# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

Bhoomika B G (1BM23CS067)

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 (23CS3PCOOJ)" carried out by **Bhoomika B G (1BM23CS067)**, 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. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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# Index

Sl. No.	Date	Experiment Title	Page No.
1	01/10/2024	Roots of Quadratic Equations	4-6
2	08/10/2024	SGPA of a Student	7-10
3	15/10/2024	Book Information	11-14
4	22/10/2024	Abstract Class-Animal and Shape	15-19
5	29/10/2024	Bank Class	20-24
6	12/11/2024	Packages	25-29
7	19/11/2024	Interfaces	30-33
8	26/11/204	Exception Handling	34-36
9	03/12/2024	Thread Programming	37-38
10	03/12/2024	Open Ended Exercise	39-40

# Github Link:

# Program 1 Implement Quadratic Equation

```
simport java. util. Scanner;
                                            NE 00/51
 class Quad {
   public static void main (String [] Args)
E double a, b, c, disc; admin the traballo
   Scanner Obj = new Scanner (System. in);
   System. out. println ("Enter a:");
   a = Obj. nextDouble ();
dystem.out.println ("Enter b:");
   b = Oly. next Double ();
   System. out. println ("Enter c: ");
   c = Oly. nextDouble ();
                               int[] marks;
   disc = (b*b) - 4.0* a*c;
   of (a <= 0.0)
      System. out : printin (" Equation is not quadratic");
     { if (disc > 0.0)
        { double 91 = (b+ Math. pow (dis, 0.5)) /(2.0*a);
         double 22= (-b - math. pow (dis, 0.5))/(2.0*a);
 System. out. println ("Roots are: "+ 41+ "and" + 2);
      else if (dis = = 0.0) { war = almoss
        double 9 = -6/(2.0*a);
         System. out. println ("Root is"+ 2); }
        System out printen ( There are no real roots');
       Enter 6: 4 has a strong the
        Enter c; 3 come") alling the material
      Roots are: -1.0 and -3.0
```

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

```
public class QuadraticEquationSolver {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
     System.out.println("Enter the coefficients of the quadratic equation (a, b, c):");
     double a = scanner.nextDouble();
    double b = scanner.nextDouble();
     double c = scanner.nextDouble();
    if (a == 0) {
       System.out.println("This is not a quadratic equation.");
       double discriminant = b * b - 4 * a * c;
       if (discriminant > 0) {
         // Two distinct real roots
          double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
          double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
          System.out.println("The roots are real and distinct.");
          System.out.println("Root 1: " + root1);
          System.out.println("Root 2: " + root2);
      else if (discriminant == 0){
          double root = -b / (2 * a);
          System.out.println("The roots are real and equal.");
          System.out.println("Root: " + root);
       }
         else {
         double realPart = -b / (2 * a);
          double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);
          System.out.println("The roots are complex and distinct.");
          System.out.println("Root 1: " + realPart + " + " + imaginaryPart + "i");
          System.out.println("Root 2: " + realPart + " - " + imaginaryPart + "i");
       }
     }
     scanner.close();
  }
}
```

```
Microsoft Windows [Version 10.0.22621.4169]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Rog\OneDrive\Desktop>java QuadraticEquation
Enter the value of a: 1
Enter the value of c: 10
The roots are real and distinct.
Root 1: 5.0
Root 2: 2.0

C:\Users\Rog\OneDrive\Desktop>java QuadraticEquation
Enter the value of a: 1
Enter the value of b: -4
Enter the value of c: 4
The root is real and equal.
Root: 2.0

C:\Users\Rog\OneDrive\Desktop>java QuadraticEquation
Enter the value of c: 4
The root is real and equal.
Root: 2.0

C:\Users\Rog\OneDrive\Desktop>java QuadraticEquation
Enter the value of a: 1
Enter the value of c: 2
Enter the value of c: 2
No real roots, the roots are complex.
```

# Program 2 SGPA of a Student

```
08/10/24
                                        LAB-3
                                                                                                                                                                      void sapa (al ()
24 Develop Java program to create a class student with members usn, name an array credits & array marks. Include methods to accept a display details of & method to calculate SGPA of student.
                                                                                                                                                                                 double sapa;
                                                                                                                                                                                 int ored = 0, mark = 0;
                                                                                                                                                                                 for (int i=0; i<n; i++)
calculate SGPA of student:

import java.usl. Scanner;

class Student {
                                                                                                                                                                                       { cred + = credits [i];
                                                                                                                                                                                               mark + = marks [:];
                                                                                                                                                                  System.out. println ("Total exedits: "+ oved);
                                                                                                                                                                 System. out. println (" Total marke: " + mark);
                     String name; and it is the string to make int [] credits;
                     int [] credits; (O aldusticer for int [] marks; (O aldusticer for for [] and []
                                                                                                                                                                        for (int 1 = 0; 1 < n; 1++)
                                                                                                                                                            double that sgp += (marke [i] * oredite [i]); }
          void accept Details ()
                                                                                                                                                                                       sgpa = sgp/cred;
                  Scanner mark - new Scanner (System in);
                                                                                                                                                            System sight sprintin ("561PA is:"+sgpa);
                   System.out. println (" Enter USN: ");
                  usn = mark. neatline ();

System. out. println ("Enter name ");

name = mark. neatline ();
                System out fruith ( Enter number of
                                                                                                                                                                       System. set. println ("Name:" + mark. name);
                                                                                                                                                                      System. out. println ("USN:" + mark. USn.);
              subjects: ");
                    int n = mark. new Int ();
                    credits = new int [n];
marks = new int [n];
                                                                                                                                                             public static void main (String [] Args)
                                                                                                                                                                             Student obj = new Student ();
obj. accept Details ();
obj. disp Details ();
              for (int i=1; i < m; i++)
                     Eystem. out. printly ("Enter seedit & marks:");
credit [i] = mark. neat Int ();
marks [i] = mark. neat Int ();
                                                                                                                                                                                 oly. Agpa Cal ();
                       for (int i=1; i<=n; i++)
                      { System. out. println (" oudit for "+ + + oudits[])
                           Eystem. out . println ("marks for "+ i + marks [i]);
```

```
Susput :-
 enter number of students:
  2 entir usn: (++); w>); 0
  CS067
  enter name: 2 [3] dilbara
bhoomika
 Enter Coredits & marks: 1
  Enter credits & marks: 4
  99
 usn: cs067
 name: bhoomika bood (fit atterns) = 1490 to
 Credits for subject 1 is: 98 1
  Credits for subject 2 is :4
 total eredits: 5
 total marks: 197 : www.") mitainer its ...
 SGIPA: 8.7
 enter usn:
 cso68 Cont Liga Of
 enter namé:
boomika : O trobate
  Enter viedits 2 marks: 3
   37 usn: 65068
   name : boomita
   total credits: 4
total maks: 177
   SGPA is: 8.25
```

```
import java.util.Scanner;
class Subject {
 int subM;
 int cred;
 int grade;
 void setSubDet(int marks, int cred) {
  this.subM = marks;
  this.cred = cred:
if (subM >= 90) {
grade = 10; }
else if (subM >= 80) {
grade = 9; }
else if (subM >= 70) {
grade = 8;
else if (subM >= 60) {
grade = 7; }
else if (subM >= 50) {
grade = 6; }
else if (subM >= 40) {
grade = 5; }
else {
grade = 0;
}}
class Student {
String name;
String usn;
double SGPA;
Scanner s = new Scanner(System.in);
Subject[] subjects = new Subject[8];
Student() {
for (int i = 0; i < \text{subjects.length}; i++) {
subjects[i] = new Subject(); }
}
void getMarks() {
for (int i = 0; i < \text{subjects.length}; i++) {
System.out.print("Enter marks for subject " + (i + 1) + ": ");
int marks = s.nextInt();
System.out.print("Enter credit for subject " + (i + 1) + ": ");
int cred = s.nextInt();
subjects[i].setSubDet(marks, cred); }
```

```
}
double calSGPA() {
double Score = 0;
int totalCred = 0;
for (Subject subject : subjects) {
Score += (subject.grade * subject.cred);
totalCred += subject.cred; }
if (totalCred > 0) {
SGPA = Score / totalCred; }
else {
SGPA = 0; 
return SGPA;
public class StudentDetails {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
System.out.print("Enter number of semesters: ");
int numSems = sc.nextInt();
Student[] students = new Student[ numSems];
double c=0.0;
String usn,name;
System.out.print("Enter USN: ");
usn = sc.next();
System.out.print("Enter Name: ");
name = sc.next();
for (int i = 0; i < numSems; i++) {
System.out.println("Enter details for semester" + (i + 1));
students[i] = new Student();
students[i].getMarks();
double s=students[i].calSGPA();
c+=s:
}
c=c/numSems;
for (int i = 0; i < numSems; i++) {
System.out.println("USN: " + usn);
System.out.println("Name: " + name);
System.out.println("SGPA for sem "+ (i+1)+":" + students[i].calSGPA());}
System.out.println("CGPA: "+c);
}
```

```
C:\Users\varsh\OneDrive\Desktop\java>java Student$StudentDetails
Enter number of semesters: 3
Enter USN: sdfg
Enter Name: bg
Enter details for semesterl
Enter marks for subject 1: 81
Enter credit for subject 1: 4
Enter marks for subject 2: 94
Enter credit for subject 2: 4
Enter marks for subject 2: 4: 83
Enter credit for subject 3: 3
Enter marks for subject 4: 84
Enter credit for subject 4: 3
Enter marks for subject 5: 90
Enter credit for subject 5: 3
Enter marks for subject 6: 88
Enter credit for subject 6: 1
Enter marks for subject 7: 97
Enter credit for subject 7: 1
Enter marks for subject 8: 85
Enter credit for subject 8: 1
Enter details for semester2
Enter marks for subject 1: 92
Enter credit for subject 1: 4
Enter marks for subject 2: 97
Enter credit for subject 2: 4
Enter marks for subject 3: 92
Enter credit for subject 3: 3
Enter marks for subject 4: 90
Enter credit for subject 4: 3
Enter marks for subject 5: 86
Enter credit for subject 5: 3
Enter marks for subject 6: 82
Enter credit for subject 6: 1
Enter marks for subject 7: 98
Enter credit for subject 7: 1
Enter marks for subject 8: 93
Enter credit for subject 8: 1
Enter details for semester3
Enter marks for subject 1: 56
Enter credit for subject 1: 4
Enter marks for subject 2: 62
Enter credit for subject 2: 4
Enter marks for subject 3: 72
Enter credit for subject 3: 3
Enter marks for subject 4: 73
Enter credit for subject 4: 3
Enter marks for subject 5: 73
Enter credit for subject 5: 2
Enter marks for subject 6: 82
Enter credit for subject 6: 1
Enter marks for subject 7: 51
Enter credit for subject 7: 1
Enter marks for subject 8: 72
Enter credit for subject 8: 1
USN: sdfg
Name: bg
SGPA for sem 1:9.4
USN: sdfg
Name: bg
SGPA for sem 2:9.8
USN: sdfg
Name: bg
SGPA for sem 3:7.315789473684211
CGPA: 8.838596491228072
```

# Program 3 Book Information

```
10/24
                              · LAB-03 .
 3) Greate a class Book which untains four numbers: name author, price, num-pages Include constructor to Alt the values for members. Include method to set is get the detail of objects. Include to String() method these could display compilet details of book. Duckep jux program to create in book objects.
  import java. util. Scanner;
 class Book {
 private String name;
 most double price; survivos war
public Book (Shing wante ) { this name - name ; public roid set Name () this name - name ; this name - price ;
this name = name; this price = price;

being author this num- pages num-pages

this num-pages num-pages

this author = author;
this author = author;
3
gublic void setPrice () {
public void set Numfager of
     this . price = price;
   this num-pages = num-pages;
 public String get Name () (
    return name;
 public String get Author () {
        return author;
Public double getPrice () for networn price;
```

```
public int getNumPages () {
  return num-pages;
public String toString () (
    return "Book: " + name + " \n"+
           "Author:" + author + "\n" +
   " Price: " + price + " \n" +
          "Pages:" + num-pages + "\n"
I class Main {
  public static void main (string[] args) {
   Scanner ob = new Scanner (system. in);
  System. print out println (" Enter number of books
  int n=etinextInt();

ob. nextLine();

Book[books = new Book[n];
  for (int i = 0; i < n; i++)
    System out printer (" Enter name of book"+ (6+1)+
   string name = ob. next line ();
   System. out println ("Enter author name: ");
   String author = ob. next Line ();
   System.out println ("Entire price of the book");
    double price = ob. next Double ()
  System. out printh (" Enter number of pages :")
    int page = ob. nextInt();
ot. nextInt();
books [i] = new Book (name, author, price, pages);
  for (int i=0; i < n; i++)
      system . pout printh (books [i] . to String);
```

```
Output !-
enter number of books:
 Enter name of book 1:
 Enter name of the author:
 Enter price of the book:
 Enter number of pages:
 432
 Enter name of book 2:
 mnop
 Enter name of the author:
  xy2
 Enter price of the book:
  2340
  Enter number of pages:
  342
 Book name: abcd
Author: get
Price: $ 1346
 Number of pages: 432
Book name: mnop
Author: xyz
Price: $ 2340
Number of pages: 342
```

```
import java.util.Scanner;
public class Book {
  private String name;
  private String author;
  private double price;
  private int num_pages;
  public Book(String name, String author, double price, int num_pages) {
    this.name = name;
    this.author = author;
    this.price = price;
    this.num_pages = num_pages;
  }
  public void setName(String name) {
     this.name = name;
  }
  public void setAuthor(String author) {
    this.author = author;
  }
  public void setPrice(double price) {
     this.price = price;
  }
  public void setNumPages(int num_pages) {
     this.num_pages = num_pages;
  }
  public String getName() {
     return name;
  }
  public String getAuthor() {
    return author;
  }
  public double getPrice() {
    return price;
  }
  public int getNumPages() {
```

```
return num_pages;
  }
  public String toString() {
    return "Book name: " + name + "\n" +
         "Author: " + author + "\setminus n" +
         "Price: $" + price + "\n" +
         "Number of pages: " + num_pages + "\n";
}
class Main {
  public static void main(String[] args) {
     Scanner ob = new Scanner(System.in);
    System.out.println("Enter number of books:");
    int n = ob.nextInt();
    ob.nextLine();
     Book[] books = new Book[n];
     for (int i = 0; i < n; i++) {
       System.out.println("Enter name of the book " +(i + 1) + ":");
       String name = ob.nextLine();
       System.out.println("Enter name of the author:");
       String author = ob.nextLine();
       System.out.println("Enter price of the book:");
       double price = ob.nextDouble();
       System.out.println("Enter number of pages:");
       int num_pages = ob.nextInt();
       ob.nextLine();
       books[i] = new Book(name, author, price, num_pages);
       System.out.println(books[i].toString());
     }
  }
}
```

```
C:\Windows\System32\cmd.e × + v
Microsoft Windows [Version 10.0.22631.4169] (c) Microsoft Corporation. All rights reserved.
C:\Users\Rog\OneDrive\Desktop>javac Book.java
C:\Users\Rog\OneDrive\Desktop>java Main
Enter number of books:
2
Enter name of the book 1:
abcd
Enter name of the author:
me
Enter price of the book:
520
Enter number of pages:
329
Enter name of the book 2:
mnopq
Enter name of the author:
her
Enter price of the book:
685
Enter number of pages:
432
Book name: abcd
Book name: abcd
Author: me
Price: $520.0
Number of pages: 329
Bhoomika B G-1BM23CS067
Book name: mnopq
Author: her
Price: $685.0
Number of pages: 432
Bhoomika B G-1BM23CS067
 C:\Users\Rog\OneDrive\Desktop>
```

# Program 4 Abstract Class

### **Animal Class:**

```
22/10/24
             . LAB-04
1. Greate abstract class Animal with methods
 eat & sleep. Greate subclass lion, der figer extend Animal class & implement eat &
  sleep methods differently based on behavior
java. util. Scanner;
   abstract class Animal {
        abstract void eat ();
        abstract void sleep ();
    class Lion extends Animal
        System but.
       void eat () {
    System out println ("Lion soits counivorous");
    3 System. out. println ("Lion sleeps") - 3
   dass Deer extends Animal [ dass
   void eat () {
   System. out. println ("Deer is howivorous"); }
    roid steep () {
    System. out. println (" Deer sleeps!"); }
   dass Tiger extends Animal ()
    system. out. println ("Tiger is carnivosous")
    void eat () {
    void sleep () (
    System out println ("Tigor steeps"); ?
```

```
public class Main {
     public static void main (String[] Args) &
       L'on lion = new Lion ();
       Deer deer = new Deer ();
       Tiger tiger = new Tiger();
        lion. eat ();
        lion. sleep ();
        devr . eat ();
        deer sleep ();
        tiger eato;
        tiger. sleep () jo as Alming busy landed
                lass sectionale extends shape E
               Richards (double le double b) {
Lion is counivolous.
Lion eleps!!!
                    2 see out pointing a such
Deer is herbivorous
Deer sleeps ....
Tiger is cornivorous
Tigur sheeps??? I equite doubt elpresist that
     System out pindle ( Acea of towngle to ?
                                                     Code:
```

```
class Animal {
    String name;

void sound() {
        System.out.println(name + " makes a sound.");
    }

public static void main(String[] args) {
        Animal myAnimal = new Animal();
        myAnimal.name = "Dog";
        myAnimal.sound();
    }
}
```

}

```
C:\Users\Admin\Desktop>javac Main.java
C:\Users\Admin\Desktop>java Main
Lion is carnivorous
Lion sleeepsss!!!
Deer is herbivorous
Deer sleeps....
Tiger is carnivorous
Tiger sleeps????
Bhoomika B G-1BM23CS067
C:\Users\Admin\Desktop>
```

# Shape class:

```
2. Develop java program to create abstract class
  Shape that contains 2 integers 2 empty method pierea (). Rovide class redangle triangle circle that prints area.
 import java ust *;
alestract dass shape {
   double x y;
   Shape (double 2, double y) { ) quite most
     this. x = x; (1) to want
     this y = g;
  abstract void printAsea (); ) quelle rook
 dass Rectangle extends Shape {
    Rectangle (double l, double b) {
    supler (l,b);
    void print Asea () {
     double a = xxy:
    System . out . printin (" Area of rectangle is: "+ a+
dass Triangle extends Shape {
     Triangle (double b. double h) [
     super (b.b);
   void printArea () {
     double at = 0.5* x* y;
    System . out . println (" Asea of triangle 18 :
```

```
class circle extends Shape {
      Circle (double r. double e) [ ...
       Anco of suctionally is proposed to
    void PrintArea () [
     double ac = 3.14 * x * x;
System out. println ("Area of circle is: "+ac+" m2");
   System out println ("Bhoomka BB-18m23cso67");
                  Also of wick is: 78.5 m'il
public dass main { Fdo2) 86 (a.9) - 3 3
   public static void main (string[] Args) {
      Scanner sc = new Scanner (System.in);
      System. out pointln ("Enter sides of rectangle");
     double l = sc. nextDouble ();
double b: sc. nextDouble ();
     Rectangle re = new Rictangle (1,b);
     re. printArea ();
     Lyslam.out. println ("Enter sides of Triongle:");
     double B = sc. next Double ();
     double h . sc. nextDouble ();
     Triangle to = new Triangle (B, h);
     tr. printArea ();
    System. out. println ("Enter radius of circle");
     double & = Sc. next Double ();
     Circle c=new Circle ();
     e-printArea();
```

```
Enter sides of rectangle is 6.0 m/2

Area of reetangle is 6.0 m/2

Enter sides of triangle:

4 3

Area of triangle & 6.0 m/2

Enter radius of arde:

Blue of circle is: 78.5 m/2

Blue on ika B G - 1Bm 23 C S O 673

Get of the sides of the s
```

```
import java.util.Scanner;
interface Polygon{
 default double getPerimeter(){
  Scanner sc=new Scanner(System.in);
  System.out.println("Enter number of sides:");
  int n=sc.nextInt();
  double p=0;
  for(int i=0;i<n;i++){
   System.out.println("Enter side:");
   double a=sc.nextDouble();
   p+=a;
  }
 return p;
 abstract double getArea();
}
class Rectangle implements Polygon{
 public double length;
```

```
public double breadth;
public Rectangle(double length,double breadth){
 this.length=length;
 this.breadth=breadth;}
public double getArea(){
 double area=length*breadth;
return area;
}
class Triangle implements Polygon{
 public double length1;
 public double breadth1;
public Triangle(double length1,double breadth1){
 this.length1=length1;
 this.breadth1=breadth1;}
public double getArea(){
 double area=0.5*length1*breadth1;
return area;
}
}
public class Shape{
 public static void main(String []Args){
 Scanner sc=new Scanner(System.in);
 System.out.println("Bhoomika BG-1BM23CS067");
do{
 System.out.println("Choose:\n 1.Rectangle\n 2.Triangle");
 int x=sc.nextInt();
 switch(x){
 case(1):
  {
  System.out.println("Enter length:");
  double l=sc.nextDouble();
  System.out.println("Enter breadth:");
  double b=sc.nextDouble();
  Polygon rc=new Rectangle(l,b);
  double p=rc.getPerimeter();
  System.out.println("Perimeter of rectangle is:"+p);
  double a=rc.getArea();
  System.out.println("Area of rectangle is:"+a);
  break;
```

```
case(2):{
    System.out.println("Enter base:");
    double l=sc.nextDouble();
    System.out.println("Enter height:");
    double b=sc.nextDouble();
    Polygon tr=new Triangle(l,b);
    double p1=tr.getPerimeter();
    System.out.println("Perimeter of triangle is:"+p1);
    double a1=tr.getArea();
    System.out.println("Area of triangle is:"+a1);
    break;
    }
    default:
        System.exit(0);
}
while(true);
}
```

```
C:\Users\Admin\Desktop\bhoomika>javac Main.java

C:\Users\Admin\Desktop\bhoomika>java Main
enter sides of rectangle:
2 6
Area of rectangle is:12.0 m^2
enter sides of triangle:
1 8
Area of triangle is:4.0 m^2
enter radius of circle:
5
Area of circle is:78.5 m^2
bhoomika B G:1BM23CS067

C:\Users\Admin\Desktop\bhoomika>
```

# Program 5 Bank Class

```
30 - 8th
                                                                                      else { System. out pointln ("Diposit amount must be +ve")
ABB-06

Develop jour program to create a class bank that maintains two kinds of account for its culterway, savings account & word account sovered account sovered account provides compound interest & withorwest facility but no chapte book facility but no interest account provides thate book facility but no interest account howards account bodges shalled maintain minimum balance & if balance falls below this wish, source charge is imposed. Greate don't Account to store customer name, account number & type of account Thom this, down class are account source to make them more specific.

Include mitingle to achieve it account balance it is digital balance.
                                                                                                  pregnant to execute a class
                                                                                      public void withdraw (double amount)
                                                                                       { if (amount <= getBalance()) { balance -= amount;
                                                                                             System. out. println ( withdrew: "+ amount) +;
                                                                                                 balance is: + bal
                                                                                                 System. out pointin ("Insufficient funds");
                                                                                         public void display Balance () 5
                                                                                                  Eystem. out. println (" Current balance: "+ balance):
 is display balance in significant influent in compute & deposit influent in promit withdrawal & update balance in protect for minimum balance impose penalty if necessary and update balance.
                                                                                      class Savenge Account orlands Account f
                                                                                                    private double interestRate;
                                                                                           public Savings Account (String automor name int acc-no, double balance, double interestRate)
    import java. Wil. Scanner;
                                                                                            super (sustance - name, acc - no, balance);
this. intrust kate = intrust kate;
           private String outenur-name;
private int acc-no;
protected double balance;
                                                                                             public void compute Interest () 5
     public Account (String customer - name, int acc-no,
                                                                                                       double interest = get Balance () * (interest Rate / 100);
            This. customer_name = customer_name;
                                                                                     public vo
                  this acc no = acc no;
                   this balance - balance; 3
                                                                                       class Our-acc extends Acount {
    private double min-balance;
    private double source-charge = 30;
     Public double getBalance () {
neturn balance; }
       public void depoit (double amount) {
    if (amount >0) {
        balance += amount;
    }
                                                                                        public Cur_acc (String customer - name, int acc.
                                                                                            double balance, double min balance, double
                                                                                                  service - charge) {
                System. out. println ("Deposited:"+ amount);
                                                                                                name, are no, balance, min - balance, survice - charge)
      super (oustomer-name, acc-no balance)
                this. min_balance - min_balance;
                                                                                          do { Bystim. out. println (" Enter choice: \n
                this. service - charge = service - charge;
                                                                                                                         "1. Deposit" \n
                                                                                                                         "a. withdraw" \n
                                                                                                                         " 3. Display balance");
     public void sheckMinBalance () {
        if (get Balance ()) < min - balance) {
                                                                                                       int c = 50. next-sit (); cur. checkminBalance():
                                                                                                      if (c = = 1) {
                      System out println (" Minimum balance
                ogenmon param (manumin premier);
balance -= source charge;
dystem out puntin("Deducted service charge;
+ service - charge;
}
                                                                                                          Eystern out printer (" Erder deposit amt:");
                                                                                                                double ant - sc. next Double ();
                                                                                                                cur · chickMinBalance ();
                                                                                                                our deposit (ant);
                                                                                                      else if (c == 2) {
                                                                                                          System out println (Enter withdrawal ant!
    public class Bank (
         public static void main (String [] Args) {
                                                                                                             double with amt = &c. next Double();
        Scarner &c = new Scarner (Lysten. in);

System out printle (" taler customer name: ");

String name = &c. next line ();

Lystem. out printle ("Enter access:);
                                                                                                             cur. withdraw (amt);
                                                                                                     else if ( c = = 3) {
                                                                                                          cur . display Balance ();
            int acc-no = sc. nextInt ();
         System.out.printle ("Enter initial balance");
double balance = sc. nextDouble ();
                                                                                                         system. exit (0);
                                                                                                  I while (but);
          Lystem out printle ("Enter minimum balance:");
                 double min_balance = sc. next Double ();
                                                                                        case (2):
                                                                                             System. out. println (" Savings account type");
        System out println ("Enter interest rate:");
                                                                                              Savings Acount sav new Lavings Acount (nome, acc-no, balance, interestRate);
               double interest Rate = sc. next Double ();
     Bystom. out println (" Enter choice: \n 1. Curount \n 2. Savinger)
                                                                                            do f Cytem out printh ("Enter choice: \n

1. Deposit \n 2. Withdraw

\n 3. Deposit \n 2. Withdraw

\n 3. Deposit \n Balance."):
           int sh = sc. next Int ();
    Gystem out printly (* Lustomer name :+ name \n
                               "Account number: "+ acc-no);
                                                                                                           int cl = sc. next Int ();
     switch (ch) {
                                                                                                            if (c1==1) {
            case (1):
                                                                                             System. out. println (" Enter deposit amount: ");
                    System. out println ("Current account type");
                                                                                                          double amt = sc. nextDouble ();
                        Cur_acc cur = new Cur-acc (
```

```
sav. deposit (amt);
                                                         Enter choice:
                                                         1. deposit
      else if (c1 = = 2) {
          System. out . println ("Entur withdrawal ant:")
                                                          2. Withdraw
              double ant = sc. next Double ();
                                                         3. display balance
           sav. withdraw (amt);
                                                          Enter withdraw ant: 1000)
       else if (c1 == 3) {
            sao. Compute Interest ();
                                                          withdrew: 300.0
             sav. display Balance ();
                                                         Enter choice:
                                                         1. deposit
           System. exit (0);
                                                         2. Withdraw
      I while (true);
                                                         3. display balance
                                                         Enter deposit amt.
                                                          500
                                                         Dynosited: 500
output:
Enter customer name:
                                                         Enter choice:
Bhoomika
                                                         1. deposit
Enter account number:
                                                         2. Withdraw
 1905
Enter initial balance
                                                         3. display balance
 5678
Enter minimum balance
                                                        aurrent balance: 5878.0.
Enter interest rate: 4
Enter choice:
1. Current
2. Savings
2
austomer name: Bhoomika
Account number: 1905
bavings account type
```

```
import java.util.Scanner;

class Account {
    private String customerName;
    private int accountNumber;
    private double balance;

public Account(String customer_name, int acc_no, double balance) {
        this.customer_name = customer_name;
        this.acc_no = acc_no;
        this.balance = balance;
    }

public double getBalance() {
        return balance;
    }

public void deposit(double amount) {
        if (amount > 0) {
            balance += amount;
            System.out.println("Deposited: " + amount);
        }
}
```

```
System.out.println("Your new balance is:"+balance);
     } else {
       System.out.println("Deposit amount must be positive.");
  }
  public void displayBalance() {
    System.out.println("Current Balance: " + balance);
}
class SavingsAccount extends Account {
  private double interestRate;
  public SavingsAccount(String customerName, int accountNumber, double initialBalance, double
interestRate) {
    super(customerName, accountNumber, initialBalance);
    this.interestRate = interestRate;
  }
  public void computeAndDepositInterest() {
    double interest = getBalance() * interestRate / 100;
    deposit(interest);
    System.out.println("Balance is: "+balance);
    System.out.println("Interest of " + interest + " has been credited.");
 public void withdraw(double amount)
    if(amount<=getBalance()){
     double new_balance=getBalance()-amount;
      System.out.println("withdrew:"+amount + " balance is:"+ new_balance);
      }
    else
     System.out.println("Insufficient funds!!");
   }
}
class CurrentAccount extends Account {
  private double minimumBalance;
  private double serviceCharge;
  public CurrentAccount(String customerName, int accountNumber, double initialBalance, double
minimumBalance, double serviceCharge) {
    super(customerName, accountNumber, initialBalance);
    this.minimumBalance = minimumBalance:
    this.serviceCharge = serviceCharge;
  public void withdraw(double amount) {
    if (amount <= getBalance()) {
       double newBalance = getBalance() - amount;
       System.out.println("Withdrew: " + amount);
     } else {
```

```
System.out.println("Insufficient balance.");
     }
  }
  private void checkMinimumBalance() {
    if (getBalance() < minimumBalance) {
       System.out.println("Balance is below minimum");
       balance-=serviceCharge;
       System.out.println("Deducted service charge:" +serviceCharge);
       System.out.println("Balance after deduction is":+balance);
  }
}
public class Bank {
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("enter customer name:");
    String name=sc.nextLine();
    System.out.println("enter accno:");
    int acc no=sc.nextInt();
    System.out.println("enter initial balance:");
    double balance=sc.nextDouble();
    System.out.println("enter minimum balance:");
    double minimum_balance=sc.nextDouble();
    System.out.println("enter interest rate:");
    double interest rate=sc.nextDouble();
    System.out.println("Enter choice:\n 1.Current acc\n 2.Savings acc");
    int ch=sc.nextInt();
    switch(ch){
       case(1):
         System.out.println("account is current type");
         CurrentAccount cu=new CurrentAccount(name,acc_no,balance,minimum_balance,interest_rate);
         do{ System.out.println("enter choice:\n 1.deposit\n 2.withdraw\n 3.display balance");
         int c=sc.nextInt();
         cu.checkMinimumBalance()
         if(c==1){
           System.out.println("enter amount to be deposited:");
           double amt=sc.nextDouble();
            cu.deposit(amt);}
         else if(c==2){
           System.out.println("enter amount to withdraw:");
           double amt=sc.nextDouble();
           cu.withdraw(amt);}
         else if(c==3){
           cu.displayBalance();}
         else
          System.out.println("invalid entry!!");
          exit(0);
          }while(true);
      case(2):
```

```
System.out.println("account is savings type");
         SavingsAccount sa=new SavingsAccount(name,acc_no,balance,interest_rate);
         do{ System.out.println("enter choice:\n 1.deposit\n 2.withdraw\n 3.display balance");
         int c1=sc.nextInt();
         if(c1==1){
           System.out.println("enter amount to be deposited:");
           double amt=sc.nextDouble();
            sa.deposit(amt);}
         else if(c1==2){
           System.out.println("enter amount to withdraw:");
           double amt=sc.nextDouble();
           sa.withdraw(amt);}
         else if(c1==3){
           sa.displayBalance();}
         else{
          System.out.println("invalid entry!!");
          exit(0);
          sa.computeAndDepositInterest();
          }while(true);
    sc.close();
}
```

```
C:\Windows\System32\cmd.e. × + ~
C:\Users\Rog\OneDrive\Desktop\Sem 3\java>java Bank
enter customer name:
cust1
enter accno:
3512
enter initial balance:
7500
enter minimum balance:
1000
enter interest rate:
 enter service charge:
Enter choice:
1.Current acc
2.Savings acc
1
Customer name is:custl
Account number:3512
Bhoomika BG-1BM23C5967
account is current type
enter choice:
1.deposit
2.withdraw
3.display balance
 enter amount to be deposited:
354
 354
Deposited: 354.0
enter choice:
1.deposit
2.withdraw
3.display balance
 z
enter amount to withdraw:
548
withdrew:548.0 balance is:7306.0
  1.deposit
2.withdraw
3.display balance
3
Current Balance: 7306.0
enter choice:
1.deposit
2.withdraw
3.display balance
C:\Users\Rog\OneDrive\Desktop\Sem 3\java>
```

```
C:\Users\Rog\OneDrive\Desktop\Sem 3\java>java Bank
enter customer name:
cust2
enter accno:
5432
enter initial balance:
5400
enter minimum balance:
1000
enter interest rate:
2
enter service charge:
30
Enter choice:
1.Current acc
2.Savings acc
2
Customer name is:cust2
Account number:5432
Bhoomika BG-1BM2SC5067
account is savings type
enter choice:
1.deposit
2.withdraw
3.display balance
1
enter amount to be deposited:
200
Deposited: 200.0
enter choice:
1.deposit
2.withdraw
3.display balance
2
enter amount to withdraw:
500
withdrew:500.0 balance is:5100.0
enter choice:
1.deposit
2.withdraw
3.display balance
2
enter amount to withdraw:
500
withdrew:500.0 balance is:5100.0
enter choice:
1.deposit
2.withdraw
3.display balance
3
Deposited: 102.0
Current Balance: 5202.0
enter choice:
1.deposit
2.withdraw
3.display balance
3
Deposited: 102.0
Current Balance: 5202.0
enter choice:
1.deposit
2.withdraw
3.display balance
4
C:\Users\Book\OneDrive\Desktop\Sem 3\java=
```

# Program 6 Packages

```
12/11/2024.
                                                          package cie;
                                                          public class Internals {
                  LAB-04
 1. treate a package CIE which has a classes-
                                                                  public int[] internal Marks;
  Student & Internals Class Student has
                                                              public Internals (int [] marks) {
  membrers like usn, name, sem. Internals has
                                                                  if (marks length !=5) {
  an array that stones internal marks scored
                                                                      System out println (" Enter 5 marks)"
 an array that shows meeting the in 5 courses of the current sumster of the student. Create another package 3EE which has external class, which is derived class of student. This class has array that stores SEE
                                                                    this internal Marks - marks ;
 Student. This day has array that stores SEE marks record in Subjects of writer that of student. Import a packages in file that declars final narks of n students in all 5 courses
                                                          for (int 2=0; i <5; i++)
                                                                       { system.out println (mark + " ");
   package "CIE;
   public days Student &
                                                                   System .out . println ();
          public string usn;
          public String name;
          public int sem;
       public Student (String um, String name, intern)
                                                           rckage SEE;
                                                             import of CIE. Student; Student fullic class Externals extends Enternals {
         this wan = usn;
       this name = name.
                                                                 public intil External Marks;
             this sem sem ; in 18th sales
                                                              public External (String name, String usn, int [] marker) {
      public void displayDetails () {
              system out println ("USN;"+ usn);
                                                                  super (name, usn, sem);
              System out printly ("Name: "+ name);
                                                                   if ( marks . length ! = 5) {
              System out printin ("Sem " + sum):
                                                                      System out . printtr ("Enter 5 subjects!
                                                                   this external marks = marks }
                                                          internals [i] = new Internals (IMarks);
 public void displays marks () {
                                                            Emarks [ students [i] = new External (Ethanks);
     System.out.println ("see marke:");
                                                                                      (name, usn, sem, Emarks);
        for (int i=0; i<5; i++)
                                                             System out printly ("Final marks of Students;
           system out printly (marks +" ");
        System out println ()
                                                                   for (int i=0; i<$; i++) {
students[i]. diplay Details ();
intrarks [i]. diplay I Marks ();
import CIG. * ;
                                                                       students [i]. display & marks();
import "See.*;
import java Wil Sancaru;
                                                                system out printh (" Final marks;");
                                                                     for (j = 0; j < 5; j++)
  public class Main {
                                                                    { int final = int Marks[i].
         public static void main (String [] args) {
                                                                          I Marks[j] + (

sudents [i]. Emarks[j])

system. out. pointln (final + ");
            Scanner sc = new Scanner ( system in );
      System out printle ("Enter no of students: ");
            int n = scriptInt ();
      Externals[students = new Externals[n];
Internals[] int Marks = new Internals[n];
                                                                  system. out printer ("/n");
     for (int i = 0; i < n; i++) {
          system. out. println (" Entir usn : ");
                string usn = so. nextline ();
         system. out. priville (" texter name: ");
          string name = so next line ();
sy out Println ("Enter sem:");
                 int sem = sc nextInt ();
         Systemout. println ("toiler internals marks (")
```

int[] IMarks = new int[5]; for (int j=0; j<5; j++) { Imarks [j] = sc. next Int ();

system. out. println (" Enilor external marks;")
int Emarks = new int[5];
for (int k=0; k<5; k++) {

EMarks [k] = Sc. neat Int ();

```
Output:

Entire the number of Hudents: 9
Entire details of student to their curs: IBMOSISCOST

Entire name; Broomika BEG
Entire street marks: 45 46 44 42 49
Entire S see marks: 92 97 96 95 94
Entire details of student 2
Entire cursinal marks: 45 44 47 42 50
Entire sinternal marks: 45 44 47 42 50
Entire S internal marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see marks: 92 93 92 99 (00
Entire S see Marks: 92 93 94 94 95 95 96
Entire S see Marks: 94 94 94 95 95 96
USN: INAZSCSOSY
Name: Varsha ver
dem: 3
Enternal Marks: 45 44 47 42 50
Enternal Marks: 45 49 47 42 50
Enternal Marks: 98 93 92 97 100
Enternal Marks: 98 93 92 97 100
Enternal Marks: 98 93 92 97 100
```

```
package CIE;
public class Student {
  public String usn;
  public String name;
  public int sem;
  public Student(String usn, String name, int sem) {
    this.usn = usn;
    this.name = name;
     this.sem = sem;
  }
  public void displayDetails() {
    System.out.println("USN: " + usn);
    System.out.println("Name: " + name);
     System.out.println("Semester: " + sem);
}
public class Internals {
  public int[] internalMarks;
  public Internals(int[] marks) {
    if (marks.length != 5) {
       System.out.println("Error: Enter 5 marks!");
       return;
     this.internalMarks = marks;
```

```
public void displayIMarks() {
     System.out.println("Internal Marks: ");
     for (int mark : internalMarks) {
       System.out.print(mark + " ");
     System.out.println();
  }
package SEE;
import CIE.Student;
import CIE.Internals;
public class Externals extends Internals {
  public int[] externalMarks;
  public Externals(String name, String usn, int sem, int[] marks) {
     super(marks);
     if (marks.length != 5) {
       System.out.println("Error: Enter 5 marks!");
       return;
     this.externalMarks = marks;
  }
  public void displayEMarks() {
     System.out.println("SEE Marks: ");
     for (int mark : externalMarks) {
       System.out.print(mark + " "); }
     System.out.println();
  }
import CIE.*;
import SEE.*;
import java.util.Scanner;
public class Main {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of students: ");
     int n = sc.nextInt();
     sc.nextLine();
     Externals[] students = new Externals[n];
     Internals[] intMarks = new Internals[n];
     for (int i = 0; i < n; i++) {
       System.out.println("Enter details for student " +(i + 1) + ":");
       System.out.print("Enter USN: ");
       String usn = sc.nextLine();
```

```
System.out.print("Enter Name: ");
    String name = sc.nextLine();
    System.out.print("Enter Semester: ");
    int sem = sc.nextInt();
    System.out.println("Enter internal marks for 5 subjects:");
    int[] iMarks = new int[5];
    for (int j = 0; j < 5; j++) {
       iMarks[j] = sc.nextInt();
    System.out.println("Enter external marks for 5 subjects:");
    int[] eMarks = new int[5];
    for (int i = 0; i < 5; i++) {
       eMarks[j] = sc.nextInt();
    sc.nextLine();
    students[i] = new Externals(name, usn, sem, eMarks);
    intMarks[i] = new Internals(iMarks);
  System.out.println("\nStudent Details:");
  for (int i = 0; i < n; i++) {
    students[i].displayDetails();
    intMarks[i].displayIMarks();
    students[i].displayEMarks();
  sc.close();
}
```

```
::\Users\Rog\OneDrive\Desktop>java Main
Enter the number of students: 2
Enter details for student 1
Enter USN: 1BM23CS067
Enter Usa: IBM255007
Enter Name: BhoomikaBG
Enter Semester: 3
Enter 5 Internal Marks: 45 46 47 48 49
Enter 5 SEE Marks: 98 97 96 95 94
Enter details for student 2
 Enter USN: 1WA23CS034
 Enter Name: VarshaVG
Enter Semester: 3
Enter 5 Internal Marks: 45 44 47 48 50
Enter 5 SEE Marks: 98 93 92 99 100
Final Marks of Students:
USN: 1BM23CS067
Name: BhoomikaBG
Semester: 3
Internal Marks: 45 46 47 48 49
SEE Marks: 98 97 96 95 94
Final Marks: 94 94 95 95 96
USN: 1WA23CS034
Name: VarshaVG
Semester: 3
Internal Marks: 45 44 47 48 50
SEE Marks: 98 93 92 99 100
Final Marks: 94 90 93 97 100
```

# 2. Family program:

#### Code:

```
package com.example.me;
public class Myself{
  public void bhoomika(){
    System.out.println("I am Bhoomika BG\n My age is 19");}
}

package com.example.family;
import com.example.me.Myself;
public class Family{
  public static void main(String[] args){
    Myself me=new Myself();
    Family fam=new Family();
    System.out.println("MY Family has 3 members";
    me.bhoomika();
  }
}
```

# Program 7 Interfaces

```
19/11/24.
                              LAB-08
                                                                               - import java util. Scanner;
                                                                                   interface Polygon {
    It Implementation of methods i
                                                                                           public double get Perimeter ();
abstract double get As ea ();
           Implementation of method 1
                                                                                  class Rectangle implements Polygon
    24 Dog class
                                                                                           public double t;
        orithet:
               Dog banks
                                                                                            public Rectargle (double 1. double b) {
               Dog eats bones
                                                                                 this. l = l;
    34 Can class :
       output:
                                                                                         public double getterinder() {

double p = 0;

p = 8*(1+4);
              sedan is starting
               Sedan is driving
    44 Printing document class:
                                                                                                  siehurn p;
           output :
                  Building document
thowing document preview
                                                                                    Cally of aday
                                                                                        public double get Area () {
    double a = 1 * b;
                                                                                             setwin a;
    54 Create interface named Polygon which includes default method getferimeter () is abstract missed
difacult method getPaineter () & abstract method getPaineter () & abstract method getPaineter () & abstract method holygons in same manner so we implemented body of getPaineter () in folygon. Now, all polygon implementing folygon can use getPerincter () to calculate primiter. But, such fife calculating area is disposent for different polygons. Hence getPaineter () is irreluded without implementation must be class that implements Polygon must provide implementation of get Aua ().
                                                                                   class Truangle implements Polygon & (system in);
public devote b;
                                                                                                  public double h;
                                                                                                 public Triangle (double b. double b) {
                                                                                                          this.b=b;
                                                                                                          this, h=h;
                                                                                             public double getPoumeter () {
                                                                                                           double p = 0;
                                                                                                            &= System. out println ("Erler 3 sides")
```

```
import java.util.Scanner;
interface Polygon{
 default double getPerimeter(){
  Scanner sc=new Scanner(System.in);
  System.out.println("Enter number of sides:");
  int n=sc.nextInt();
  double p=0;
  for(int i=0;i<n;i++){
   System.out.println("Enter side:");
   double a=sc.nextDouble();
   p+=a;
 return p;
 abstract double getArea();
class Rectangle implements Polygon{
 public double length;
 public double breadth;
public Rectangle(double length,double breadth){
 this.length=length;
 this.breadth=breadth;}
public double getArea(){
 double area=length*breadth;
return area;
}
class Triangle implements Polygon{
 public double length1;
 public double breadth1;
public Triangle(double length1,double breadth1){
 this.length1=length1;
 this.breadth1=breadth1;}
public double getArea(){
 double area=0.5*length1*breadth1;
return area;
public class Shape{
 public static void main(String []Args){
 Scanner sc=new Scanner(System.in);
 System.out.println("Bhoomika BG-1BM23CS067");
 System.out.println("Choose:\n 1.Rectangle\n 2.Triangle");
 int x=sc.nextInt();
 switch(x)
 case(1):
```

```
System.out.println("Enter length:");
  double l=sc.nextDouble();
  System.out.println("Enter breadth:");
  double b=sc.nextDouble();
  Polygon rc=new Rectangle(l,b);
  double p=rc.getPerimeter();
  System.out.println("Perimeter of rectangle is:"+p);
  double a=rc.getArea();
  System.out.println("Area of rectangle is:"+a);
  break;
 case(2):{
  System.out.println("Enter base:");
  double l=sc.nextDouble();
  System.out.println("Enter height:");
  double b=sc.nextDouble();
  Polygon tr=new Triangle(1,b);
  double p1=tr.getPerimeter();
  System.out.println("Perimeter of triangle is:"+p1);
  double a1=tr.getArea();
  System.out.println("Area of triangle is:"+a1);
  break;
 default:
  System.exit(0);
}while(true);
```

```
C:\Users\Rog\OneDrive\Desktop\Sem 3\java>java Shape
Bhoomika BG-1BM23CS067
Choose:
1.Rectangle
2.Triangle
Enter length:
Enter number of sides:
Enter side:
z
Enter side:
Enter side:
Enter side:
3
Perimeter of rectangle is:10.0
Area of rectangle is:6.0
Choose:
1.Rectangle
2.Triangle
Enter base:
Enter height:
5
Enter number of sides:
Enter side:
Enter side:
Enter side:
Perimeter of triangle is:9.0
Area of triangle is:10.0
```

# Program 8 Exception Handling

```
LAB-08
s voite a program that demonstrates handling of exceptions in inheritance tree. Creale base alone "Fother" and drived class "Son" which extends base class. In Fother class, implement constructor which takes age as injust and thous exception Wrongles () where input age <0. In Son class, implement constructor that uses both 4ther and son's age and throws exaption if son's age.
                                                                                      if (style > = fage)

throw new Agemismatch ("Son's age can't be greater
than yeather's age")

System ("Son's age is " + This style")
                                                                                     public class Aze Chick {
    public static void main (String [] o'gh) {
        Scanner sc = new Scanner (bystem.in);

 import java util Scanner ();
dass wrong ge extends Exception {
                                                                                           try ( system out println ("Enter father's age:"),
          public wrong Age ( string mersage) {
                  super (missage); }
                                                                                                      int fage = sc. nextInt ();
                                                                                                  System out printer ("Enter sons age:");
class Age Mismatch extends Exception {
                                                                                                ant style = sc next Int ();
Son son = new Son (fAge, sAge);
            public AgeMismatch (string mussage) {
                super (missage); }
                                                                                        catch ( wrong Age | Age Mismatch e) {
                                                                                                  System out pointln ("Exception: "+
e. get Menage ());
 class Father &
         int fage; public Father (int fage) throws wrongAge {
               if (fage < 0) {
                  throw new wrongAge ("Father age cannot
                                                 le ("fother age connor )

le less than ove") adjuit: Enter fother's age: 40

Enter son's age: 50

Father's age: 40

Enception: Son's age cannot be greater tran-
father's age.
    System. out. printer ( Father's age: "+ this fage)
class Son extends Father {
         int sage; public son (int fage, int sage) throws
                                                                                          Enter father's age: -2
                                                                                         Enter son's age: 10
         wang Age, Age Mismatch [
super (fage):
                                                                                          Exception: Father's age cannot be less than
```

seithmetic Exception => 1 by zero File: test-text is missing, Please check file name. 11 after saving file ti, this is test test 3. Please enter your age Numbric value: 21 You are authorised to view the page 1. java lang Axith matte Exception: / by zero at Giffin main (Giffin java: 7) java lang. Arithmetic Exception: / by zero Type an integer on console You typed 19. Type an integer on the console bhoomika exception and throwing wrapping Exaption is of type: Invalidation Input Exception: Invalid integer value entired. Original caught exception is of type java util. Input Mismatch Exception

```
import java.util.Scanner;
class WrongAge extends Exception {
  public WrongAge(String message) {
     super(message);
class AgeMismatch extends Exception {
  public AgeMismatch(String message) {
     super(message);
}
class Father {
  protected int fatherAge;
  public Father(int fatherAge) throws WrongAge {
     if (fatherAge < 0) {
       throw new WrongAge("Father's age cannot be less than 0.");
    this.fatherAge = fatherAge;
     System.out.println("Father's age is set to: " + this.fatherAge);
class Son extends Father {
  private int sonAge;
  public Son(int fatherAge, int sonAge) throws WrongAge, AgeMismatch {
     super(fatherAge); // Call the constructor of Father class
    if (sonAge < 0) {
       throw new WrongAge("Son's age cannot be less than 0.");
     if (sonAge >= fatherAge) {
       throw new AgeMismatch("Son's age cannot be greater than or equal to father's age.");
    this.sonAge = sonAge;
    System.out.println("Son's age is set to: " + this.sonAge);
  }
public class Main19 {
  public static void main(String[] args) {
     Scanner scanner = new Scanner(System.in);
     try {
       // Taking input from the user for Father's and Son's ages
       System.out.print("Enter Father's age: ");
       int fatherAge = scanner.nextInt();
       System.out.print("Enter Son's age: ");
       int sonAge = scanner.nextInt();
       Son son = new Son(fatherAge, sonAge);
     } catch (WrongAge | AgeMismatch e) {
       System.err.println("Exception: " + e.getMessage());
     } finally {
```

```
scanner.close();
}
}
```

```
C:\Users\Admin\Desktop>javac AgeCheck.java

C:\Users\Admin\Desktop>java AgeCheck
Enter Father's age: 40
Enter Son's age: 50
Father's age: 40
Exception: Son's age cannot be greater than or equal to father's age.

C:\Users\Admin\Desktop>java AgeCheck
Enter Father's age: 40
Enter Son's age: 21
Father's age: 40
Son's age is set to: 21

aC:\Users\Admin\Desktop>java AgeCheck
Enter Father's age: -3
Enter Son's age: -7
Exception: Father's age cannot be less than 0

C:\Users\Admin\Desktop>java AgeCheck
Enter Father's age: 3
Enter Son's age: -9
Father's age: 3
Exception: Son's age cannot be less than 0.
```

# Program 9 Multithreading Program

```
3/12/24
                                                                  Thread:
                     LAB-10
                                                                  Thread: Thread -0 &
                                                                  Thread: Thread -0, 1
main thread
                                                                   Thread: Thread -O, State: Dead
main Thread
main Thread
main Thread
                                                                     921
 main Thread
 Main Thread
main thread
main Thouad
 main Thread
child thread
child Thread
child Thread
                                                              Program 1 :
                                                              write a program which creater two threads one thread displays "BMS college of Engineering every 10 records & another "CSE," every 2 mands
 Child Thread
 child Thread
 child thread
 Unild Thread
                                                              → class College extends Thread {
public void run(){
 Child Thread
Child Thread
child Thread
                                                                           toy { while (true) {
  Main Thread) altern (Carollalances
2. Current thread: Thread [#1, main, 5, main]
                                                                            System out println ("BMS College of
                                                                               Thread . sleep (10000);
   Name is: main
3 Thread man, state: New Thread; main,
                                                                           catch (Intercupted Exception e) {
    State: New Thread: man, State: Start
                                                                              S.O.P (" Task interrupted)
    Thread: main, state: stort
Thread: Thread-0, State: Running
    Thread: Thread-1, State: Running
     Thread main, State: Dead Thread Thread-1.4
                                                                  dass Dept extends Thread {
                                                                         public void run () {
     Thread: Thread-1,3
Thread: Thread-1,2
Thread: Thread-1,1
                                                                              try & while (true) {
                                                                                     System. out . println ("CSE")
      Thread main State Dead Thread Thread - 04
                                                                                   Thousand. sleep (2000); }
```

```
Code:
class Task1 extends Thread {
  public void run() {
    try {
       while (true) {
         System.out.println("BMS College of Engineering");
         Thread.sleep(10000);
     } catch (InterruptedException e) {
       System.out.println("Task1 interrupted");
  }
}
class Task2 extends Thread {
  public void run() {
    try {
       while (true) {
         System.out.println("CSE");
          Thread.sleep(2000);
       }
     } catch (InterruptedException e) {
       System.out.println("Task2 interrupted");
  }
public class MultiThreadExample {
  public static void main(String[] args) {
    Task1 t1 = new Task1();
    Task2 t2 = new Task2();
    t1.start();
    t2.start();
  }
```

# Program 10 Open Ended Exercise

```
frame add (numicabel)
Program 2
write program to ereale user interface to perform
                                                               frame add (numa habel)
 division. User enters 2 numbers in text fields
                                                               frame add (numi).
division. The ones a displayed in result fill Num! & Num2. Result is displayed in result fill when I would button is chicked If Num! or Num2
                                                                frame add (num 2);
                                                               frame add (divide);
 are not integer, program would throw number for my
                                                                frame, add (result);
 Exception of Nama is zero, it would throw an
 Arithmetic Exception. Display exception in dialouge box
                                                             divide. addActionListener (new ActionListeners) {
                                                                     public void action for formed (Action Event e) {
 > import javax. swing. *
   import java. aut. event. *;
                                                                        int num! = Integer. parseInt (num! get Text());
   public dass Division {
        public static void main (String [] args) {
                                                                       int num2 = Integer parseInt (num2. getTent())
           JFrame frame = new JFrame ("Division Calculator
                                                                       int result = num 1 / num 2;
           frome set Sixe (300, 200);
           frame set Default close Operation (JFrame
                                                                       rusult. set Text (String value of (result));
                                                                   catch (NumberFormatException ex) {
         frame sethagout (null);
                                                                       Joption Pane. show message Dialog (frame
                                                                      "Please enter integer!", "Number format
     Thabit num habel = new Thabel ("Num!;"),
                                                                       error", Jophonfane ERROR_MESSAGE);
     Thabel num2 Label - new Thabel ("Num 2;")
    Treatfield num! = new JTextfield ();
    Treatfield num 2 = new Treatfield ();
    JButton divide = new JButton ("Divide");
    JTextField result - new JTextField ();
                                                               frame suttisible (true);
     JButton result = new JButton (" Result")
    result. selEditable ("False");
   numit Label. set Bounds (20, 20, 50, 25);
                                                                                                    Division
                                                                                           Inliger
                                                                  Integer Division
   num 11. setBounds (80, 20, 100, 25):
                                                                                           Num 1:
                                                                 Num1: 4
   num 2 setBounds (80,60,100,25).
                                                                                           Num 2
   num 2 Label. set Bounds (20,60,50, 25);
                                                                  Num2:
   divide . Set Bounds (20, 100, 100, 25);
                                                                  Divide T
                                                                                           Divide)
                                                                            2
   result . set Bounds (130, 100, 100, 25);
                                                                                                   Number Format Error
Please enter intige
```

```
import javax.swing.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
public class DivisionCalculator {
  public static void main(String[] args) {
    JFrame frame = new JFrame("Integer Division");
    frame.setSize(300, 200);
    frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    frame.setLayout(null);
    JLabel num1Label = new JLabel("Num1:");
    JLabel num2Label = new JLabel("Num2:");
    JTextField num1Field = new JTextField();
    JTextField num2Field = new JTextField();
    JButton divideButton = new JButton("Divide");
    JTextField resultField = new JTextField();
    resultField.setEditable(false);
    num1Label.setBounds(20, 20, 50, 25);
    num1Field.setBounds(80, 20, 100, 25);
```

```
num2Label.setBounds(20, 60, 50, 25);
    num2Field.setBounds(80, 60, 100, 25);
    divideButton.setBounds(20, 100, 100, 25);
    resultField.setBounds(130, 100, 100, 25);
    frame.add(num1Label);
    frame.add(num1Field);
    frame.add(num2Label);
    frame.add(num2Field);
    frame.add(divideButton);
    frame.add(resultField);
    divideButton.addActionListener(new ActionListener() {
       public void actionPerformed(ActionEvent e) {
           int num1 = Integer.parseInt(num1Field.getText());
           int num2 = Integer.parseInt(num2Field.getText());
           int result = num1 / num2;
           resultField.setText(String.valueOf(result));
         } catch (NumberFormatException ex) {
           JOptionPane.showMessageDialog(frame, "Please enter valid integers!", "Number Format Error",
JOptionPane.ERROR_MESSAGE);
         } catch (ArithmeticException ex) {
           JOptionPane.showMessageDialog(frame, "Cannot divide by zero!", "Arithmetic Error",
JOptionPane.ERROR_MESSAGE); }}
    });
    frame.setVisible(true);
}
```





