextInt();
stud.markenter(n);
System.out.println("SGPA scored is "+ stud.calc(n) );
}
}
```

OUTPUT:


Command Prompt
public class Sgpa {
^
1 error
C:\Users\samri\Desktop\java lab>javac sample.java
C:\Users\samri\Desktop\java lab>java Sgpa
Enter the Details of the student
Enter the usn of the student
345
Enter the Name of the Student
samrith
Enter the Marks of the 1 st Subject
98
Enter the Marks of the 2 st Subject
99
Enter the Marks of the 3 st Subject
78
Enter the Marks of the 4 st Subject
90
Enter the Marks of the 5 st Subject
97
The Name of the Student : samrith
The Usn of the Student : 345
The SGPA of the Student : 8.0
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
C:\Users\samri\Desktop\java lab>
Activate Windows
Go to Settings to activate Windows.
Type here to search
20°C
ENG
09:16
27-01-2023

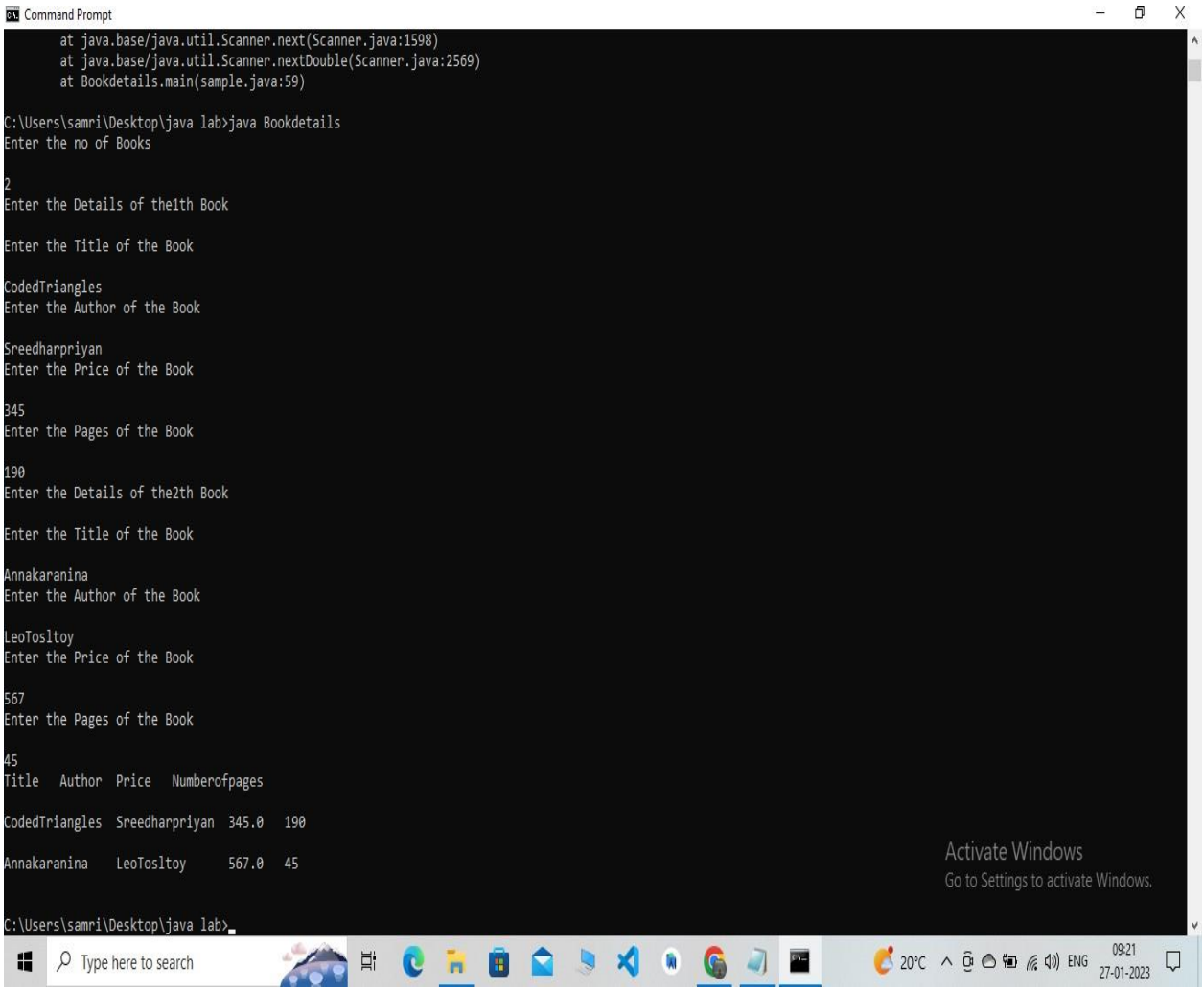
PROGRAM 3

Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.

```
import java.util.*;

class book{
String name;
String author;
double price;
int pages;
Scanner sc= new Scanner(System.in);
book(){
name="";
author="";
price=0.0;
pages=0;
}

void set(){
System.out.println("Enter name of the book");
name=sc.next();
System.out.println("Enter name of the author");
author=sc.next();
System.out.println("Enter price of the book");
price=sc.nextDouble();
System.out.println("Enter price of the book");
pages=sc.nextInt();
}
```

```
//tostring() is an inbuilt funtion in java and helps us to print values with much ease
//you dont have to call it when you use println it automatically goes there

public String toString()
{
String s="Name of the book is "+name+" and it is written by "+author+". The book costs "+price+" and has "+ pages+" pages";
return s;
}
}


class bookmain{
public static void main(String args[]){
Scanner sc= new Scanner(System.in);
System.out.println("Enter the number of books");
int n;
n=sc.nextInt();
book b[]=new book[n]; //this is how you create an array of class
for(int i=0;i<n;i++){
System.out.println("Enter details of book "+(i+1));
b[i]=new book();
b[i].set();
}
for(int i=0;i<n;i++){
System.out.println(b[i]);
}
}
}
```

OUTPUT:


Command Prompt
at java.base/java.util.Scanner.next(Scanner.java:1598)
at java.base/java.util.Scanner.nextDouble(Scanner.java:2569)
at Bookdetails.main(sample.java:59)
C:\Users\samri\Desktop\java lab>java Bookdetails
Enter the no of Books
2
Enter the Details of the1th Book
Enter the Title of the Book
CodedTriangles
Enter the Author of the Book
Sreedharpriyan
Enter the Price of the Book
345
Enter the Pages of the Book
190
Enter the Details of the2th Book
Enter the Title of the Book
Annakaranina
Enter the Author of the Book
LeoTosltoy
Enter the Price of the Book
567
Enter the Pages of the Book
45
Title Author Price Numberofpages
CodedTriangles Sreedharpriyan 345.0 190
Annakaranina LeoTosltoy 567.0 45
C:\Users\samri\Desktop\java lab>
Activate Windows
Go to Settings to activate Windows.
Type here to search
20°C
ENG
09:21
27-01-2023

PROGRAM 4

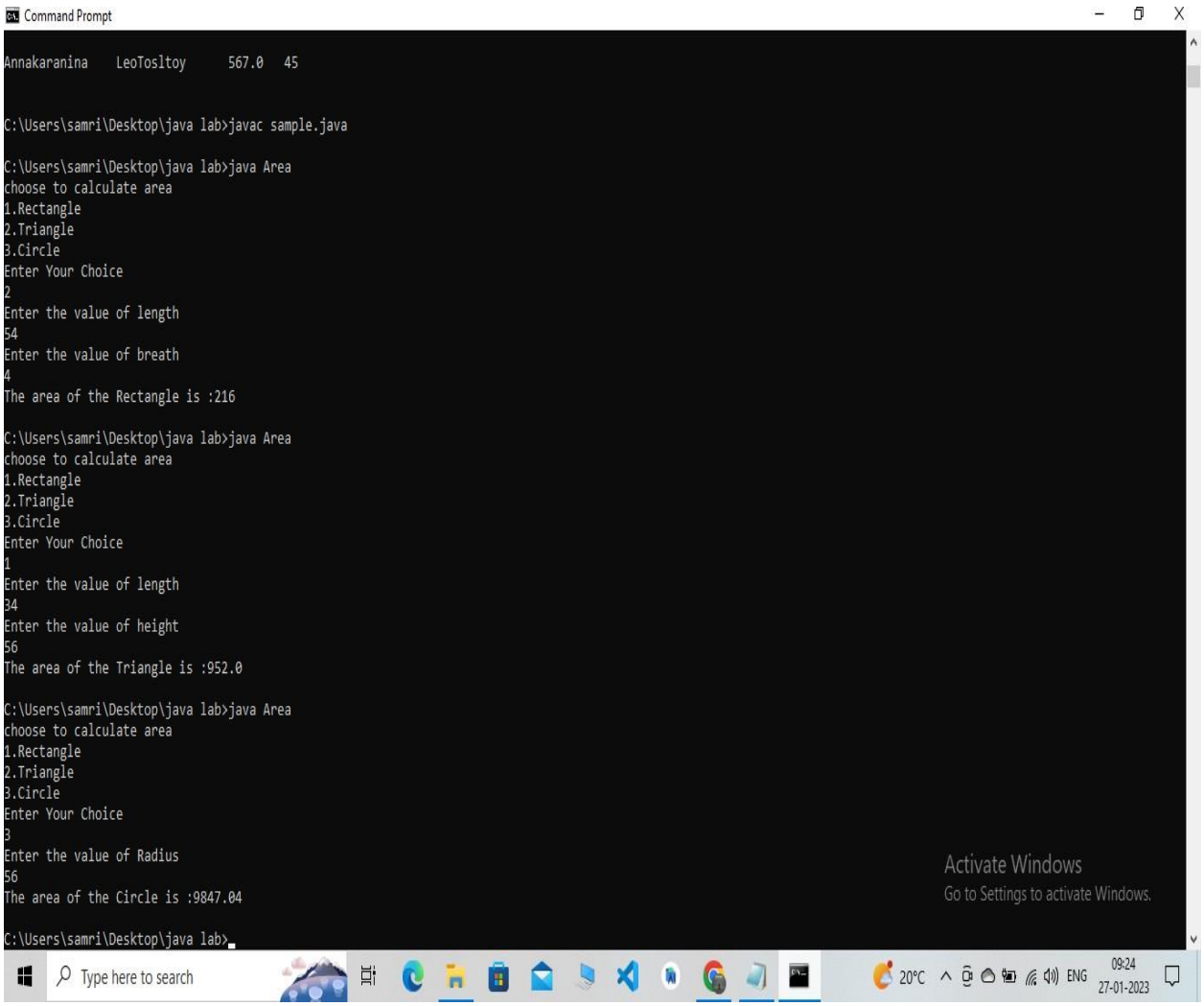
Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea( ). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

```
abstract class Shape{

 int dim1,dim2;

    Shape(int x,int y)
    {

        dim1=x;
        dim2=y;
     }

   Shape(int z)
   {
     dim1=z;
   }

 abstract double printarea();

 }

 class Rectangle extends Shape{

        Rectangle(int x,int y)
       {
```

```
        super(x,y);
      }


      double printarea()
     {
        return  dim1*dim2;
      }

}


class triangle extends Shape{


        triangle(int x,int y)
        {

            super(x,y);
         }


        double printarea()
     {
        return  0.5*(dim1*dim2);
      }


 }


class circle extends Shape{


        circle(int z)
        {

            super(z);
```

```
        }


        double printarea()
    {
        return  3.14*dim1*dim1;
     }


}



class abst{


  public static void main(String args[])

   {

       Rectangle r1=new Rectangle(15,30);
       triangle t1=new triangle(20,50);
       circle c1=new circle(10);

        Shape f;

        f=r1;
        double a1=f.printarea();
        System.out.println("Area of Rectangle is"+" "+a1);

        f=t1;
        double a2=f.printarea();
        System.out.println("Area of triangle is"+" "+a2);

        f=c1;
        double a3=f.printarea();
        System.out.println("Area of circle is"+" "+a3);

   }
}
```

OUTPUT:


Command Prompt
Annakaranina LeoTosltoy 567.0 45
C:\Users\samri\Desktop\java lab>javac sample.java
C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
2
Enter the value of length
54
Enter the value of breath
4
The area of the Rectangle is :216
C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
1
Enter the value of length
34
Enter the value of height
56
The area of the Triangle is :952.0
C:\Users\samri\Desktop\java lab>java Area
choose to calculate area
1.Rectangle
2.Triangle
3.Circle
Enter Your Choice
3
Enter the value of Radius
56
The area of the Circle is :9847.04
C:\Users\samri\Desktop\java lab>
Activate Windows
Go to Settings to activate Windows.
Type here to search
20°C
ENG
09:24
27-01-2023

PROGRAM 5

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: a) Accept deposit from customer and update the balance.

b) Display the balance. c) Compute and deposit interest d) Permit withdrawal and update the balance Check for the minimum balance, impose penalty if necessary and update the balance.

```
import java.util.Scanner;

class Account
{
        String name;
        int type;
        long accno;
        double balance;
        void setA()
        {
                Scanner s=new Scanner(System.in);
                System.out.print("Enter customer name: ");
                name=s.nextLine();

                System.out.print("Enter account number: ");
                accno=s.nextLong();
                System.out.print("Enter bank balance: ");
                balance=s.nextDouble();
        }
        void display()
        {
```

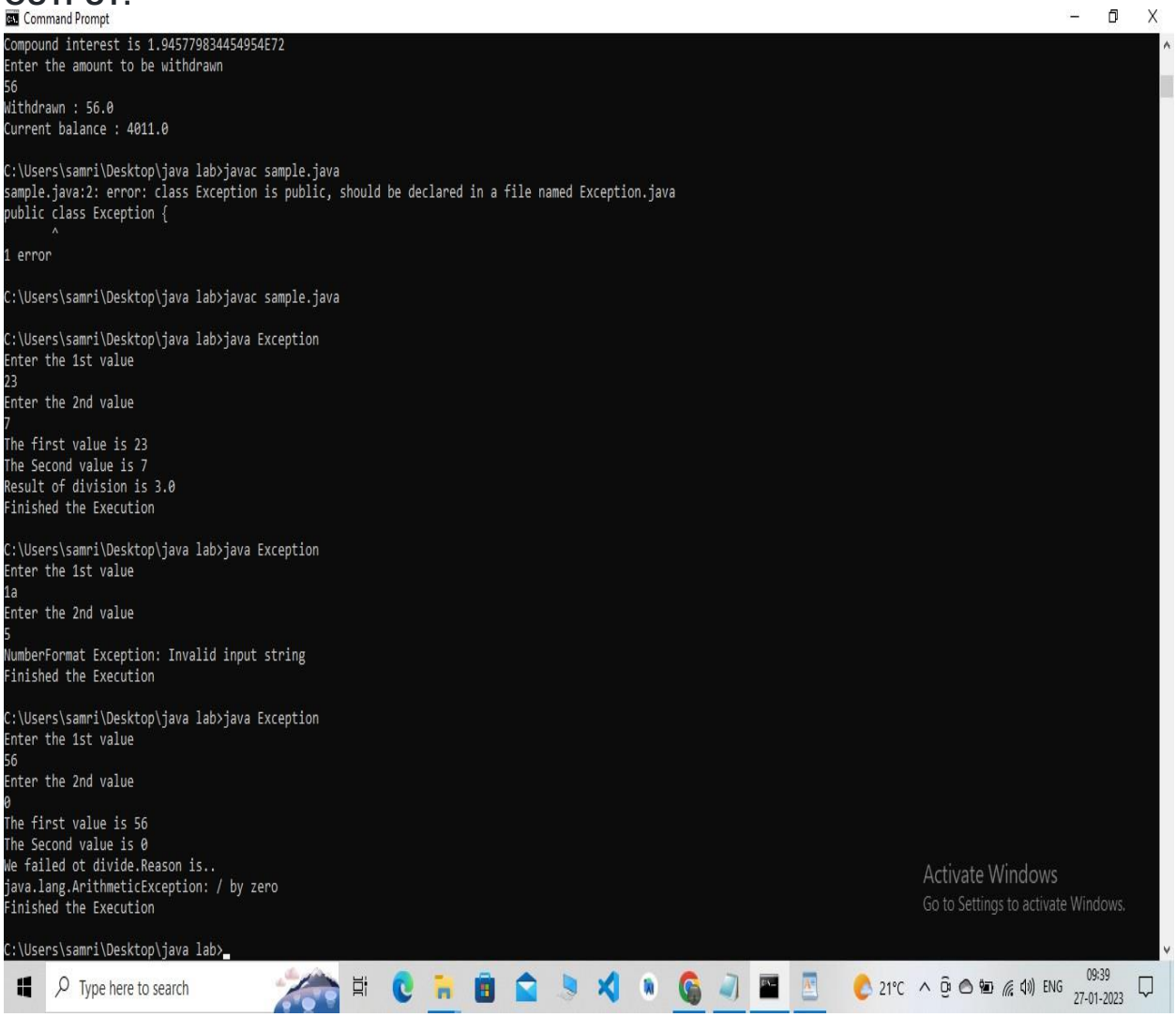
```
                System.out.println("Customer name is: "+name);
                if(type==1) {
                        System.out.println("Customer account type is: Savings");
                }
                else {
                        System.out.println("Customer account type is: Current");
                }
                System.out.println("Customer account number is: "+accno);
                System.out.println("Current balance is: "+balance);
        }
        void deposit()
        {
                System.out.print("Enter the amount to be deposited: ");
                Scanner x=new Scanner(System.in);
                double amt=x.nextDouble();
                balance+=amt;
        }
}


class Sav_acct extends Account
{
        double interest;
        Scanner s=new Scanner(System.in);

        Sav_acct() {
                type=1;
        }
        void cinterest()
        {
                int timey;
                float irate;
                System.out.println("Compound Interest details:");

                System.out.println("Enter time in years: ");
                timey=s.nextInt();
                System.out.println("Enter rate of interest: ");
                irate=s.nextFloat();
                System.out.println("Interest will be compunded 5 times a year");
                interest=balance*(Math.pow((1+irate/5),(5*timey)));
                balance+=interest;
```

```
	}
	void withdraw()
	{
		System.out.println("Enter the amount to be withdrawn: ");
		double amt=s.nextDouble();
		if(balance>amt)
		{balance-=amt;}
		else
		{System.out.println("Amount to be withdrawn greater than balance!!!");}
	}

}

class Curr_acct extends Account
{
	double check_amt;

	Curr_acct() {
		type=2;
	}

	void cheque()
	{
		System.out.print("Enter the cheque amount: ");
		Scanner s=new Scanner(System.in);
		check_amt = s.nextDouble();
		if(check_amt>balance-5000)
		{
			System.out.println("Rs. 500 penalty imposed...Is it ok to proceed? Enter y for yes and n for no");
			String option=s.next();
			if(option.equals("y")) {balance=balance-check_amt-500;}
			else {System.out.println("no check debited");}
		}
		else
		{
			System.out.println("Rupees "+check_amt+" debited"); balance-=check_amt;
		}
	}
	void withdraw()
	{
```

```
                System.out.println("Enter the amount to be withdrawn: "); Scanner s=new
Scanner(System.in);
                double amt=s.nextDouble();
                if(balance>amt)
                {balance-=amt;}
                else
                {System.out.println("Amount to be withdrawn greater than balance!!!");}
        }
}

class Bank {
        public static void main(String ss[]) {
                String op1,op2;
                Scanner s=new Scanner(System.in);
                System.out.println("1. Savings or   2. Current?");
                int q;
                q=s.nextInt();
                if(q==1) {
                        Sav_acct s1 = new Sav_acct();
                        while(true) {
                        System.out.print("Enter the choice: \n1 .Set the values for savings acc\n2.
display\n3. deposit\n4. Interest\n5. Withdraw\n6. exit\n");
                        op1=s.next();
                        switch(op1)
                        {
                        case "1":s1.setA();
                                break;
                        case "2":s1.display();
                                break;
                        case "3":s1.deposit();
                                break;
                        case "4":s1.cinterest();
                                break;
                        case "5":s1.withdraw();
                                break;
                        case "6":System.exit(0);
                        }
                        }
                }
                else if(q==2) {
                        Curr_acct c1 = new Curr_acct();
```

```
                while(true) {
                System.out.print("Enter the choice: \n1.Set the values for current account\n2. display\n3. deposit\n4. transferCheck\n5. Withdraw\n6. exit\n");
                op2=s.next();
                switch(op2)
                {
                case "1":c1.setA();
                        break;
                case "2":c1.display();
                        break;
                case "3":c1.deposit();
                        break;
                case "4":c1.cheque();
                        break;
                case "5":c1.withdraw();
                        break;
                case "6":System.exit(0);
                }}
        }}
```

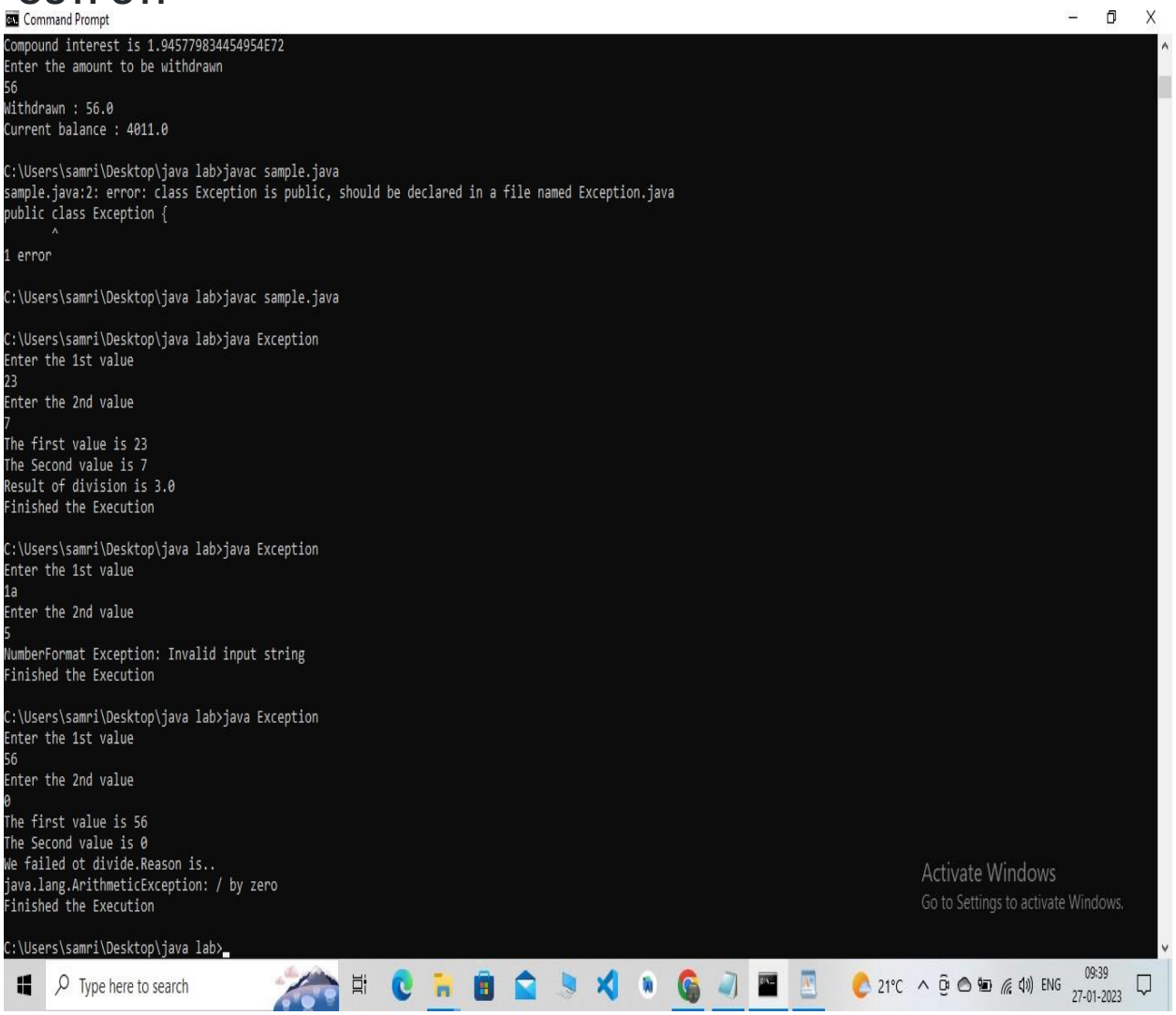
OUTPUT:


Command Prompt
Compound interest is 1.945779834454954E72
Enter the amount to be withdrawn
56
Withdrawn : 56.0
Current balance : 4011.0
C:\Users\samri\Desktop\java lab>javac sample.java
sample.java:2: error: class Exception is public, should be declared in a file named Exception.java
public class Exception {
^
1 error
C:\Users\samri\Desktop\java lab>javac sample.java
C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
23
Enter the 2nd value
7
The first value is 23
The Second value is 7
Result of division is 3.0
Finished the Execution
C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
1a
Enter the 2nd value
5
NumberFormat Exception: Invalid input string
Finished the Execution
C:\Users\samri\Desktop\java lab>java Exception
Enter the 1st value
56
Enter the 2nd value
0
The first value is 56
The Second value is 0
We failed ot divide.Reason is..
java.lang.ArithmeticException: / by zero
Finished the Execution
C:\Users\samri\Desktop\java lab>
Activate Windows
Go to Settings to activate Windows.
Type here to search
21°C
ENG
09:39
27-01-2023

PROGRAM 6

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero,the program would throw an Arithmetic Exception Display the exception in a message dialog box.

OUTPUT:



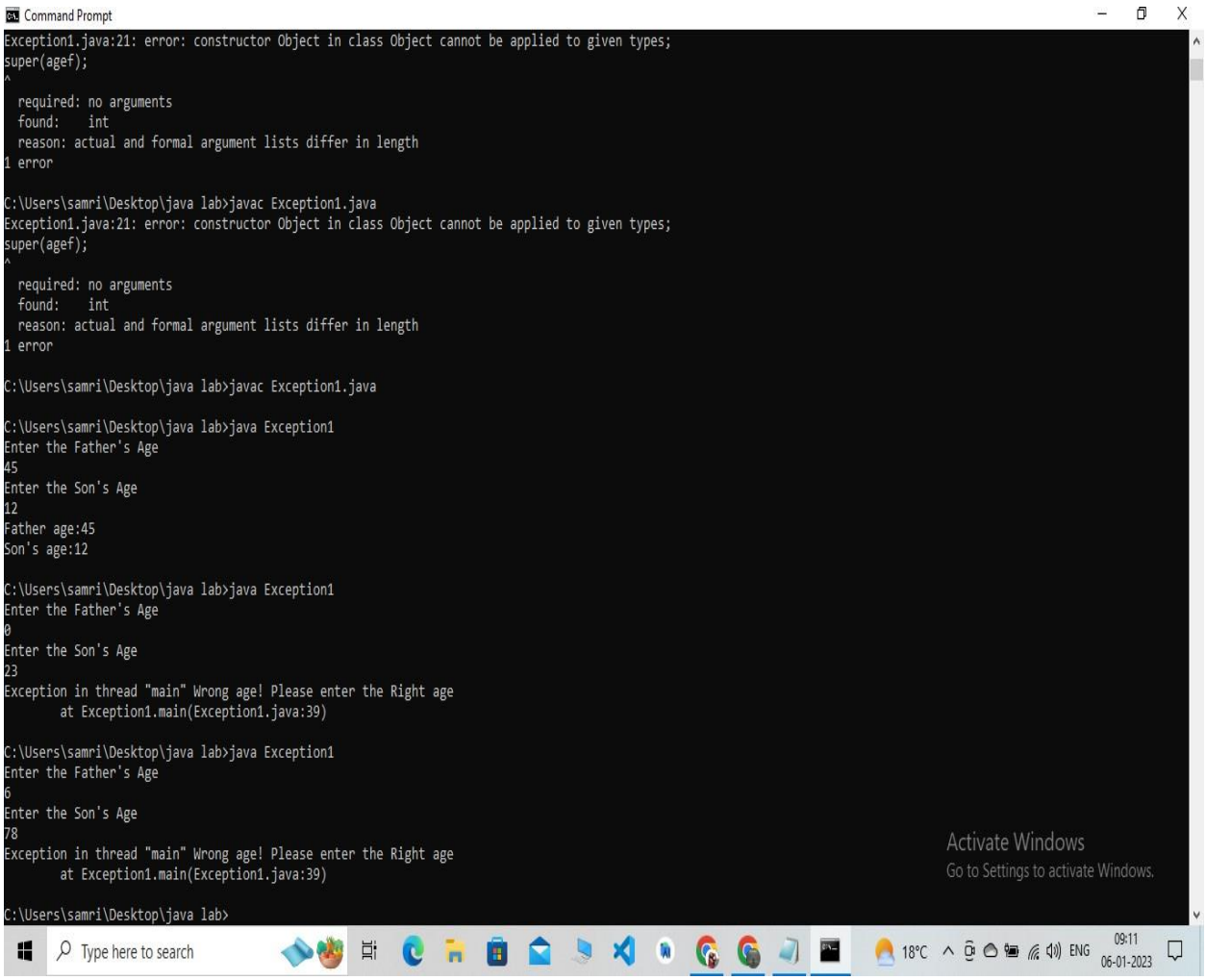
PROGRAM 7

Write a program that demonstrates handling of exceptions in inheritancetree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age<0. In Son class, implement a constructor that cases bothfather and son's age and throws an exception if son's age is >=father's age.

```
import java.util.*;


class fatherAgeException extends Exception
{
  public String toString(){
     return("Father's age is less that 0");
  }
}

class sonAgeException extends Exception{
   int a;
   sonAgeException(int age){
      a=age;
   }
   public String toString(){
      if(a<0)
        return("Son's age is less than 0");
      else
        return("Son's age is more than father's age");
   }
}


class Father{
   int age;
   Scanner in=new Scanner(System.in);
   Father(){
      System.out.println("Enter the father's age: ");
```

```
        age=in.nextInt();
    }
    void ex1() throws fatherAgeException
    {
        if(age<0)
         throw new fatherAgeException();
    }


}
class Son extends Father{
    int age;
  Son(){
    System.out.println("Enter the age of son: ");
    age=in.nextInt();
  }
  void ex2() throws sonAgeException{
      if(age<0||age>super.age){
         throw new sonAgeException(age);
      }
  }
}

public class except {
    public static void main(String[] args){
        Son s=new Son();
        try{
            s.ex1();
        }
        catch(fatherAgeException e){
            System.out.println(e);
        }
        try{
            s.ex2();
        }
        catch(sonAgeException e){
            System.out.println(e);
        }
    }
}
```

OUTPUT:


Command Prompt
Exception1.java:21: error: constructor Object in class Object cannot be applied to given types;
super(agef);
^
required: no arguments
found: int
reason: actual and formal argument lists differ in length
1 error
C:\Users\samri\Desktop\java lab>javac Exception1.java
Exception1.java:21: error: constructor Object in class Object cannot be applied to given types;
super(agef);
^
required: no arguments
found: int
reason: actual and formal argument lists differ in length
1 error
C:\Users\samri\Desktop\java lab>javac Exception1.java
C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
45
Enter the Son's Age
12
Father age:45
Son's age:12
C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
0
Enter the Son's Age
23
Exception in thread "main" Wrong age! Please enter the Right age
at Exception1.main(Exception1.java:39)
C:\Users\samri\Desktop\java lab>java Exception1
Enter the Father's Age
6
Enter the Son's Age
78
Exception in thread "main" Wrong age! Please enter the Right age
at Exception1.main(Exception1.java:39)
C:\Users\samri\Desktop\java lab>
Activate Windows
Go to Settings to activate Windows.
Type here to search
18°C
ENG
09:11
06-01-2023

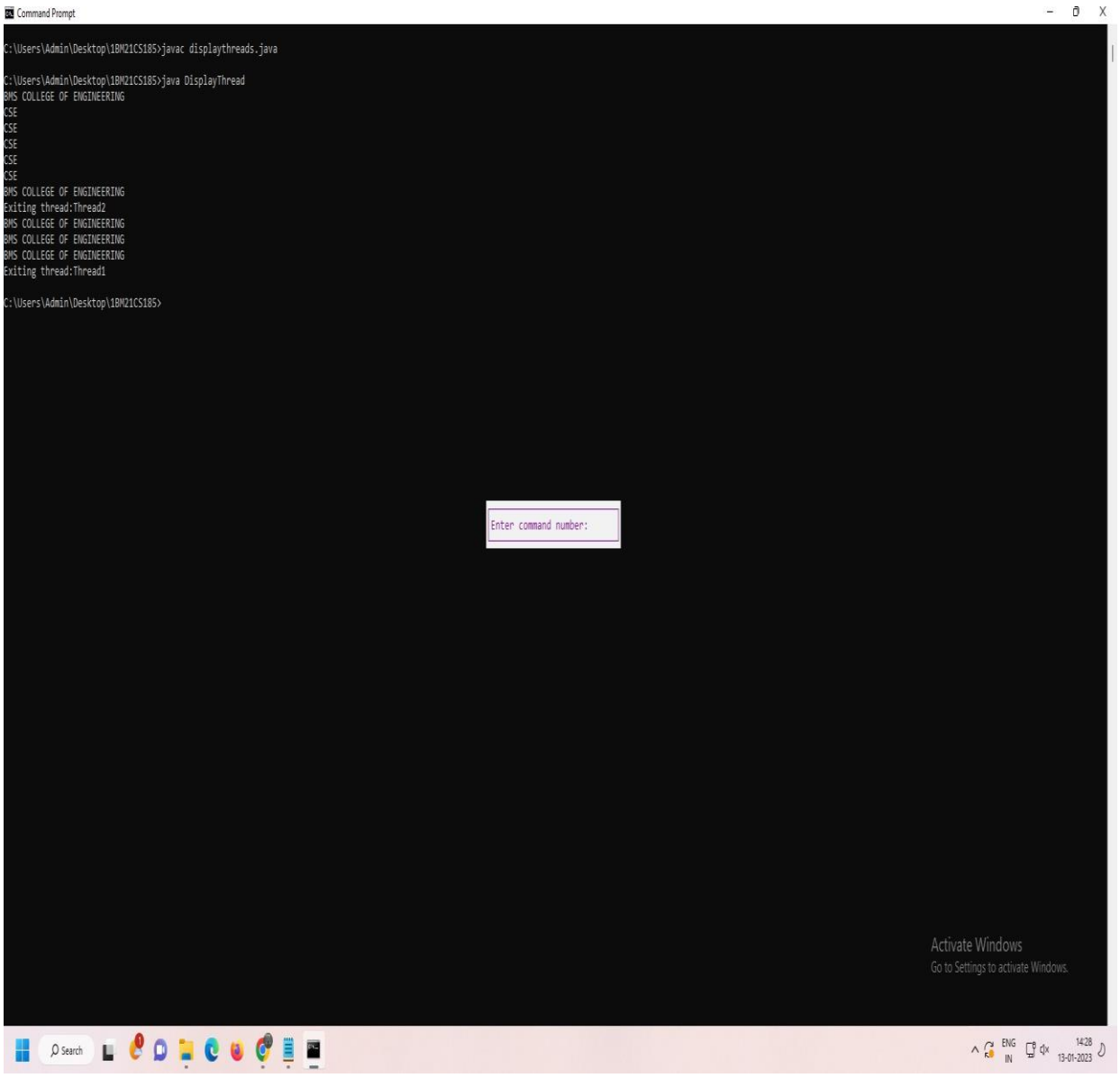
PROGRAM 8

Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds.

```
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 COLLEGE OF ENGINEERING", 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");
}
}
}
```

OUTPUT:


Command Prompt
C:\Users\Admin\Desktop\1BM21CS185>javac displaythreads.java
C:\Users\Admin\Desktop\1BM21CS185>java DisplayThread
BMS COLLEGE OF ENGINEERING
CSE
CSE
CSE
CSE
CSE
BMS COLLEGE OF ENGINEERING
Exiting thread:Thread2
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
BMS COLLEGE OF ENGINEERING
Exiting thread:Thread1
C:\Users\Admin\Desktop\1BM21CS185>
Enter command number:
Activate Windows
Go to Settings to activate Windows.
Search
ENG
IN
14:28
13-01-2023