Lab 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.

```
import java.util.Scanner;
public class Quadratic
{
 public static void main(String args[])
 {
  double a,b,c;
  double root1,root2;
  Scanner in=new Scanner(System.in);
  System.out.println("Enter value of a : ");
  a=in.nextDouble();
  System.out.println("Enter value of b : ");
  b=in.nextDouble();
  System.out.println("Enter value of c : ");
  c=in.nextDouble();
  double determinant=(b*b)-(4*a*c);
  double sq=Math.sqrt(determinant);
  // condition for real and different roots
  if(determinant>0)
  {
   root1=((-b+sq)/(2*a));
   root2=(-b-sq)/(2*a);
   System.out.println("Root 1= "+root1+"\t"+"Root2= "+root2);
  }
  // condition for real and equal roots
  else if(determinant==0)
  {
   root1=root2=(-b+sq)/(2*a);
   System.out.println("Root 1=Root 2=  "+root1);
  }
  // condition for roots that are not real
  else
  {
   double  real=-b/(2*a);
   double  img=Math.sqrt(-determinant)/(2*a);
   System.out.println("Root 1= "+real+"+"+img+"i"+"\t"+"Root2= "+real+"-"+img+"i");
  }
 }
}
```

OUTPUT:

```
Snehas-MacBook-Pro:~ snehasrivastava$ javac Quadratic.java
Snehas-MacBook-Pro:~ snehasrivastava$ java Quadratic
Enter value of a :
5
Enter value of b :
2
Enter value of c :
1
Root 1= -0.2+0.4i       Root2= -0.2-0.4i
Snehas-MacBook-Pro:~ snehasrivastava$ java Quadratic
Enter value of a :
1
Enter value of b :
-4
Enter value of c :
6.25
Root 1= 2.0+1.5i        Root2= 2.0-1.5i
Snehas-MacBook-Pro:~ snehasrivastava$ java Quadratic
Enter value of a :
5
Enter value of b :
6
Enter value of c :
1
Root 1= -0.2    Root2= -1.0
Snehas-MacBook-Pro:~ snehasrivastava$
```

WRITEUP:

Date.....

Expt. No..... LAB PROGRAM-1 (1BM19CS158) Page No. 6

7) Develop a Java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
public class Quadratic
{
public static void main (String args[])
 {
   double a, b, c;
   double root1, root2;
   Scanner in = new Scanner (System.in);
   S.O.pln(" Enter value of a :") ;
   a = in.nextDouble();
   S.O.pln(" Enter value of b:");
   b= in.nextDouble();
   S.O.pln(" Enter value of c:");
   c= in.nextDouble();
   double determinant = (b*b) -(4*a*c);
   double sq = Math.sqrt(determinant);
   // condition for real and different roots
   if (determinant>0)
{
   root1 = ((-b+sq)/(2*a));
   root2 = (-b-sq) /(2*a);
   S.O.pln(" Root1 = " + root1 +"\t"+ "Root2 = " + root2);
}
```

Teacher's Signature : _____

Date

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```
// condition for real and equal roots
else if (determinant == 0)
{
root1 = root2 = (-b+sq)/(2*a);
S.O.pln ("Root1 = Root2 = " + root1);
}
// condition for roots that are not real
else
{
double real = -b/(2*a);
double img = Math.sqrt(-determinant)/(2*a);
S.O.pln("Root1 = " + real + "+" + img + "i" + "\t" + "Root2 = " + real + "-" + img + "i");
}
}
}
```

Teacher's Signature :

Sneha Srivastava
(1BM19CS158)

OUTPUT:-

```
Enter value of a:
5
Enter value of b:
2
Enter value of c:
1
Root1 = -0.2+0.4i        Root2=-0.2-0.4i
```

```
Enter value of a:
1
Enter value of b:
-4
Enter value of c:
6.25
Root1 = 2.0+1.5i         Root 2 = 2.0-1.5i
```

```
Enter value of a:
5
Enter value of b:
6
Enter value of c:
1
Root1 = -0.2        Root2 = -1.0
```

Lab Program 2:

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

```
import java.util.*;

public class Student
{
    String name;
    String USN;
    int marks[]=new int[5];
    int credits[]=new int[5];

        int tot=0;
        int i;
        int grade=0;
   void read_data()
   {
        Scanner obj=new Scanner(System.in);
        System.out.println("ENTER THE NAME OF THE STUDENT:\n");
        name=obj.next();
        System.out.println("ENTER THE USN:\n");
        USN=obj.next();
        System.out.println("ENTER THE CREDITS AND MARKS FOR 5 SUBJECTS:\n");

        for(i=0;i<5;i++)
        {
           System.out.println("CREDITS FOR SUBJECT "+(i+1)+": ");
           credits[i]=obj.nextInt();
           System.out.println("\nMARKS FOR SUBJECT "+(i+1)+": ");
           marks[i]=obj.nextInt();
        }
   }
    void calc_SGPA()
   {
      for(i=0;i<5;i++)
      {
         if(marks[i]>=90 && marks[i]<=100)
            grade = 10;
         else if(marks[i]>=75 && marks[i]<90)
             grade = 9;
         else if(marks[i]>=60 && marks[i]<75)
             grade = 8;
         else if(marks[i]>=50 && marks[i]<60)
             grade = 7;
         else if(marks[i]>=45 && marks[i]<50)
             grade = 6;
         else if(marks[i]>=40 && marks[i]<45)
            grade = 5;
         else if(marks[i]<40)
            grade = 0;

            tot = tot + grade * credits[i];
      }
      tot = tot/20;
      System.out.println("Total SGPA:" +tot);
```

```
    }
     void details()
    {
            System.out.println("NAME:"+name);
            System.out.println("USN:"+USN);
            System.out.println("MARKS and CREDITS OF ALL 5 SUBJECTS:");
            for(i=0;i<5;i++)
            {
                System.out.print(marks[i]+"\t");
                System.out.println(credits[i]);
            }

            calc_SGPA();
        }

    public static void main(String args[])
    {
        Student ob=new Student();
        ob.read_data();
        ob.calc_SGPA();
        ob.details();
    }
}
```

OUTPUT:

```
Snehas-MacBook-Pro:~ snehasrivastava$ javac Student.java
Snehas-MacBook-Pro:~ snehasrivastava$ java Student
ENTER THE NAME OF THE STUDENT:

Sneha
ENTER THE USN:

1BM19CS158
ENTER THE CREDITS AND MARKS FOR 5 SUBJECTS:

CREDITS FOR SUBJECT 1:
4

MARKS FOR SUBJECT 1:
87
CREDITS FOR SUBJECT 2:
4

MARKS FOR SUBJECT 2:
65
CREDITS FOR SUBJECT 3:
3

MARKS FOR SUBJECT 3:
90
CREDITS FOR SUBJECT 4:
4

MARKS FOR SUBJECT 4:
73
CREDITS FOR SUBJECT 5:
3

MARKS FOR SUBJECT 5:
95
Total SGPA:8
NAME:Sneha
USN:1BM19CS158
MARKS and CREDITS OF ALL 5 SUBJECTS:
87      4
65      4
90      3
73      4
95      3
Total SGPA:8
Snehas-MacBook-Pro:~ snehasrivastava$
```

WRITEUP:

9/10/2020

LAB PROGRAM-2

Sneha Srivastava
~~(1BM19CS158)~~

ALGORITHM:-

STEP:1:- START.

STEP:2:- import java.util.* package created along with class Student.

STEP:3:- Required variables & array created.

STEP:4:- void read_data() method created to read name, USN & Credits & marks of the student.

STEP:5:- void calc_SGPA() method created so as to calculate the SGPA of 5 subjects according to the marks and grade points of every subject.

STEP:6:- SGPA after calculation is printed.

STEP:7:- Creation of void details() method to display all the requirements on the screen i.e. Name, USN, MARKS, Credits & SGPA of a student.

STEP:8:- Now, main method() is created and an object ob is created.

STEP:9:- The object ob calls all the three methods i.e. ob.read_data(), ob.calc_SGPA(), ob.details() and performs the requirements.

STEP:10:- Close of main() method along with the close of class Student.

STEP:11:- STOP.

__/__/____

```
import java.util.*;
public class Student
{
 String name;
 String USN;
 int marks[] = new int[5];
 int credits[] = new int[5];
  int tot=0;
  int i=0;
 int grade = 0;
 void read_data()
{
  Scanner obj = new Scanner(System.in);
  S.O.pln("ENTER THE NAME OF THE STUDENT:\n");
  name = obj.next();
  S.O.pln("ENTER THE USN:\n");
  USN = obj.next();
  S.O.pln("ENTER THE CREDITS AND MARKS FOR 5 SUBJECTS:\n"
for (i=0; i<5; i++)
{
S.O.pln("CREDITS FOR SUBJECT" + (i+1) + ":");
credits[i] = obj.nextInt();
S.O.pln("\n MARKS FOR SUBJECT" + (i+1) + ":");
marks[i] = obj.nextInt();
}
}
 void calc_SGPA()
 {
  for (i=0; i<5; i++)
```

```
{
if (marks [i] >= 90 && marks [i] = 100)
 grade = 10;
else if (marks [i] >= 75 && marks[i] < 90)
 grade = 9;
else if (marks [i] >=60 && marks [i] < 75)
 grade = 8;
else if (marks[i] >= 50 && marks [i] < 60)
 grade = 7;
else if ( marks [i] >= 45 && marks [i] < 45)
 grade = 5;
 else if (marks [i] < 40)
 grade = 0;
   tot = tot + grade * credits [i];
}
tot = tot/20;
S.o.pln ("Total SGPA :"+tot);
}
void details()
{
 S.o.pln ("NAME :"+name);
 S.o.pln ("USN : "+ USN);
S.o.pln (" MARKS and CREDITS OF ALL 5 SUBJECTS:");
for (i = 0; i < 5; i++)
{
 S.o.p (marks [i] + "\t");
 S.o.pln ( credits [i]) ;
}
 cal - SGPA();
}
```

```
public static void main (String args [])
 {
  Student ob = new Student ();
  ob. read-data();
  ob. cale - SGPA();
  ob. details();
 }
}
```

Lab 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 Book1
{
   String name,author;
   double price;
   int num_pages;

      public Book1()
      {
       this.name="";
       this.author="";
       this.price=0.0;
       this.num_pages=0;
      }

       public void DETAILS()
      {
       Scanner ob=new Scanner(System.in);
       System.out.println("ENTER THE NAME OF THE BOOK\n");
       name=ob.nextLine();
       System.out.println("ENTER THE NAME OF THE AUTHOR");
       author=ob.nextLine();
       System.out.println("ENTER THE PRICE OF THE BOOK");
       price=ob.nextDouble();
       System.out.println("ENTER THE NUMBER OF PAGES OF THE BOOK");
       num_pages=ob.nextInt();
      }

     public void ToString()
     {
      System.out.println("****DETAILS OF THE BOOK****");
      System.out.println("NAME OF THE BOOK:"+name);
      System.out.println("NAME OF THE AUTHOR:"+author);
      System.out.println("PRICE OF THE BOOK:"+price);
      System.out.println("NO. OF PAGES OF THE BOOK:"+num_pages);
     }
      public static void main(String args[])
      {
        int i=0,n;
        Book1 obj=new Book1();
        Scanner ob1=new Scanner(System.in);
        System.out.println("ENTER THE LIMIT");
        n=ob1.nextInt();
        for(i=1;i<=n;i++)
        {
          obj.DETAILS();
          obj.ToString();
        }
      }
}
```

OUTPUT:

```
Snehas-MacBook-Pro:~ snehasrivastava$ javac Book1.java
Snehas-MacBook-Pro:~ snehasrivastava$ java Book1
ENTER THE LIMIT
3
ENTER THE NAME OF THE BOOK

Computer Applications
ENTER THE NAME OF THE AUTHOR
Sumita Arora
ENTER THE PRICE OF THE BOOK
980
ENTER THE NUMBER OF PAGES OF THE BOOK
1020
****DETAILS OF THE BOOK****
NAME OF THE BOOK:Computer Applications
NAME OF THE AUTHOR:Sumita Arora
PRICE OF THE BOOK:980.0
NO. OF PAGES OF THE BOOK:1020
ENTER THE NAME OF THE BOOK

Understanding JAVA
ENTER THE NAME OF THE AUTHOR
Vijay Kumar Pandey
ENTER THE PRICE OF THE BOOK
759.98
ENTER THE NUMBER OF PAGES OF THE BOOK
894
****DETAILS OF THE BOOK****
NAME OF THE BOOK:Understanding JAVA
NAME OF THE AUTHOR:Vijay Kumar Pandey
PRICE OF THE BOOK:759.98
NO. OF PAGES OF THE BOOK:894
ENTER THE NAME OF THE BOOK

OOJ Concepts
ENTER THE NAME OF THE AUTHOR
Mc-GrawHill
ENTER THE PRICE OF THE BOOK
1345.86
ENTER THE NUMBER OF PAGES OF THE BOOK
2985
****DETAILS OF THE BOOK****
NAME OF THE BOOK:OOJ Concepts
NAME OF THE AUTHOR:Mc-GrawHill
PRICE OF THE BOOK:1345.86
NO. OF PAGES OF THE BOOK:2985
Snehas-MacBook-Pro:~ snehasrivastava$
```

WRITEUP:

Date 16/10/2020

Expt. No. ---------- LAB PROGRAM-3 (1BM19CS158) Page No. 12

→ 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 & 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 Book1
{
 String name, author;
 double price;
 int num-pages;

 public Book1()
 {
  this.name="";
  this.author="";
  this.price= 0.0;
  this.num-pages=0;
 }

 public void DETAILS()
 {
 Scanner ob = new Scanner (System.in);
 S.O.pln ("ENTER THE NAME OF THE BOOK\n");
 name = ob.nextline();
 S.O.pln ("ENTER THE NAME OF THE AUTHOR");
```

Teacher's Signature : _____

Expt. No.---------- Date----------

Page No. 13

```
author = ob.nextLine();
S.O.pln ("ENTER THE PRICE OF THE BOOK");
price =ob.nextDouble();
S.O.pln(" ENTER THE NUMBER OF PAGES OF THE BOOK");
num_pages =ob.nextInt();
}
public void ToString()
{
S.O.pln ("**** DETAILS OF THE BOOK ****");
S.O.pln ("NAME OF THE BOOK :"+name);
S.O.pln (" NAME OF THE AUTHOR :"+author);
S.O.pln (" PRICE OF THE BOOK :"+price);
S.O.pln (" NO. OF PAGES OF THE BOOK :"+num_pages);
}
public static void main (String args[])
{
  int i=0, n;
  Book1 obj= new Book1();
  Scanner ob1 = new Scanner (System.in);
  S.O.pln (" ENTER THE LIMIT");
  n = ob1.nextInt();
  for (i= 1; i<= n; i++)
  {
    obj.DETAILS();
    obj.ToString();
  }
}
```

Teacher's Signature : _____

Exp:

ALGORITHM

Step 1 :- Start.
Step 2 :- import java.util.* package & create class Book1.
Step 3 :- Required variables i.e. name, author, price & num-pages is declared.
Step 4 :- Constructor Book1() created to initial the values to the variables.
Step 5 :- method DETAILS() is created in order to enter the details of the book, i.e. name of the book, author, price & no. of pages.
Step 6 :- Another method ToString() is created.
Step 7 :- The method ToString() basically prints all the details of the book.
Step 8 :- Now, main() method is created.
Step 9 :- An object is created obj to call the functions.
Step 10 :- Scanner object ob1 is also created in order to create n book objects.
Step 11 :- A for loop is created for n book objects which calls the methods DETAILS() & ToString().
Step 12 :- The main method() is closed along with the close of class Book1.
Step 13 :- Stop.

Teacher's Signature : _____

Output :-

```
ENTER THE LINIT
3
ENTER THE NAME OF THE AUTHOR BOOK
Computer Applications
ENTER THE NAME OF THE AUTHOR
Sumita Arora
ENTER THE PRILE OF THE BOOK
980
ENTER THE NUMBER OF PAGES OF THE BOOK
1020
**** DETAILS OF THE BOOK ****
NAME OF THE BOOK: Computer Applications
NAME OF THE AUTHOR: Sumita Arora
PRICE OF THE BOOK : 980.0
NO. OF PAGES OF THE BOOK: 1020
ENTER THE NAME OF THE BOOK
Understanding Java
ENTER THE NAME OF THE AUTHOR
Vijay Kumar Pandey
ENTER THE PRICE OF THE BOOK
759.98
ENTER THE NUMBER OF PAGES OF THE BOOK
894
**** DETAILS OF THE BOOK ****
NAME OF THE BOOK: Understanding JAVA
NAME OF THE AUTHOR : Vijay Kumar Pandey
PRICE OF THE BOOK : 759.98
NO. OF PAGES OF THE BOOK: 894
```

```
ENTER THE NAME OF THE BOOK
 OOJ Concepts
ENTER THE NAME OF THE AUTHOR
 Mc-GrawHill
ENTER THE PRICE OF THE BOOK
 1345.86
ENTER THE NUMBER OF PAGES OF THE BOOK
 2985
 **** DETAILS OF THE BOOK ****
 NAME OF THE BOOK: OOJ Concepts
 NAME OF THE AUTHOR: Mc-GrawHill
 PRICE OF THE BOOK: 1345.86
 NO. OF PAGES OF THE BOOK: 2985
```

Lab 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.

```
import java.util.*;
import java.lang.Math.*;

abstract class shape{
	public int a;
	public int b;
	abstract public void printArea();
	Scanner s=new Scanner(System.in);
}

class rectangle extends shape{
	public void printArea(){
		System.out.print("Enter length and breadth of rectangle: ");
		float a=s.nextFloat();
		float b=s.nextFloat();
		float area=a*b;
		System.out.println("Area="+area+"sq.units");
	}
}

class triangle extends shape{
	public void printArea(){
		System.out.print("Enter three sides of triangle: ");
		float a=s.nextFloat();
		float b=s.nextFloat();
		float c=s.nextFloat();
		float d=(a+b+c)/2;
		double area=Math.sqrt(d*(d-a)*(d-b)*(d-c));
		System.out.println("Area="+area+"sq.units");
	}
}

class circle extends shape{
	public void printArea(){
		System.out.print("Enter radius of circle: ");
		float a=s.nextFloat();
		float area=22/7*a*a;
		System.out.println("Area="+area+"sq.units");
	}
}

class shapedemo{
	public static void main(String args[]){
		shape r=new rectangle();
		shape t=new triangle();
		shape c=new circle();
```

```
            for(int i=0;i<100;i++){
            System.out.println("\n1)Triangle\n2)Rectangle\n3)Circle\n");
            System.out.println("Enter your choice: ");
            Scanner s=new Scanner(System.in);
            int ch=s.nextInt();
            switch(ch){
                  case 1: t.printArea();
                        break;
                  case 2: r.printArea();
                        break;
                  case 3: c.printArea();
                        break;
                        default:
                  System.out.println("Invalid choice");
                  }
            }
      }
}
```

OUTPUT:

```
[Snehas-MacBook-Pro:~ snehasrivastava$ nano shapedemo.java
[Snehas-MacBook-Pro:~ snehasrivastava$ javac shapedemo.java
[Snehas-MacBook-Pro:~ snehasrivastava$ java shapedemo

1)Triangle
2)Rectangle
3)Circle

Enter your choice:
1
Enter three sides of triangle: 5
7
3
Area=6.49519052838329sq.units

1)Triangle
2)Rectangle
3)Circle

Enter your choice:
3
Enter radius of circle: 6
Area=108.0sq.units

1)Triangle
2)Rectangle
3)Circle

Enter your choice:
2
Enter length and breadth of rectangle: 5
8
Area=40.0sq.units

1)Triangle
2)Rectangle
3)Circle

Enter your choice:
9
Invalid choice
```

WRITEUP:

6/11/2020

WRITE-UP: LAB PROGRAM-4 (1BM19CS158)

(1)

```
import java.util.*;
import java.lang.Math.*;
abstract class shape{
        public int a;
        public int b;
        abstract public void printArea();
        Scanner s = new Scanner(System.in);
}
Class rectangle extends shape{
    public void printArea(){
        S.O.p("Enter length and breadth of rectangle:");
        float a = s.next.Float();
        float b = s.nextFloat();
        float area = a*b;
        S.O.pln("Area=" + area + "sq.units");
}
}
Class triangle extends shape{
    public void printArea(){
    S.O.p("Enter three sides of triangle:");
    float a = s.nextFloat();
    float b = s.nextFloat();
    float c = s.nextFloat();
    float d = (a+b+c)/2;
    double area = Math.sqrt(d*(d-a)*(d-b)*(d-c));
    S.O.pln("Area =" + area + "sq.units");
}
}
```

__/__/____

(2)

```
class circle extends shape{
    public void printArea(){
        S.O.p("Enter radius of circle:");
        float a = s.nextFloat();
        float area = 22/7*a*a;
        S.O.println("Area"+area+"sq.units");
    }
}
class shapedemo{
    public static void main(String args[])
    {
    shape r = new rectangle();
    shape t = new triangle();
    shape c = new circle();
    for(int i=0; i<100; i++)
    {
    S.O.pln("\n1)Triangle\n2)Rectangle\n3)Circle\n");
    S.O.pln("Enter your choice:");
    Scanner s = new Scanner(System.in);
    int ch = s.nextInt();
    switch(ch){
        case 1: t.printArea();
                break;
        case 2: r.printArea();
                break;
        case 3: c.printArea();
                break;
                default;
                S.O.pln("Invalid choice");
    } } } }
```

__/__/____

(3)

OUTPUT: javac shapedemo.java
java shapedemo

1) Triangle
2) Rectangle
3) Circle
Enter your choice:
1
Enter ~~three~~ sides of triangle: 5
7
3
Area = 6.4951905283829 sq.units
1) Triangle
2) Rectangle
3) Circle
Enter your choice:
3
Enter radius of circle: 6
Area = 108.0 sq.units
1) Triangle
2) Rectangle
3) Circle
Enter your choice:
2
Enter length and breadth of rectangle: 5
8
Area = 40.0 sq.units
1) Triangle
2) Rectangle
3) Circle
Enter your choice:
9
Invalid choice

Lab 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 Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- **Accept deposit from customer and update the balance.**
- **Display the balance.**
- **Compute and deposit interest**
- **Permit withdrawal and update the balance**
- **Check for the minimum balance, impose penalty if necessary and update the balance.**

```
import java.util.*;
class Account
{
	String name,type;
	int acc_no;
	double amount;
	Scanner in=new Scanner(System.in);
	void type(int choice)
	{
		if(choice==1)
			type="Savings Account";
		if(choice==2)
			type="Current Account";
	}
	void input()
	{
		System.out.println("Enter the Name,Account number and Balance:");
		name=in.next();
		acc_no=in.nextInt();
		amount=in.nextDouble();
	}
	void deposit()
	{
		System.out.println("Enter the amount to be deposited:");
		double x=in.nextDouble();
		amount=amount+x;
	}
	void display()
	{
		System.out.println("Name:"+name);
		System.out.println("Account number:"+acc_no);
		System.out.println("Type:"+type);
		System.out.println("balance:"+amount);
	}
}
class Savings_acc extends Account
{
	double a,cinterest;
	int r,t;
	Scanner in=new Scanner(System.in);
```

```
	void withdrawal()
	{
		System.out.println("Enter amount to be withdrawn:");
		double amtw=in.nextDouble();
		if(amtw<=amount)
			amount=amount-amtw;
		else
			System.out.println("Invalid amount");
	}
	void cmp_interest()
	{
		System.out.println("Enter the rate and time:");
		r=in.nextInt();
		t=in.nextInt();
		a=amount* Math.pow(1 + (r *0.01),t);
		cinterest= a - amount;

	}
	 void display()
	{
		super.display();
		System.out.println("Compound Interest after " + t + " years: "+cinterest);
		System.out.println("Amount after " + t + " years: "+a);
	}
}
class Current_acc extends Account
{
	double min=10000;
	void input()
	{
		super.input();
	}
	void service_charge()
	{
		if(amount<min)
		amount=amount-500;
	}
	void display()
	{
		super.display();
	}
}
class bankdemo
{
	public static void main(String args[])
	{
		Scanner in=new Scanner(System.in);
		System.out.println("Choose type of account.");
		System.out.println("1.Savings account.");
		System.out.println("2.Current account.");
		int choice=in.nextInt();

		if(choice==1)
		{
			Savings_acc b=new Savings_acc();
			b.type(choice);
			b.input();
			System.out.println("Do you want to deposit or withdraw?\n1.Deposit.
\n2.Withdraw\n");
			int ch=in.nextInt();
```

```
                if(ch==1)
                b.deposit();
                else if(ch==2)
                b.withdrawal();
                else
                System.out.println("Invalid choice");
                b.cmp_interest();
                b.display();
        }
        else if(choice==2)
        {
                Current_acc b=new Current_acc();
                b.type(choice);
                 b.input();
                b.deposit();
                b.service_charge();
                b.display();
        }
        else
                System.out.println("Invalid choice");

    }
}
```

OUTPUT:

```
Snehas-MacBook-Pro:~ snehasrivastava$ java bankdemo
Choose type of account.
1.Savings account.
2.Current account.
1
Enter the Name,Account number and Balance:
Sneha
86956473
8900369.78
Do you want to deposit or withdraw?
1.Deposit.
2.Withdraw

1
Enter the amount to be deposited:
12300
Enter the rate and time:
5
9
Name:Sneha
Account number:86956473
Type:Savings Account
balance:8912669.78
Compound Interest after 9 years: 4913806.329413034
Amount after 9 years: 1.3826476109413033E7
Snehas-MacBook-Pro:~ snehasrivastava$ java bankdemo
Choose type of account.
1.Savings account.
2.Current account.
2
Enter the Name,Account number and Balance:
Smita
86904512
76409.75
Enter the amount to be deposited:
3490
Name:Smita
Account number:86904512
Type:Current Account
balance:79899.75
Snehas-MacBook-Pro:~ snehasrivastava$
```

WRITEUP:

6/11/2020

LAB PROGRAM-5 (1BM19CS158)

```
import java.util.*;
class Account
{
  String name, type;
  int acc_no;
  double amount;
  Scanner in = new Scanner (System.in);
  void type ( int choice)
  {
    if (choice ==1)
        type = "Savings Account";
    if (choice ==2)
        type = "Current Account";
  }
  void input()
  {
   S.O.pln ("Enter the Name, Account number and Balance:");
   name = in.next();
   acc_no = in.nextInt();
   amount = in.nextDouble();
  }
  void deposit()
  {
    S.O.pln(" Enter the amount to be deposited:");
    double x = in.nextDouble();
    amount = amount + x;
  }
  void display()
  {
```

__/__/____

```
S.O.pln("Name :" +name);
S.O.pln ("Account number :" + acc_no);
S.O.pln ( " Type:" + type);
S.O.pln ("balance :" + amount);
}
}

class Savings_acc extends Account
{
    double a, cinterest;
     int r, t;
    Scanner in= new Scanner (system.in);
    void withdrawal()
   {
    S.O.pln(" Enter amount to be withdrawn:");
    double amtw=in.nextDouble();
     if (amtw <= amount)
         amount= amount-amtw;
     else
        S.O.pln ("Invalid amount");
}
Void cmp-interest()
{
   S.O. pln (" Enter the rate and time :");
    r = in.nextInt ();
    t = in.next Int();
    a = amount * Math.pow (1+(r * 0.01), t);
    cinterest = a - amount;
}
```

__/__/____

```
void display()
{
  super.display();
  S.o.pln("Compound Interest after "+t+" years:"+cinterest);
  S.O.pln("Amount after "+t+" years: "+a);
 }
}
class Current_acc extends Account
{
  double min=10000;
  void input()
  {
    super.input();
  }
  void service_charge()
   {
      if(amount<min)
        amount = amount - 500;
   }
   void display()
   {
     super.display();
   }
}
  class bankdemo
  {
   public static void main(String args[])
   {
    Scanner in = new Scanner(System.in);
```

__/__/____

```
S.O.pln("Choose type of account.");
S.O.pln("1.Savings account.");
S.O.pln("2. Current account.");
int choice = in.nextInt();
if (choice==1)
{
    Savings_acc b = new Savings_acc();
    b.type(choice);
    b.input();
    S.O.pln("Do you want to deposit or withdraw ?\n1.Deposit.
\n2. Withdraw\n");
int ch = in.nextInt();
if (ch==1)
 b.deposit();
else if (ch==2)
 b. withdrawal();
else
 S.O.pln("Invalid choice");
  b.cmp_interest();
  b.display();
}
 else if (choice==2)
  {
      Current_acc b = new Current_acc();
       b.type(choice);
       b.input();
       b. deposit();
       b. service_charge();
       b. display();
  }
} } else S.O.pln("Invalid choice");
```

Lab Program 6:

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class Internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

```
package CIE;
import java.util.*;
public class personal
{
  public String name;
  public int sem;
  public String usn;

  public void read()
  {
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter the name");
    name = sc.next();
    System.out.println("Enter the semester");
    sem = sc.nextInt();
    System.out.println("Enter the USN");
    usn = sc.next();
  }
  public void display()
  {
    System.out.println("Student details: ");
    System.out.println("Name: "+name+"\nUSN: "+usn+"\nSem: "+sem);
  }
}

package CIE;
import java.util.*;
public class internals extends personal
{
  public double cie[];

  public void accept()
  {
    cie= new double[5];
    Scanner sc = new Scanner(System.in);
    for(int i=0;i<5;i++)
    {
      System.out.println("CIE mark for course "+(i+1)+" : ");
      cie[i]= sc.nextDouble();
    }
  }



}

package SEE;
```

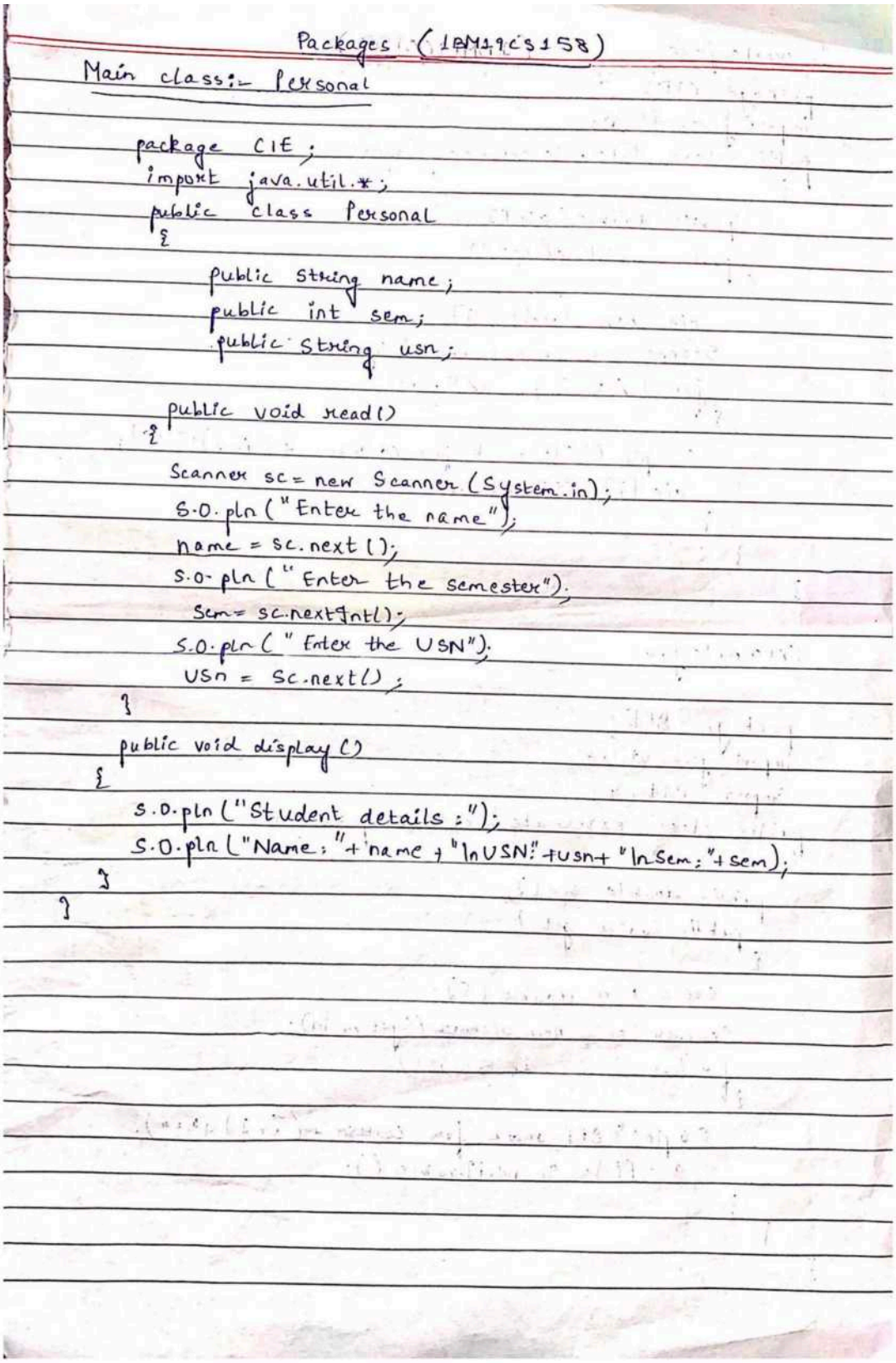
```
import java.util.*;
import CIE.*;
public class externals extends personal
{
  public double see[];

  public void get()
  {
    see= new double[5];
    Scanner sc = new Scanner(System.in);
    for(int i=0;i<5;i++)
    {
      System.out.println("SEE mark for course "+(i+1)+" : ");
      see[i]= sc.nextDouble();
    }
  }


}

import CIE.*;
import SEE.*;
import java.util.*;

class Main
{
  public static void main(String args[])
  {
    Scanner sx = new Scanner(System.in);
    System.out.println("Enter the number of students");
    int n= sx.nextInt();
    CIE.internals in[]= new CIE.internals[n];
    SEE.externals en[]= new SEE.externals[n];
    int i,j;
    for(i=0;i<n;i++)
    {
      System.out.println("Student "+(i+1));
      in[i] = new CIE.internals();
      en[i] = new SEE.externals();
      in[i].read();

      System.out.println("CIE MARKS:");
      in[i].accept();
      System.out.println("SEE MARKS:");
      en[i].get();
      System.out.println();
      in[i].display();
      for(j=0;j<5;j++)

      System.out.println("Total Marks for course "+(j+1)+": "+(in[i].cie[j] + (en[i].see[j]/2)));
    }
  }
}
```

OUTPUT:

```
Snehas-MacBook-Pro:desktop snehasrivastava$ javac Main.java
Snehas-MacBook-Pro:desktop snehasrivastava$ java Main
Enter the number of students
2
Student 1
Enter the name
Sneha
Enter the semester
3
Enter the USN
1bm19cs158
CIE MARKS:
CIE mark for course 1 :
45
CIE mark for course 2 :
50
CIE mark for course 3 :
32
CIE mark for course 4 :
40
CIE mark for course 5 :
41
SEE MARKS:
SEE mark for course 1 :
89
SEE mark for course 2 :
76
SEE mark for course 3 :
90
SEE mark for course 4 :
96
SEE mark for course 5 :
76

Student details:
Name: Sneha
USN: 1bm19cs158
Sem: 3
Total Marks for course 1: 89.5
Total Marks for course 2: 88.0
Total Marks for course 3: 77.0
Total Marks for course 4: 88.0
Total Marks for course 5: 79.0
Student 2
Enter the name
Smita
Enter the semester
5
Enter the USN
1bm18cs153
CIE MARKS:
CIE mark for course 1 :
45
CIE mark for course 2 :
23
CIE mark for course 3 :
```

```
CIE mark for course 5 :
41
SEE MARKS:
SEE mark for course 1 :
89
SEE mark for course 2 :
76
SEE mark for course 3 :
90
SEE mark for course 4 :
96
SEE mark for course 5 :
76

Student details:
Name: Sneha
USN: 1bm19cs158
Sem: 3
Total Marks for course 1: 89.5
Total Marks for course 2: 88.0
Total Marks for course 3: 77.0
Total Marks for course 4: 88.0
Total Marks for course 5: 79.0
Student 2
Enter the name
Smita
Enter the semester
5
Enter the USN
1bm18cs153
CIE MARKS:
CIE mark for course 1 :
45
CIE mark for course 2 :
23
CIE mark for course 3 :
34
CIE mark for course 4 :
41
CIE mark for course 5 :
12
SEE MARKS:
SEE mark for course 1 :
76
SEE mark for course 2 :
54
SEE mark for course 3 :
87
SEE mark for course 4 :
34
SEE mark for course 5 :
9

Student details:
Name: Smita
USN: 1bm18cs153
Sem: 5
Total Marks for course 1: 83.0
Total Marks for course 2: 50.0
Total Marks for course 3: 77.5
Total Marks for course 4: 58.0
Total Marks for course 5: 16.5
Snehas-MacBook-Pro:desktop snehasrivastava$
```

WRITEUP:



Packages (1BM19CS158)

Main class:- Personal

```
package CIE;
import java.util.*;
public class Personal
{
    public String name;
    public int sem;
    public String usn;

    public void read()
    {
        Scanner sc = new Scanner(System.in);
        S.O.pln("Enter the name");
        name = sc.next();
        S.O.pln("Enter the semester");
        Sem = sc.nextInt();
        S.O.pln("Enter the USN");
        USn = sc.next();
    }
    public void display()
    {
        S.O.pln("Student details:");
        S.O.pln("Name:"+name+"\nUSN:"+usn+"\nSem:"+sem);
    }
}
```

Internals.java (1BM19CS158)

```
package CIE;
import java.util.*;
public class internals extends personal
{
    public double cie[];
    public void accept()
    {
        cie = new double[5];
        Scanner sc = new Scanner(System.in);
        for(int i=0; i<5; i++)
        {
            S.O.pln("CIE mark for course"+(i+1)+":");
            cie[i] = sc.nextDouble();
        }
    }
}
```

Externals.java

```
package SEE;
import java.util.*;
import CIE.*;
public class externals extends personal
{
    public double see[];
    public void get()
    {
        see = new double[5];
        Scanner sc = new Scanner(System.in);
        for(int i=0; i<5; i++)
        {
            S.O.pln("SEE mark for course"+(i+1)+":");
            see[i] = sc.nextDouble();
        }
    }
}
```

(1BM19CS158)

```
import CIE.*;
import SEE.*;
import java.util.*;
class Main
{
public static void main (String args[])
{
Scanner sx = new Scanner (System.in);
S.o.pln( "Enter the no. of students");
int n = sx.nextInt();
CIE. internals in[] = new CIE.internals [n];
SEE. externals en[] = new SEE. externals [n];
int i, j;
for ( i=0; i<n; i++)
{
S.o.pln ("Student" + (i+1));
in[i] = new CIE. internals ();
en [i] =new SEE. externals ();
in [i]. read();

S.o.pln( "CIE marks:");
in [i]. accept();
S.o.pln ("SEE marks:");
en [i]. acceptget();
S.o.pln();
in [i]. display();
for (j=0; j < 5; j++)
{
S.o.pln( "Total marks for course" + (j+1)+":"+
(in[i]. cie [j] + (en [i]. see [j]/2));
}
}
}
```

Lab Program 7:

Write a program to demonstrate generics with multiple object parameters.

```
import java.util.*;

class Genrics<T>{
  T var1;

void Genirics(T gvar){
  var1=gvar;
 }

T Gdisplay(){
 return var1;
 }
}

public class App{
        public static void main(String[]args)throws Exception{
System.out.println("--PLEASE ENTER STUDENT DETAILS--");

Scanner Minp=new Scanner(System.in);

Genrics<Integer> Rollno= new Genrics<Integer>();
Genrics<String> Name= new Genrics<String>();

System.out.println("NAME: ");
String Sname=Minp.nextLine();
Name.Genirics(Sname);

System.out.println("USN: ");
int Sroll=Minp.nextInt();
Rollno.Genirics(Sroll);
System.out.println("-------DISPLAY-------");
System.out.println("--STUDENT DETAILS--");
System.out.println("NAME: "+Name.Gdisplay());
System.out.println("USN: "+Rollno.Gdisplay());

Minp.close();
}
}
```

OUTPUT:

```
Snehas-MacBook-Pro:~ snehasrivastava$ javac App.java
Snehas-MacBook-Pro:~ snehasrivastava$ java App
--PLEASE ENTER STUDENT DETAILS--
NAME:
Sneha
USN:
158
-------DISPLAY-------
--STUDENT DETAILS--
NAME: Sneha
USN: 158
Snehas-MacBook-Pro:~ snehasrivastava$
```

WRITEUP:

__/__/____

Generics (1BM19CS158)

```
import java.util.*;
class Genrics <T> {
 T var1;
 void Genirics (T gvar){
  var1 = gvar;
 }
 T Gdisplay(){
    return var1;
  }
}

public class App{
public static void main( String[]args throws Exception{
System.out.println("--PLEASE ENTER STUDENT DETAILS--");
Scanner Minp= new Scanner(System.in);
Genrics <Integer> Rollno=new Genrics <Integer>();
Genrics <String> Name=new Genrics <String>();
System.out.println("NAME:");
String Sname = Minp.nextline();
Name.Genirics(Sname);
System.out.println("USN:");
 int Sroll= Minp.nextInt();
Rollno.Genirics(Sroll);
System.out.println("USN:");
System.out.println("-----DISPLAY-----");
System.out.println("--STUDENT DETAILS--");
System.out.println("NAME :" + Name.Gdisplay());
System.out.println("USN:" + Rollno.Gdisplay());
 Minp.close();
}}
```

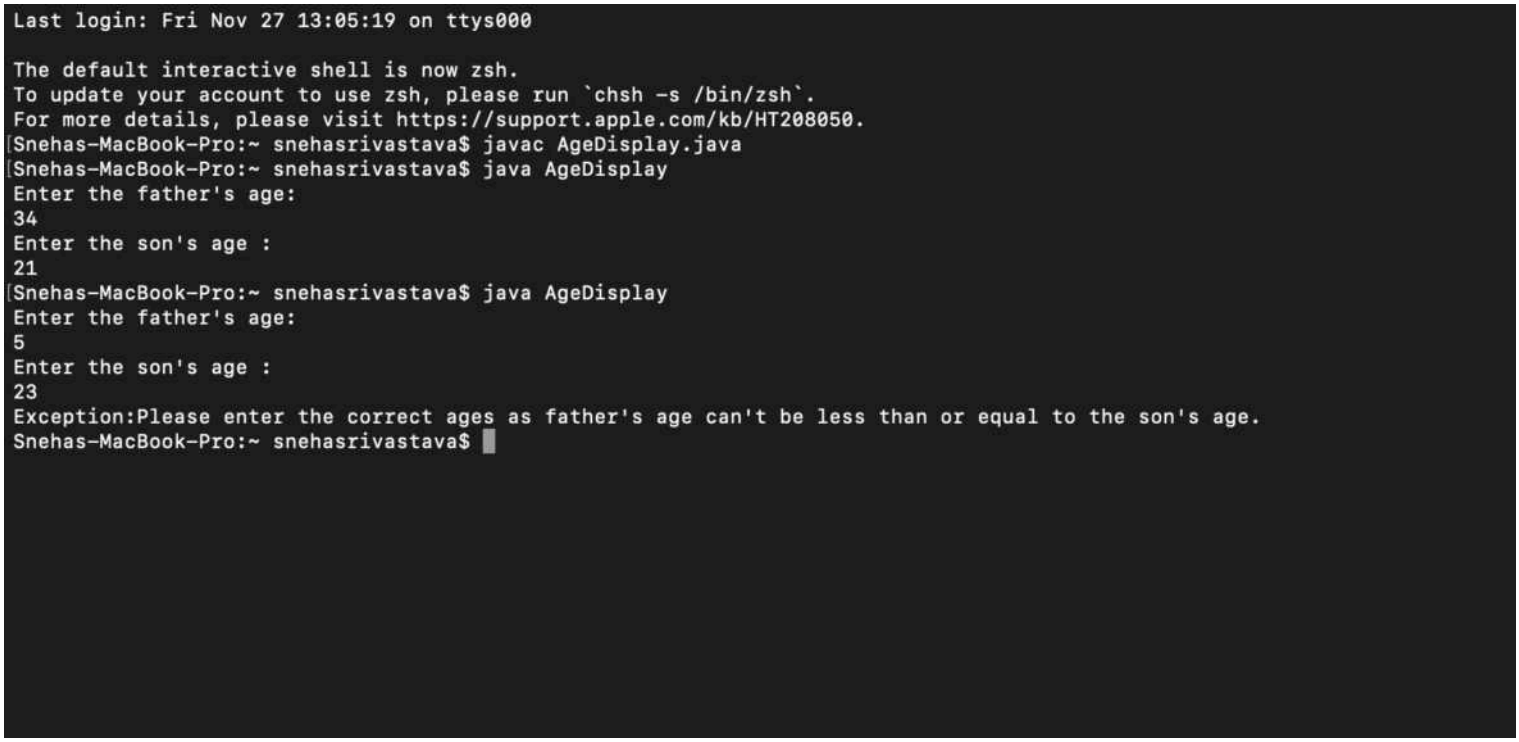
Lab Program 8:

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 both father and son's age and throws an exception if son's age is >=father's age.

```
import java.util.*;
class WrongAge extends Exception{
 int f,s;
WrongAge(int fage,int sage){
f=fage;
s=sage;
}
public String toString(){
return "Please enter the correct ages as father's age can't be less than or equal to the son's
age.";
}}
class NegativeAge extends Exception{
int x;
NegativeAge(int fage){
x=fage;
}
public String toString(){
return "Age can't be a negative value.";
}}
class Father
{
int fage;
Scanner in=new Scanner(System.in);
Father() throws NegativeAge
{
System.out.println("Enter the father's age:");
fage=in.nextInt();
if(fage<0){
throw new NegativeAge(fage);
}}}
class Son extends Father
{
int sage;
Scanner in=new Scanner(System.in);
Son() throws NegativeAge,WrongAge{
super();
System.out.println("Enter the son's age :");
sage=in.nextInt();
if(sage<0)
{
throw new NegativeAge(sage);
}
if(sage>=fage){
throw new WrongAge(fage,sage);
}
}}
class AgeDisplay{
public static void main(String args[]){
```

```
try{
Son s=new Son();
}
catch(NegativeAge n){
System.out.println("Exception:"+n);
}
catch(WrongAge w){
System.out.println("Exception:"+w);
}
}}
```

OUTPUT:



WRITEUP:

Exception Handling (1BM19CS158)

```
import java.util.*;
Class WrongAge extends Exception {
    int f,s;
    WrongAge (int fage, int sage) {
        f = fage;
        S = sage;
    }
    public String toString() {
    return (" Please enter the correct ages as father's age
     can't be less than or equal to the son's age.");
}
}
class NegativeAge extends Exception{
    int x;
    NegativeAge(int fage) {
        x = fage;
    }
    public String toString() {
    return "Age can't be negative value.";
}}

class Father
{
    int fage;
    Scanner in=new ....
    Father() throws NegativeAge
{
    S.o.pln (" Enter father's age:");
    fage = In.nextInt();
    if (fage <0)
    {
        throw new NegativeAge(fage);
    }}}
```

Lab Program 9:

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.

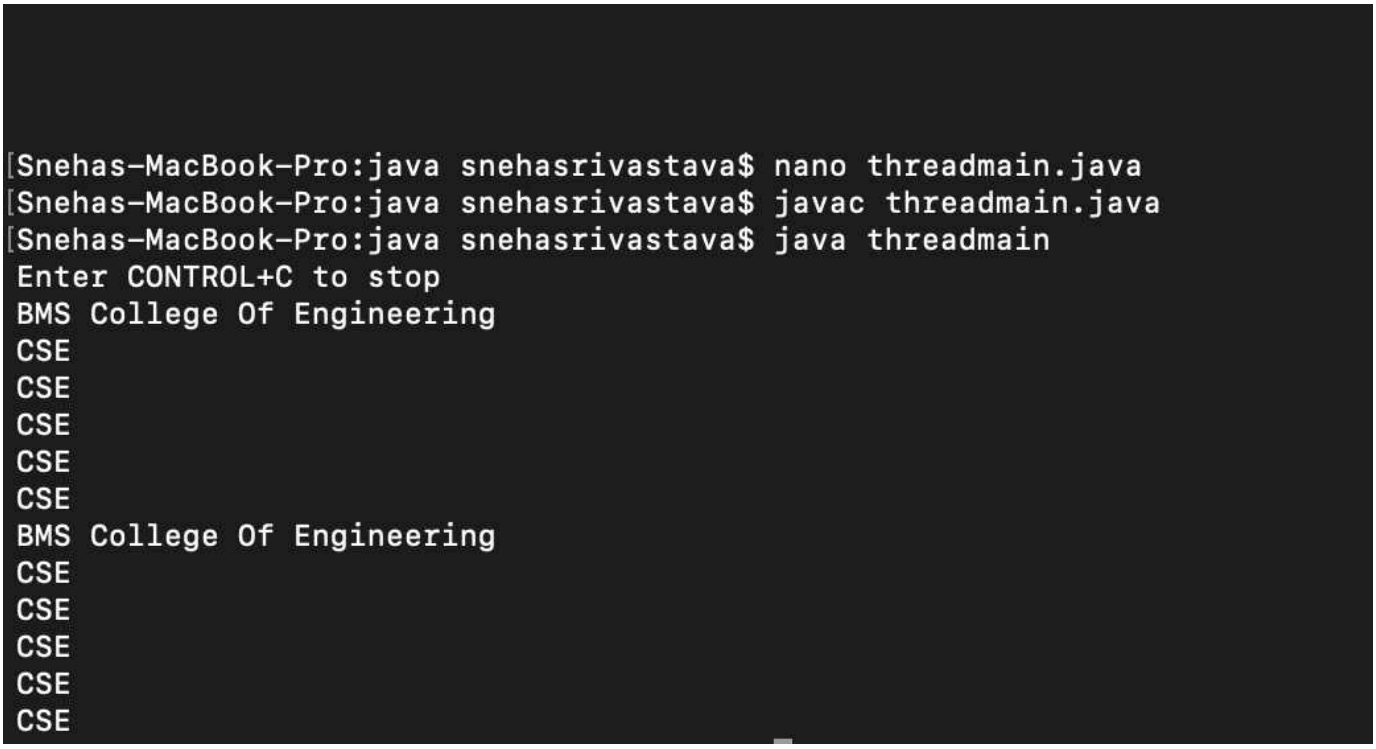
```
class thread1 implements Runnable
{
    Thread t;
    thread1()
    {
        t = new Thread(this,"thread1");
        t.start();
    }

    public void run()
    {
   for(;;)
  {
         try
         {
            System.out.println("BMS College Of Engineering");
            Thread.sleep(10000);
         }
        catch(InterruptedException ie)
        {
            System.out.println("Interrupted");
        }
    }
  }
}

class thread2 implements Runnable
{
    Thread t2;
    thread2()
    {
        t2 = new Thread(this,"thread2");
        t2.start();

    }

    public void run()
    {   for(;;)
  {
         try
         {
            System.out.println("CSE");
            Thread.sleep(2000);
         }
        catch(InterruptedException ie)
        {
            System.out.println("Interrupted");
        }
    }
  }
}
```

(1BM19CS158)

```
Class Son extends Father
{
  int sage;
  Scanner in = ....

  Son() throws NegativeAge, WrongAge {
    super();
    S.o.pln(" Enter son's age : ");
    sage = in.....
    if (sage < 0)
    {
    throw new NegativeAge(sage);
    }
    if (sage <= fage) {
      throw new WrongAge (fage, sage);
    }
    }}

  class AgeDisplay {
  public static ....
    try {
    Son s = new Son();
    }
    catch (NegativeAge n)
    {
    S.o.pln (" Exception :" + n);
    }
    catch ( WrongAge w)
    {
    S.o.pln ( " Exception: " + (w);
    }
    }}.
```

```
class threadmain
{
   public static void main(String args[])
   {
      System.out.println("Enter CONTROL+C to stop");
       thread1 t1 = new thread1();
       thread2 t2 = new thread2();

   }
}
```

OUTPUT:



WRITEUP:

11/12/2020

LAB PROGRAM (Threads)

```
class thread1 implements Runnable
{
  Thread t;
  thread1()
  {
    t = new Thread (this, "thread1");
    t.start();
  }
  public void run()
  {
    for(;;)
    {
      try
      {
        System.out.println("BMS College of Engineering");
        Thread.sleep (10000);
      }
      catch (InterruptedException ie)
      {
        System.out.println("Interrupted");
      }
    }
  }
}
class thread2 implements Runnable
{
  Thread t2;
  thread2(),
  {
```

__/__/____

```
t2 = new Thread (this, "thread2");
t2.start();
}
public void run ()
{
  for (;;)
  {
    try
    {
      System.out.println ("CSE");
      Thread.sleep (2000);
    }
    catch (InterruptedException ie)
    {
      Systen.out.println("Interrupted");
    }
  }
}
}
class threadmain
{
  public static void main(String args [])
  {
    System.out.println(" Enter CONTROL+C to stop");
    thread t1 = new thread1();
    thread t2 = new thread2();
  }
}
```