## VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



#### LAB REPORT

on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

**AFEEFAH (1BM23CS015)** 

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)

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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 **AFEEFAH** (**1BM23CS015**), 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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#### Github Link:

https://github.com/Afeefahafeefah/java-lab

#### Program 1

Implement Quadratic Equation

```
LAB-1
import java. util . Scarner;
impact java. long. Math;
E public static void main (sling [ Jaigs)
     Scarner scarner = new Scarner (System. in);
     System. Out. print ("Afrefah 18m23 eso15");
     System. out. print ("Entre coefficient a:");
     double a = slavner. rest Double
      System. and print ("Enter coefficient 6:"),
     double b: Scener. rentDouble();
      System. out plent (" Enter coefficient ( 1");
      double ( = scanner, next Doublel);
     double d 2 b+b-4+a+C;
     1/(950)
     { double 21 = (-6+ Maksglt(d)) / (2+a);
      double 22 = (-6 - Math - Syrtld)) /(2*a);
     System and printle 1 The roots are real and been
     Rystin out printin ("Root2"+21);
     3 Elster. oud. printer (" loot 2:"+ 22);
else ? (d=20)
      double 12-6/(2*a);
      Eysten and printly "The roots are real and the
      Eane!");
      Eystem. Out. println ("Root:"+2);
     else
    I system and pointin ("The coots are complex:");
      Louisle realPart = -6/(2+a);
      double inaginary part = Math. 89At(d) 1(2+a);
      Explan. out printly ("Coot! "+lealPart+"+"+
      i maginary Pout + "?").
      Eysten. Out. prints ("Poot 2: "+ elal Part +"-"+
      inaginary Part + "; ").
     scanner. close ();
   3 Segren
```

Enter coefficient a: Enter coefficient b: -5 Enter confricient c

#### **Code:**

```
import java.lang.Math;
class Quadratic
  public static void main(String[] args) {
     Scanner scanner = new Scanner(System.in);
     System.out.println("AFEEFAH 1BM23CS015");
     System.out.print("Enter coefficient a: ");
     double a = scanner.nextDouble();
     System.out.print("Enter coefficient b: ");
     double b = scanner.nextDouble();
     System.out.print("Enter coefficient c: ");
     double c = scanner.nextDouble();
     double d = b * b - 4 * a * c;
     if (d > 0) {
       double r1 = (-b + Math.sqrt(d)) / (2 * a);
       double r2 = (-b - Math.sqrt(d)) / (2 * a);
       System.out.println("The roots are real and different:");
       System.out.println("Root 1: " + r1);
       System.out.println("Root 2: " + r2);
     \} else if (d == 0) {
       double r = -b / (2 * a);
       System.out.println("The roots are real and the same:");
       System.out.println("Root: " + r);
     } else {
       System.out.println("The roots are complex:");
```

```
double realPart = -b / (2 * a);

double imaginaryPart = Math.sqrt(-d) / (2 * a);

System.out.println("Root 1: " + realPart + " + " + imaginaryPart + "i");

System.out.println("Root 2: " + realPart + " - " + imaginaryPart + "i");

}

scanner.close();

}

scanner.close();

**Cyclidity jour. Quadratic jour.
**Cycl
```

#### **Program 2**

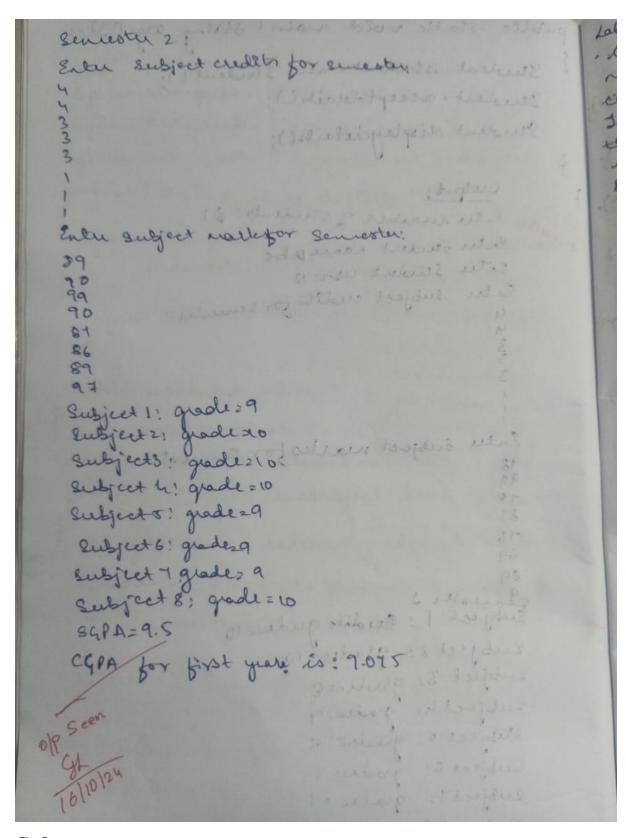
#### Implement SGPA Calculator

```
Jab - 2.
· Dendop a Jana program do create a class student with members used, rame, on
array credits and an overay marles. Include
methods to calculate scips ga student.
import java util. Allay list,
       Jana, will histy . it as particular is
Import java. util. Scarnel;
   string USD;
 string rame; 1 maps of menergation
  int I's ceedits;
  int [] malles;
  int newsbubject; (1999)
void acceptOctail()
   Scanner Scanner (System in);
   System out printly ("Enter USN:");
   System. and printly ("Enter rance:");
    name: Sc. nextline();
   redits = new int [num Subjects];
nacles = new int [num Subjects];
  for line izo; icnum subjects; itt)
  E sop ("Enter credits for subject" + (i+1)+":");
    creditatij= sc. next Int (1;
   SOP ("Enter marks for Subjects" + (i+)+"!
   marks [i] = Sconent Intl).
```

```
Void display Details (?)

{ System and printly ( Student Details : ");
    System out printin ( "USN " + USN);
                                                            Stude
    System and printer ("Name:"+ name);
   System aut. printin (" Subjects and Crediti"),
   for lint iso; i' num Subjects; it);
    System. aut. printly ("Subject" + (i+1)+": Creditis="
           + credits [9] + ", marks "+ marks [1]);
                                                                 Ent
      System. Out. prentin ("SYPA: "+ Calculate SYPACI);
   double calculate SGPA ()
   int total credits 20
   double weighed gradepoint = 00.
   for (int : 20; 12 runsusject; i++)
    ent gradePoints : realculategradepoints (maelos (i)),
    weighed grade points + 2 grade points + credits [1];
                                                                 89
           total credits + = credits [i];
   return ( welghedgrade points / total credits);
int Calculate grade points (int walks)
                                                                 Su
                                                                  Su
2 if (males>=90) return -10,
 else if (marks) 280) retuen 9;
else if (marks >= 60) return 8;
else if (marks >= 50) return 7;
else if (marks >= 50) return 6;
else is (marks >= 45) letturs;
clse if (marks > 2 40) extrems;
else return o;
```

```
public static void main ( sleing age [7)
             Student student = new Student ();
           Student - acceptalitails ();
            Student-displaydetails();
                 Output -
              e Enter number of students: 31
                Enter Student name abe
               Entre Student usn: 12
               Enter subject ceedets for semester:
(1)
               Enter Entject marks for servister:
(Ci 3):
               69
               Subject 1: Cardits grades 210
               Subject 2: glades= 10.
               Subject 4: gradis=8
Subject 4: gradis=9
                Subject 6: gradue 8
                Subject 6: grades 2 7
                Eusject 7: grades =9
               Subject 8; gradus: 1
               SGPA 28.6
```



```
class Student
{
  String name;
  String usn;
  int credits[] = new int[8];
  int marks[] = new int[8];
  double sgpa=0.0;
  double cgpa;
  int grade[] = new int[8];
  double calculate(int m[], int c[])
 {
     int j;
     double sum = 0.0;
     int div = 0;
     for (j = 0; j < 8; j++)
       if (m[j] != 100)
       {
          grade[j] = (m[j] + 10) / 10;
        }
       else
       {
          grade[j] = 10;
       div = credits[j] + div;
       sum = sum + (grade[j] * credits[j]);
```

```
System.out.println("Grade for subject " + (j + 1) + ": " + grade[j]); //
error check
     }
     sgpa = sum / div;
     System.out.println("SGPA: " + sgpa);
     return sgpa;
  }
double calcgpa(double sgpa1, double sgpa2)
{
cgpa=(sgpa1+sgpa2)/2;
return cgpa;
}
void input()
Scanner sc=new Scanner(System.in);
     System.out.println("Now enter subject credits for semester:");
     int i;
     for (i = 0; i < 8; i++)
       credits[i] = sc.nextInt();
     System.out.println("Now enter subject marks for semester:");
     for (i = 0; i < 8; i++)
     {
       marks[i] = sc.nextInt();
}
```

```
public static void main(String args[]) {
System.out.println("AFEEFAH 1BM23CS015");
Scanner sc1 = new Scanner(System.in);
System.out.println("Enter number of students: ");
int n=sc1.nextInt();
Student obj[]=new Student[n];
int k;
for(k=0;k< n;k++)
obj[k]=new Student();
System.out.println("Enter Student name: ");
     String name = sc1.next();
System.out.println("Enter Student USN: ");
     String usn = sc1.next();
obj[k].input();
System.out.println("Semester 1");
     double result = obj[k].calculate(obj[k].marks, obj[k].credits);
     System.out.println("1st Semester SGPA for " + obj[k].name + " (" +
obj[k].usn + ") is: " + result);
System.out.println("Semester 2");
obj[k].input();
     double result2 = obj[k].calculate(obj[k].marks, obj[k].credits);
     System.out.println("2nt Semester SGPA for " + obj[k].name + " (" +
obj[k].usn + ") is: " + result2);
System.out.println("CGPA for 1st year is: "+obj[k].calcgpa(result,result2));
}
}
```

```
D:\afeefah>java Student.java
AFEEFAH 1BM23CS015
Enter number of students:
Enter Student name:
abc
Enter Student USN:
12
Now enter subject credits for semester:
Now enter subject marks for semester:
99
78
87
76
69
89
Semester 1
Grade for subject 1: 10
Grade for subject 2: 10
Grade for subject 3: 8
Grade for subject 4: 9
Grade for subject 5: 8
Grade for subject 6: 7
Grade for subject 7: 9
Grade for subject 8: 1
SGPA: 8.6
1st Semester SGPA for null (null) is: 8.6
Semester 2
Now enter subject credits for semester:
Now enter subject marks for semester:
89
90
99
90
87
86
89
97
Grade for subject 1: 9
Grade for subject 2: 10
Grade for subject 3: 10
Grade for subject 4: 10
Grade for subject 5: 9
Grade for subject 6: 9
Grade for subject 7: 9
```

#### **Program 3:**

#### Create Objects for Books

```
Lab -3.
· Cleate a class Book which contains four members:
rane, author, pite, run-pages. Include a
constructor to set the values for the menusers.
Include methods to set and get the details of
the objects. Include a to String () rethod that
could display the complete delaits of the book.
Develop a Jana program to create a book Objects.
import java ulil . Seamer
 I string name;
 Steing author;
        peice;
   ent runePages;
   book ( String name, String author, int pick, int rundays)
   I this rame = name;
     this author: author;
     this price : price;
      this . numbages = numbages
    public string tosting ()
     String book Details = " Book name ! " + this name + " in"
                      "Author rame" + this author +
                      "In" + " Perce:"+ this price +"In"+
                    "Number of Pages" + this reme Pages
        letun book Details
  public class Main
   public static noid main (String[] algs)
    3 cannel 5 2 new Scanner (Systemoin)
     System. out. peent (" Enter the number glooks:")
     int n 2 S. nextInt ();
```

```
Lab 4.
   Sook[] books = new bode[n];
                                                     · Denslop
   forlint 1=0; ien; i++)
   ¿ system out. print ("Enter name & book "+ (i+1)+1:1)
      string names so nextl).
     System out prent ("Enter author of book "+ (i+1) +"!"
                                                      that ear
                                                      Shape. E
      sting author = 3. next ();
                                                      method
     System. and print L'Enterprice & book "+ (i+i)+"
      int piece s. newthat ();
      System. and, peind ("Enter nuarber & pages in book (1+1)+")
                                                       import
                                                       abstrac
      int numPages = s. nextInt();
     books [i] = new book Charl, author, price, numbers
                                                         int
                                                         int
   System out prenten ("In Book Petaels!");
                                                          publi
   for (Book book : books)
                                                         2 th
  I System and printin (book);
                                                           th
    S. close ();
                                                          pub
                               was pulled and
Output
Entre the number of books : 1
Enter name gree book 1: fine-pline
Ender author of book I: lawren asher
Entre pice 2 book 1 ! 400
Enter number of pages in book 1: 200
                                                          clas
                                                           pu
Book Delass!
Book name: the print
Author ranget lauren asher
Price: 406
```

```
class Book
{
  String name;
  String author;
  int price;
  int numPages;
  Book(String name, String author, int price, int numPages) {
     this.name = name;
     this.author = author;
    this.price = price;
    this.numPages = numPages;
  }
  @Override
  public String toString() {
     String bookDetails = "Book name: " + this.name + "\n" +
                 "Author name: " + this.author + "\n" +
                 "Price: " + this.price + "\n" +
                 "Number of pages: " + this.numPages + "\n";
     return bookDetails;
  }
}
```

```
public class Main {
  public static void main(String[] args) {
     Scanner s = new Scanner(System.in);
     System.out.print("Enter the number of books: ");
     int n = s.nextInt();
     Book[] books = new Book[n];
     for (int i = 0; i < n; i++) {
       // Prompt user to enter book details
       System.out.print("Enter name of book " + (i + 1) + ": ");
       String name = s.next();
       System.out.print("Enter author of book " + (i + 1) + ": ");
       String author = s.next();
       System.out.print("Enter price of book " + (i + 1) + ": ");
       int price = s.nextInt();
       System.out.print("Enter number of pages in book " +(i + 1) + ": ");
       int numPages = s.nextInt();
       books[i] = new Book(name, author, price, numPages);
     }
     System.out.println("\nBook Details:");
     for (Book book : books) {
       System.out.println(book);
```

```
}
    s.close();
        System.out.println("AFEEFAH 1BM23CS015");
  }
}
C:\Users\Admin\Desktop>java Main
Enter the number of books: 3
Enter name of book 1: fine_print
Enter author of book 1: lauren_asher
Enter price of book 1: 400
Enter number of pages in book 1: 250
Enter name of book 2: terms_and_conditions
Enter author of book 2: lauren_asher
Enter price of book 2: 400
Enter number of pages in book 2: 300
Enter name of book 3: final offer
Enter author of book 3: lauren asher
Enter price of book 3: 550
Enter number of pages in book 3: 400
Book Details:
Book name: fine print
Author name: lauren asher
Price: 400
Number of pages: 250
Book name: terms_and_conditions
Author name: lauren asher
Price: 400
Number of pages: 300
Book name: final_offer
Author name: lauren_asher
Price: 550
Number of pages: 400
AFEEFAH 1BM23CS015
C:\Users\Admin\Desktop>
```

#### **Program 4:**

#### Implement Abstract Class

```
Lab 4.
. Dendog a Jana program do create an abstract class
named shape that contains two litegers and an
empty method named print Area (). Provide there
classes ranged Rectarge, Telanger and Ciece such
that each one of the classes extends the class
shape. Each one of the clarses contain only the
method print Area (1) that prints the area of
given shape;
import java. util. Scarner;
abstract class Shape
  int dim!
  int dimz:
  public snapel)
  2 this dim 129;
    this. dim 2:0;
                       LEVEL ENGY O LEGAN STOCK
  public Shapelint din |, int din 2)
     this . dim 2 = dim 2;
    public abstract void printAlia ();
class Rectangle entends Singpe
  public Rectargle (int length, int width)
     dine 1 = length;
     dim 2 2 width;
   public void print thea()
  E gut areaz dine 1 * dine2,
     System out. println l'Alea ? Lectage :
```

int base class Telange extends shape Shape diso public Terange (but base, int deight) ¿ dinl=base; din2 = neight; public void printAleal) shape c ciecles double alla: 0.5 \* din1 \* din2; System out pointen l'Alea & Priangle! in. clo System class Circle extends Shape E public Circle (ant radius) output: dim la la dius; Entu leno dim 2 2 0; 12 public word print Aleal) Area & Louble area & Mathi. PJ \* Limit din!; Entu & System out printer ("Area ? Ciegle: "+ area); 15 Area & public class shapes. Enter 25 duag public static void main (string () algs) olp seen Scannel in = new Scanner (System. in); System out plint of Enter length and wister of Rectargle:"); int length = in . rent Int (); int whath = in, next Int LD; Snape rectangle = new Rectangle (length, width); rectargle point Areal } System. Out . printin ("Enler base and height for Torangle: "),

```
int basez in, next Jut ();
       Stape trangle = now Telangle (best, height);
       triangle print Aleal);
        System and printer ("Entre ladeus for ciacle:");
        shape circle = new Circle (radius);
         circlespoint Aleal);
        in. close 1);
3 1 5
       Output:
      Entu length and width for Pectangle!
       Area of rectangle: 96
       Ala & Triangle: 75.0
       Enter radius for circle:
       25
       duag cicle: 1963.495
```

```
abstract class Shape {
  int dim1;
  int dim2;
  public Shape() {
     this.dim1 = 0;
     this.dim2 = 0;
  }
  public Shape(int dim1, int dim2) {
     this.dim1 = dim1;
     this.dim2 = dim2;
  }
  public abstract void printArea();
}
class Rectangle extends Shape {
  public Rectangle(int length, int width) {
     dim1 = length;
     dim2 = width;
  }
  public void printArea() {
```

```
int area = dim1 * dim2;
     System.out.println("Area of Rectangle: " + area);
  }
}
class Triangle extends Shape {
  public Triangle(int base, int height) {
     dim1 = base;
     dim2 = height;
  }
  public void printArea() {
     double area = 0.5 * dim1 * dim2;
     System.out.println("Area of Triangle: " + area);
  }
}
class Circle extends Shape {
  public Circle(int radius) {
     dim1 = radius;
     dim 2 = 0;
  }
```

```
public void printArea() {
     double area = Math.PI * dim1 * dim1;
     System.out.println("Area of Circle: " + area);
  }
}
public class shapes
  public static void main(String[] args)
        {
     Scanner in = new Scanner(System.in);
     System.out.println("Enter length and width for Rectangle:");
     int length = in.nextInt();
     int width = in.nextInt();
     Shape rectangle = new Rectangle(length, width);
     rectangle.printArea();
     System.out.println("Enter base and height for Triangle:");
     int base = in.nextInt();
     int height = in.nextInt();
     Shape triangle = new Triangle(base, height);
```

```
triangle.printArea();
     System.out.println("Enter radius for Circle:");
     int radius = in.nextInt();
     Shape circle = new Circle(radius);
     circle.printArea();
     in.close();
        System.out.println("AFEEFAH 1BM23CS015");
  }
D:\1bm23cs015\LAB 4>java shapes
Enter length and width for Rectangle:
Area of Rectangle: 96
Enter base and height for Triangle:
Area of Triangle: 75.0
Enter radius for Circle:
Area of Circle: 1963.4954084936207
AFEEFAH 1BM23CS015
D:\1bm23cs015\LAB 4>
```

#### **Program 5:**

#### Bank Account Management

```
lab 5
· Develop a program to create a class bank that
                                                        E 3.0.P
 raintains two kinds of account for its customers, as
called carrys account, and the other current account
                                                        public
The savings actound provides compound interest and
 witerstand facilities but no caregone book facility
                                                        2 30P ( "
The arrent account provides cheque book facility
but so interest. account holders should at
maintain a minimum balance and if the balance
falls below ten level a service arouge is Empore
import java. util. Scaner;
                                                          private
                                                          public
class Account &
private string customer-rance;
private ent ace-ro;
                                                          accou
                                                           intere
 protected double belone;
                                                           supe
pulsere Account Catting austonia- some, int accus,
                                                            init.
 customer dans double balance)
                                                            this
  this . customer - name = customer - name;
  this acc no = acc no;
                                                         public
  this. balance : belance,
                                                            double
 public double getbalance U
                                                           deposi
I return balance;
                                                      class cue
public rela deposit l'double amount)
[ if (amount >0)
                                                        private.
   ¿ balance+2 amount;
                                                        Prinate
     3.0. P ("Deposited" + amount);
                                                        public c
                                                        account
    S.O. PC Deposit amount must be positive.");
                                                        winine
                                                          Ruper
public void ustadiam (double amount)
                                                           this. A
 i) ( anout L' getbalance (1)
  balance - amount;
 5.0.P ("with drew: " + amount + "balance is : "+ balance);
```

```
3. O.P ("Insufficient funds!!")
public nord display balance()
2 SOP ("current balance : "I balance);
class Barings Account extends Account
  private double interestfate;
  public Sourys Account 1 String customer have, int
   accountshember, double initial Balance, double
    interest late)
   E super (austomer Dame, account Number,
     inital Balance).
     this . interestRate = interest Rate;
  public word compute And Deposit Interest ()
  ¿ double interest = get Balancel) + interestate (100;
   deposit (entrust);
class current Account extends Account
  private double minimum balance;
  prinate double service charge;
 public constitut Account ( String ous time Name, int
  account Number double intal Balance, double
  vinnementance, double service crange)
  E super Coustoner Name, account Number, initiallabrely
    this . whenever balance = whimmen balance;
     this. service charge = service charge;
```

public word check Minimum Beloncel) [ 9] (get Balance () a minimum Balance) 8.0.P ("Balanceis below minimum"); balance - 2 service charge; S.O. Plubeducted service cearge: "+ service Charge). 8.0. Pl"Salance after deduction is: "+ balance); public class bonk public state void mais (string [] augs) Scanner Scanner ( System. in); 3.0. Pl'enter customer rane "); string rame = 8 corexterel); So.p ("enter accro:"), int ace no escreptititi), S. D. P I enter initial balance: "); double boilance = Sc. next Pouble (); S. O. P ("entre men num balance:"). double ul'némenne - balance = Sc. rest Double (); S.O.P (renter Enterest rate: 1); double interest-rate = Sc. rest Double (); S.O. P ( "entre service charge:"); double service - charge = sc. nextDouble (); 3.0.P ("Enter cero"ce: " 1. Current aca in 5. 2. Sowings acc"); int ch = Sc. Met Tutl ); SO.P ("Custoner name is!" + name + " In Account number: "+ace-no+ "In Agreph - 18m23Cso 15") Switce (ch) case (1): 5.0. P ("allower is current yes"); current Account car new currentAccount (Name, act-no, balance, nininum-balance, service day) do SO. P ("Enter Choice: h! deposit in 2 - weterdrow in

```
int c= sc. next Intl);
                  Ca. check Minenum Balancel);
                  E s.o. P (verter amount to be deposited:");
                    double ant = sc. rextPoublel);
                    ca. deposit (ant);
alance);
                  else if (czza)
                  2 s.o. p ("enter ancount to withdraws:");
                    double ant = Screet Double ();
                   3 ca. witer draw (and); 3
                    else "(((223))
                    E so. Plienter
                     ca. display balance ();
                    else
                    System. exit(0);
                    while (tune);
                          S.O. Placeo cut is savings type "
                  case (2):
                  Savings Account & Saznew Savings Account Case
ouble();
                    accino, balance, interest late);
();
                  2 S.O. P ("enter curce: In 1. deposit In 2. willdean
                       3. display balance"),
cain &
                     int c1 = Scheet Itl);
                     9 g( cl==1)
                     Es. o. P ("enly amount to be deposited:");
+ " In Account
m23cs0151)
                       double aut = Sc. Nest Double();
                       Sa. deposit (ant);
                       else PK CU==2)
coold (rank,
                       2 s.o. P ("enter amount to withdraw: ");
service days).
                        double ant 2 sc. rest Double ();
                         Sa. withdraw (and);
```

```
else of (c1==3)
                                                            lab I.
      Sa. Compute And Deposet Interest ();
                                                            q. weite
                                                            In Fath
                                                            In Son
                                                            father
                                                            it son's
                                                           import jo
   entu accro:
   entre initial balence
   ente prinimum balance:
   entre interest date: 3
   enter seiner andy 112
   enter caroice:
   1. Current acc
  customer rame : apriger
  Account ruber, 12573
  account is curesarys type
  entre ceroice:
  enter amount to be deposited 40000
   Deposited: 40000,0
entuceroice: 2
enter ancount to withdraw: 20000
                                                               publi
withthew: 2000 10
balance : 21 5000.0
```

```
class Account {
  private String customer_name;
  private int acc_no;
  protected 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);
     } else {
       System.out.println("Deposit amount must be positive.");
     }
 public void withdraw(double amount)
    if(amount<=getBalance()){</pre>
      balance-=amount;
```

```
System.out.println("withdrew:"+amount + " balance is:"+ balance);
    else
     System.out.println("Insufficient funds!!");
   }
  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);
  }
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 checkMinimumBalance() {
    if (getBalance() < minimumBalance) {</pre>
       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 service charge:");
    double service_charge=sc.nextDouble();
    System.out.println("Enter choice:\n 1.Current acc\n 2.Savings acc");
    int ch=sc.nextInt();
    System.out.println("Customer name is:"+ name+"\nAccount
number:"+acc_no+"\nAFEEFAH - 1BM23CS015");
    switch(ch){
       case(1):
         System.out.println("account is current type");
         CurrentAccount ca = new
CurrentAccount(name,acc_no,balance,minimum_balance,service_charge);
        do\{\ System.out.println("enter \ choice: \ 1.deposit \ 2.withdraw \ n
3.display balance");
         int c=sc.nextInt();
         ca.checkMinimumBalance();
         if(c==1)
           System.out.println("enter amount to be deposited:");
           double amt=sc.nextDouble();
            ca.deposit(amt);}
         else if(c==2){
           System.out.println("enter amount to withdraw:");
           double amt=sc.nextDouble();
           ca.withdraw(amt);}
         else if(c==3){
           ca.displayBalance();}
         else
          System.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.computeAndDepositInterest();
           sa.displayBalance();}
         else{
           System.exit(0);
          }while(true);
  }
}
}
```

```
D:\1DM23CS015\LAB 5>Java Bank
enter customer name:
afeefah
enter accno:
36472
enter initial balance:
50000
enter minimum balance:
1000
enter interest rate:
1.5
enter service charge:
10
Enter choice:
1.Current acc
2.Savings acc
Customer name is:afeefah
Account number:36472
AFEEFAH - 1BM23CS015
account is current type
enter choice:
1.deposit
2.withdraw
3.display balance
enter amount to be deposited:
25000
Deposited: 25000.0
enter choice:
1.deposit
2.withdraw
3.display balance
enter amount to withdraw:
40000
withdrew:40000.0 balance is:35000.0
enter choice:
1.deposit
2.withdraw
3.display balance
```

```
enter customer name:
afeefah
enter accno:
45637
enter initial balance:
enter minimum balance:
1000
enter interest rate:
enter service charge:
12
Enter choice:
1.Current acc
 2.Savings acc
Customer name is:afeefah
Account number:45637
AFEEFAH - 1BM23CS015
account is savings type
enter choice:
 1.deposit
 2.withdraw
 3.display balance
enter amount to be deposited:
40000
Deposited: 40000.0
enter choice:
1.deposit
 2.withdraw
3.display balance
enter amount to withdraw:
withdrew:25000.0 balance is:215000.0
enter choice:
1.deposit
 2.withdraw
 3.display balance
Deposited: 6450.0
Current Balance: 221450.0
```

## **Program 6:**

## Implement Packages

```
Lab-6
· create a package CIE white has two classes
 Student and Internals. The class Student has
 members ether OSN, name, sem. The class Interns
 desired from student was an alway that stores
                                                       prote
the internal marks several in fine courses of the
current seriester & the student. Create
another package SEE which has the class.
                                                         Scar
External which is a defined class of Students.
                                                        Sypte
This class are allay that gons the SEE
                                                         for (i
marks scould in fine courses & the thillent
                                                        2 Sys
semester of the student. Import the two packages.
in a field that declares the foral marks of o
students in all fine courses.
1. CIE/ Student fana is not Albies has along the
package CIE;
                                                     3. SEE/
import jana util . Scanner;
                                                      package
public class student {
                                                      import
   plotected sling usn; "
                                                     import
   Plotected Stelling rame;
                                                      public
   protected and sem,
                                                        prote
                                                        Profe
  public void inpultudent Details ()
                                                        public
    Scarner 3 = new Scarner (System 20);
                                                         Syste
    System. and print ("Enter USN: ");
     Usn = S. nentlinel);
    Lystem. Outo plint ("Entre Name: ");
    Name = S. renderel);
    System. out. plint ("Enter Semester: ");
    Seni = 3. next Int ();
                                                        Publi
                                                        gor li
                                                         Final
 public void display Student Details () {
System. out. peinten ("USN: "+ usn);
System. out. pristen ("None: " + name);
 Eystem. and. printer ("Semester: " + sem);
```

```
2. CIE/Internals.java
 classes.
ent has
             package CIE;
o Juternals
             import java. util . Scaner;
              public class Internals extends Student &
              protected int [] internal Marks = new int [5];
               public void input CIEnracked) {
lass.
sendents.
                Scanner Se new Scanner (System in);
               System. Dul plinten 1" Enter Internal Marks for 5 Subjection,
the see
               for (int 1 =0; 126; 1+1)
ellent
               E System. Out prent ("Subject"+ (1+1)+ ":");
acleages
                 internal Marks [:] = s. next Int();
 4500
            3. SEE/Externals. jana
             package SEE;
             import CIE. Internals;
             import java. util. Scanlet,
             public class Externals extends Internals ?
               protected int [] seeMarks = new $ Int[6];
               protected int[] finalMalles a new Intts];
               public void exputSEE nalles () 2
                Scanner S= new Scanner (Systemom);
               System ent. printly (* Enter SEE Malles for 5 subjects");
               for ("nt 120; " <5; 1+1)

E System out print ("Subject" + ("+1) + "");
                  sentantes [:] = Smeet Int();
              public vad calculatifical Markes ?
              for lint "=0; 9 <5; "++) {
               finalMarks [i] = intered Marks [i] + seeMarks [i];
```

```
public void display final Malks () {
  display Student Details ();
  System out printer ("Final Marks for 5 subjects: ");
  for (int 120; 165; i++) {
                                                               Pa
     System. Out printin ("Subject"+(i+1) + ":" + Inal Malles [7]).
                                                                EN
                                                                En
                                                                E1
4) Main. jana.
import SEE. Externals;
Input java util. Scaner;
Class Main {
   public static void main (string [ Jargs) {
     Scanner S= new Scanner (System in );
     System.out. print ("Enter number of students: ");
     int n = s. next Int ();
     Externals [] students = new Externals [n];
    for ( int 120; icn; i++) {
     Eysten. out. printin ("In Ender detalls for Student"
       + (1+1) + ":");
     Students (2) = new Externals ();
     students (i) input Students stails);
     Students Ei). input (1E walks ();
     students (1) - input set walks ();
     students [i). Calculate Fral Marks ().
  System. and. prester ( n Fral Martes of Studenty: ");
   for lint := 8; i <n; i++) {
    System out pointly (" Student" + (1+1)+":");
    Students [i]. displayfinalMalks (1;
```

```
Enter details for student!
       Endu USN! 12
([] a
       Enter Name: abidely
        Enter Internal marks for 5 subjects:
        Subject 1:23
         Subject 2:23
         Subject 3:34
         Subject 4:34
         Subject 5: 43
         Enter SEE marks for 5 subjects:
          Bubject 1:43
          Subject 2:36
          Subject 3: 37
          Subject 4: 46
          Subject 5: 41
         final Marks of Students:
        Student1:
         Name: abcdet
         Senuster 2
        final Malles for 5 subjects:
        Subject 1:166
         Subject 2:59
         Subject 4:80
```

//CIE/Student.java package CIE;

```
import java.util.Scanner;
public class Student {
  protected String usn;
  protected String name;
  protected int sem;
  public void inputStudentDetails() {
     Scanner s = new Scanner(System.in);
     System.out.print("Enter USN: ");
     usn = s.nextLine();
     System.out.print("Enter Name: ");
     name = s.nextLine();
     System.out.print("Enter Semester: ");
     sem = s.nextInt();
  }
  public void displayStudentDetails() {
     System.out.println("USN: " + usn);
     System.out.println("Name: " + name);
     System.out.println("Semester: " + sem);
  }
}
//CIE/Internals.java
package CIE;
import java.util.Scanner;
```

```
public class Internals extends Student {
  protected int[] internalMarks = new int[5];
  public void inputCIEmarks() {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter Internal Marks for 5 subjects:");
     for (int i = 0; i < 5; i++) {
       System.out.print("Subject " + (i + 1) + ": ");
       internalMarks[i] = s.nextInt();
     }
  }
}
//SEE/Externals.java
package SEE;
import CIE.Internals;
import java.util.Scanner;
public class Externals extends Internals {
  private int[] seeMarks = new int[5];
  private int[] finalMarks = new int[5];
  public void inputSEEmarks() {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter SEE Marks for 5 subjects:");
     for (int i = 0; i < 5; i++) {
```

```
System.out.print("Subject " + (i + 1) + ": ");
       seeMarks[i] = s.nextInt();
     }
  }
  public void calculateFinalMarks() {
     for (int i = 0; i < 5; i++) {
       finalMarks[i] = internalMarks[i] + seeMarks[i];
     }
   }
  public void displayFinalMarks() {
     displayStudentDetails();
     System.out.println("Final Marks for 5 subjects:");
     for (int i = 0; i < 5; i++) {
       System.out.println("Subject " + (i + 1) + ": " + finalMarks[i]);
   }
//Main.java
import SEE.Externals;
import java.util.Scanner;
class Main {
  public static void main(String[] args) {
     Scanner s = new Scanner(System.in);
```

}

```
System.out.print("Enter number of students: ");
     int n = s.nextInt();
     Externals[] students = new Externals[n];
     for (int i = 0; i < n; i++) {
       System.out.println("\nEnter details for student " + (i + 1) + ":");
       students[i] = new Externals();
       students[i].inputStudentDetails();
       students[i].inputCIEmarks();
       students[i].inputSEEmarks();
       students[i].calculateFinalMarks();
     }
     System.out.println("\nFinal Marks of Students:");
     for (int i = 0; i < n; i++) {
       System.out.println("\nStudent" + (i + 1) + ":");
       students[i].displayFinalMarks();
     }
System.out.println("\n NAME:AFEEFAH USN: 1BM23CS015");
  }
```

}

```
D:\1bm23cs015>javac Main.java
D:\1bm23cs015>java Main.java
Enter number of students: 3
Enter details for student 1:
Enter USN: 11
Enter Name: abcdef
Enter Semester: 2
Enter Internal Marks for 5 subjects:
Subject 1: 23
Subject 2: 23
Subject 3: 34
Subject 4: 34
Subject 5: 43
Enter SEE Marks for 5 subjects:
Subject 1: 43
Subject 2: 36
Subject 3: 37
Subject 4: 46
Subject 5: 41
Enter details for student 2:
Enter USN: 12
Enter Name: ghijkl
Enter Semester: 2
Enter Internal Marks for 5 subjects:
Subject 1: 29
Subject 2: 27
Subject 3: 36
Subject 4: 38
Subject 5: 41
Enter SEE Marks for 5 subjects:
Subject 1: 41
Subject 2: 46
Subject 3: 38
Subject 4: 36
Subject 5: 39
Enter details for student 3:
Enter USN: 13
Enter Name: mnopqr
Enter Semester: 2
Enter Internal Marks for 5 subjects:
Subject 1: 38
Subject 2: 39
Subject 3: 37
Subject 4: 36
Subject 5: 35
Enter SEE Marks for 5 subjects:
Subject 1: 43
Subject 2: 31
Subject 3: 25
Subject 4: 26
Subject 5: 27
Final Marks of Students:
Student 1:
USN: 11
Name: abcdef
Semester: 2
```

```
Final Marks of Students:
Student 1:
USN: 11
Name: abcdef
Semester: 2
Final Marks for 5 subjects:
Subject 1: 66
Subject 2: 59
Subject 3: 71
Subject 4: 80
Subject 5: 84
Student 2:
USN: 12
Name: ghijkl
Semester: 2
Final Marks for 5 subjects:
Subject 1: 70
Subject 2: 73
Subject 3: 74
Subject 4: 74
Subject 5: 80
Student 3:
USN: 13
Name: mnopqr
Semester: 2
Final Marks for 5 subjects:
Subject 1: 81
Subject 2: 70
Subject 3: 62
Subject 4: 62
Subject 5: 62
 NAME: AFEEFAH USN: 1BM23CS015
D:\1bm23cs015>
```

<u>Program 7:</u>
Implement Exception Handling

```
9. write a program that demonstrates handling &
exception in inheritance due.
quale a base class called "father" and a defined
class cilled "Son" which extends the base class.
In Fathers class implement a constructors which
takes the age and throws the exception currong Age 11
when he grant age is less than Zero.
In son's class Englement a constructor dust uses
father and son's age and theours an exception
if son's age is greater than or equal to fathersage.
import java. ulil. Scarael;
class wrong Age Exception extends Exception
E public wrong Age Exception (string message)
class Son Age Exception extends Exception
I public Son Age Exception (String message)
 class Father
 I plivate int age;
  public Father (int age) throws whong Age Exception
     I show new wrong AgeException ("Whong age");
     this age = age;
   public int get Age ()
     return age;
```

System. class son extends father I private int lon Aage; String public Soul cut fatherage, int Son Age) throws ik limp WeongAge Exception, SonAge Exception Euper ( Jather Age); To ( son Age >= fathuAge) theow new SonAge Exception ("Son's age cannot be greater chan or equal to fathers age!); output! Name: Age this. Son Age = son Age ; USN: 1BM public int getSonAge () Enter Jack Enter son's Son's age return son Age; Do you u public class ExceptionHandling Enter fred E public static void mais (string [] augs)

E system out printin ("Mane: "Apugh " USN ISUSSISON;

while (true) Enter Son Scanner Sc: new Scanner (System. in); Cystem. out. print ("Enter Fathers Age!"); Enter Jake Enter son int Father Age = Sc. Next Jut (); Bystem and print (" Enter Son's Age: "); Do you we int sonage = sco rectite () Enter forth Enter Son Son son = new Son (fatherAge, son Age); Attepted 3 dystement. printen ("Accepted successfully"); catch (welong Age Exception e) System. and pointen (e. get Message (1); catch (Son Age Exception e) Eystem. and. plinten (e. gitnessage 1));

```
ent. printer (" Do you want to insert details again? " (YIN)");
           break;
     Do you want to Erseit details again? (YIN)
     Entre fallers age: 0
     Enter Sons age: 212
                           details again? (410)
1)5
```

import java.util.Scanner;

class WrongAgeException extends Exception {

```
public WrongAgeException(String message) {
    super(message);
  }
}
class SonAgeException extends Exception {
  public SonAgeException(String message) {
    super(message);
  }
}
class Father {
  private int age;
  public Father(int age) throws WrongAgeException {
    if (age <= 0) {
       throw new WrongAgeException("Wrong age");
    this.age = age;
  }
  public int getAge() {
    return age;
  }
}
class Son extends Father {
  private int sonAge;
  public Son(int fatherAge, int sonAge) throws WrongAgeException,
SonAgeException {
```

```
super(fatherAge);
    if (sonAge >= fatherAge) {
       throw new SonAgeException("Son's age cannot be greater than or equal
to father's age");
    this.sonAge = sonAge;
  }
  public int getSonAge() {
    return sonAge;
  }
}
public class ExceptionHandling{
  public static void main(String[] args)
System.out.println("NAME: AFEEFAH\nUSN:1BM23CS015");
    while(true)
{
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter Father's Age: ");
       int fatherAge = sc.nextInt();
       System.out.print("Enter Son's Age: ");
       int sonAge = sc.nextInt();
       try {
         Son son = new Son(fatherAge, sonAge);
         System.out.println("Accepted Succesfully");
       }
       catch (WrongAgeException e) {
```

```
System.out.println(e.getMessage());
}
catch (SonAgeException e) {
    System.out.println(e.getMessage());
}
System.out.println("Do You Want To Insert Details Again? (Y/n)");
String input = sc.next();
if (input.equalsIgnoreCase("n")) {
    break;
}
}
```

```
D:\1bm23cs015\lab 7>javac ExceptionHandling.java
D:\1bm23cs015\lab 7>java ExceptionHandling
NAME: AFEEFAH
USN:1BM23CS015
Enter Father's Age: 51
Enter Son's Age: 54
Son's age cannot be greater than or equal to father's age
Do You Want To Insert Details Again? (Y/n)
Enter Father's Age: 0
Enter Son's Age: 0
Wrong age
Do You Want To Insert Details Again? (Y/n)
Enter Father's Age: 0
Enter Son's Age: 12
Wrong age
Do You Want To Insert Details Again? (Y/n)
y
Enter Father's Age: 23
Enter Son's Age: 9
Accepted Succesfully
Do You Want To Insert Details Again? (Y/n)
Enter Father's Age: -23
Enter Son's Age: -12
Wrong age
Do You Want To Insert Details Again? (Y/n)
```

<u>Program 8:</u>Multithreading, Creating Threads in Java

24 11/24 lab 8	public o
which cleans to tas, on	¿ public
	2 Syste
meny her seconds	Coll
once every two seconds.	CSE
Talass Collegetherad entends Thread	CoU
public void eune)	3
E tu	3
2 rhile (true)  { Sustem Put on at Common College & Sugnerial	
Esystem Dut Drin the Cappe & College & Enginerial	Agrefah
Eystem. Dut. printin ("Bans College & Enginering) Thread. sleep (1000);	oms Cou
3 2 catch / = 1000. et. d. 6	
3 catch (Interrupted Exception e)	C88
Elystem and printer Coolege meread Externitely	CSE
3 3	BMS Col
class CSEThread extends Thread	CSE _
2 public void eur (1)	CSE
£ try	CSE
{ while (true)	
2 Syptem. and printin ("CSE").	
Theread. steep (2000);	
3 carter (Interrupted Exception e)	1300
E System. Out. println ("CSE Thelad interrupted.");	
3	
3	
P D	

```
public class Thread Exemple
¿ public statie void main (String [] args)
E System. Dert. printin ("Afrejah, USN 18M23CSO15"),
College Therand college Thread = New College Thread();
CSE Thread cretheld = New CSE Thread();
        College Thread. start();
cse Thread. start();
CSE
```

```
class CollegeThread extends Thread {
  public void run() {
```

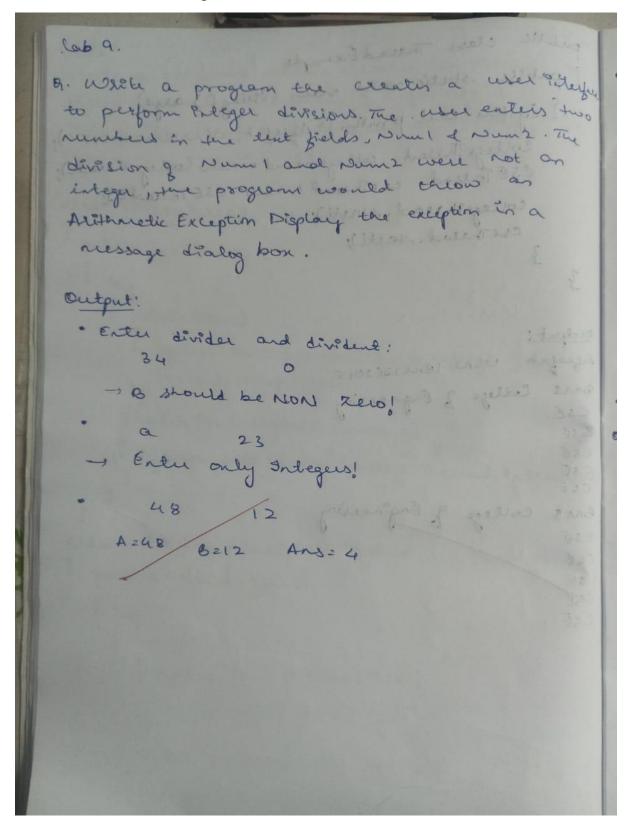
```
try {
       while (true) {
         System.out.println("BMS College of Engineering");
         Thread.sleep(10000);
       }
     } catch (InterruptedException e) {
       System.out.println("CollegeThread interrupted.");
     }
  }
class CSEThread extends Thread {
  public void run() {
    try {
       while (true) {
         System.out.println("CSE");
         Thread.sleep(2000);
       }
     } catch (InterruptedException e) {
       System.out.println("CSEThread interrupted.");
     }
}
public class ThreadExample {
  public static void main(String[] args) {
System.out.println("Name: AFEEFAH, USN:1BM23CS015");
    CollegeThread collegeThread = new CollegeThread();
```

# CSEThread cseThread = new CSEThread();

```
collegeThread.start();
  cseThread.start();
}
```

```
C:\Users\aDMIN\Desktop>java ThreadExample
Name: AFEEFAH, USN:1BM23CS015
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

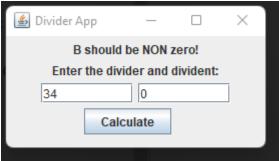
<u>Program 9:</u>
Interface to Perform Integer Division

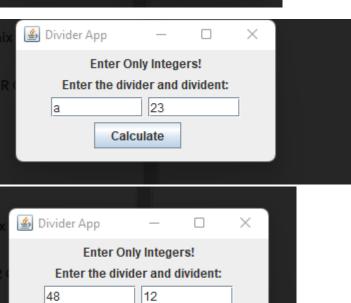


```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
SwingDemo(){
// create jframe container
JFrame jfrm = new JFrame("Divider App");
jfrm.setSize(275, 150);
jfrm.setLayout(new FlowLayout());
// to terminate on close
jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
// text label
JLabel jlab = new JLabel("Enter the divider and divident:");
// add text field for both numbers
JTextField ajtf = new JTextField(8);
JTextField bitf = new JTextField(8);
// calc button
JButton button = new JButton("Calculate");
// labels
JLabel err = new JLabel();
JLabel alab = new JLabel();
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
// add in order :)
jfrm.add(err); // to display error bois
ifrm.add(jlab);
```

```
jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
jfrm.add(alab);
jfrm.add(blab);
jfrm.add(anslab);
ActionListener 1 = new ActionListener() {
public void actionPerformed(ActionEvent evt) {
System.out.println("Action event from a text field");
}
};
ajtf.addActionListener(l);
bjtf.addActionListener(1);
button.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent evt) {
try{
int a = Integer.parseInt(ajtf.getText());
int b = Integer.parseInt(bitf.getText());
int ans = a/b;
alab.setText("\nA = " + a);
blab.setText("\nB = " + b);
anslab.setText("\nAns = "+ ans);
}
catch(NumberFormatException e){
alab.setText("");
blab.setText("");
anslab.setText("");
```

```
err.setText("Enter Only Integers!");
}
catch(ArithmeticException e){
alab.setText("");
blab.setText("");
anslab.setText("");
err.setText("B should be NON zero!");
}
}
});
// display frame
jfrm.setVisible(true);
}
public static void main(String args[]){
// create frame on event dispatching thread
SwingUtilities.invokeLater(new Runnable(){
public void run(){
new SwingDemo();
}
});
}
```





A = 48 B = 12 Ans = 4

Calculate

# **Program 10:**

Implement Deadlock and Inter-process Communication

```
lab-10
9. Demonstrate Inter process communication
 and deadlock
output!
                             ·put:3
 · put! 1
                             · Put: 4
   · Got! 1
                              · Put! 5
  · Got!
                              · Put!6
  - 40+11
                              · Put:7
   · Cuot:1
                             · 90+17
   · Got!
   · put!2
· Deadbolle.
output:
 Packag Thelad entered B. bar
Main Thelad entered A. 500
Packag Thelad trying totall A. last ()
Main Thread trying totall B. last ()
  Inside A. last
  Inside A. last
  Back in Other thead
  Bolch in mainthread
```

```
//PCFixed.java
class Q {
int n;
boolean valueSet = false;
synchronized int get() {
while(!valueSet)
try {
System.out.println("Consumer waiting");
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedExceptioncaught");
}
System.out.println("Got: " + n);
valueSet = false;
System.out.println("Intimate Producer");
notify();
return n;
}
synchronized void put(int n) {
while(valueSet)
try {
System.out.println("Producer waiting");
wait();
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
}
```

```
this.n = n;
valueSet = true;
System.out.println("Put: " + n);
System.out.println("Intimate Consumer");
notify();
}
}
class Producer implements Runnable {
Qq;
Producer(Q q) {
this.q = q;
new Thread(this, "Producer").start();
}
public void run() {
int i = 0;
while(i<15) {
q.put(i++);
}
class Consumer implements Runnable {
Qq;
Consumer(Q q) {
this.q = q;
new Thread(this, "Consumer").start();
}
public void run() {
```

```
int i=0;
while(i<15) {
int r=q.get();
System.out.println("consumed:"+r);
i++;
}
}
class PCFixed {
public static void main(String args[]) {
Q q = new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
}
}
//Deadlock.java
class A {
synchronized void foo(B b) {
String name =Thread.currentThread().getName();
System.out.println(name + " enteredA.foo");
try {
Thread.sleep(1000);
} catch(Exception e) {
System.out.println("A Interrupted");
}
```

```
System.out.println(name + " trying tocall B.last()");
b.last();
}
void last() {
System.out.println("Inside A.last");
}
}
class B {
synchronized void bar(A a) {
String name =Thread.currentThread().getName();
System.out.println(name + " enteredB.bar");
try {
Thread.sleep(1000);
} catch(Exception e)
{
System.out.println("B Interrupted");
System.out.println(name + " trying tocall A.last()");
a.last();
}
void last() {
System.out.println("Inside A.last");
}
class Deadlock implements Runnable
A a = new A();
```

```
B b = new B();
Deadlock() {
Thread.currentThread().setName("MainThread");
Thread t = new Thread(this, "RacingThread");
t.start();
a.foo(b); // get lock on a in this thread.
System.out.println("Back in mainthread");
}
public void run() {
b.bar(a); // get lock on b in other thread.
System.out.println("Back in other thread");
}
public static void main(String args[]) {
new Deadlock();
}
}
```

C:\Users\aDMIN\Desktop\1bm23cs015>java PCFixed Press Control-C to stop. Put: 0 Intimate Consumer Producer waiting Got: 0 Intimate Producer Put: 1 Intimate Consumer consumed:0 Producer waiting Got: 1 Intimate Producer consumed:1 Put: 2 Intimate Consumer Producer waiting Got: 2 Intimate Producer consumed:2 Put: 3 Intimate Consumer Producer waiting Got: 3 Intimate Producer consumed:3 Put: 4 Intimate Consumer Producer waiting Got: 4 Intimate Producer consumed:4 Put: 5 Intimate Consumer Producer waiting Got: 5 Intimate Producer consumed:5 Put: 6 Intimate Consumer Producer waiting Got: 6 Intimate Producer consumed:6 Put: 7 Intimate Consumer Producer waiting

```
C:\Users\aDMIN\Desktop\1bm23cs015>javac Deadlock.java
C:\Users\aDMIN\Desktop\1bm23cs015>java Deadlock
RacingThread enteredB.bar
MainThread enteredA.foo
RacingThread trying tocall A.last()
MainThread trying tocall B.last()
Inside A.last
Inside A.last
Back in other thread
Back in mainthread
```