VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT on

OBJECT ORIENTED JAVA PROGRAMMING (21CS3PCOOJ)

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 BENGALURU-560019 October-2022 to Feb-2023

(Autonomous Institution under VTU)

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 (21CS3PCDOOJ)"** carried out by **Jeevanthi Kashyap (1BM21CS080),** 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. The Lab report has been approved as it satisfies the academic requirements in respect of Object Oriented Java Programming (21CS3PCOOJ) work prescribed for the said degree.

Prof. Basvaraj Jakkali	**Dr. Jyothi S Nayak**
Assistant Professor	Professor and Head Of
Department of CSE	Department of CSE
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PROGRAM 1:

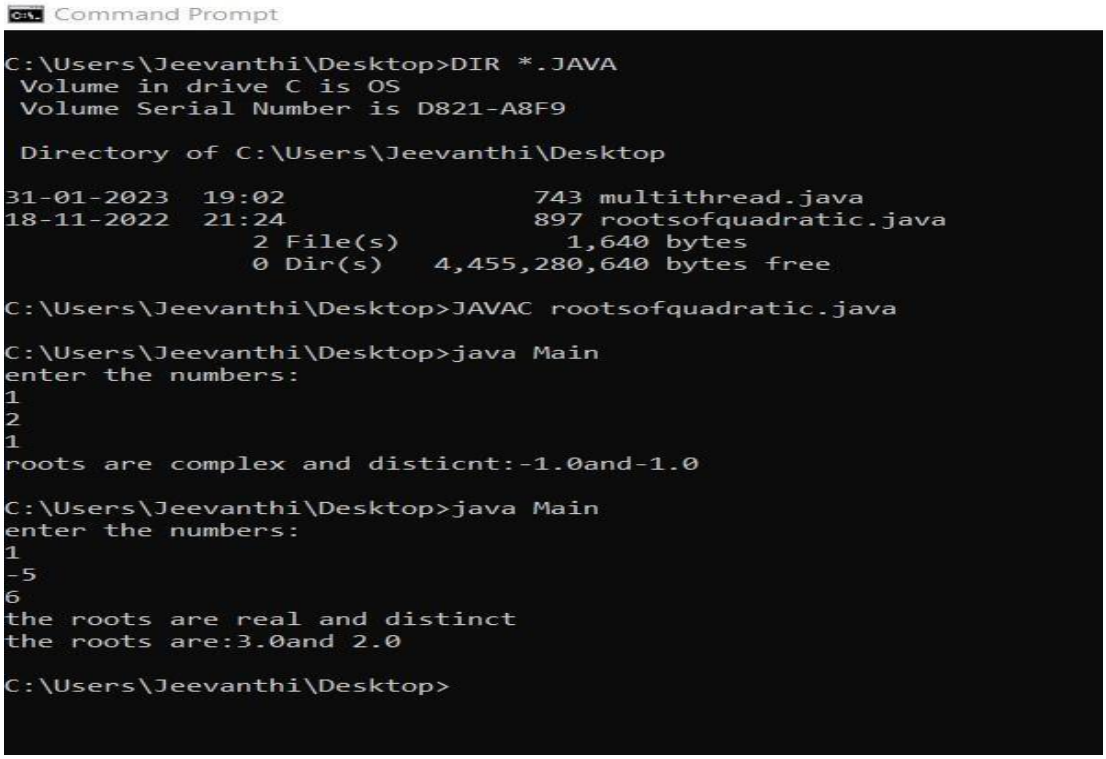
Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions.

CODE:

```
import java.util.*;

import java.lang.*; class

Main{

public static void main(String args[])

{

   Scanner sc= new Scanner(System.in);

System.out.println("enter the numbers:");

double a=sc.nextDouble();     double

b=sc.nextDouble();     double

c=sc.nextDouble();


double d, root1,root2;

d=(b*b)-(4*a*c);

if(d>0){

   System.out.println("the roots are real and distinct");

root1=(-b+Math.sqrt(d))/(2*a);     root2=(-b-

Math.sqrt(d))/(2*a);

   System.out.println("the roots are:"+root1+"and "+root2);


}
```

```
  else  if(d==0)
    {
        root1=root2=-b/(2*a);

        System.out.println("roots are complex and disticnt:"+root1 +"and"+root2);
    }     else{
        System.out.println("the roots are
imaginary\n"); double rpart=(-b)/(2*a); double
ipart=(Math.sqrt(-d))/(2*a);
System.out.println("the roots are:"+rpart +"and"+ipart);
}
    }
}
```

OUTPUT:



PROGRAM 2

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

CODE:

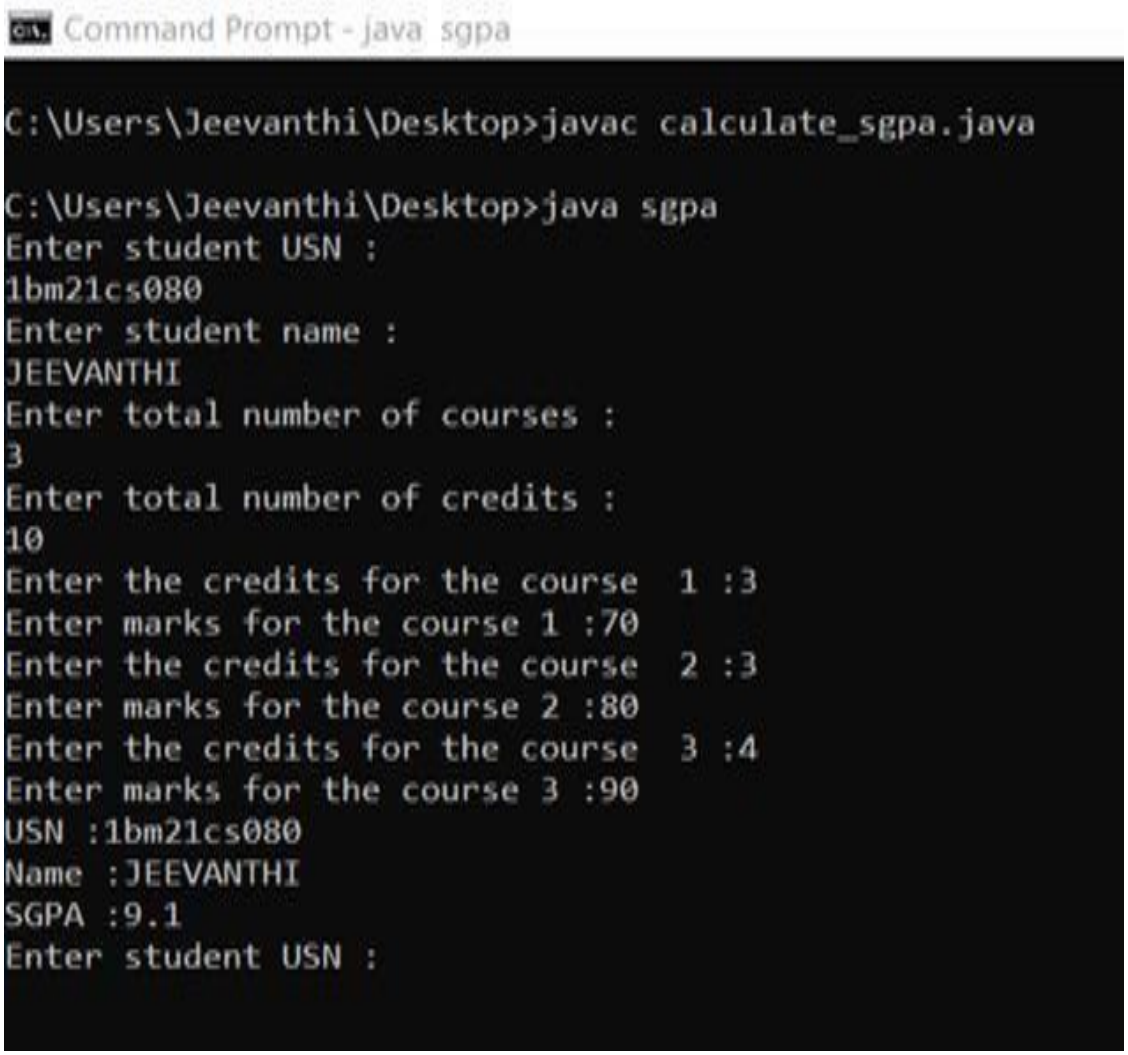
```
import java.util.*; class
Student
{
   String usn;     String
name;     int credits[]=new
int[20];     double
total,sgpa;     int count,i;
int marks[]=new int[20];
int points[]=new int[20];
void input()
   {
      Scanner sc=new Scanner(System.in);
System.out.println("Enter student USN :");
usn=sc.next();
      System.out.println("Enter student name :");
name=sc.next();
      System.out.println("Enter total number of courses :");
count=sc.nextInt();
      System.out.println("Enter total number of credits :");
total=sc.nextDouble();
```

```
        for(i=0;i<count;i++)
        {
            System.out.print("Enter the credits for the course  "+(i+1)+" :");
credits[i]=sc.nextInt();
            System.out.print("Enter marks for the course "+(i+1)+" :");
marks[i]=sc.nextInt();
   }     }
    double calculate()
    {
        for(i=0;i<count;i++)
        {
            if(marks[i]<=100 && marks[i]>=90)
points[i]=10;
            else if(marks[i]<90 && marks[i]>=80)
points[i]=9;
            else if(marks[i]<80 && marks[i]>=70)
points[i]=8;
            else if(marks[i]<70 && marks[i]>=60)
points[i]=7;
            else if(marks[i]<60 && marks[i]>=55)
points[i]=6;
            else if(marks[i]<55 && marks[i]>=50)
points[i]=5;
```

```
 else if(marks[i]<50 && marks[i]>=40)
points[i]=4;
          else
points[i]=0;


       }
       double sum=0.0;



       for(i=0;i<count;i++)
       {
          sum+=credits[i]*points[i];
       }
 sgpa=sum/total;
return (sgpa);
    }
    void display()
    {
       System.out.println("USN :"+usn);
       System.out.println("Name :"+name);
       System.out.println("SGPA :"+calculate());     }
} class sgpa
{
    public static void main(String args[])
```

```
    {
        Student s1=new
Student();        s1.input();
s1.display();
        Student s2=new
Student();        s2.input();
s2.display();
}
}
```

OUTPUT:



PROGRAM 3:

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

CODE:

```
import java.util.*;  class

book{

Scanner sc=new

Scanner(System.in); String title,

author; int price, num_pages; book()

{

System.out.println("enter book title :");

title=sc.nextLine();  System.out.println("enter author

name :"); author=sc.nextLine();

System.out.println("enter number of pages :");

num_pages=sc.nextInt();

System.out.println("enter the price :");

price=sc.nextInt();  } void set()

{
System.out.println("all inputs are set");

} void

get()

{
```

```
System.out.println("the details of the book are :");
System.out.println("Book Title : " + title+"\n");
System.out.println("Book Author : " + author+"\n");
System.out.println("Book Price : " + price+"\n");
System.out.println("Book Pages: " + num_pages+"\n");
}
public String toString()
{
return title+" "+author+" "+num_pages+" "+price;
} } class
bookdetails
{
public static void main(String args[])
{ int n,i;
System.out.println("enter number of
books"); Scanner sc=new
Scanner(System.in); n=sc.nextInt();
book b[]=new book[n];  for(i=0;i<n;i++)
{      b[i]=new book();
}
for(i=0;i<n;i++)
{ b[i].set();
b[i].get();
System.out.println(b[i]);
```

}

}}

OUTPUT:


Command Prompt
C:\Users\Jeevanthi\Desktop>JAVAC book_info.java
C:\Users\Jeevanthi\Desktop>java bookdetails
enter number of books
2
enter book title :
harry potter
enter author name :
jk rowling
enter number of pages :
300
enter the price :
650
enter book title :
meluha
enter author name :
amish tripati
enter number of pages :
500
enter the price :
1000
all inputs are set
the details of the book are :
Book Title : harry potter
Book Author : jk rowling
Book Price : 650
Book Pages: 300
harry potter jk rowling 300 650
all inputs are set
the details of the book are :
Book Title : meluha
Book Author : amish tripati
Book Price : 1000
Book Pages: 500
meluha amish tripati 500 1000
C:\Users\Jeevanthi\Desktop>

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.

CODE:

```
import java.util.*; abstract

class Shape  { int x,y;

abstract void printArea();

}
class Rectangle extends

Shape{ void

printArea(){ float area;

area=x*y;

System.out.println("Area of

Rectangle is: "+area);

} }  class Triangle

extends Shape{ void

printArea(){ float

area; area=(x*y)/2.0f;

System.out.println("

A rea of Triangle is:

"+area);

} } class Circle extends

Shape{ void printArea(){
```

```
float area; area=3.14f*x*x;
System.out.println("Area of
Circle is: "+area);  }
} class abs{ public
static void
main(String args[])
{ int choice;
Scanner sc=new
Scanner(System.in);  System.out.println("Select\n
1.Area of
Rectangle\n2.Area of
Triangle\n3.Area of
Circle"); System.out.println("enter your choice: ");
choice=sc.nextInt(); switch(choice){ case 1:
System.out.println("enter the values for length and
breadth :");
Rectangle r=new
Rectangle();
r.x=sc.nextInt();
r.y=sc.nextInt();
r.printArea(); break; case 2:
System.out.println("enter
the values for base and
height: "); Triangle t=new
Triangle();
```

```
t.x=sc.nextInt();
t.y=sc.nextInt();
t.printArea()
; break; case
3:
System.out.println("enter
the radius value: "); Circle
c=new Circle();
c.x=sc.nextInt();
c.printArea();
break;
default:
System.out.println("Invalid
choice!");
}
}
}
```

OUTPUT:

Command Prompt

```
C:\Users\Jeevanthi\Desktop>javac abstract_shapes.java

C:\Users\Jeevanthi\Desktop>java abs
Select
1.Area of Rectangle
2.Area of Triangle
3.Area of Circle
enter your choice:
1
enter the values for length and breadth :
5
10
Area of Rectangle is: 50.0

C:\Users\Jeevanthi\Desktop>javac abstract_shapes.java

C:\Users\Jeevanthi\Desktop>java abs
Select
1.Area of Rectangle
2.Area of Triangle
3.Area of Circle
enter your choice:
2
enter the values for base and height:
10
20
Area of Triangle is: 100.0

C:\Users\Jeevanthi\Desktop>javac abstract_shapes.java

C:\Users\Jeevanthi\Desktop>java abs
Select
1.Area of Rectangle
2.Area of Triangle
3.Area of Circle
enter your choice:
3
enter the radius value:
5
Area of Circle is: 78.5
```

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.

CODE:

```
import java.util.Scanner;
import java.lang.Math; class
Account
{
String name, acc_type; int
        acc_no;       double
bal,dep;
Scanner scan= new Scanner(System.in); void
setd()
{
System.out.println("Enter your Name:");
name=scan.next();
System.out.println("Enter your Account Number:");
acc_no=scan.nextInt();
System.out.println("Enter your Account type:
```

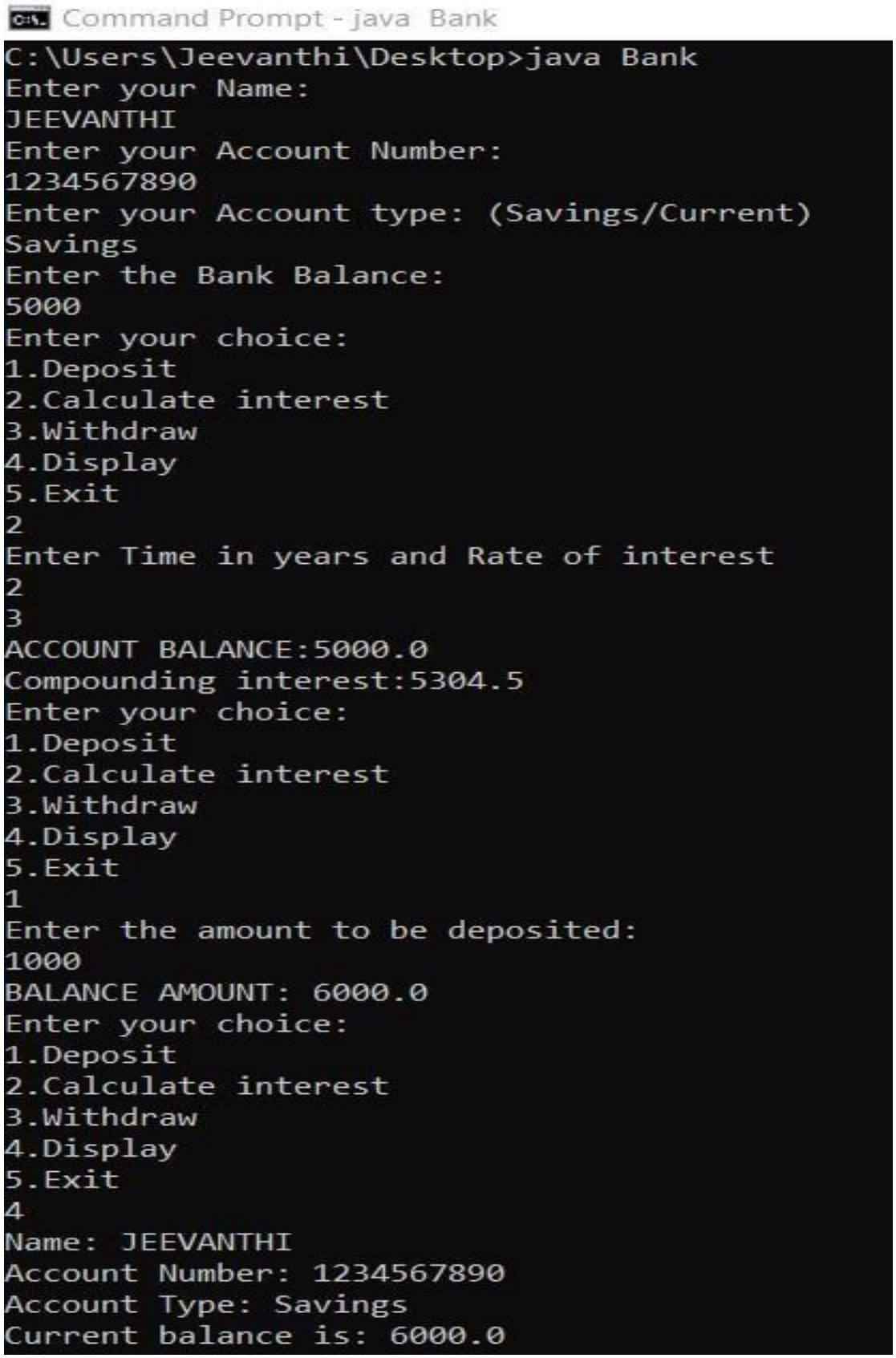
```
(Savings/Current)"); acc_type=scan.next();
System.out.println("Enter the Bank Balance:");
bal=scan.nextInt();
} void
disp()
{
System.out.println("Name: "+name);
System.out.println("Account Number: "+acc_no);
System.out.println("Account Type: "+acc_type);
System.out.println("Current balance is: "+bal);
} void
deposit()
{
System.out.println("Enter the amount to be deposited:");
dep=scan.nextInt(); bal+=dep;
System.out.println("BALANCE AMOUNT: "+bal);
}
  }
class Cur_acct extends Account
{  int  penal()  {
double min, pen;
System.out.println("Enter Minimum balance & penalty
amount if not followed:"); min=5000; pen=min*0.05;
if(bal<min) { bal-=pen;
System.out.println("Penalty imposed for having
insufficient balance"); return 0;
} else
   {System.out.println("No penalty");
   return 1;} }
void
withdrawal()  {
double amt;
System.out.println("Enter amount to be withdrawn:");
amt=scan.nextInt();
          int a= penal();
if(a==1) {
if(bal>=amt)
              { bal=bal-amt;
```

```
System.out.println("Account Balance after withdrawal
is:" +bal);} } else
            System.out.println("The amount can't be
withdrawn");
     }
}
class Sav_acct extends Account
{
void calc_interest()
{
System.out.println("Enter Time in years and Rate of
interest");
double t=scan.nextDouble(); double
r=scan.nextDouble(); double CI =
bal*Math.pow((1 + r/ 100), t);
System.out.println("ACCOUNT BALANCE:" + bal);
System.out.println("Compounding interest:"+ CI);
}
void
withdrawal()  {
double amt;
System.out.println("Enter amount to be withdrawn:");
amt=scan.nextInt();
if(bal>=amt)
             { bal=bal-amt;
System.out.println("Account Balance after withdrawal
is:" +bal);} else
            System.out.println("The amount can't be
withdrawn");
     }
} class Bank
{
  public static void main(String arg[])
  {
Scanner ss=new Scanner(System.in);
Account b1=new Account(); b1.setd();
if(b1.acc_type.equals("Savings"))
{
Sav_acct s1=new Sav_acct();
```

```
s1.name=b1.name; s1.acc_no=b1.acc_no;
s1.acc_type=b1.acc_type; s1.bal=b1.bal; while(true)
{
System.out.println("Enter your
choice:\n1.Deposit\n2.Calculate
interest\n3.Withdraw\n4.Display\n5.Exit");
int choice=ss.nextInt();
switch(choice) { case 1:
s1.deposit(); break; case 2:
s1.calc_interest(); break; case 3:
s1.withdrawal(); break; case 4:
s1.disp(); break; case 5:
System.exit(0);
default: System.out.println("Invalid input");
}
} }
else if(b1.acc_type.equals("Current"))
{
Cur_acct c1=new Cur_acct(); c1.name=b1.name;
c1.acc_no=b1.acc_no; c1.acc_type=b1.acc_type;
c1.bal=b1.bal;  while(true)
{
System.out.println("Enter your
choice:\n1.Deposit\n2.Penalty
Check\n3.Withdraw\n4.Display\n5.Exit"); int
choice=ss.nextInt();
switch(choice)  { case 1:
c1.deposit(); break; case 2:
c1.penal(); break; case 3:
c1.withdrawal(); break; case
4: c1.disp(); break; case 5:
System.exit(0);
default: System.out.println("Invalid input");
}  }
}
els
e
  System.out.println("Invalid Account type");
```

```
    }
}
```

OUTPUT:


Command Prompt - java Bank
C:\Users\Jeevanthi\Desktop>java Bank
Enter your Name:
JEEVANTHI
Enter your Account Number:
1234567890
Enter your Account type: (Savings/Current)
Savings
Enter the Bank Balance:
5000
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
2
Enter Time in years and Rate of interest
2
3
ACCOUNT BALANCE:5000.0
Compounding interest:5304.5
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
1
Enter the amount to be deposited:
1000
BALANCE AMOUNT: 6000.0
Enter your choice:
1.Deposit
2.Calculate interest
3.Withdraw
4.Display
5.Exit
4
Name: JEEVANTHI
Account Number: 1234567890
Account Type: Savings
Current balance is: 6000.0

PROGRAM 6:

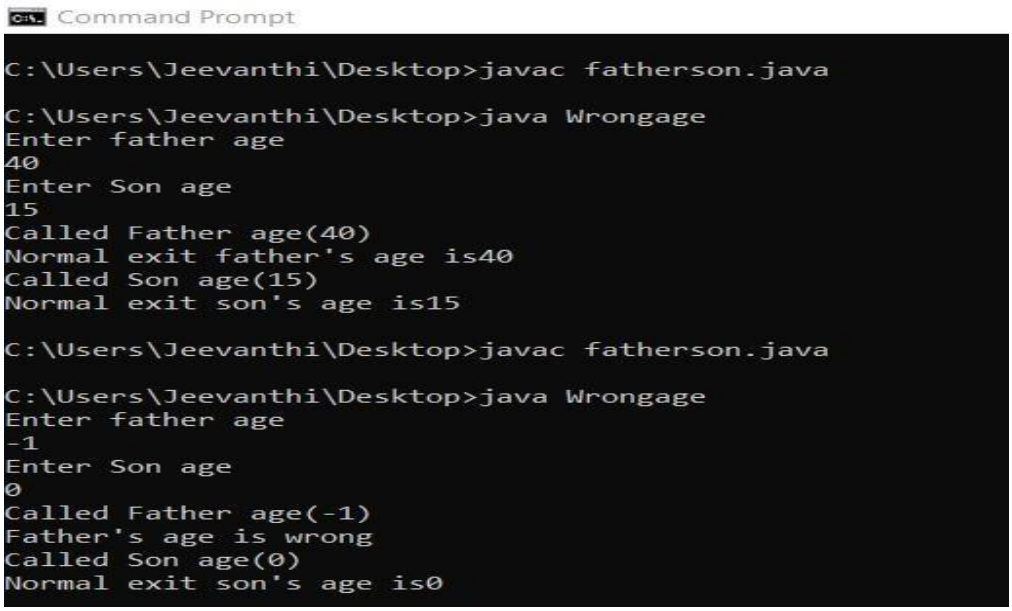
Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called “Father” and derived class called “Son” which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge( ) when the input age=father’s age

CODE:

```
import java.util.Scanner; class
Father extends Exception{
int f_age;
Father(int x)  {
f_age=x; } public
String toString(){
return "Father's age
is wrong";
} }
class Son extends Father{
int s_age;
Son(int x,int y)
{ super(x);
s_age=y;
}
public String toString(){
return "Son's age cannot be greater than or equal to father"; }
}
class Wrongage{
static int x,y; static void Father_age(int x)
throws Father
{
System.out.println("Called Father age("+x+")"); if(x<0)
throw new Father(x);
System.out.println("Normal exit father's age is"+x);
}
static void Son_age(int x,int y) throws Son
{
```

```
System.out.println("Called Son
age("+y+")"); if(y>=x) throw new Son(x,y);
System.out.println("Normal exit son's age is"+y);
}
public static void main(String args[])
{
Scanner input=new
Scanner(System.in);
System.out.println("Enter father age");
x=input.nextInt();
System.out.println("Enter Son age");
y=input.nextInt(); try{  Father_age(x); }
catch(Father e)
{
System.out.println(e);
} try{
Son_age(x,y)
; } catch(Son
e)
{
System.out.println(e);
}
}
}
```

OUTPUT:



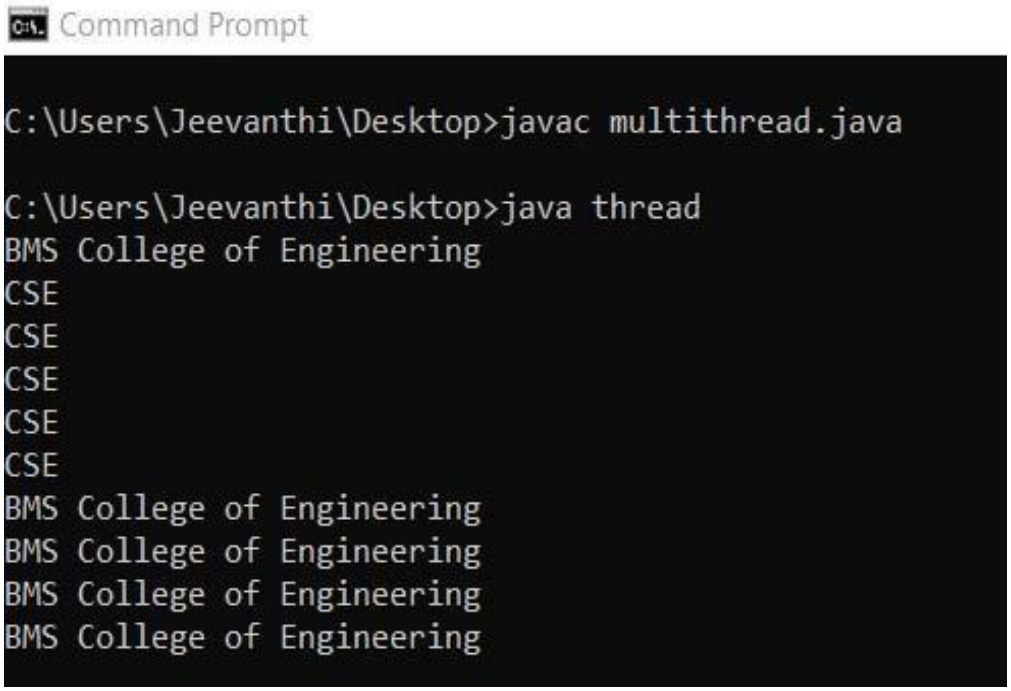
PROGRAM 7:

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.

CODE:

```
import java.util.*; class multithread
implements Runnable
{
   Thread t;     String
a;
   int b;
multithread(String s, int n)
   {        a=s; b=n;        t=new Thread(this,"Thread");
      t.start();     }
public void run()
   {        try {
for(int i=5;i>0;i--)
          {
             System.out.println(a);
             Thread.sleep(b);
          }
      } catch (InterruptedException e) {
          System.out.println("Thread exception");
      }
   }
}

class thread{
   public static void main(String[] args) {
      multithread n=new multithread("BMS College of Engineering",10000);
multithread m=new multithread("CSE",2000);
   }

}
```

OUTPUT:


Command Prompt
C:\Users\Jeevanthi\Desktop>javac multithread.java
C:\Users\Jeevanthi\Desktop>java thread
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering
BMS College of Engineering